Australian Government

Department of Infrastructure and Regional Development

WESTERN SYDNEY AIRPORT

ENVIRONMENTAL IMPACT STATEMENT

VOLUME 1
PROJECT BACKGROUND

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Western Sydney Airport 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 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 approximately 10 million passengers each year and is fully described in the revised draft Airport Plan. The EIS assumes the airport could be operating at this level approximately 5 years after operations commence which for assessment purposes has been assumed to be 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 approximately 1,780 hectares at Badgerys Creek. The Stage 1 development impacts about 1,150 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.
EIS	This 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 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 EIS is divided into five 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*. Volume 5 outlines the feedback received from the community and stakeholders. It provides responses to the issues raised and describes how these were addressed in finalising the EIS and revised draft Airport Plan, where relevant.

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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.
90th Percentile N60	The N60 value that is exceeded on 10 per cent of nights.
90th 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 sulphides, which produce sulfuric acid when exposed to air.
AHD	Australian height datum
Airport Lessee Company	The company that is granted an airport lease over the Airport Site.
Revised draft 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 Sydney West Airport as defined in the Airports Act.
Airports Act	*Airports Act 1996* (Cth)
Airports Act amendment	*Airports Amendment Act 2015* (Cth)
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	Noise exposure contours produced for a hypothetical future airport usage pattern used, for example, in the process of examining flight path options around an airport.
Australian Noise Exposure Forecast	Official forecasts of future noise exposure patterns around an airport. They constitute the contours on which land use planning authorities usually base their controls.
BoM	Bureau of Meteorology
Bulk earthworks	The removal, moving or adding of large quantities of soil or rock from a particular area to another.

Term	Definition
Bund	A constructed retaining wall designed to prevent inundation or breaches from a known source.
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 – indicatively shown in the revised draft Airport Plan.
Continuous descent approaches	A method by which aircraft approach an airport prior to landing that minimises segments of level flight. This type of approach can 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.
dBA	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.
DoE	Australian Government Department of the Environment (now Department of the Environment and Energy)
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, long term and cumulative effects or impacts a project will have on the environment.
Environment Minister	The minister who administers the EPBC Act.
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FTE	Full time equivalent

Term	Definition
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
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 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 Organization – 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.

Term	Definition
Indirect impact	As defined in the EPBC Act *Significant impact guidelines 1.2*, indirect impacts include downstream or downwind impacts, such as impacts on wetlands or ocean reefs from sediment, fertilisers or chemicals which are washed or dischardged into river system; upstream impacts, such as those associated with the extraction of raw materials and other inputs which are used to undertake the action; and facilitated impacts which result from futher actions (including actions by third parties) which are made possible or facilitated by the action, such as urban or commercial development of an area made possible by a project.
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.
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 equivalent-continuous noise level between 9am and 3pm (it is used to describe 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
Main Construction Works	Main Construction Works means substantial physical works on the airport site (including large scale vegetation clearance, bulk earthworks and the carrying out of other physical works, and the erection of buildings and structures) described in Part 3 of the Airport Plan, other than Preparatory Activities.
Manual of Standards	Standard procedures for the operation of airports issued by the Civil Aviation Safety Authority.
MAP	Million annual passengers
Master plan	Master plan prepared and approved in accordance with the Airports Act.
Maximum noise level (L_{Amax})	L_{Amax} over a sample period is the maximum A-weighted noise level measured during the period. In the context of aircraft noise, L_{Amax} generally means the maximum A-weighted noise level recorded during a specific overflight, measured using "Slow" speed, and can therefore also be written L_{ASmax}. In this report, L_{Amax} denotes the maximum level attained during a single overflight.
MDP	Major development plan prepared and approved in accordance with the Airports Act.
mg/m^3	Milligrams per cubic metre

Term	Definition
MIKE21 modelling	MIKE21 is a two dimensional hydraulic modelling software program used to simulate surface flow and estimate flood levels and flow velocities.
Infrastructure Minister	The minister who administers the Airports Act.
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.
N60	N60 is a measure of noise exposure that shows the number of aircraft overflights per day exceeding 60 dBA. N60 is generally used to describe night time noise exposure. In this EIS, unless otherwise noted, N60 values represent the number of aircraft overflights per day exceeding 60 dBA during the period 10pm to 7am.
N70	N70 is a measure of noise exposure that shows the number of aircraft overflights per day (or other specified time period) exceeding 70 dBA. The numbers of overflights are graded in contour lines on a map. N70 contours can be calculated for different time periods; however in this EIS they are presented for 24-hour periods.
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 in visual flight conditions.
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

Term	Definition
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). For the airport site, proposed permissible uses that would apply once an airport lease has been granted are set out in the land use plan in Part 2 of the revised draft Airport Plan.
PM	Airborne particulate matter
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 μm
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 μm
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
Point Merge system	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
Preparatory Activities	Preparatory Activities mean the following: a. day to day site and property management activities; b. site investigations, surveys (including dilapidation surveys), monitoring, and related works (e.g. geotechnical or other investigative drilling, excavation, or salvage); c. establishing construction work sites, site offices, plant and equipment, and related site mobilisation activities (including access points, access tracks and other minor access works, and safety and security measures such as fencing); and d. enabling preparatory activities such as: i. demolition or relocation of existing structures (including buildings, services, utilities and roads) provided they are demolished or relocated in accordance with applicable environmental impact mitigation measures specifically referable to demolition or relocation of the relevant structures; ii. the relocation of cemeteries in accordance with an approved cemeteries relocation management plan; and iii. application of environmental impact mitigation measures.
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.

Term	Definition
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
SES Officer	An SES employee under the *Public Service Act 1999*
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	Sulfur dioxide
SO_x	Sulfur oxides
Stage 1 development	The initial stage in the development of the proposed airport, including a single runway and facilities for approximately 10 million annual passengers. (the EIS assumes the airport could be operating at this level approximately 5 years after operations commence which for assessment purposes has been assumed to be 2030).
Stage 1 operations	The airport operating at the Stage 1 capacity as defined in the revised draft Airport Plan.
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
Sydney West Airport	The proposed airport. Note: this is the name used in the Act. The Airport is also commonly known as Western Sydney Airport.
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.

Term	Definition
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
$\mu g/m^3$	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.
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

Executive Summary

Executive Summary

Introduction to Western Sydney Airport

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 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* (DIT 2013) (the Wilton and Richmond Study) in April 2013.

The proposed Western Sydney Airport (proposed airport) will cater for ongoing growth in demand for air travel, particularly in the rapidly expanding Western Sydney region, as well as providing additional aviation capacity in the Sydney region more broadly. 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 will be capable of handling initially around 10 million passengers per year, similar to Adelaide Airport today, increasing to 82 million by about 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 the 2020s. 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 approximately 8,000 person-years over the construction period to the commencement of operations in the mid-2020s. 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 during operations at the proposed airport in the early 2030s.
- Over the long term, by around 2063, the airport is anticipated to deliver about an estimated 61,500 direct jobs at the airport site.

The airport site covers an area of approximately 1,780 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.

[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 Northern Road transects the western end of the airport site and Elizabeth Drive borders the airport 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 land 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.

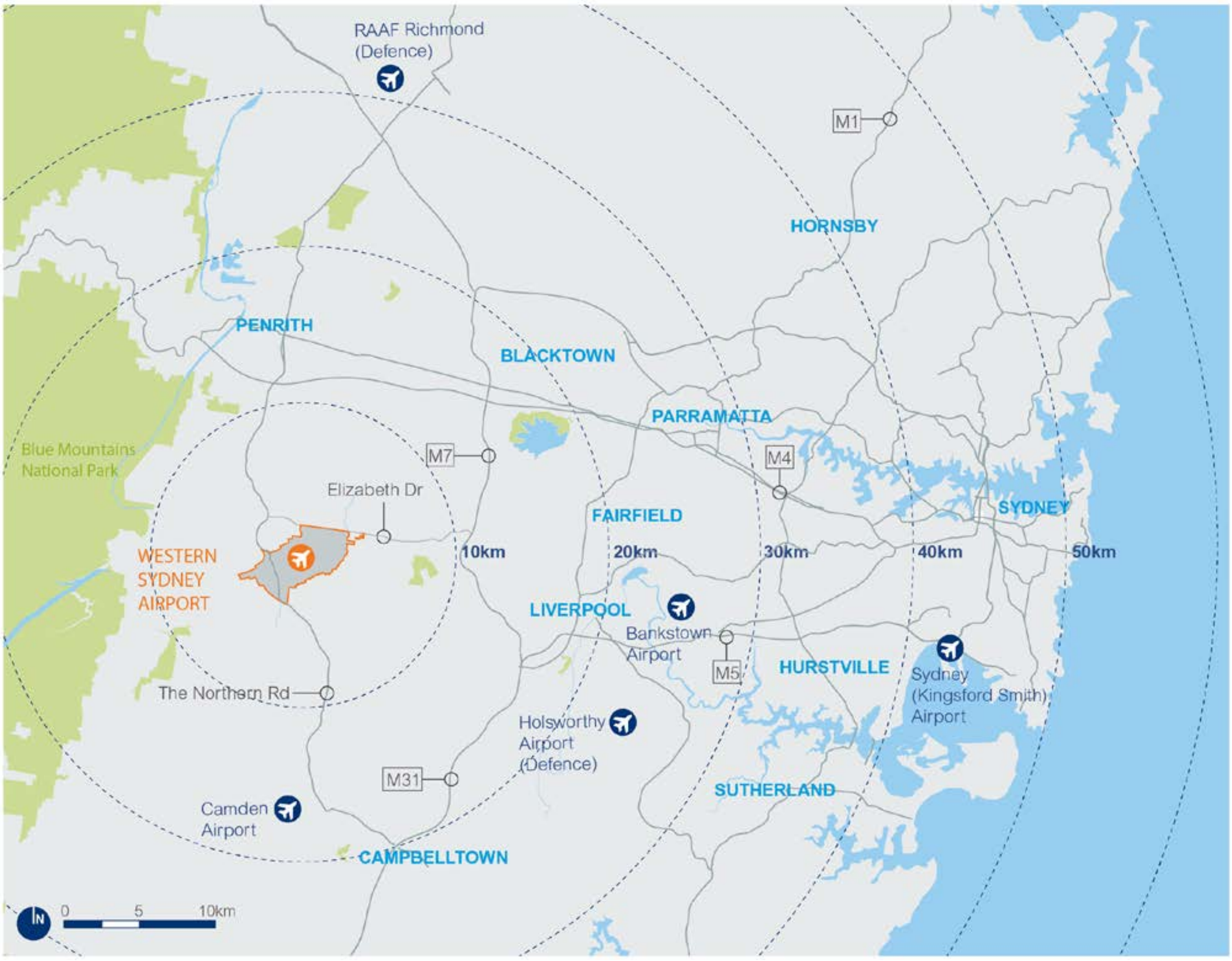


Figure ES–1 Location of the proposed Western Sydney Airport

Historical context

The need and potential location for a second airport in the Sydney region have 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. The Wilton and RAAF Base Richmond Study (Department of Infrastructure and Transport 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 options 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.

2015
EIS public exhibition

2016
Publication of final 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 2012 *Joint Study on Aviation Capacity in the Sydney Region* (Joint Study) (Department of Infrastructure and Transport), 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 of failing to meet the expected demand 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 developing 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, an airport at Badgerys Creek would provide access to aviation infrastructure and significant economic benefits for the fast growing Western Sydney 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 population 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 access to air transport services 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 district is the fastest growing district 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; it considered three separate options for the development of the airport site. Option A included 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 site. 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 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 EIS. This EIS represents a comprehensive assessment of the likely environmental impacts of the proposed airport.

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 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 Infrastructure Minister 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. 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 consultation phase and a contractual phase.

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 proposed 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. Major airport developments at existing federally leased airports require 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 Act 2015* – 'Airports Act amendments') to provide for a single and transparent mechanism to authorise 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 Infrastructure Minister. The finalisation of this EIS is a pre-condition to the determination of the Airport Plan under the Airports Act.

The Airports Act amendments strengthen the Environment Minister's role under the Airports Act in relation to the Airport Plan. This EIS has been prepared and will be finalised under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Department of the Environment, now called the Department of the Environment and Energy, issued guidelines for the content of a draft EIS for the proposed airport in January 2015.

A draft EIS was prepared to address the requirements of the EPBC Act and the EIS guidelines and released for public exhibition. This EIS has been finalised to take into account submissions received during the public exhibition period and provide any additional information that may be relevant to the Environment Minister's consideration of the environmental impacts of the proposal.

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

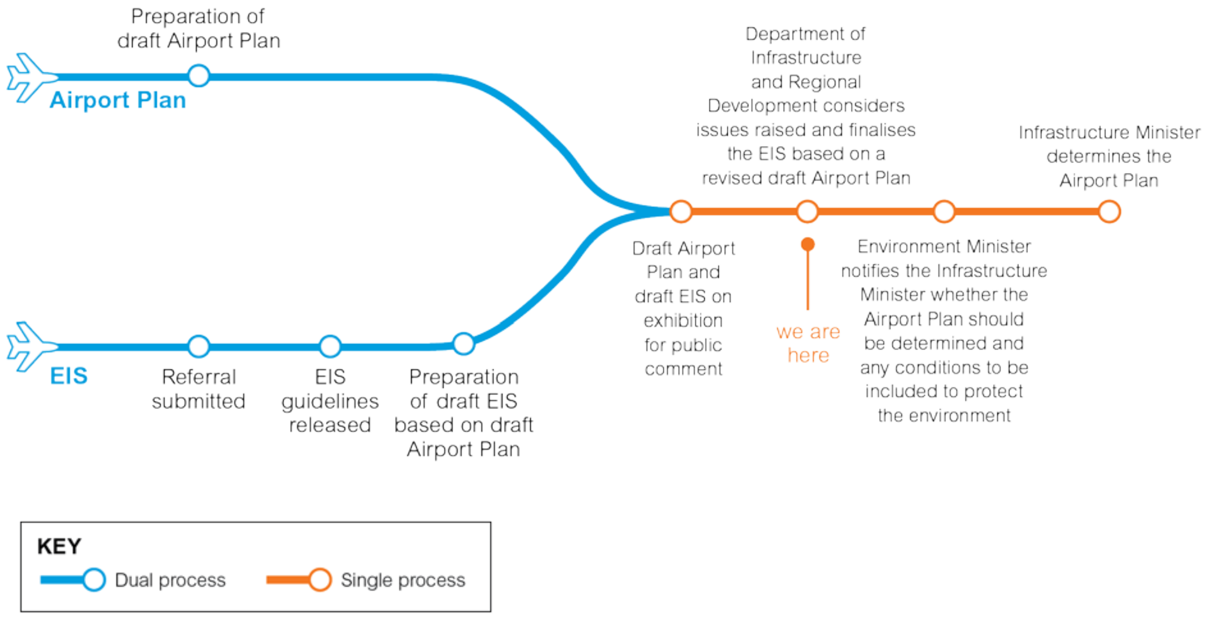


Figure ES–3 Proposed Western Sydney Airport approval process

This EIS, together with copies of comments received during the public exhibition period, will be given to the Environment Minister in accordance with section 104 of the EPBC Act. Before determining an Airport Plan, the Infrastructure Minister is required to provide a draft to the Environment Minister under section 96B of the Airports Act. The Environment Minister would then consider the finalised EIS and draft plan from an environmental perspective and notify the Infrastructure Minister 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. The Infrastructure Minister will then consider whether to determine the Airport Plan and, if determined, will include any specific conditions or provisions notified by the Environment Minister. The Infrastructure Minister in determining the Airport Plan may also impose conditions.

The role of an Airport Lessee Company

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

Within the first five years of an airport lease being granted by the Commonwealth, or such longer period as allowed by the Infrastructure Minister, the ALC is required to submit for approval a master plan. Airport master plans provide a broad strategic overview of the intended development and use of an airport, and are subject to public consultation under the Airports Act. The Infrastructure 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 airport developments.

The Airport Plan

Stage 1 of a Western Sydney Airport would be constructed and operated in accordance with the Airport Plan, as determined, which provides for the Stage 1 development and a transitional planning instrument under the Airports Act. The Airport Plan can only be varied in accordance with the Airports Act. Under the Act, the Airport Plan consists of three main parts:

- Part 1 is the title section;
- Part 2 outlines the concept design for the airport; and
- Part 3 details the specific developments authorised by the Airport Plan.

The concept design outlined in Part 2 of the revised draft Airport Plan sets out the Government's development objectives, detailing the Stage 1 development and setting out the long term vision for the proposed airport. The Stage 1 development would establish airport facilities to provide an operational capacity for approximately 10 million domestic and international passengers per year, as well as freight traffic. This would cater for the predicted demand on opening as well as growth capacity for the first five years of operations.

The revised draft Airport Plan also refers to the potential long term development of the proposed airport. As aviation demand increases beyond 10 million annual passengers, additional aviation infrastructure and aviation support precincts would be developed as required.

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 support facilities. A second runway is expected to be required when the operational capacity approaches 37 million annual passengers, which is forecast to occur around 2050. Following development of the second runway, additional infrastructure, such as taxiways and increased terminal capacity, would be developed to support the long term passenger demand of approximately 82 million annual passengers, forecast to occur around 2063.

The Land Use Plan as presented in the revised 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 Infrastructure Minister. 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.

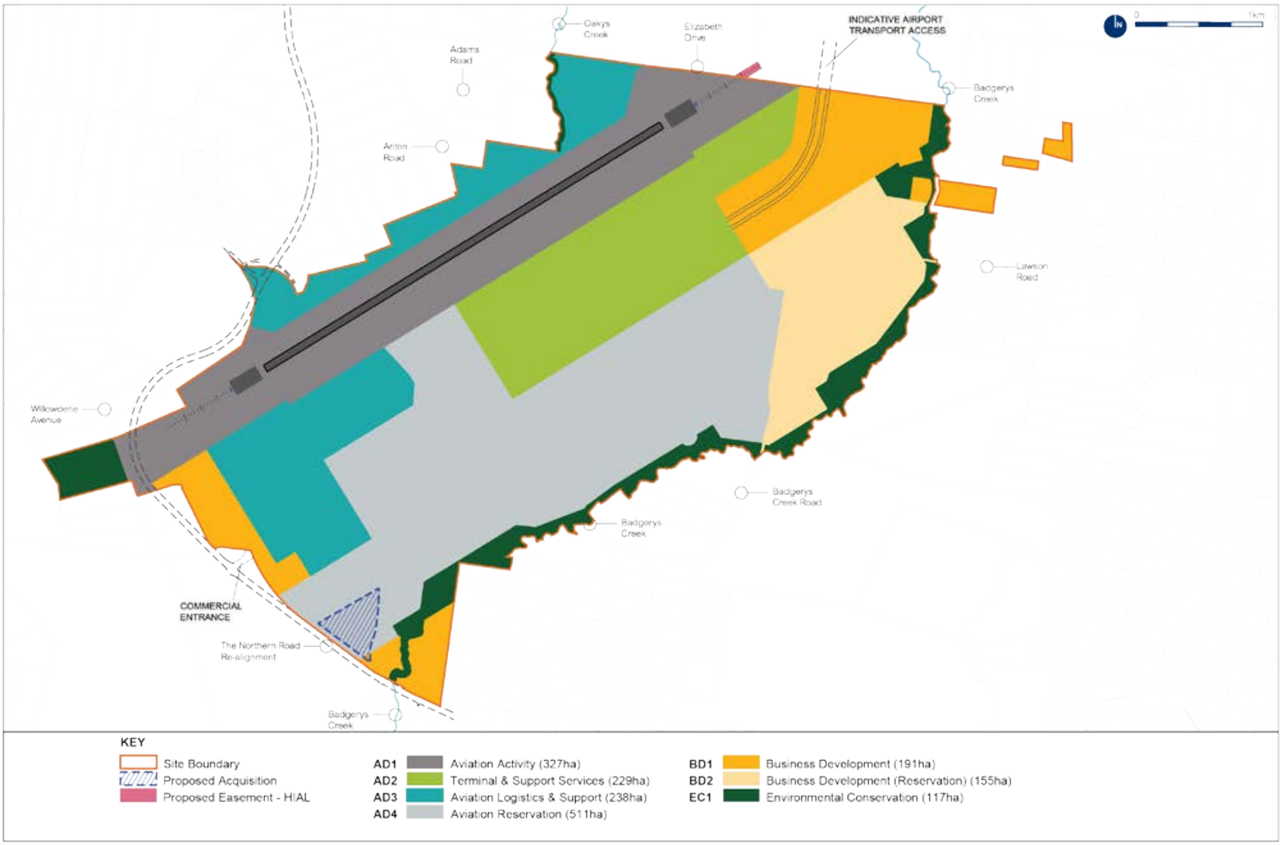


Figure ES–4 Land use zones (Stage 1)

Part 3 of the revised draft Airport Plan provides details of the developments for which authorisation is being sought under the Airports Act. Determination of the 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 revised draft Airport Plan.

The EIS also provides a strategic level environmental assessment of a possible long term development of the proposed airport. However, Part 3 does not authorise or require any longer term development which would, if it occurred, be undertaken under the planning framework in Part 5 of the Airports Act as it applies to existing federally leased airports. Providing a strategic level assessment 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 approximately 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 without a curfew to maximise its economic capacity. The revised draft Airport Plan also sets 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 not provided for in Part 3 of the revised draft Airport Plan would be subject to separate consideration and approval requirements under the Airports Act.

The airport site is approximately 1,780 hectares in size. The area that would be directly impacted by construction of the Stage 1 development (the construction impact zone) covers approximately 1,150 hectares. The construction impact zone includes the area of bulk earthworks in the northern portion of the airport site and other areas of disturbance outside of the bulk earthworks boundary that would be used for ancillary infrastructure, including drainage swales and detention ponds as part of the proposed water management system developed for the site. The existing terrain is characterised by rolling hills and substantial earthworks will be required to achieve a level surface and allow construction of the runway, taxiways and support services. This will involve the excavation of around 22 million cubic metres of soil and rock. The southern sector of the airport site would remain largely undisturbed, with the exception of drainage works for the management of water on site. This area of the site is zoned for future aviation use, business development or environment protection in accordance with the Airport Plan.

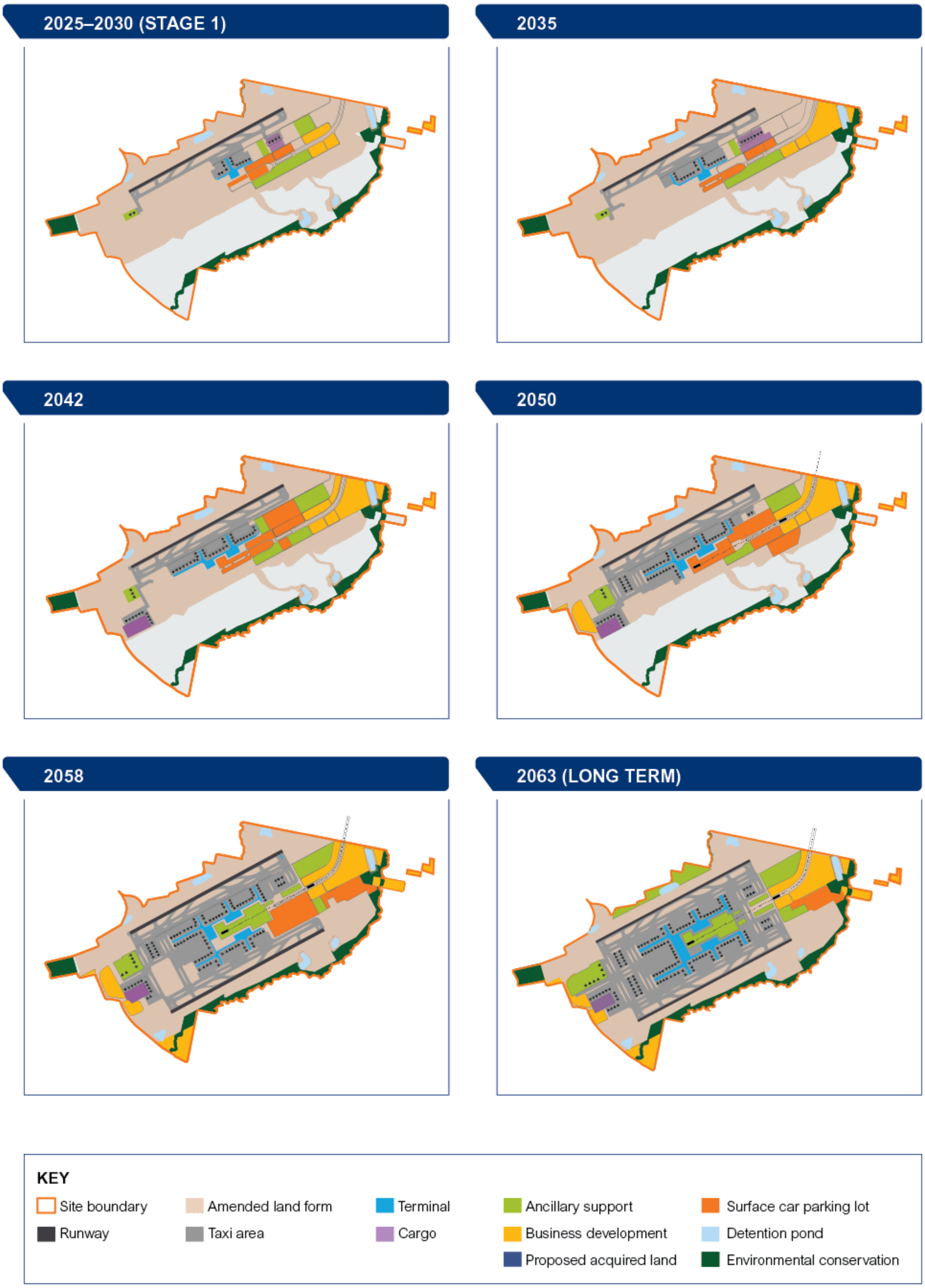


Figure ES–5 Indicative Stage 1 development and long term concept designs

Long term development

It is expected that the proposed airport would be progressively developed as demand increases beyond 10 million annual passengers. 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 expected to be required when the operational capacity approaches 37 million annual passengers, which is equivalent to approximately 185,000 air traffic movements per year. A second runway is forecast to be required 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 EIS is forecast to service approximately 82 million passengers annually, which is equivalent to approximately 370,000 air traffic movements per year. This is expected to occur around 2063. The layout for the Stage 1 development will be finalised as part of the detailed design process for the airport. Figure ES–5 provides indicative layouts as the proposed airport expands operations beyond the Stage 1 development. 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 initial airspace design

Capacity and activity forecasts

Airservices Australia has assessed the airspace implications and air traffic management approaches for Sydney region airspace associated with the introduction of services at the proposed Western Sydney Airport. The proposed airport is expected to be used as a high capacity airport to accommodate any aircraft fleet mix. Airfield capacity analysis was completed based on the long term, parallel runway scenario.

This analysis indicates that an airport development at Badgerys Creek with parallel runway operations could potentially achieve 103 total aircraft movements per hour, consisting of:

- 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 predicted peak hour[2] 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 operations	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)	3,300	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 the airport's 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 predicted that the Stage 1 development could serve approximately two million annual international passengers within five years of opening. Passenger demand is predicted to grow to approximately 19.5 million annual international passengers by 2050. By this time, the domestic-international passenger split could be approximately 47 per cent domestic and 53 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 Stage 1 development accommodating approximately 7,000 dedicated freight air traffic movements per year. The number of freight operations is predicted to increase to 30,000 annual aircraft movements in long term development.

[2] Reference to peak hour activity is equivalent to busy hour activity as described in the revised draft Airport Plan

Operating modes

Aircraft departures and arrivals 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 (while the airport operates with a single runway, this would only determine the direction). Allocation of the runway to be used is normally determined by air traffic control personnel and is based on a combination of weather conditions and airport operating policy.

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

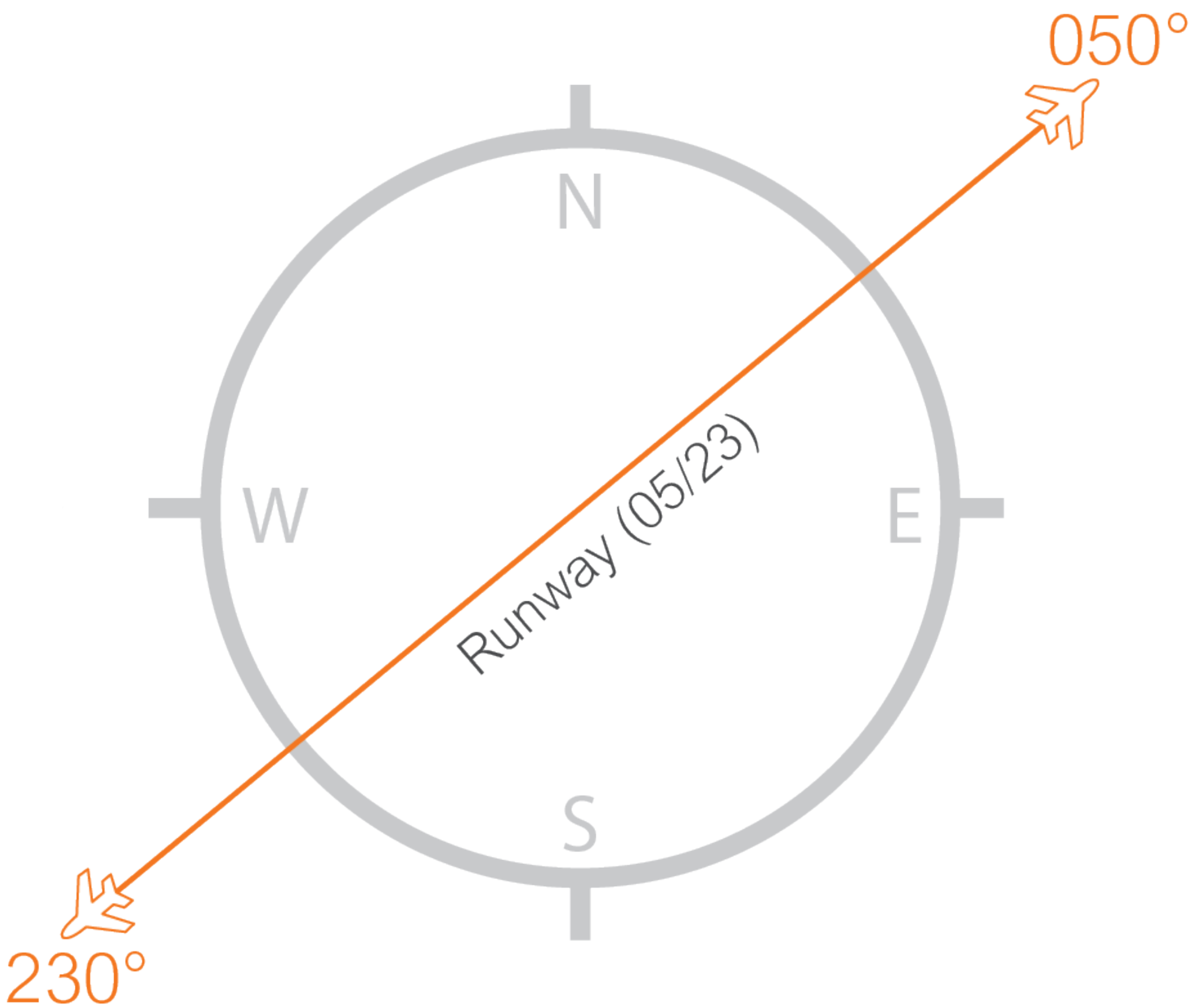


Figure ES–6 Runway orientation

Based on the 05/23 runway orientation, the two main operating modes for Stage 1 operations that would be used depending on the prevailing weather conditions are:

- 'Operating mode 05' operations, whereby aircraft would take-off and land in the 05 direction. 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
- 'Operating mode 23' operations, whereby aircraft would take-off and land in the 23 direction. 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.

A third operating mode, 'head-to-head' (also known as reciprocal runway operations) may be feasible following further detailed assessment before the start of operations. This would involve all take-offs and landings occurring in opposing directions, either to and from the south-west; or to and from the north-east. Under this mode all aircraft operations would occur only on one end of the airport site for a period of time and therefore offer a period of no aircraft operations for other areas during that time.

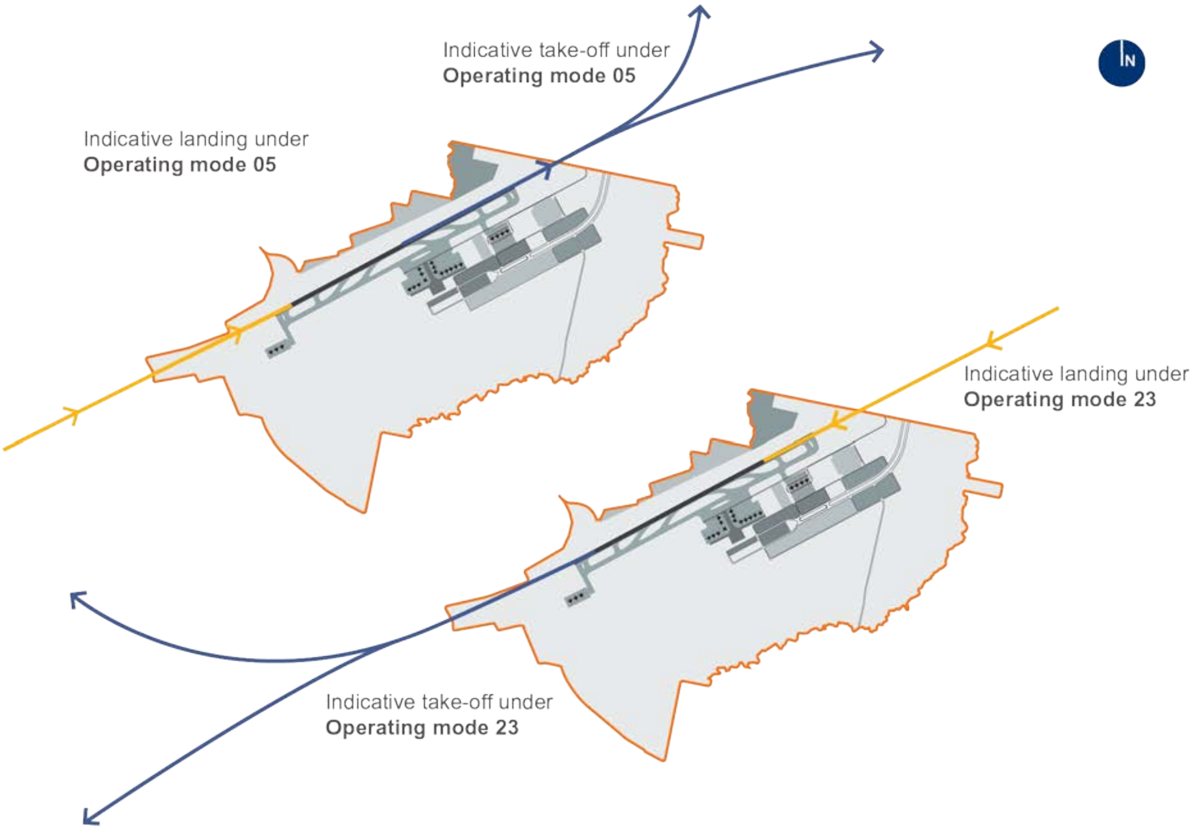


Figure ES–7 '05' and '23' operating modes

Airspace architecture

A preliminary airspace management analysis was conducted to establish whether safe and efficient operations could be introduced at the proposed Western Sydney Airport through the development of indicative air traffic management designs and flight paths. The analysis indicates there are no known physical impediments that would prevent safe and efficient operations for aircraft arriving at or departing from the proposed airport.

Indicative concept designs for approach and departure flight paths demonstrate that the Stage 1 Western Sydney Airport and Sydney (Kingsford Smith) Airport could safely operate independently as high capacity airports. They also show that an airspace design could be implemented for single runway operations at the proposed airport without changing 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 operations, 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 indicative flight paths developed through the preliminary analysis used to model and assess the potential impacts of aircraft operations at a Western Sydney Airport were in the EIS. Figure ES–8 and Figure ES–9 present indicative flight paths for aircraft operations in both the 05 and 23 directions.

The flight paths assessed in the EIS represent one possible airspace design – aircraft operations on different flight paths would result in different noise outcomes from those presented. For the purposes of an EIS, the use of indicative flight paths is a valid approach for identifying and assessing the nature and scale of impacts arising from operations at the proposed airport and is generally consistent with the environmental assessment approach for runway infrastructure developments at other airports.

The process of preparing this EIS has provided the opportunity for the community and stakeholders to consider the design of the indicative flight paths and express views about their assessed impacts. While the analysis based on the modelled flight paths found that peak aircraft noise levels in the lower Blue Mountains would be below generally accepted thresholds for day and night time operations, comments in response to the draft EIS indicated significant community concern about the potential for flight paths to concentrate over a single point above the town of Blaxland.

Future airspace design process

The Australian Government has announced that the airspace design to be implemented for the proposed Western Sydney Airport will not converge arriving aircraft at a single point over the community of Blaxland. There is substantial scope to develop flight paths for arrivals and departures that minimise the overflight of residential areas and reduce the impact of aircraft noise on the communities of Western Sydney and the Blue Mountains. Consistent with the Government’s announcement, the detailed airspace and flight path design for the proposed airport will apply international best practice for managing airspace design and its associated environmental impacts.

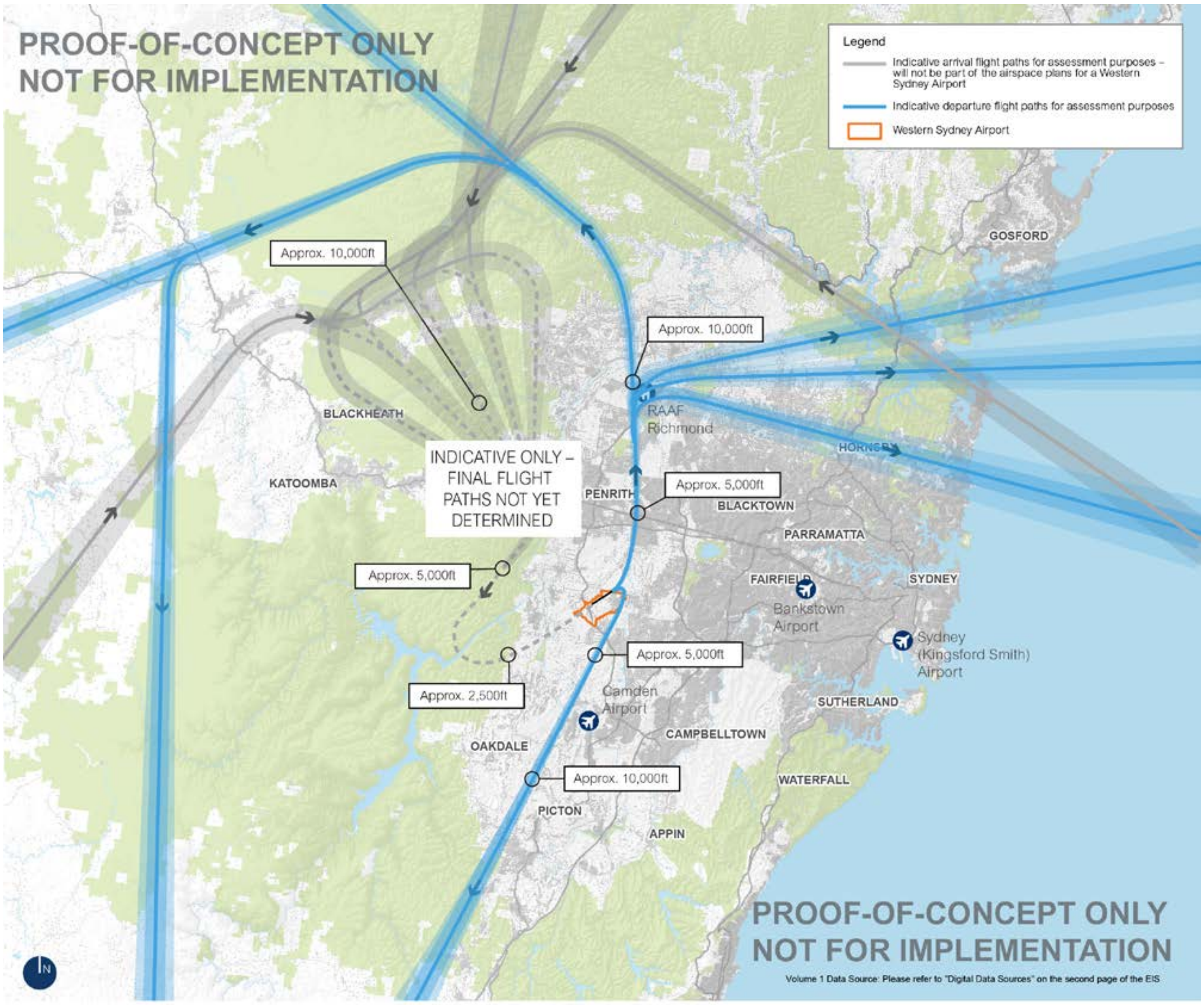
Extensive community and stakeholder engagement will occur throughout the planning and design phases of the flight path design process, which will commence after the Airport Plan is determined by the Infrastructure Minister. The Forum on Western Sydney Airport, a community and stakeholder reference group, will be established to ensure community views are taken into account in the airspace and flight path design process.

An overview of the design process and key principles is presented in Chapter 7, Section 7.8. Key principles that will apply to the comprehensive airspace and flight path design process for single runway operations include:

- overflights of residential areas and noise sensitive facilities will be avoided to the maximum extent possible;
- aircraft arrivals will not converge through a single merge point over any single residential area;
- the use of head-to-head operations to and from the south-west, when it is safe to do so, is an important preferred option for managing aircraft noise at night. This preferred option will be thoroughly evaluated through further detailed assessment; and
- in determining the final flight paths, the community, aerodrome operators and airspace users will be consulted extensively and flight path designs will be subject to referral under the EPBC Act.

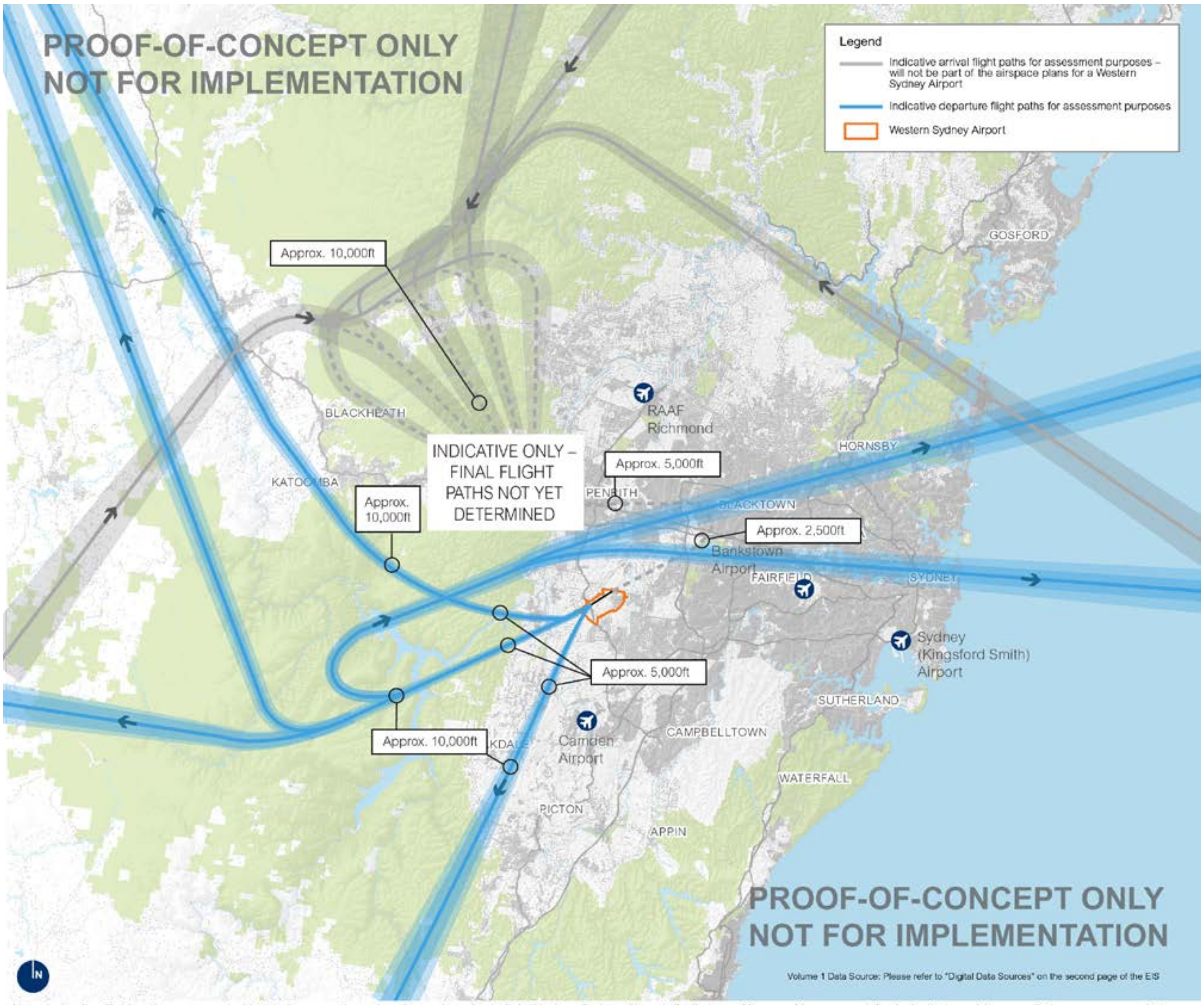
The process will optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations, while minimising changes to existing airspace arrangements in the Sydney basin. The use of relatively new satellite-based navigation technologies at the proposed airport will provide greater flexibility in planning flight paths and will allow a larger range of options to be considered for managing noise from both night and daytime operations.

The Department will be responsible for delivering the flight path design for the proposed airport, working in close collaboration with Airservices Australia and the Civil Aviation Safety Authority (CASA). The proposed airspace design arrangements will be formally referred under the EPBC Act. CASA would ultimately approve the proposed airspace management arrangements, including final flight paths, before the commencement of operations.



Note: Indicative flight paths as presented in this figure are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis, that provides a preliminary assessment at a conceptual level of airspace management design. The Australian Government has announced that aircraft arrivals for the proposed Western Sydney Airport will not converge through a single merge point over Blaxland or any other single residential area. The formal flight path design process will start from determination of the Airport Plan and optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations.

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



Note: Indicative flight paths as presented in this figure are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis, that provides a preliminary assessment at a conceptual level of airspace management design. The Australian Government has announced that aircraft arrivals for the proposed Western Sydney Airport will not converge through a single merge point over Blaxland or any other single residential area. The formal flight path design process will start from determination of the Airport Plan and optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations.

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

Table 7–1 summarises the phases, activities and outputs of the formal airspace design process. The table also shows the current proposed timing for the different stages of the process. Further details about the future airspace design process are presented in Section 7.8 of Chapter 7.

Table ES–2 Airspace design process

Phase	Key activities	Key outcomes	Timing
Planning	• Establish expert steering group • Collect stakeholder views on system requirements, including community and environmental inputs • Confirm Sydney basin airspace and air route requirements and constraints • Establish community and stakeholder reference group • Develop and undertake a preliminary environmental assessment of airspace concept options (i.e. standard arrival and departure routes)	• Consultation conducted with interested parties, including regulatory authorities, government agencies, airlines, other Sydney basin aerodrome operators and airspace users, and the community • Review of airspace concept options and potential noise abatement procedures including identification of a preferred high-level airspace concept option	Approx. 2 years starting from determination of Airport Plan
Preliminary design and environmental assessment	• Evaluate the preliminary airspace design	• Preferred airspace design concept	Approx. 1 year
	• Refer preferred airspace design to the Environment Minister under the EPBC Act • Prepare and submit any formal environmental assessment documentation required by the Environment Minister • Public exhibition and community consultation • Policy on property acquisition and noise insulation announced		Approx. 2 years (c. 2019-2021)
Detailed design	• Evaluate, validate and refine the detailed design taking account of the EPBC Act process	• Final airspace design and noise abatement procedures for implementation • Long term ANEF chart	Approx. 1 year
Implementation	• Notify airspace and air route changes	• Airspace change proposal approved by CASA.	Approx. 2 years
		• Commencement of air operations at Western Sydney Airport in accordance with specific noise abatement procedures and noise management measures identified in the airspace design process	Mid-2020s

Community consultation

The Australian Government committed to providing multiple opportunities for the community to provide feedback and receive information on the proposed airport. Community consultation was undertaken in three phases, including:

- Phase 1: the preparation of the draft EIS and draft Airport Plan, from September 2014 to October 2015;

- Phase 2: the public exhibition of the draft EIS and draft Airport Plan, from 19 October 2015 to 18 December 2015; and
- Phase 3: the finalisation of the EIS and preparation of the revised draft Airport Plan, from 19 December 2015 onwards, including after publication of the finalised EIS.

These three phases include activities undertaken in order to raise awareness, provide information and listen and respond to comments or concerns regarding the proposed Western Sydney Airport. Activities were held at locations across Western Sydney and the Blue Mountains, and the project website also provided a comprehensive, clear and accessible source of information.

The principles for the engagement process were guided by the Core Values and Code of Ethics of the International Association for Public Participation.

Community members were able to have their say and make submissions on the draft EIS and draft Airport Plan during the exhibition period (Phase 2). In total, 4,975 submissions were received from 3,973 unique submitters. More information on the consultation and engagement activities undertaken can be found in Chapter 8 in the EIS.

Issues raised during the exhibition of the EIS include:

- the changing face of Western Sydney;
- proposed flight paths and aircraft overflight noise impacts;
- the Greater Blue Mountains World Heritage Area;
- potential for increased pollution levels in Western Sydney and general health impacts;
- impacts of the Western Sydney Infrastructure Plan;
- local traffic and transport changes; and
- employment opportunities from the proposed airport.

As required by the EPBC Act, Volume 5 of this EIS outlines the feedback received from the community and stakeholders. It provides responses to the issues raised and describes how these were addressed in finalising the EIS and revised draft Airport Plan, where relevant.

As part of Phase 3 of the community consultation, activities are ongoing to keep the community and stakeholders informed about the proposed airport as the EIS and the Airport Plan are finalised. These activities include community market pop up stalls, an online noise modelling tool, regular newsletters and a dedicated project website with fact sheets and up-to-date project information.

EIS process

The Department submitted a referral under the EPBC Act for the development of the proposed 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 actions (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 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 revised 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 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;
- identifying 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;
- completing impact assessments for the airport proposal based on the broad parameters presented in the revised draft Airport Plan, having regard to the baseline conditions;
- refinement of the airport proposal having regard to the impact assessments; and
- identifying 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 EIS.

Aircraft overflight noise

Operation of the Stage 1 development would change the pattern of aircraft movements in the airspace above Western Sydney. Communities in Western Sydney and the Blue Mountains would be impacted by noise from aircraft during take-off, landing and when in flight. Noise modelling shows that the highest noise exposure levels are predicted to be experienced in those locations closer to the airport under or near the indicative aircraft departure and arrival routes.

The assessment completed in this EIS is based on the indicative flight paths prepared by Airservices Australia. 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 weather conditions, particularly wind direction and speed, the number of presenting aircraft and the time of day. Operational strategies were developed based upon the preferred direction for landing and take-off when weather and operating conditions permit their use. Operating strategies include Prefer 05, Prefer 23 and, where traffic and weather conditions permit, 'head-to-head', (also known as reciprocal runway) operations at night in combination with the preferred daytime direction.

Individuals show varying sensitivity to noise. Experience at existing airports in Australia has shown that, while aircraft noise contours based on cumulative noise exposure measures such as the Australian Noise Exposure Forecast (ANEF) are useful for land use planning purposes near airports, they are not necessarily an indicator of the full extent of community reaction to, or individual annoyance from, aircraft noise or the total spread of noise impacts. The EIS assessment of aircraft noise is based on measures outlined in Australian Standard (AS) 2021:2015 and the National Airports Safeguarding Framework. These guidelines emphasise the challenge of communicating the complex nature and extent of aircraft noise and advocate using a number of different measures to aid interpretation of predicted noise exposure levels. While this EIS has used a range of measures for describing noise exposure, it is important to note that aircraft noise impacts would be experienced outside of the areas depicted by the various noise exposure contours. Individuals and communities newly exposed to aircraft noise are likely to show an enhanced sensitivity to changes in the noise environment.

The loudness of a sound depends on its sound pressure level, which is expressed in decibels. Most sounds we hear in our daily lives have sound pressure levels in the range of 30-90 decibels. A-weighted decibels (dBA) are generally used for the purposes of assessment and have been adjusted to account for the varying sensitivity of the human ear to different frequencies of sound. The main effect of the adjustment is that low and very high frequencies are given less weight.

In terms of sound perception 3 dBA is the minimum change that most people can detect and every 10 dBA increase in sound level is heard as a doubling of loudness. However, many individuals may perceive the same sound differently. Figure ES–10 illustrates indicative dBA noise levels in typical situations.

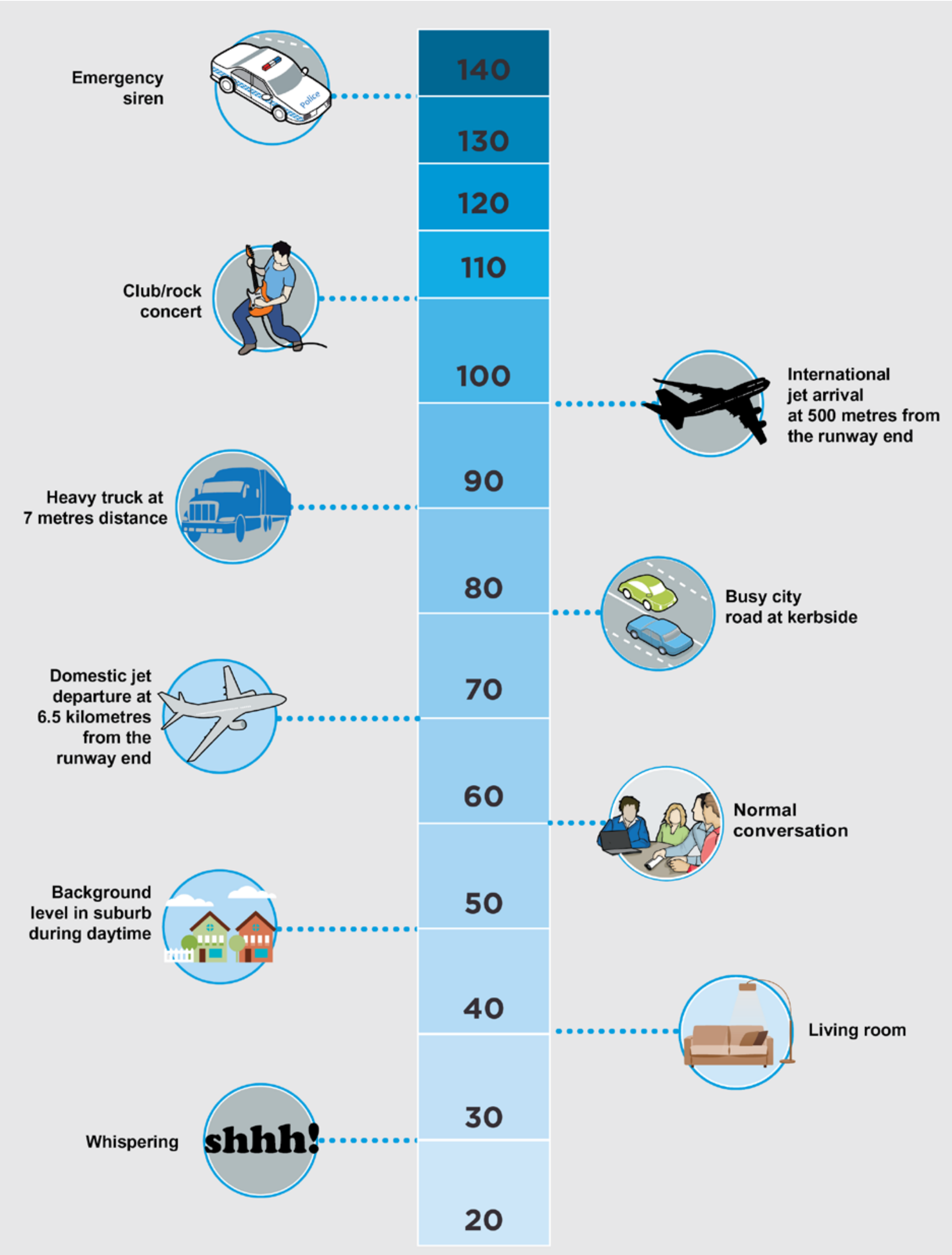
The loudest aircraft operations (long-range departures by a Boeing 747 or equivalent aircraft), are predicted to produce maximum noise levels of over 85 dBA at a small number of rural residential locations in Badgerys Creek close to the airport site. External noise levels of 70 to 75 dBA would infrequently be experienced over a greater area and could be expected within built-up areas in St Marys and Erskine Park. At these noise levels, a person may need to raise their voice to be properly heard in conversation when indoors with a window open. However, the Boeing 747 is being phased out of operations. 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 built-up areas around St Marys and Erskine Park and over 70 dBA in some adjacent areas to the south-west of the proposed airport, such as Greendale and Luddenham.

Over an average 24-hour period, between 1,500 and 1,600 residents would experience five or more aircraft noise events above 70 dBA. The number of residents affected by different levels of aircraft noise depends on the runway operating strategy adopted. Comparison of the two key strategies assessed in this EIS indicates that while there is limited variability of noise exposure levels in close proximity to the airport, the choice of runway operating strategy has a more pronounced effect on communities further away.

At night, the Prefer 05 operating strategy (with aircraft 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. With an operating strategy in the opposite direction (Prefer 23), approximately 6,000 people are expected to experience more than five events above 60 dBA per night. The exposed population would reduce to 4,000 if a ‘head-to-head’ operating mode were implemented, in which aircraft would both approach and depart at the south-west end of the runway.

The noise impact associated with take-offs in both directions and aircraft reverse thrust during landing would primarily affect Luddenham and Greendale.

Figure ES–11 presents the single event maximum noise level 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.



Note: Noise levels adapted from Melbourne Airport website

Figure ES–10 Indicative dBA noise levels in typical situations

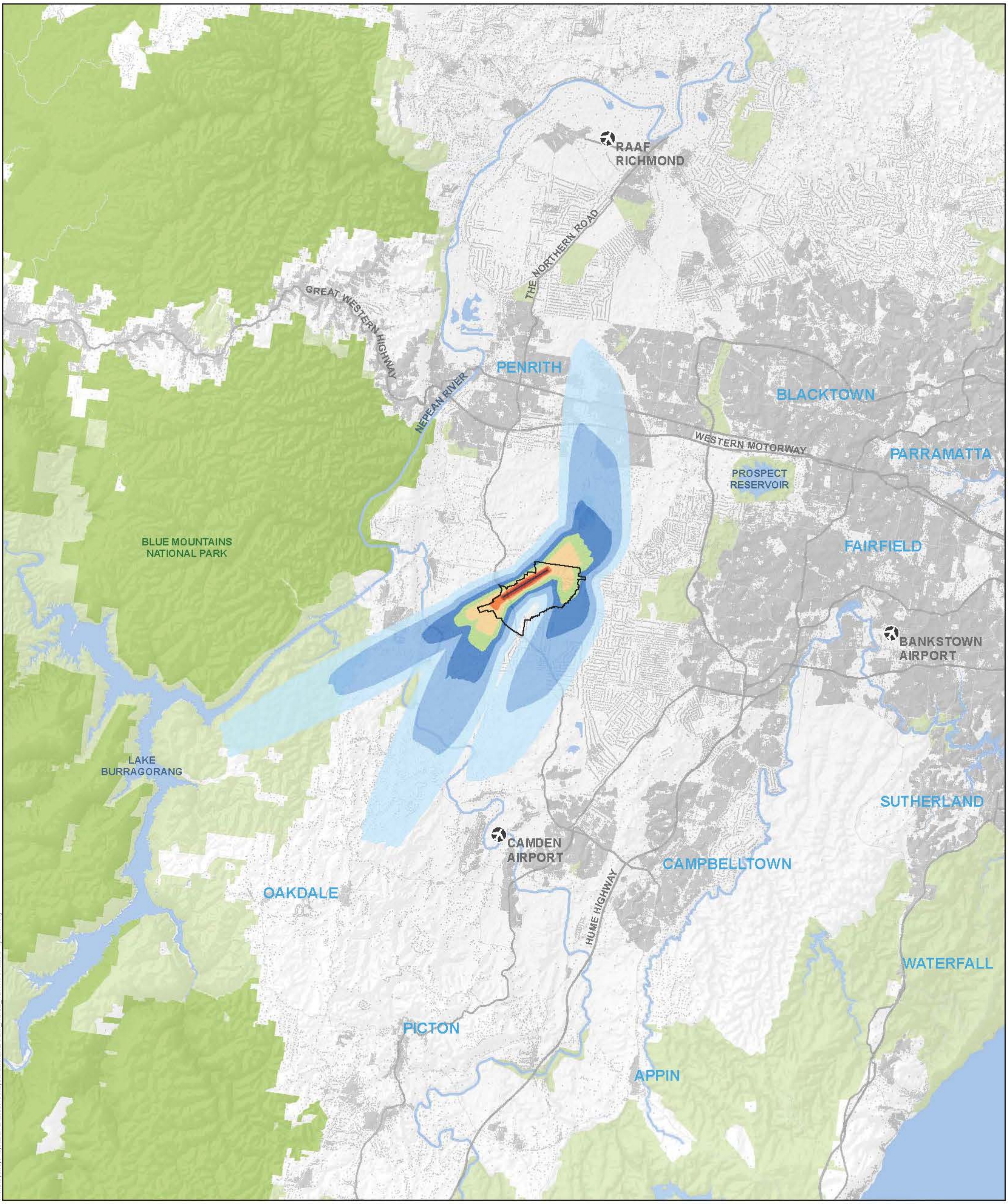
LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	**LAmax**	
Runway	Parks and reserves	60-65 dBA	75-80 dBA
Airfields		65-70 dBA	80-85 dBA
Buildings		70-75 dBA	>85 dBA

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

0 2.25 4.5 9
Kilometres

ES 11 - Single event noise level for an A320 arrival (left) and departure (right)



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
- 85-90 dBA
- >90 dBA

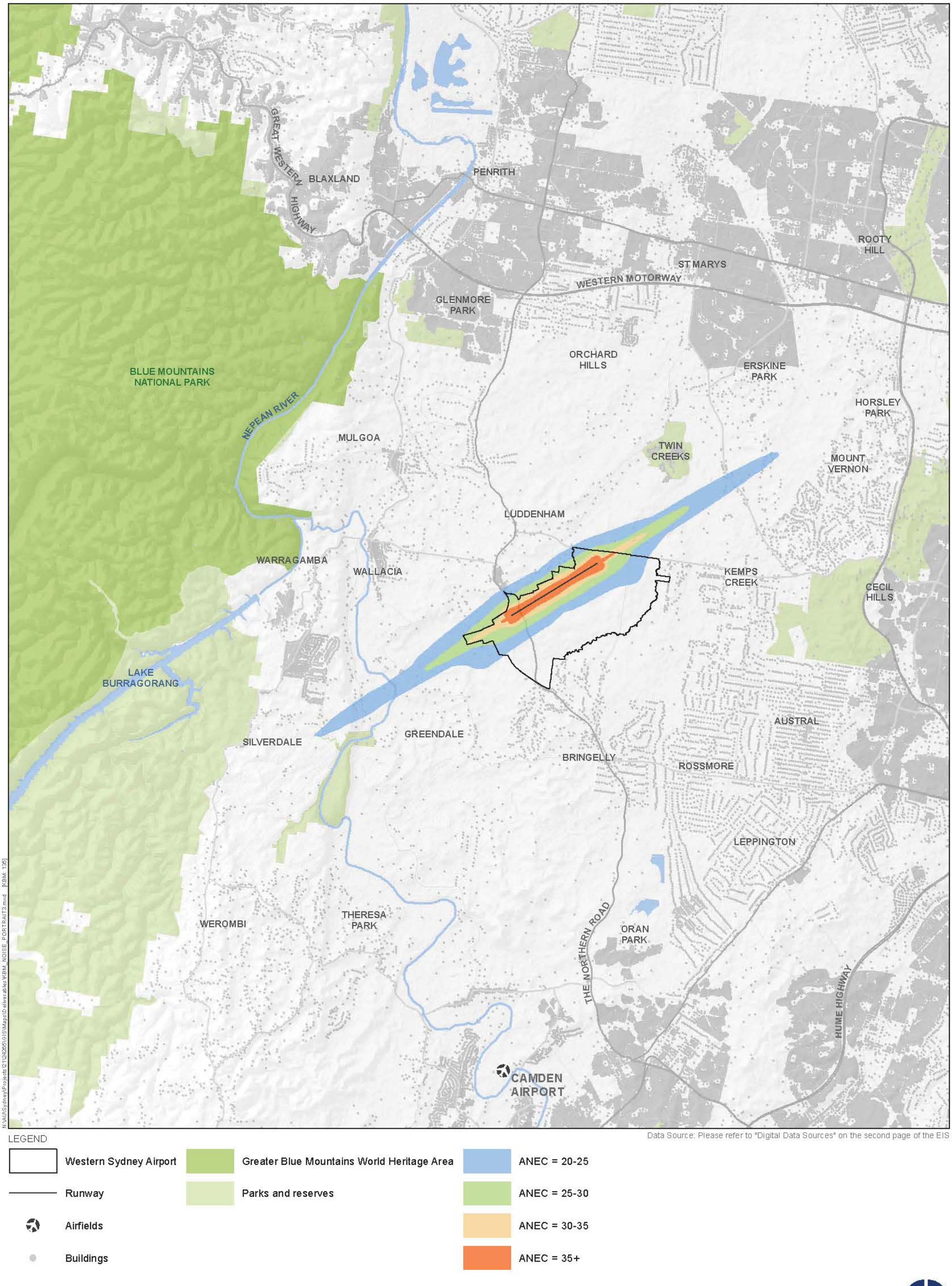
0 2.25 4.5 9
Kilometres

ES 12 - Single event noise level for an A320 arrival (left) and departure (right)

Most recreational areas in the vicinity of the airport site would not be subject to aircraft overflight noise events 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.

It is expected that future land use planning around the proposed airport would be influenced by final 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 AS 2021 *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 a hypothetical Australian Noise Exposure Concept (ANECs) developed for the 1985 EIS (Kinhill Stearns 1985) have been adopted by councils surrounding the airport site. These controls have protected the area around the airport site from incompatible development for nearly three decades. ANEC contours calculated for Stage 1 operations are shown on Figure ES–13. These contours combine predicted noise exposure levels for both the Prefer 05 and Prefer 23 operating strategies. They are generally less geographically extensive than those developed for the 1985 EIS.



ES 13 - ANEC contours for Prefer 05 and Prefer 23 operating strategy (2030)

It is important to note that the noise exposure contours for Stage 1 operations are presented for comparative purposes only and any change to current land use planning instruments should be based on long term forecasts of noise exposure.

A number of organisations, including the ALC, the Australian, NSW and local governments, airlines, aircraft and engine manufacturers, and regulators would all share the responsibility for managing noise impacts of the proposed airport. 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. Consideration of potential noise abatement opportunities would form an essential part of the formal airspace design process. Further detail is provided in Chapter 7.

Ground operations noise

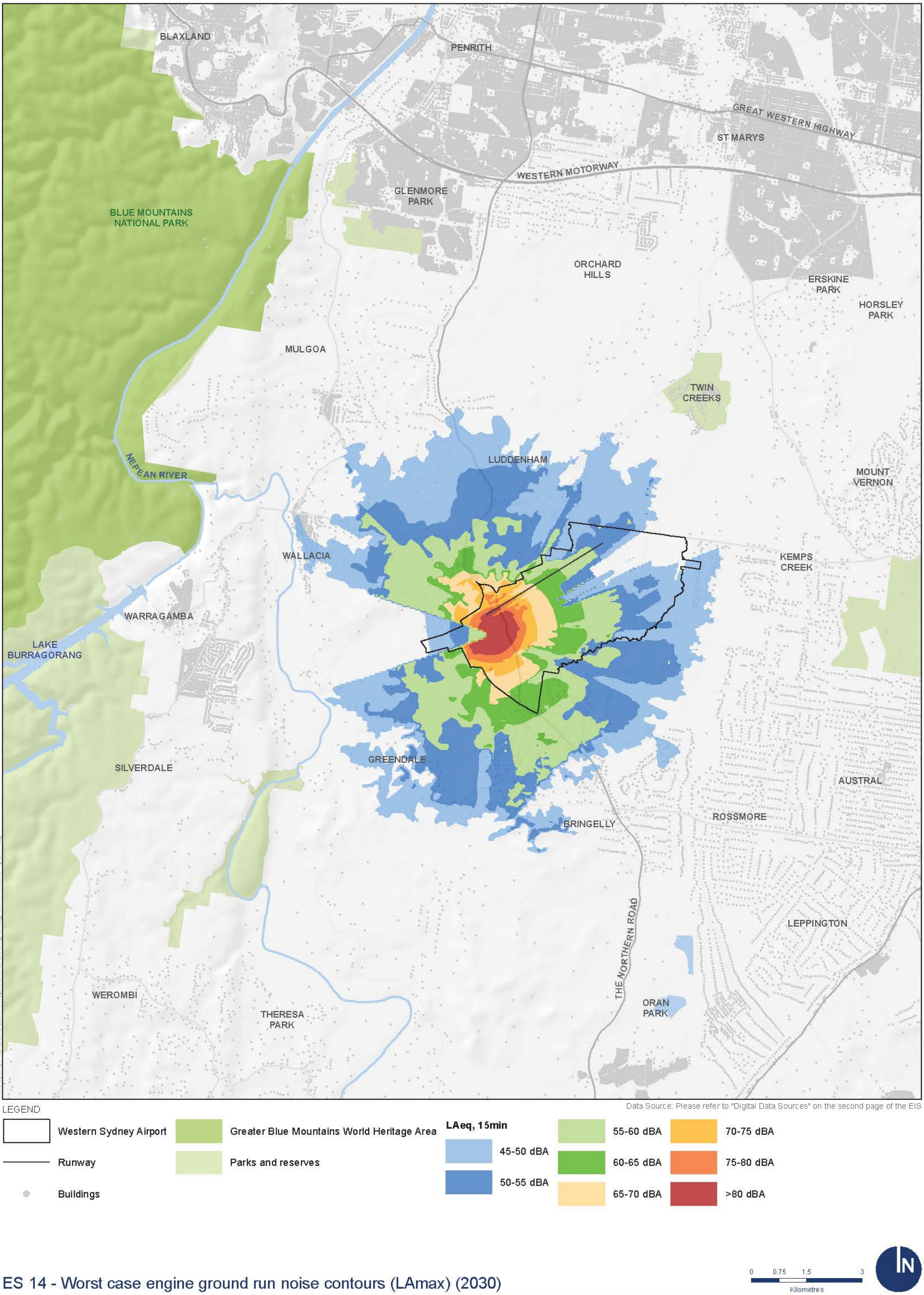
For the purposes of this EIS, airport ground operations noise is defined as noise generated from on-site sources, including aircraft taxiing and the ground running of aircraft engines for maintenance testing. Airport traffic on the surrounding road network and airport construction activities are other sources of ground operations noise assessed in the EIS.

Monitoring was undertaken in areas surrounding the airport site to determine existing background noise levels and identify assessment criteria for the construction and operational phases of the proposed airport development. Dominant noise sources include road traffic noise and local industry, reflecting the predominantly rural residential nature of the area. Construction and operation of the proposed airport would introduce new noise sources.

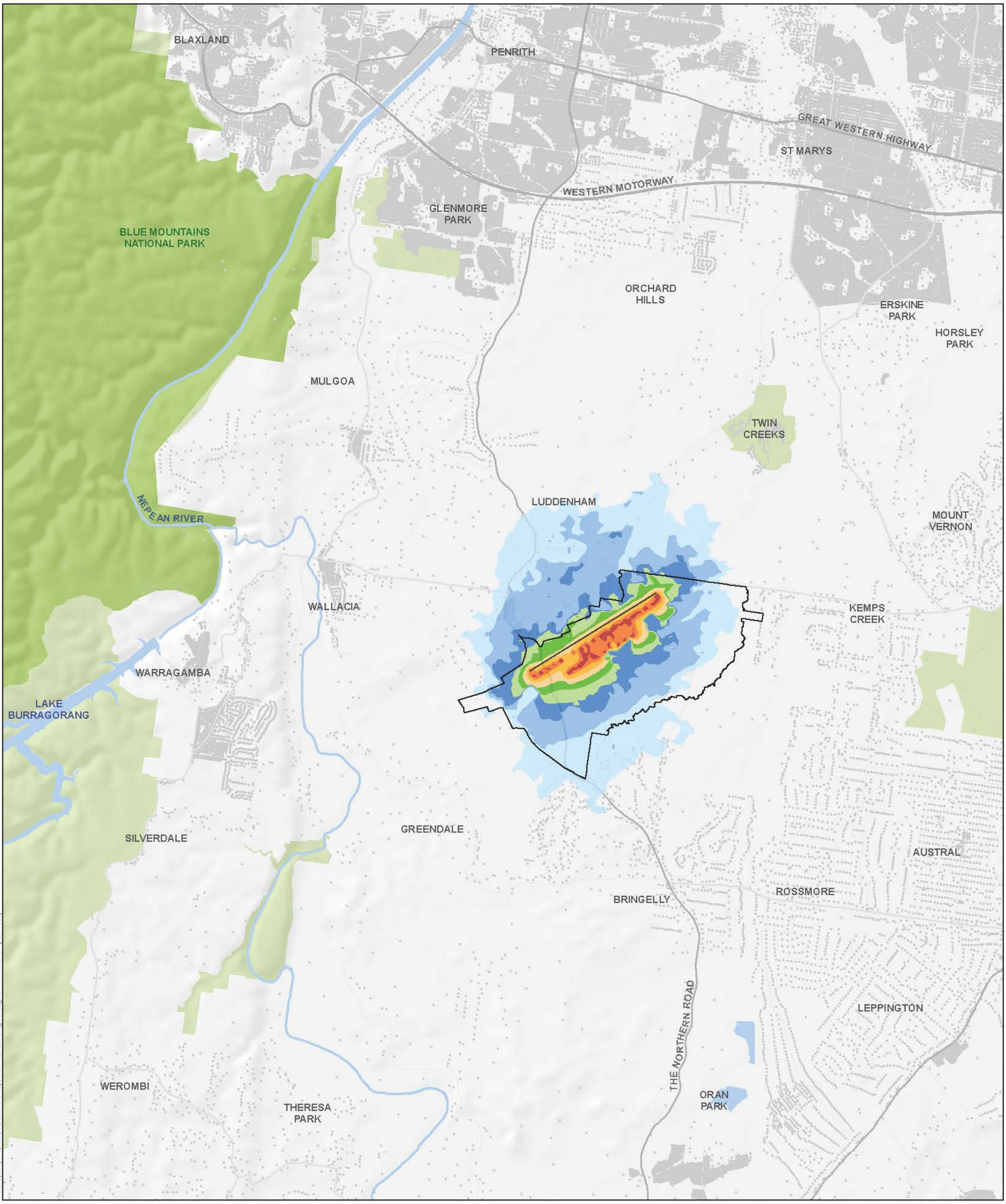
Noise during construction of the proposed airport would be largely confined within the airport site, although there would be some impacts on Luddenham and Badgerys Creek under worst case meteorological conditions. Construction vehicles would need to access the airport site during the construction stage. Modelling indicates that the resulting increase in traffic noise would not be audible. Vibration and airblast levels have been assessed in the event that blasting is required during construction. The assessment identifies precautionary measures that would likely be required to avoid significant vibration and airblast levels at surrounding sensitive receivers. Vibration generated by other construction activities and equipment is unlikely to cause building damage outside the airport site.

The primary sources of ground operations noise would be generated by aircraft engine maintenance testing and taxiing. Under worst case meteorological conditions, noise associated with engine maintenance testing may exceed the noise criteria established for the EIS assessment in Luddenham, Badgerys Creek, Bringelly, Wallacia and Greendale. The impact of noise from taxiing would extend over a much smaller area and would primarily affect Luddenham. The potential for exceedance of the noise criteria at these locations would depend on prevailing background 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. The noise contours in Figure ES–14 show noise shielding to the west of the airport site due to the location of an aircraft maintenance hangar that is assumed to be adjacent to the engine run-up area based on a preliminary airport design.



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



LEGEND

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

LAeq, 15min

40-45 dBA	55-60 dBA	70-75 dBA
45-50 dBA	60-65 dBA	75-80 dBA
50-55 dBA	65-70 dBA	>80 dBA

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

0 0.75 1.5 3
Kilometres

N:\AU\Sydney\Projects\21\24265\GIS\Maps\Deliverables\KBM_NOISE_PORTRAIT3.mxd [KBM: 133]

ES 15 - Worst case taxiing noise contours (2030)

During Stage 1 operations, road traffic generated by the airport would increase local noise levels. Apart from a section of the proposed M12 Motorway and Elizabeth Drive, noise level increases attributable to airport traffic would be less than 2 dBA, which are unlikely to be noticeable. Any new road construction or realignments as part of the Western Sydney Infrastructure Plan (or other road improvements over time) would be subject to separate environmental assessment and approvals processes including any necessary noise mitigation.

Mitigation measures have been proposed to address noise during construction and operation of the proposed airport. Alternate locations for the engine run-up facility may be considered during detailed design. Other mitigation measures include implementing a Noise and Vibration Construction Environment Management Plan (CEMP) and a Noise Operational Environment Management Plan (OEMP) to manage other ground operations noise.

The Noise OEMP, to be prepared by the ALC, would identify residences and other sensitive receivers surrounding the airport site and any reasonable and feasible noise mitigation measures to protect their amenity. Preparation of the plan would include:

- engagement with residents and occupants of other facilities regarding potential noise impacts and amelioration measures;
- development 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 mitigation measures;
- other specific measures to address noise exceedances where physical noise mitigation is ineffective; and
- noise monitoring and reporting arrangements.

Air quality and greenhouse gases

The air quality and greenhouse gas assessment included a review of climatic data and an analysis of ambient air quality based on 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 quality impacts associated with the operation of the proposed airport. The air quality parameters assessed were nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulphur dioxide (SO_2) and air toxics, as well as 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. 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. 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.

Stage 1 operations 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. Odour emissions would also be produced from exhaust and the onsite wastewater treatment plant. The highest offsite concentrations of these pollutant emissions are generally predicted to occur at receptors located to the north and north-east of the airport site which is generally consistent with the predominant winds.

Background traffic associated with the broader urbanisation of Western Sydney, on surrounding road infrastructure was found to be a significant contributor to predicted offsite ground level concentrations of air pollutants, particularly for those receptors located close to proposed roadways. Despite this, there are 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 exceptions are the 99.9th percentile one-hour maximum for formaldehyde, which shows one exceedance at an on-site receptor and $PM_{2.5}$ which exceeds a proposed future air quality objective at a number of sensitive receivers. This is primarily attributed to background concentrations. Predicted offsite odour concentrations are below odour detection limits for both aircraft exhaust emissions and odours from the onsite wastewater treatment plant.

Only marginal ozone impacts would result from the Stage 1 operations, in the context of predicted background regional ozone levels around 2030. These emissions would be managed using best available techniques and/or emission offsets.

Greenhouse gas emissions produced at the airport site during Stage 1 operations 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 0.1 per cent of Australia's projected 2030 transport-related greenhouse gas emission 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. The management plan would incorporate existing airport regulations which set air quality criteria and provide for a system of monitoring, reporting and auditing.

Human health

The health risk assessment considers the risks associated with construction and operation of the Stage 1 development on the health of the community. The assessment was undertaken in five stages comprising: issue identification, hazard assessment, exposure assessment, risk characterisation and uncertainty assessment.

The assessment focuses on the chronic health risks associated with changes to air quality, noise (overflights and ground operations), and surface and groundwater quality, as these are the primary pathways for health risks to occur. The health risk assessment considers impacts from particulate matter, nitrogen dioxide, sulphur dioxide, air toxics (benzene), diesel and ozone. Water contaminants considered include petroleum hydrocarbons, heavy metals, polyaromatic hydrocarbons, chlorinated hydrocarbons and perfluorinated compounds. The noise health risks assessed include sleep disturbance, increases in heart disease and impacts on cognitive development and learning in children. Other perceived and non-chronic health effects such as anxiety are considered as part of the social impact assessment.

The health risk assessment reviews any increased risk of mortality, hospital admissions for respiratory and cardiovascular diseases, and asthma in children as a result of air quality impacts. Overall, the health risk assessment found:

- the health risk from exposure to diesel and particulate matter during construction would be low;
- emissions of nitrogen dioxide and ozone will increase health risks, particularly when taking into account background road traffic associated with other developments in the region;
- emission of diesel during airport operations will increase health risks but these increased risks will largely occur on the airport site itself; and
- the health risks from exposure to other pollutants during airport operations such as sulphur dioxide, carbon monoxide and benzene will be low or very low.

Based on the findings of the local and regional air quality assessments, the air quality health risk assessment found in detail that:

- Levels of airborne particulates generated by construction would be low overall and less than those during operation. The highest risk is predicted to be associated with $PM_{2.5}$ during construction of aviation infrastructure which could result in a maximum of two additional deaths per 100 years. The most affected areas would be Luddenham and Bringelly.
- Health risks due to PM_{10} and $PM_{2.5}$ particulate matter would be low for the Stage 1 development. The highest predicted risk attributed to PM_{10} is for all-cause mortality from long-term exposures with between four additional deaths per 1,000 years and six additional deaths per 100 years. The highest predicted risk attributed to $PM_{2.5}$ is for all-cause mortality and cardiopulmonary mortality from long-term exposures with between two additional deaths per 1,000 years and six additional deaths per 100 years.
- Exposure to nitrogen dioxide would be the highest risk category resulting from airport operation. The highest predicted risk is for long-term mortality in people over 30 years of age with a maximum predicted risk of 1.1 additional deaths per year for the Stage 1 development. When traffic emissions on the external road network are excluded (which accounts for some 69 per cent of the NO_x emissions inventory), the maximum risk would reduce to four additional deaths every 10 years.
- The health risk due to exposure to sulphur dioxide from the airport operations would be very low. The highest risk is for hospital admissions from respiratory causes with approximately between seven additional admissions per thousand years and seven additional admissions per hundred years.
- The health risk arising from exposure to carbon monoxide would be negligible. The highest risk is predicted for hospital admissions for cardiovascular disease in people 65 years of age and older with a maximum of an additional four additional hospital admissions in 1,000 years.
- The risk from exposure to benzene during airport operations would result in a very small increase in cancer risk which is within levels considered acceptable by national and international regulatory agencies.
- The risk from exposure to diesel particulates falls at the upper bound of the levels of risk considered acceptable by national and international regulatory agencies. The highest risk

occurs at an onsite location, which is relevant for the consideration of exposure of onsite workers.

- The maximum risk increase resulting from exposure to ozone is 4.5 in 100,000 for emergency department attendances for asthma in children which is marginally above the levels of risk considered acceptable by national and international regulatory agencies.

Overall, the air quality health risk assessment found that the predicted health risks from Stage 1 operations would generally be within or at the upper bound of national and international standards of acceptability, with the exception of NO_2. A significant contributor to air quality emissions, and therefore the health risks identified above, are background emissions from urban development and particularly road vehicles external to the airport site. This is reflected in the assessment which found the highest risks are predicted for Bringelly, Rossmore and Kemps Creek which are located next to planned major roads and will experience significant urban development.

The health risk assessment for noise found that the risks from Stage 1 operations are low overall but may lead to an increase in sleep disturbance (assessed as awakenings) and delays in childhood learning and cognitive development at some locations in close proximity to the airport site. These impacts would vary depending on the operating strategy in use at the airport site. In particular:

- there would be an increase in electroencephalography (EEG) awakenings (a measure of sleep disturbance) with between zero and 40 additional EEG awakenings per person per year due to aircraft overflight and between zero and 75 awakenings per person per year due to ground operation noise. This is small given that individuals typically exhibit about 24 EEG awakenings per eight hours of sleep (European Environment Agency 2010);
- the number of full awakenings would be very low with between zero and five additional full awakenings per person per year due to aircraft overflight noise and an additional zero to 4 full awakenings per person per year due to ground-based operations noise;
- aircraft overflight noise and ground-based operations noise is not predicted to lead to an increased risk of myocardial infarction (heart attacks); and
- the predicted risk of learning and cognitive development in children would be very low for both aircraft overflight and ground-based operations noise, except at Luddenham where indoor noise is predicted to be higher. This does not mean that there will be an impact on children’s learning and cognitive development but that there is an increased risk, albeit very low.

These effects are more likely for suburbs closest to the airport site, in particular Luddenham. Further work would be undertaken in future stages of the airport design to identify and, where necessary, implement feasible mitigation measures to reduce these impacts, noting that the two noise sources, overflights and ground-based operations, may need to be addressed separately.

While there are potential risks to surface and groundwater resources from construction and operation of the proposed airport, 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 strict guidelines enforced by Airservices Australia for managing these contingency events.

Overall, the assessment found that potential risks to community health are generally low, with the exception of nitrogen dioxide. Following the implementation of the measures proposed in this EIS, the community health risks from the Stage 1 development will be further reduced.

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 associated with airports generally and are not unique to the proposed airport.

A number of important airspace considerations would be resolved during detailed design closer to the commencement of operations. Certification of the aerodrome by CASA would be required before operations can commence, as well as implementation of the requirements of the existing safety regulatory framework. Satisfying these regulatory requirements will necessitate detailed design studies of various and specific aspects of the airports design and associated inclusions.

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

- storage of jet fuel;
- identification and/or reservation of a pipeline corridor to secure future fuel supply by means other than road transport, in conjunction with relevant authorities;
- additional bird and bat surveys to confirm the preliminary low strike risk identified;
- 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 150-160 additional peak hour vehicle movements during the AM and PM peak periods. The forecast AM peak traffic volume equates to about an eight per cent increase in traffic on this road, which would not be expected to lower the level of service on Elizabeth Drive. In the context of the broader Western Sydney region, this would not be considered a significant increase. A community awareness programme 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 Traffic and Access CEMP would also be implemented and provide the overall plan and staging for managing traffic through and around each work site.

Stage 1 operations are expected to result in approximately 21,562 vehicles entering the airport site in the AM peak period and 21,556 leaving the airport site in the PM peak period. With the introduction of the M12 Motorway, this additional traffic is not likely to affect significantly 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.

Significant road improvement works are underway as part of the Western Sydney Infrastructure Plan in addition to those identified in planning for the Western Sydney Employment Area, Western Sydney Priority Growth 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 Stage 1 operations. A Ground Transport Operational Environment Management Plan (OEMP) would be prepared prior to the commencement of operations to manage impacts on the local and internal airport road networks.

The public transport, walking and cycling systems proposed by the NSW Government and local councils in the region are expected to provide sufficient capacity for the predicted airport passenger and employee demand.

While no rail connection to the proposed airport is currently confirmed for the Stage 1 development, planning for the proposed airport preserves flexibility for several possible rail alignments including a potential express service. To meet future needs, the Australian Government and NSW governments are undertaking a Joint Scoping Study on the rail needs for Western Sydney, including the proposed airport. The study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region.

Biodiversity

The airport site features remnant patches of grassy woodland and narrow corridors of riparian forest within extensive areas of derived (exotic) grassland, cropland, and cleared and developed land. The condition of native vegetation is generally poor and there is moderate to severe weed infestation throughout the site. The main land uses have been agriculture and low density rural-residential development. Notwithstanding the generally poor condition of the airport site, it has 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 1,153.8 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 318.5 hectares of native vegetation are expected to be removed for the Stage 1 development. 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 potential 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 Stage 1 development 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 is expected to affect threatened species, populations and ecological communities listed under 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 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, animals and their habitat (including a number of species, populations and ecological communities listed as threatened under NSW legislation) in an area of Commonwealth land.

Mitigation and management measures would be implemented to reduce the potential impacts on biodiversity. These measures 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, a 117.1 hectare environmental conservation zone would be established along the southern perimeter of the airport site.

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 104.9 hectares of Cumberland Plain Woodland, the removal of about 141.8 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 in suitable offset sites in the surrounding region in perpetuity.

Biodiversity offsets are expected to be delivered primarily through the procurement of biodiversity credits to offset the proposed airport's impacts on affected EPBC Act-listed biota as calculated by the offsets assessment guide. Additional biodiversity credits would be purchased to offset impacts on other plants, animals and their habitat. The biodiversity credits are generated through a system which includes establishing a form of conservation covenant over the area of land from which they are generated. Procurement of the biodiversity credits will provide funds for management of that area in perpetuity.

Due to the scale and nature of the biodiversity offsets required for the proposed airport, the process of identifying and securing suitable offset areas will continue after the Airport Plan is determined by the Infrastructure Minister. This process would include identification of further offset areas for Cumberland Plain Woodland in addition to the areas which have been identified at the time of this EIS. Potential offset sites would be subject to targeted surveys to confirm their qualities and their value in terms of biodiversity credits or other offsetting potential. A biodiversity offset delivery plan will be developed to set out the specific actions to be taken to meet offset requirements for the Stage 1 development and will be guided by the framework established in the offset package.

The Department of Infrastructure and Regional Development will be responsible for delivering this plan that will require approval from the Environment Minister or an SES officer (an appointed official) in the Department of the Environment and Energy (DoEE) prior to the commencement of Main Construction Works for the Stage 1 development, ensuring that biodiversity offsets have been identified (and secured where possible) prior to substantial impacts occurring.

While conservation of offset sites through the NSW BioBanking Scheme is expected to form the primary component of the biodiversity offsets, a variety of other conservation actions will also be considered that would assist in meeting overall offset requirements. These may include additional funding to a variety of existing and future programmes, projects, and policies and where such alternative options are more practical, or achieve greater strategic benefits for biodiversity conservation in the region. Examples of other conservation mechanisms which could be used to deliver offsets are presented in Section 16.8 of Chapter 16 (Volume 2a) of this EIS. The Department will consult closely with DoEE and relevant NSW authorities, organisations and stakeholder groups on these and other potential offsetting opportunities.

Topography, geology and soils

Soils at the airport site are characterised by 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 earthworks programme would essentially involve the redistribution of about 22 million cubic metres of soil across the construction impact zone at the airport site, to achieve a level surface suitable for the construction of airport facilities. The modified landform and indicative Stage 1 layout is presented in Figure ES–16.

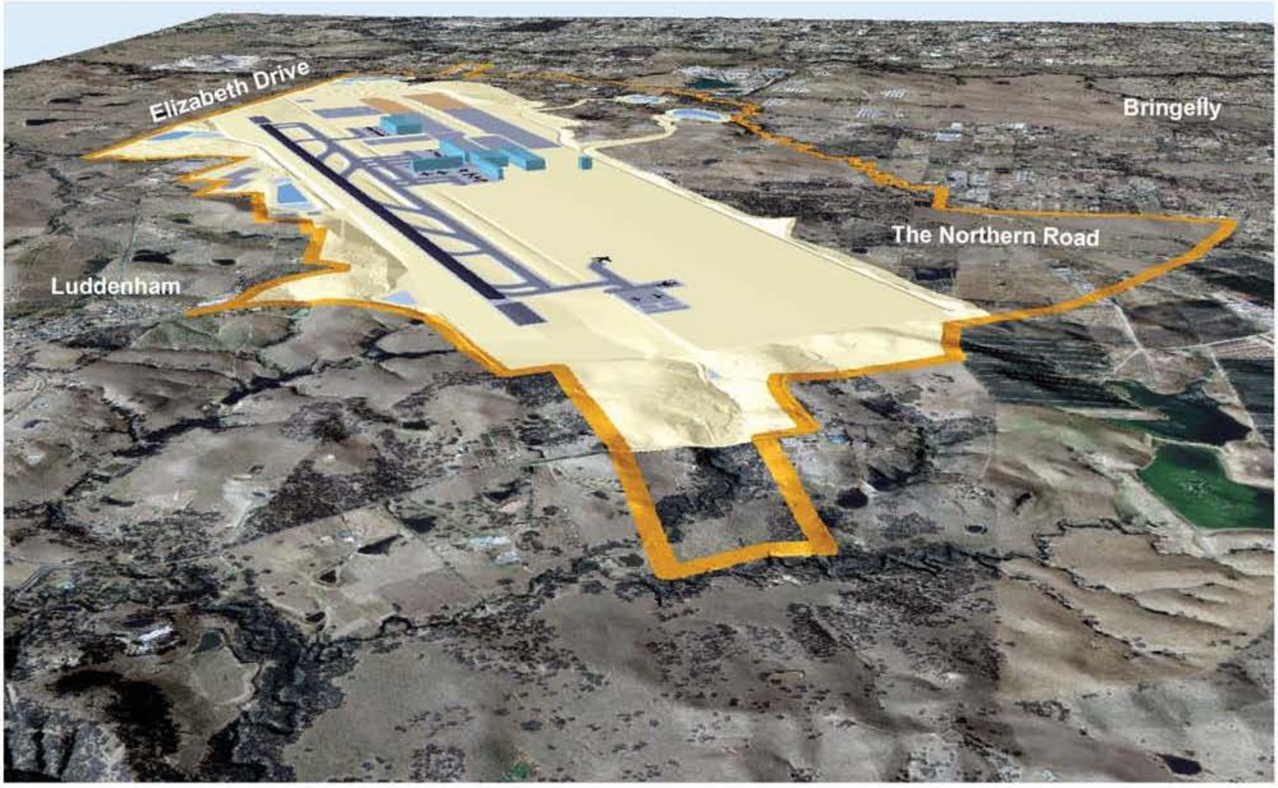
Construction and operation would also involve the controlled storage, treatment and handling of fuel, sewage and other chemicals with the potential to contaminate land.

Measures including erosion control structures, sediment basins and stockpile management are required to mitigate and manage potential soil erosion and degradation associated with a large and complex 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.

Due to existing land use at the airport site including agriculture, light commercial and building demolition, 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 proposed 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 relevant 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.

view to the north-east



view to the south-west

LEGEND

- Airport site
- Terminal buildings and support facilities
- Runways
- Taxiways and aprons
- Landscape area
- Detention basin
- Bio retention basin
- Business park

ES 16 - Indicative Stage 1 Landform

Surface water and groundwater

The airport site contains about 64 kilometres of mapped watercourses and drainage lines (notably Badgerys Creek, Cosgroves Creek, Oaky 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 that is 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 approximately 60 per cent of the airport site from a rolling grassy and vegetated landscape to essentially a 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.

An estimated 1.36 megalitres of water would be required per day for site preparation activities for the proposed airport, including potable water for drinking and ablutions plus raw water for soil conditioning and dust suppression. Water supply options include water sourced from existing assets operated by Sydney Water and stormwater runoff captured in the drainage system or existing farm dams.

The design of the Stage 1 development includes a water management system to control the flow of surface water and improve the quality of water before it is released back into the environment. The water management system would include a series of grassed swales to convey runoff from the developed areas within the airport site to a series of bio-retention and detention basins. Each basin includes provision for water quality treatment by a bio-retention system and a flood detention basin to control the volume of discharges from the site in a way that mimics natural flows. The assessment indicates that this system would be generally effective at mitigating flooding and water quality impacts.

Existing water quality at the airport site is in a degraded condition due to land clearing and previous land use. To take into account these existing conditions, local standards for water quality will be developed in accordance with the Airports (Environment Protection) Regulations 1997, with due consideration to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC). The development of local standards will be based on the results of baseline water quality monitoring, derived from a minimum of 24 months of data collected prior to the commencement of Main Construction Works.

The excavation and increase in impervious surfaces due to the development of the airport site would alter groundwater levels and recharge conditions. 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, are unlikely to be significant given the existing low hydraulic conductivity and water quality of the Bringelly Shale aquifer. Registered bores near 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 management 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 activities. 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 of the airport site, especially in the top soil and the plough zone.

The airport site has been the subject of a number of previous archaeological assessments as part of work towards 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 comprise 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 in the 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 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, the 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

The assessment of European heritage identified 20 European heritage items at the airport site and an associated site and an additional 22 heritage items 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.

Construction of the proposed Stage 1 development would involve substantial clearing and earthworks, which would preclude the preservation of European heritage items in situ. All existing structures on the airport site will be removed as part of the Stage 1 development.

Mitigation and management measures would be implemented to minimise the impacts on European cultural heritage. These measures 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 considered through the detailed design of the proposed airport.

Planning and land use

In developing the Western Sydney Priority Growth Area (previously part of the South West Priority Growth Area and the Broader Western Sydney Employment Area), the NSW Government and local councils have taken into consideration the potential opportunities and impacts from the proposed airport, including the opportunity to capitalise on the economic growth and investment the proposed airport could bring. Implementation of these strategic planning approaches is expected to result in land uses surrounding the airport site transitioning from rural-residential and agricultural to urban.

Existing rural residential, agricultural, recreational, community and extractive industry land uses on the airport site would be also removed where required to support the development of the airport. Infrastructure improvements at the airport site, rail and road, would also facilitate land use change in the broader region.

Measures to manage land use and planning impacts are proposed, including mitigation measures for employment land use conflict, zoning rationalisation, integration of operational airspace controls and aircraft noise protection as well as infrastructure corridor protection. Coordination of government land use planning activities, policies and programmes across the local, state and national level will facilitate an integrated approach to zoning land in and around the airport site. Through successful implementation of these measures, the proposed airport and its surrounds would become a focus for employment generating land uses in Western Sydney, creating jobs for the new residents of the Western Sydney Priority Growth Area and the broader Western Sydney area. This would also ensure that airport operations are not impeded by noise sensitive developments.

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.

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 has 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 would 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 retaining existing vegetation and revegetating suitable areas.

Social

The Western Sydney region is diverse, with densely populated and highly urbanised areas, to semi-rural and recreational/natural areas. The region is also culturally diverse, with strong heritage values (both Indigenous and non-Indigenous), cohesive communities, natural and recreational values, and connections to the employment hubs of Parramatta and Sydney Central Business District developments.

As part of this, the proposed airport is expected to result in both positive and negative social impacts. In particular, the proposed airport has the potential to bring significant benefits to the people and economy of Western Sydney through increased economic development and employment opportunities. As a facilitator of growth and change in Western Sydney, the proposed airport would stimulate further development in local and regional centres, contributing to better quality social infrastructure, amenities and services for local communities. The construction and operation of the Stage 1 development would create jobs for many types of workers of various skills and qualifications, contributing to increased incomes across the Western Sydney region. When considered with other developments taking place in the region, the opportunities for positive change and improved socio-economic outcomes for Western Sydney are significant.

Negative social impacts would largely result from changes in social amenity and lifestyle as a result of other impacts. In particular, aircraft noise, changes in air quality, increased road vehicle movements, and visual impacts are expected to reduce social amenity and impact on the existing lifestyle of residents. These impacts will be the most prevalent in communities close to the airport site, particularly in Luddenham. The implementation of mitigation measures proposed for these impacts will also reduce the expected negative social impacts. Additionally, the implementation of major planning initiatives by the NSW Government, in particular the Western Sydney Priority Growth Area, will help to plan for these changes and ensure land uses around the airport site are compatible with airport operations.

To maximise employment opportunities for local residents an Australian Industry Participation Plan and an equal opportunity policy would be prepared by or on behalf of the ALC to promote the utilisation of local labour, goods and services during the construction and operation of the proposed airport.

Economic

Construction and operation of the proposed airport is expected to generate significant economic and employment effects for the local and regional economy. These benefits will grow commensurately with the forecast increase in passenger demand over time.

Overall, the Western Sydney region is expected to benefit from these effects and would experience a significant share of the increased economic activity and employment opportunities generated by the proposed airport. Over the construction period, the Stage 1 development is forecast to create employment opportunities and value-add for the economy. In particular, construction of the Stage 1 development would:

- create about 3,180 full-time equivalent (FTE) jobs directly and indirectly in Greater Sydney during the peak of construction activity. Approximately 84 per cent of these jobs would be created in Western Sydney. In the peak year of construction about 760 FTE direct onsite jobs would be created,1,240 FTE jobs in the supply chain and 660 FTE jobs created through consumption effects; AND
- create about $2.3 billion in value-add across Greater Sydney during the construction period, with approximately $1.9 billion or 83 per cent of that value-add being created in Western Sydney.
- During Stage 1 operations, the proposed airport is expected to continue its role as a substantial source of economic and employment opportunities in the region. In particular, Stage 1 operations would:
- create about 8,730 FTE direct onsite jobs;
- potentially create a further 4,440 FTE onsite jobs within business parks on the airport site;
- generate about $77 million in value-add for Western Sydney;
- generate about $145 million in value-add for the rest of Greater Sydney; and
- drive growth in business profits, productivity and household income.

As a major infrastructure project, the proposed airport has the potential to redistribute employment and population growth toward Western Sydney. While this may result in relatively slower employment and population growth in other parts of Sydney, it will also contribute to more balanced and sustainable growth. Similarly, the proposed airport is expected to result in a slight reduction in value-add, business profits and worker productivity in areas outside of NSW as economic activity is redistributed towards Western Sydney.

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, construction and operation of the proposed airport would involve the consumption of natural resources and has the potential to generate substantial quantities of waste.

Peak waste generation would occur during construction, when an estimated 202,500 tonnes of waste vegetation and construction materials such as concrete and timber would be generated. During Stage 1 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 and Resources CEMP would be prepared prior to construction and a Waste and Resources OEMP prior to operation of the proposed airport, which would guide the management of waste during construction and Stage 1 operations.

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 types and volumes expected to be generated at the airport site.

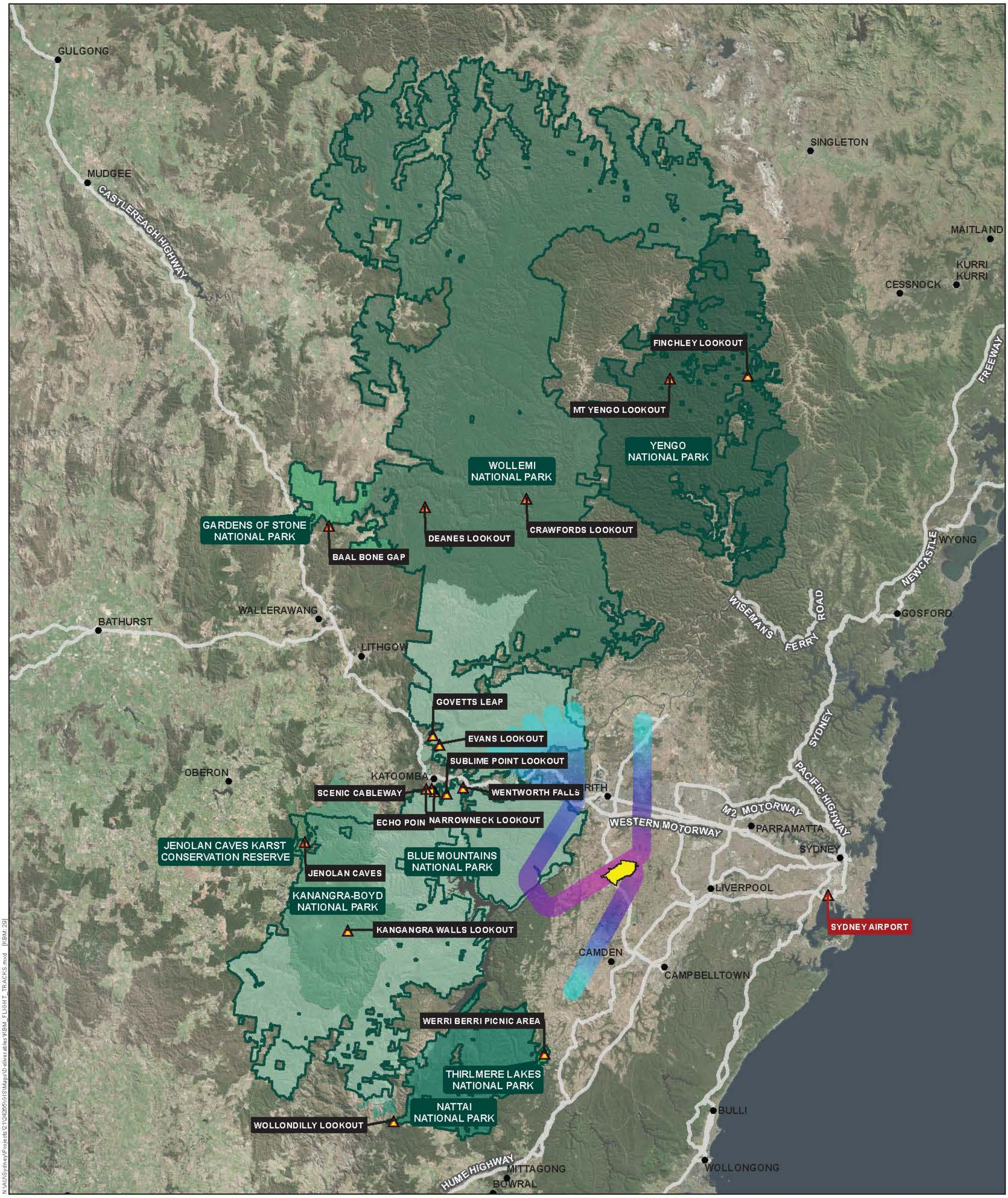
Greater Blue Mountains

The Greater Blue Mountains World Heritage Area (GBMWHA) covers 1.03 million hectares or 10,300 square kilometres of sandstone plateaus, escarpments and gorges dominated by temperate eucalypt forest. The boundary of the GBMWHA is approximately seven kilometres from the proposed airport at its closest point. The area is 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 eucalypts in post-Gondwana isolation on the Australian continent.

The Greater Blue Mountains Area is listed on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List for its 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 values, the GBMWHA has a number of other important values, which complement and interact with these including: recreation, tourism, wilderness, scenic, cultural heritage, scientific and aesthetic values. The Greater Blue Mountains Area was added to the National Heritage List in 2007 in recognition of its national heritage significance.

Potential impacts on the World Heritage, National Heritage and other values of the Greater Blue Mountains Area from the construction and operation of the proposed airport were assessed against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE 2013a). The assessment found that there would be no direct impacts on the values of the GBMWHA associated with the construction of the airport. Indirect noise, air quality and visual amenity impacts on the GBMWHA are predicted from aircraft overflights. Stage 1 operations are not expected to have an adverse impact on the World Heritage values or integrity of the GBMWHA.

Based on the preliminary airspace design, 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 locations within the GBMWHA (Figure ES–17 and Figure ES–18). No flights are expected to occur below 6,500 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 are limited to the eastern boundary of the Blue Mountains National Park, which would experience 50 to 100 flights per day.



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LEGEND

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

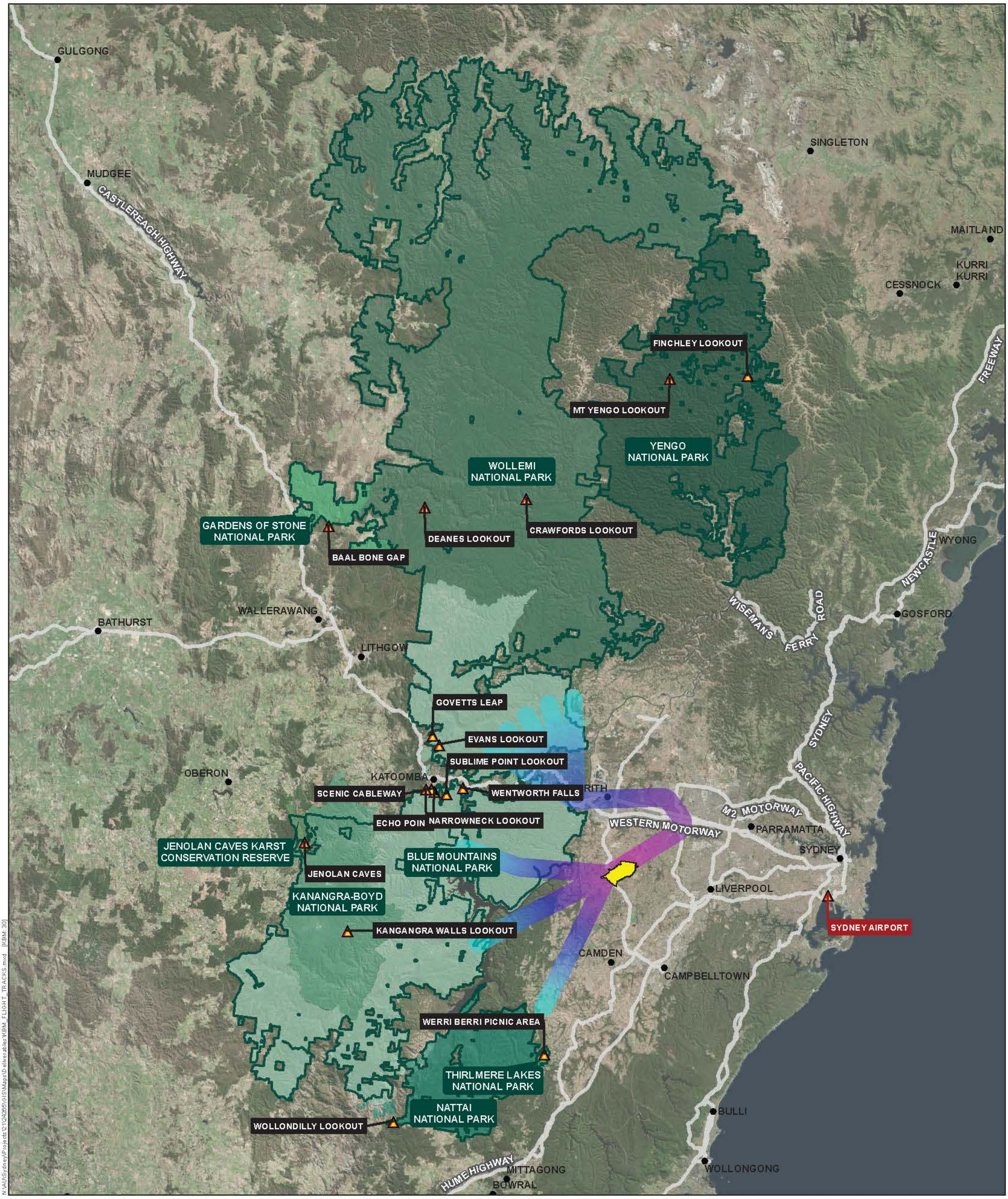
- Airport site
- Greater Blue Mountains World Heritage Area

Flight track altitude below 10,000 feet

- 10,000 ft
- 5,000 ft
- 0 ft

0 5 10 20
Kilometres

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



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

LEGEND

- Airport site
- Greater Blue Mountains World Heritage 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, 23 operating mode single runway

Generally across the GBMWHA, maximum aircraft noise levels are not expected to exceed 55 dBA. Echo Point at Katoomba would not experience aircraft noise levels above 50 dBA and the majority of other selected sensitive areas are predicted to only be affected by aircraft noise levels above 55 dBA during the infrequent operation (predicted to be once every two days) of the Boeing 747 (or equivalent), noting that this aircraft type is being phased out of operations.

Emergency fuel jettisoning is very unlikely to impact the GBMWHA due to the rarity of such events, the inability of many aircraft to jettison fuel, the rapid vaporisation and wide dispersion of jettisoned fuel and the strict regulations enforced by Airservices Australia for managing these contingency events.

Mitigation and management of potential noise impacts would be achieved through the formal airspace design process. All relevant factors, including potential environmental impacts on sensitive areas such as the GBMWHA, would be taken into account in determining operating procedures for the proposed airport.

The current assessment based on the indicative flight paths shows that impacts on the Greater Blue Mountains, including the World Heritage values and integrity of the GBMWHA, from operation of the proposed airport are not likely to be significant. Opportunities to further reduce the noise and visual impact from aircraft flying over wilderness and other areas of the GBMWHA would be considered in finalising formal airspace and operational arrangements.

Long term airport strategic environmental assessment

Volume 3 of this EIS provides a strategic level assessment of the indicative long term development of the proposed airport. Volume 3 reflects the difficulty in undertaking an assessment within the context of uncertainty relevant to the long term development of an airport. The assessment's 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 assessment of the potential long term development focuses on potential impacts of the expanded operations on the amenity of the surrounding community. Key issues considered in the assessment 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 findings of the assessment of the long term development are outlined below.

Noise

Aircraft noise is one of the most sensitive issues associated with the development of the proposed airport and an increase in air traffic movements has the potential to increase the level of noise disturbance experienced by 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.

The assessment of noise impacts associated with the long term development of the proposed airport considers aircraft noise (based on indicative flight paths) 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 are predicted for 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, including Greendale.

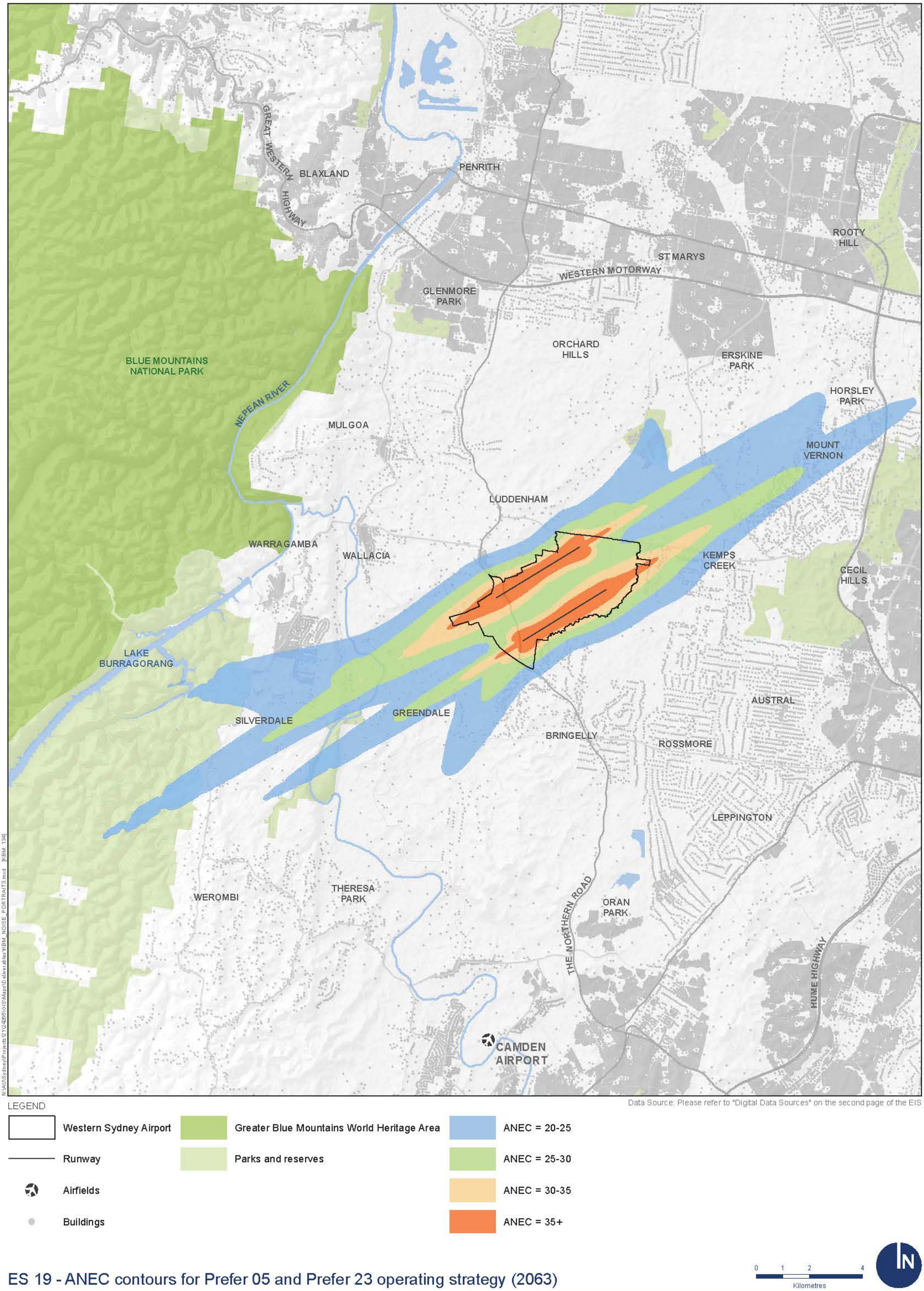
The extent to which particular areas would be potentially exposed to aircraft noise would be strongly influenced by the airport operating strategies especially when operating a single runway at maximum capacity (around 2050). In terms of total population, the Prefer 05 operating strategy (which gives preference to approaches and departures in a south-west to north-east direction) is predicted to have a greater 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. The less populated, predominantly rural-residential areas to the south-west, including Greendale and parts of Silverdale would be most affected under the Prefer 23 strategy. Adoption of ‘head-to-head’ operations would reduce the number of residents affected when aircraft movements are low and weather conditions permit.

For night-time operations in around 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 is predicted to result in large parts of St Marys experiencing more than 20 aircraft noise events per night on average 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 located within the noise affected areas for the indicative flight path design, particularly under the Prefer 05 operating strategy. This is because 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 land use planning controls will limit the potential for new residential development to be impacted by a progressive increase in airport operations. The modelled 2063 ANEC contours for the long term development are shown on Figure ES–19. This figure combines the noise exposure contours calculated for both the 05 and 23 operating strategies. The 2063 ANEC is 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

ES 19 - ANEC contours for Prefer 05 and 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 (NO_X, PM_{10}, and $PM_{2.5}$) for the long term development. Several exceedances were predicted at sensitive receptors for these indicators.

The progressive increase in aircraft movements and site based activities would increase the level of emissions during the long term operations. However, no improvement in aircraft emissions, either due to improvements in fuel or engine emissions was incorporated into the modelling. As a result, actual air emissions from the operating long term development may be lower than predicted given the use of mains powered auxiliary power units at the airport gates (instead of on-board 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 103,000 additional vehicle trips to and from the airport each day by 2063. These additional trips would be generated in the context of substantial urban growth in Western Sydney, particularly the development of the Greater Macarthur Land Release Investigation Area. Travel demand generated by the proposed airport and the substantial forecast development growth in Western Sydney would have a significant combined effect on the road and public transport systems.

Significant road improvement works, including a new M12 Motorway, are being delivered as part of the Western Sydney Infrastructure Plan to cater for this demand. The long term development is also likely to require additional transport infrastructure. To this end, the Australian Government and NSW governments are undertaking a Joint Scoping Study on the rail needs for Western Sydney, including the proposed airport. The Study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region.

Visual

Future development of the areas surrounding the airport site, under provisions of the Western Sydney Employment Area, Western Sydney Priority Growth Area and the South West Priority Land Release 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. This EIS has been prepared in accordance with Part 3 of the EPBC Act and the Department of the Environment guidelines for the assessment of the airport proposal (EPBC 2014/7391). This EIS will inform the determination of the Airport Plan.

An Airport Plan will provide the strategic direction for development of the proposed airport, forming the basis of the authorisation for the project under the Airports Act. The revised 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 approximately 10 million annual passengers as well as freight traffic.

Development of the proposed airport would act as 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 and ease existing aviation capacity constraints within the broader Sydney region.

This EIS has found that 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.

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PART A:

Project Background

1 Introduction

1.1 Overview

On 15 April 2014, the Australian Government announced that the 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* (Department of Infrastructure and Transport 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 would be staged in response to ongoing growth in aviation demand. A revised draft Airport Plan has been prepared 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 revised 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 would include a single 3,700 metre runway on a north-east/south-west orientation and aviation support facilities for an operational capacity of approximately 10 million passengers annually, as well as freight traffic. Stage 1 is designed to cater for the predicted demand for five years following services commencing.

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

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 expected when the operational capacity approaches 37 million annual passengers, which is forecast to occur around 2050. The long term passenger capacity of approximately 82 million annual passengers is forecast to occur around 2063.

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

The Airport Plan, once determined, would authorise the Stage 1 development encompassing the initial design, construction and operation of the proposed airport to an annual operational capacity of 10 million passengers. This 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 revised draft Airport Plan.

This 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 a new airport in Western Sydney 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&E 2014). 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. Airports attract investment, professional industries and a range of businesses to the surrounding region.

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 approximately 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.

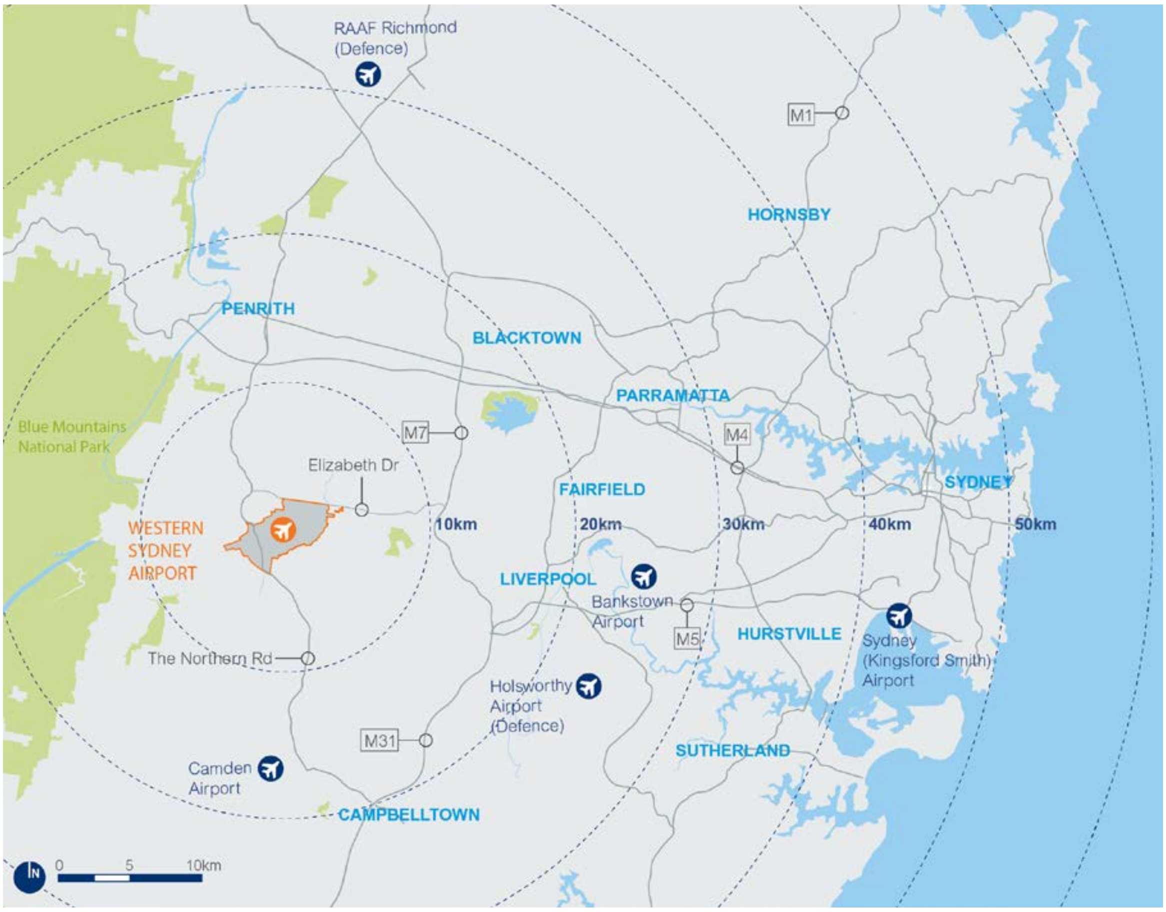


Figure 1–1 Location of the airport site

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 following areas are expected to be acquired to support the development and operation of the proposed airport and incorporated into an airport site:

- Lot 102 on Deposited Plan 812563 in the south of the airport site; and
- the portion of The Northern Road that currently transects the airport site.

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 EIS.

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.

The coordinates for points that mark the approximate extent of the airport site boundary are included in Table 1–1.

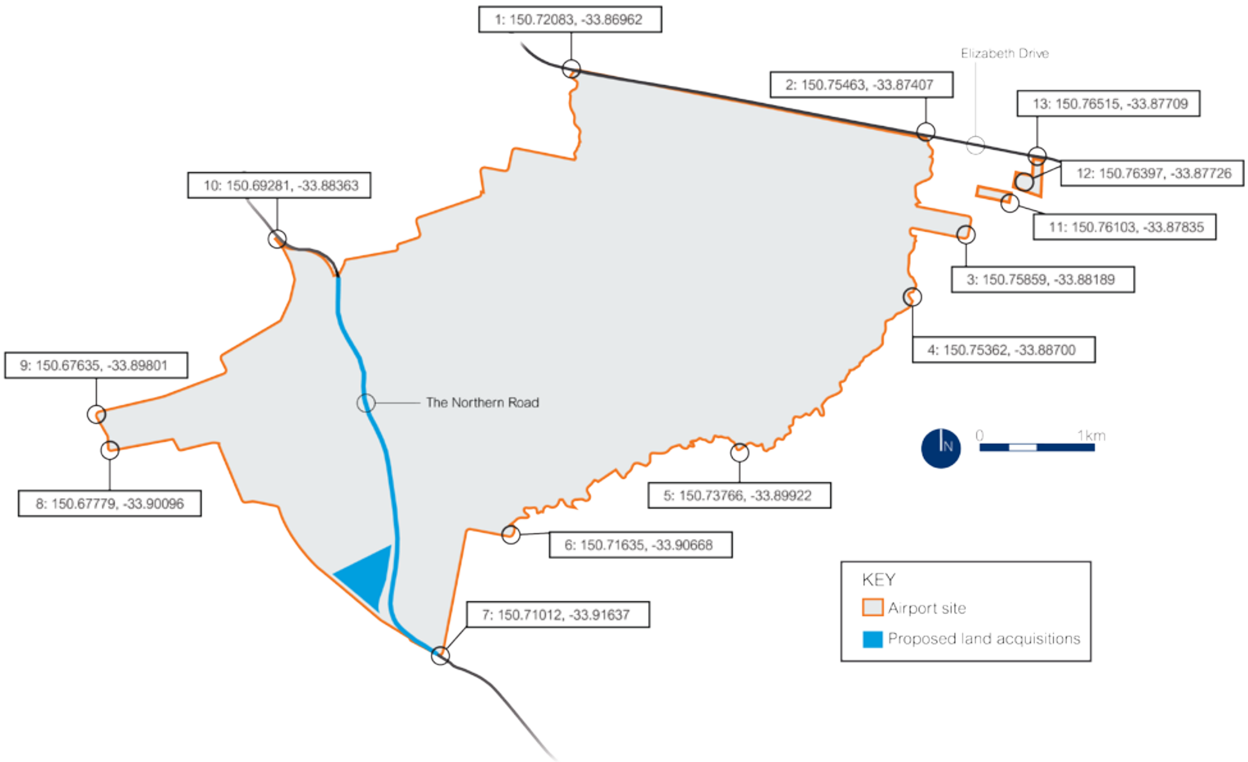


Figure 1–2 Airport site and proposed land acquisitions

Table 1–1 Boundary points at the airport site

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

1.3.2 Revised 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. The draft EIS and draft Airport Plan were placed on public exhibition concurrently from 19 October to 18 December 2015. A revised draft Airport Plan has been prepared and sits alongside this EIS as a companion document.

The concept design outlined in Part 2 of the 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, projected aircraft noise contours and the land use plan for the airport site.

The Airport Plan as determined under the Airports Act by the Infrastructure Minister, would authorise the Stage 1 development. The infrastructure comprised in the Stage 1 development has been sized to provide capacity for apporximatelt 10 million passengers per year and 63,000 air traffic movements including some freight. This level of demand is predicted to be reached about five years after the airport opens in the mid-2020s. This 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 revised draft Airport Plan.

The revised 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 prior to the determination of an Airport Plan.

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 for the anticipated development of a range of commercial uses such as retail and business parks within a dedicated business development zone. All commercial operations are not part of the Stage 1 development and 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 airport site, which is approximately 1,780 hectares. The majority of construction activity for Stage 1, including bulk earthworks and aviation infrastructure works would be restricted to a Stage 1 construction impact zone of about 1,150 hectares, predominantly in the northern portion of the site. Other areas of disturbance would be used for ancillary infrastructure, including drainage swales and detention ponds as part of the proposed water management system developed for the site. The Stage 1 construction impact zone is represented on Figure 1–3.

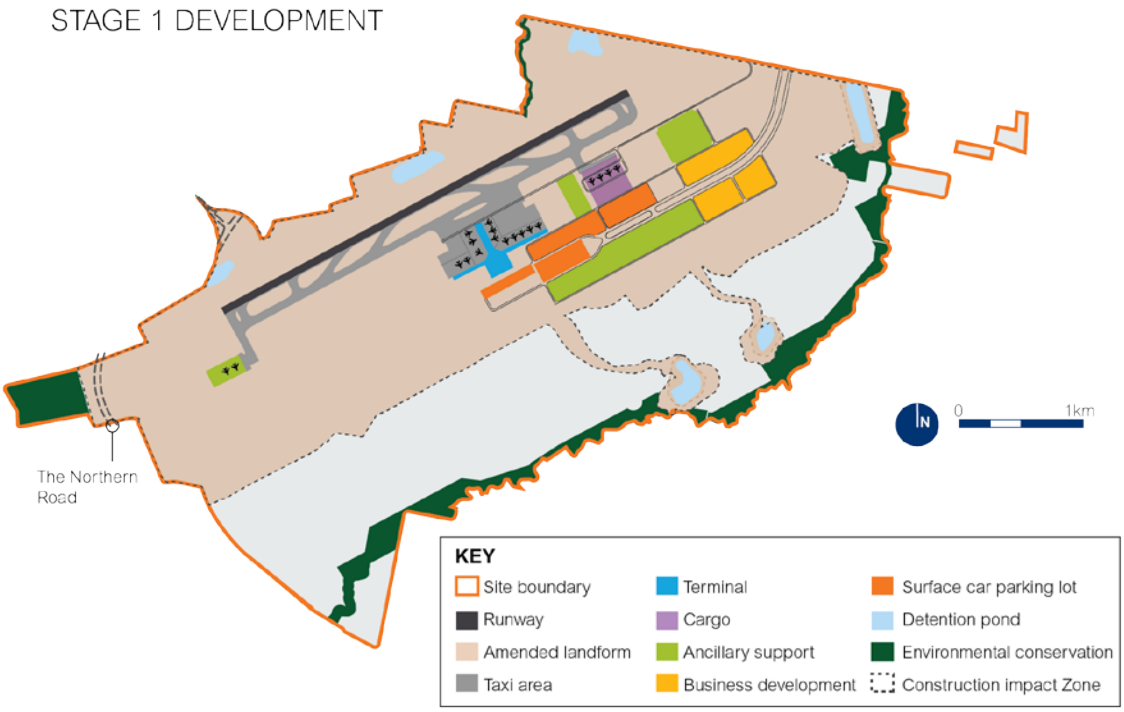
The southern portion of the site would predominantly remain uncleared during the initial stage of airport development. This area is reserved for future development activities which could include construction of a second runway, and expansion of aviation uses and business development in accordance with the 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.



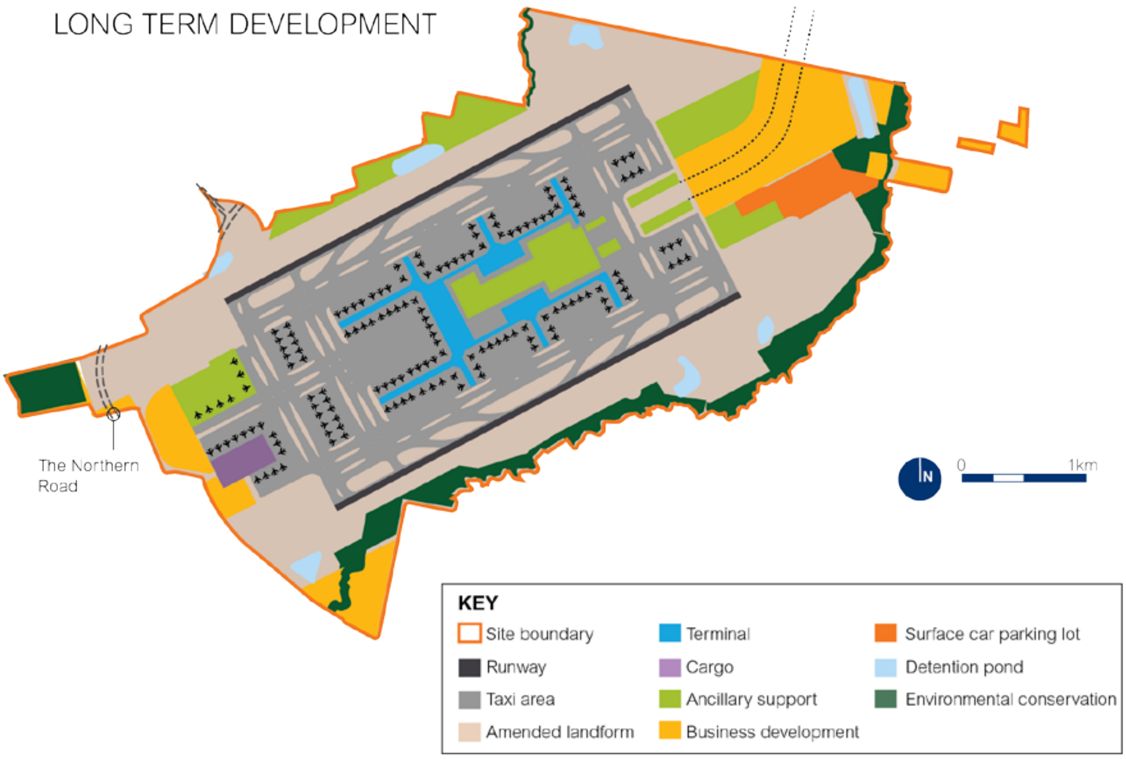


Figure 1–3 Stage 1 and long term indicative layouts

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 revised 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 Infrastructure Minister 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. The Australian Government may undertake some preparatory and construction related activities. An airport lease would be granted by the Commonwealth to an Airport Lessee Company (ALC), which would then become responsible for the airport site and further construction and subsequent operation of the proposed airport.

Under the right of first refusal, 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.

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 a Western Sydney Airport at Badgerys Creek, including technical specifications, contractual terms and timetable.

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 Infrastructure Minister, the ALC will be required to submit for approval a full master plan to the Infrastructure Minister. 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 airport 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 impacts. 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 1997–1999 EIS, the then Environment Minister 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 (Department of Infrastructure and Transport 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 options 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.

2015
EIS public exhibition

2016
Publication of final 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 airport site. The report 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 Department commenced a new environmental assessment for the proposed airport.

This EIS has been developed to assess the proposed airport as described in the revised 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 EIS.

1.6 EIS function and structure

1.6.1 Approval framework

The proposed airport would be developed in accordance with an Airport Plan determined under the Airports Act. A revised draft Airport Plan is a companion document to this EIS. The EIS assesses the potential environmental, social and economic impacts associated with the Stage 1 development as described in Part 3 of the Airport Plan. The EIS has been prepared in accordance with the requirements of the EPBC Act and the specific assessment guidelines for the development of the airport issued on 29 January 2015.

The draft EIS and draft Airport Plan were placed on public exhibition for a 45 business (60 calendar) day period from 19 October to 18 December 2015. During the public exhibition period any person, group, corporation or agency was invited to submit comment on the draft 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 have been provided to the Environment Minister with this EIS.

The draft EIS and the draft Airport Plan have been reviewed taking account of comments received during the exhibition period. This finalised EIS will also include any additional information that may be relevant to the Environment Minister's consideration of the environmental impacts of the proposal.

The Environment Minister will consider this EIS and the revised draft Airport Plan from an environmental perspective and notify the Infrastructure Minister whether the Airport Plan should be determined and, if it is determined, whether any specific conditions or provisions should be included in relation to the Stage 1 development for the purpose of protecting the environment.

The Airport Plan determined by the Infrastructure Minister must include any conditions or provisions specified by the Environment Minister.

As noted above, the Australian Government may undertake some preliminary activities to prepare the airport site. 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 impacts 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.
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 revised draft Airport Plan including airport performance and design criteria, the land use plan, a detailed description of the Stage 1 development, the construction activities required for the development of the site and airspace architecture; and • Part C includes an overview of the community and stakeholder engagement activities completed during the preparation and exhibition of the EIS and planned to be undertaken during the determination phase of the proposal.
Volume 2a – Stage 1 environmental impact assessment	Volumes 2a and 2b provide 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;
Volume 2b – Stage 1 environmental impact assessment	• 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	Scope
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.
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.
Volume 5 – Submissions report	Volume 5 provides a submissions report. The submission report presents a summary of all submissions received during the public exhibition period and provides a response to the issues raised. It also identifies the revisions made for the finalisation of this EIS.

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 benefits including jobs for their surrounding regions and the nation. Airports are key international gateways for travel and freight, taking on an increasingly important 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.

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 domestic aviation services along the east coast. While these alternatives demonstrate potential to provide marginal capacity benefits, they would not replace the need for a Western Sydney 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 increasing 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, a factor which is increasingly important in a globalised economy.

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).

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 to 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.

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. 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.

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 having increased considerably over recent decades, particularly in the Sydney basin. This increase 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, airport capacity in the Sydney basin will not be able to fully absorb the growth in aviation demand in the long term, and without additional aviation capacity demand will go unmet.

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 travel in the long term.

Sydney's population and resulting demand for aviation services is also expected to grow significantly. SGS Economics and Policy (SGS) 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).

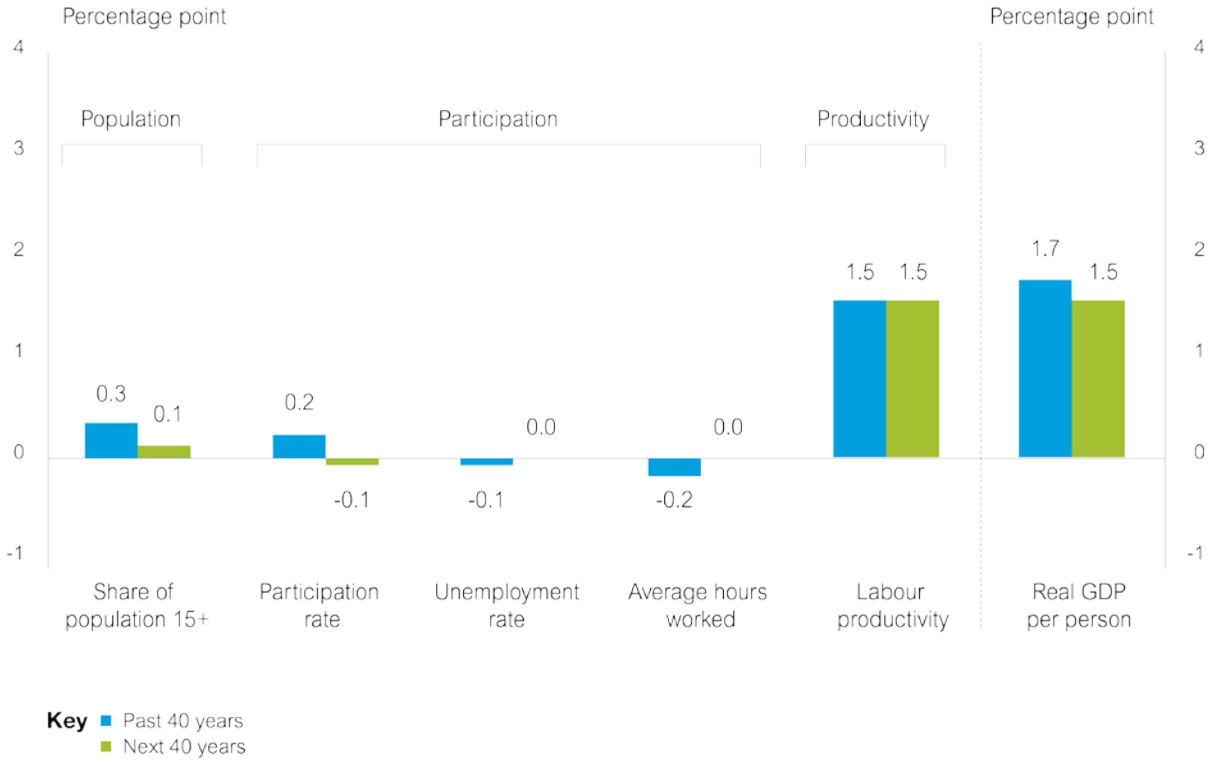
2.3.3 Expected economic growth

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 experiencing 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

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 eight 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 five per cent in 2008 to nine 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 both 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 tourists, 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. 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 inbound aviation services to Sydney 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 is 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. In the 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 passengers 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 servicing 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 passengers, and around 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.

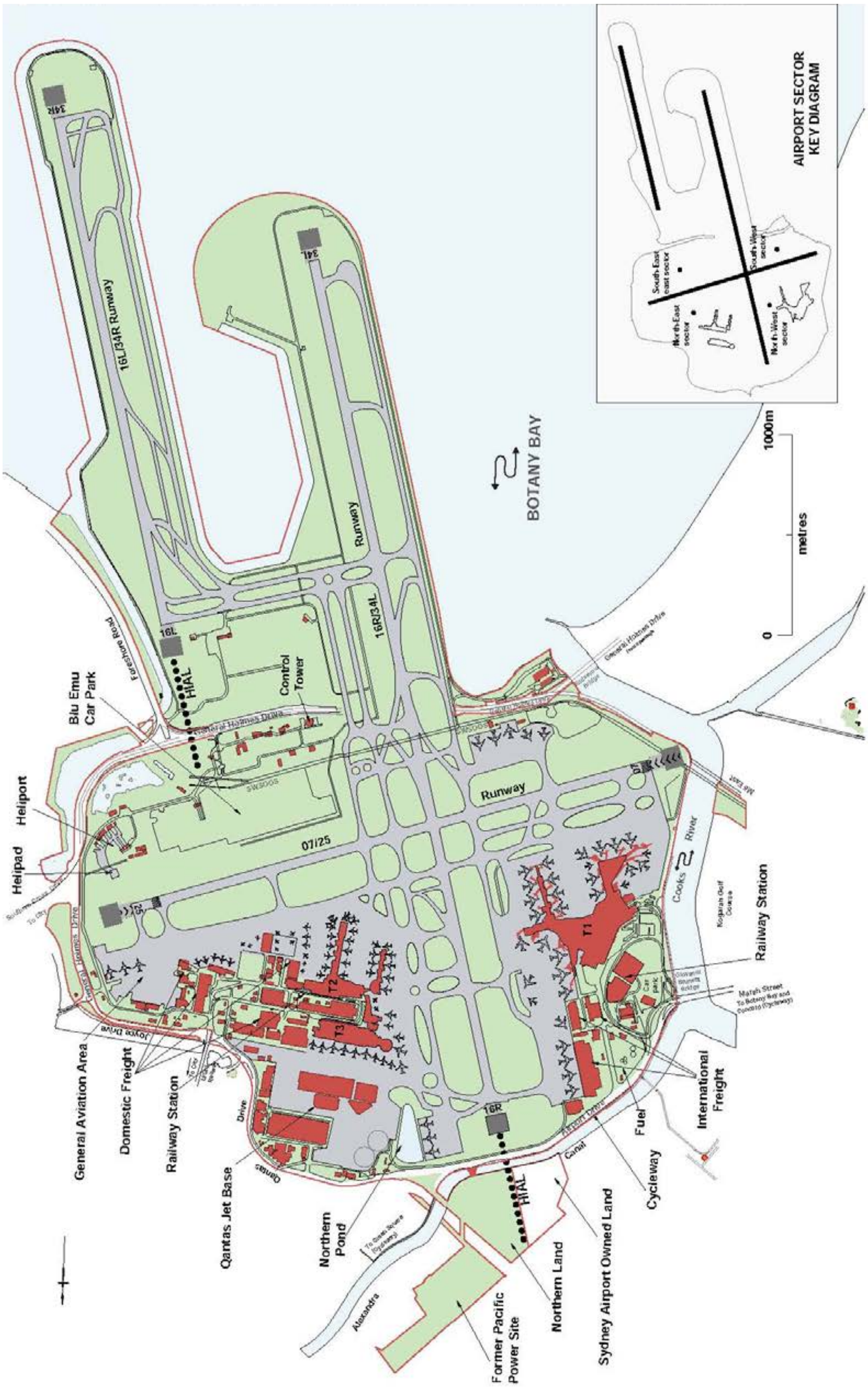
Sydney Airport has three runways, comprising two parallel runways on an approximate north−south alignment and a cross runway on an east−west alignment as shown in Figure 2–3. Runway 16R/34L is the main runway for the airport and is 3,962 metres in length. It parallels the shorter (2,438 metre) Runway 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 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. Their locations relative to other airports (including the proposed Western Sydney Airport) 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 is a single storey building with approximately 715 square metres gross floor area. There is no regular scheduled passenger service at the airport, although the terminal building is used occasionally to process charter flight passengers, 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 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, Forestry Corporation of NSW, 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 and runway ends and threshold lighting. Runway 10/28 is a grass surface crosswind runway, approximately 723 metres long. 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 are 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.

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.

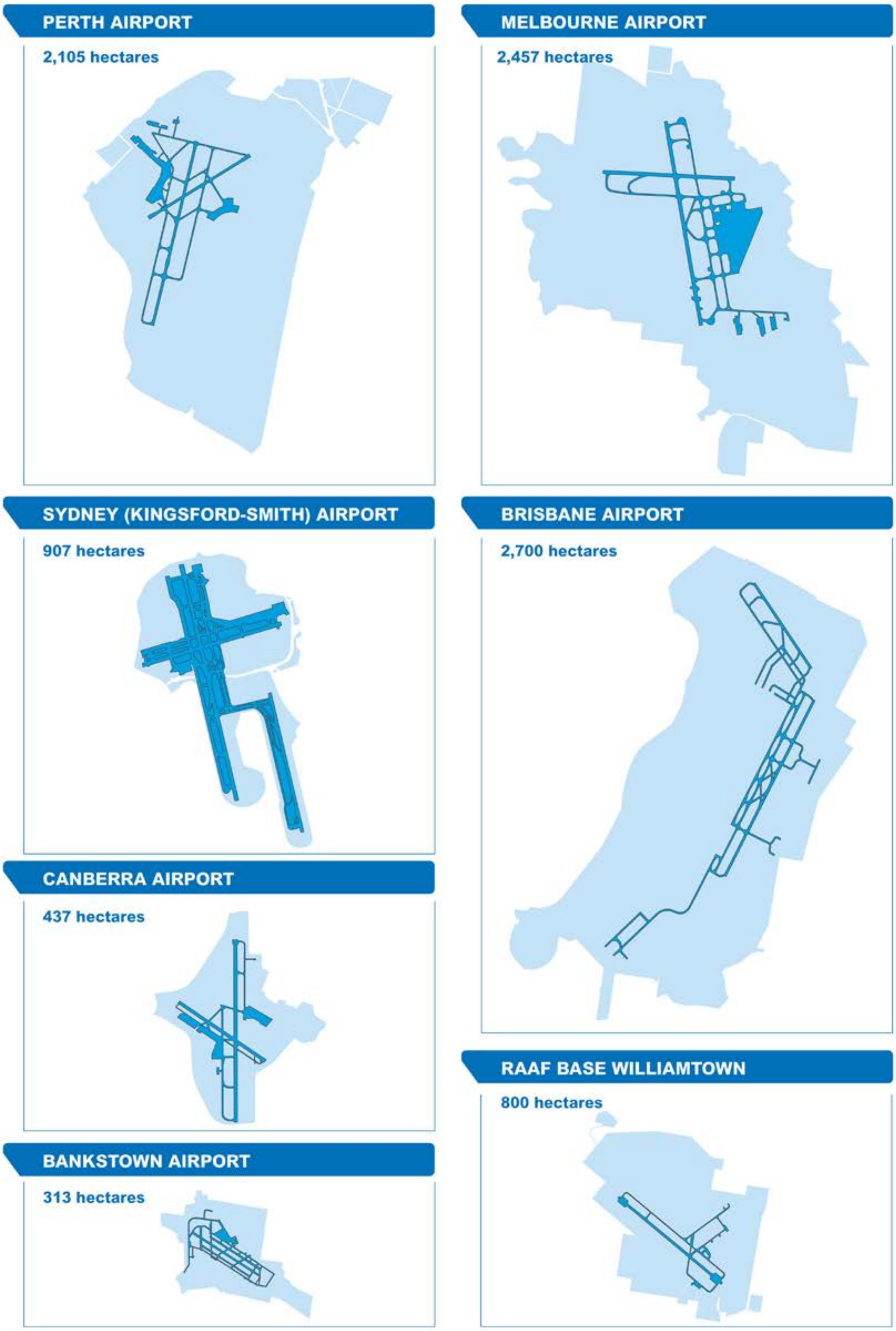
In the absence of other major passenger airports close to Sydney, Sydney Airport would be the only option for servicing this demand. By 2035, Sydney Airport would need to accommodate close to 80 million passengers a year; which is equivalent to around 430,000 annual aircraft movements and represents a 50 per cent increase on movements in 2010. The Joint Study found that due to capacity constraints, Sydney Airport 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 in the Sydney basin, 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 existing airports outside the Sydney basin.

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. 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 the 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 have 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 were 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.

Lengthening 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 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 Joint Study considered the effect of allowing up to 85 movements per hour on airport capacity 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 increasingly congested surface transport linkages.

Curfew shoulder settings

A curfew has been in place at Sydney Airport since 1963 to protect the communities close to the airport (the distance from the end of the runway to the nearest suburban residences is just 600 metres) 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 in the above locations;
- 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. Due to the relatively high density of urban development adjacent to and around Bankstown Airport, the commencement of any substantial level of passenger services at Bankstown may have significant impacts on the local community, including increased noise and road congestion.

RAAF Base Richmond

The Joint Study outlined that Airservices Australia estimates 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* (Department of Infrastructure and Transport 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 single 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 range of complex 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	Ettalong	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

Region	Locality Number	Locality	Local Government Areas
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 are 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 were excluded 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
	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 the 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 best 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* (Department of Infrastructure and Transport 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 of this chapter, were assessed against Matters of National Environmental Significance.

World heritage properties

The GBMWHA covers an area of 1.03 million hectares to the west and north of Sydney and is inscribed on the UNESCO World Heritage List and the National Heritage List. The GBMWHA 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 indirect impacts as expected for a Western Sydney Airport at Badgerys Creek.

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 that would have direct impacts upon national heritage places were excluded during the site selection process. 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 influence on 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 Wilton and RAAF Base Richmond for Civil Aviation Operations* (Department of Infrastructure and Transport 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 (see Chapter 16 (Volume 2a)).

Commonwealth action

The proposed airport at Badgerys Creek and its proposed establishment is an action proposed to be undertaken by the Commonwealth. 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 is 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 (based on the selection of the same north-east/south-west runway alignment) have been protected from urban and noise-sensitive development for nearly three decades. 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. Minimising aircraft noise impacts on surrounding communities was a primary determinant in 1985 when selecting the runway alignment and site boundary – the 05/23 alignment was assessed as having a lesser noise impact than a north-south alignment. The 1999 EIS drew the same conclusion. 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 Blacktown, Blue Mountains, Canterbury-Bankstown, Camden, Campbelltown, Cumberland, Fairfield, Hawkesbury, Liverpool, City of 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 the rest of Sydney. An extra one million people are expected to live in Western Sydney by 2030 (SGS 2015). 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 projects, 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. In addition, the Australian and NSW governments are undertaking a Joint Scoping Study into the rail needs of Western Sydney and the proposed airport.

These strategies have emerged partly in response to several issues confronting Western Sydney. Amongst 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 connect the airport site with Sydney's road network, capitalise on the expected economic gains of developing an airport at Badgerys Creek and address the lack of ground transport infrastructure in Western Sydney. The NSW Government has also established the Western Sydney Priority Growth 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. Airports transform the local economy, bringing a range of jobs in specialist, knowledge-based industries. 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 operations with a single northern runway, total passenger demand at the proposed airport is forecasted to reach approximately 10 million passengers annually within its first five years of operation. Beyond Stage 1, the single runway is expected to reach capacity, at a level of approximately 37 million passengers annually by 2050. This equates to approximately 63,000 air traffic movements for Stage 1 operations and 185,000 air traffic movements in 2050.

In the long term, the proposed airport is expected to include a second parallel 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 operations	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)	3,300	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 the 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 forecasted that about five years after opening, 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 approximately 80 per cent of total demand for Stage 1 operations. 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 forecasted 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). 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 NSW DP&E (2014), the proposed airport would emerge as a new economic and transport hub, enabling nearby centres such as Liverpool, Penrith, Campbelltown and Camden 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 GSP.

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 Australian 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 development, 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 Act 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 authorise the Stage 1 development of the proposed airport. The Airports Act amendment provides for the Infrastructure Minister to determine an Airport Plan, as a transitional planning instrument to guide the development of the airport. The Airports Act amendment also strengthens the Environment Minister's role under the Act.

This EIS has been prepared under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In determining the Airport Plan, the Infrastructure Minister must accept any environmental conditions proposed by the Environment Minister, taking into account this EIS.

A draft Airport Plan in the form proposed to be determined, will be provided to the Environment Minister. After considering the final EIS, the Environment Minister will then advise the Infrastructure Minister of any environmental conditions to be imposed in relation to the Stage 1 development. The Airport Plan, once determined, will set out details of developments that make up the Stage 1 development, while this EIS assesses the environmental, social and economic impacts associated with the Stage 1 development. Future development beyond the Stage 1 development will be subject to approvals under the Airport Act. The relationship between the EIS and the Airport Plan is shown in Figure 3–1.

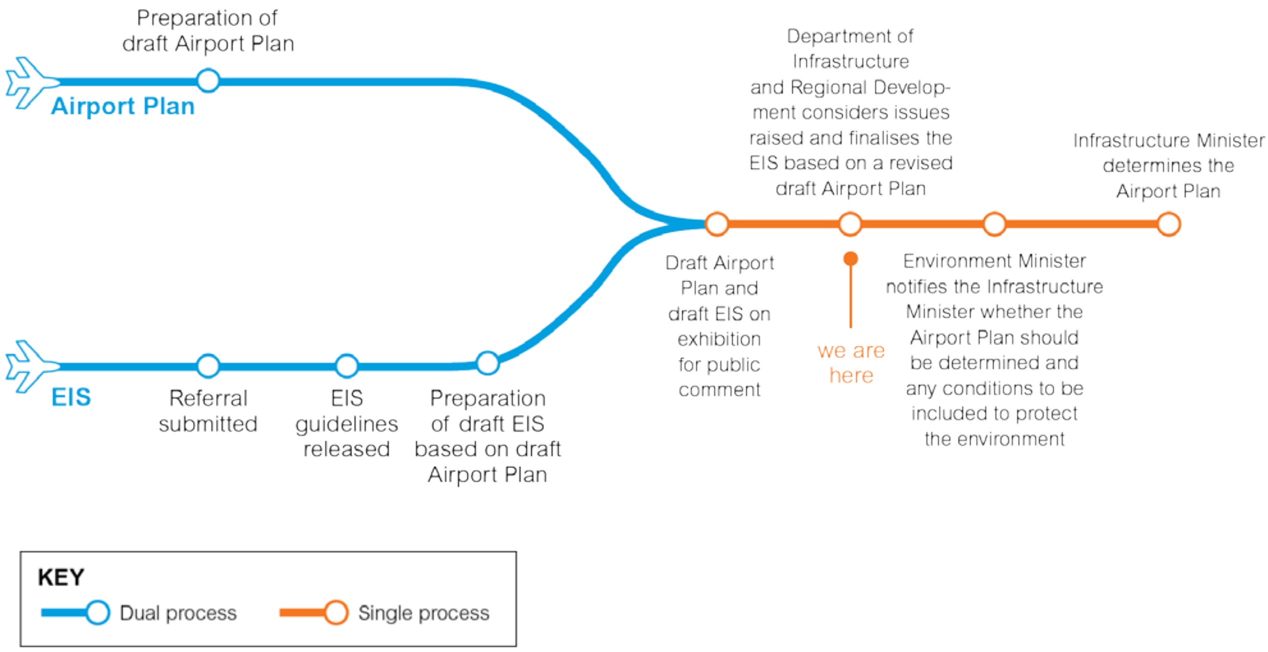


Figure 3–1 Western Sydney Airport approval process

3.2 Approval process for Stage 1

3.2.1 The Environmental Protection and Biodiversity Conservation Act

Introduction

The environmental assessment of the Stage 1 development 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 include:

- 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;
- nuclear actions;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park; 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 process

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, now called the Department of Environment and Energy, invited public comment on the referral.

On 23 December 2014, a delegate of the Environment Minister 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

A draft EIS was prepared to address the requirements of the EPBC Act and the EIS guidelines and was released for public exhibition. Following public exhibition, the EIS is to be finalised and submitted to the Environment Minister as described in Section 3.2.3.

Scope of the environmental assessment

The proposed airport would be developed as outlined in the revised draft Airport Plan, which was prepared in accordance with the Airports Act (as amended in June 2015). Consistent with the proposal for a staged airport development, the revised draft Airport Plan includes a specific proposal for Stage 1 of the 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 revised draft Airport Plan also provides indicative design concepts for the long term development of the airport, setting out the Australian Government's strategic vision for the airport's development over time. Subsequent stages of development beyond Stage 1, including construction of additional terminal areas or supporting infrastructure to expand the capacity of the airport using the first runway or construction of a second runway, do not form part of the action subject to the current assessment process. It is expected that there would be a number of incremental stages of development before the airport approaches its potential long term capacity. Future stages of development beyond Stage 1 (as described in Part 3 of the revised draft Airport Plan) will be subject to the approval requirements in the Airports Act.

Although the long term airport development is not part of the current action, Volume 3 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 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. Section 6 of the Airports Act provides for a 'Sydney West Airport' to be identified 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 is therefore deemed to be an airport for the purpose of the Airports Act. For the purposes of this EIS, Sydney West Airport is often referred to as the Western Sydney Airport. An airport lease would in due course be granted by the Commonwealth to an ALC, which would then become responsible for the airport site.

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

The revised draft Airport Plan consists of three main parts:

- Part 1 is the title section;
- Part 2 outlines the indicative concept design; and
- Part 3 details the specific developments that are authorised by the Airport Plan.

Part 3 of the revised draft Airport Plan is 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 more substantial terminal, support and commercial facilities and eventually a second runway.

Developments that are not included in Part 3 of the Airport Plan, as determined, will be subject to the general planning approval 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. For the purposes of the EPBC Act, a variation of the Airport Plan is taken to be 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 Environment Minister must therefore be sought on the variation before it is made. In addition, any condition or provision that the Environment Minister requires to be included in the Airport Plan to protect the environment may only be varied with the agreement of the Environment Minister.

3.2.3 Public consultation and determination of the Airport Plan

The draft EIS and draft Airport Plan were placed on concurrent public exhibition from 19 October to 18 December 2015. A number of communications channels were engaged to notify the public of the exhibition and invite comment, including national, metropolitan and local newspapers, and online at www.westernsydneyairport.gov.au. Further information is included in Chapter 8.

During the public exhibition period any person, group, corporation or agency was able to submit comment on the draft EIS or the draft Airport Plan to the Department of Infrastructure and Regional Development. All comments on either document were considered to be comments on the EIS. Volume 5 of this EIS contains a summary of the comments received and how those comments have been addressed in this EIS.

Finalisation of the EIS and determination of the Airport Plan

This EIS, together with copies of comments received during the public comment period, will be given to the Environment Minister in accordance with section 104 of the EPBC Act. It is expected that the Infrastructure Minster will then give Environment Minister a copy of the revised draft Airport Plan in the form proposed to be determined by the Infrastructure Minister under section 96B of the Airports Act. The Environment Minister would then consider the finalised EIS and revised draft Airport Plan from an environmental perspective and notify the Infrastructure Minister 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.

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 allowed by the Infrastructure Minister. 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 an assessment 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 an 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 invite public comment on a preliminary version of a draft airport master plan for public comment. The ALC must provide copies of comments received on the preliminary version to the Infrastructure Minister and demonstrate that the company has had due regard to those comments in preparing the draft master plan.

Chapter 28 (Volume 2b) contains a more detailed discussion of the arrangements for transitioning from the Airport Plan to the first 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;
- constructing or modifying certain buildings (including terminals);
- constructing or extending taxiways;
- transport links such as road and rail;
- development that is likely to have significant environmental or ecological impact;
- development which affects an identified environmentally significant area;
- development likely to have a significant impact on the local or regional community; and
- certain sensitive developments.

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 Infrastructure Minister.

Under section 160 of the EPBC Act, the Infrastructure Minister is required to seek the advice of the Environment Minister before deciding to approve a draft MDP. The Environment Minister 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 Infrastructure Minister is satisfied that the draft MDP meets the objectives defined in the Airports Act, the decision may be made to approve the plan.

It is expected that major development plans would be required for each of the stages of significant expansion of terminal and support facilities required to take the airport from the capacity provided by the Stage 1 development (approximately 10 million passengers per annum) to the capacity required for the first runway to operate at full capacity (indicatively approximately 37 million passengers per annum). A major development plan would also be required for construction of the second runway.

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 (AEPR) set out the framework for the regulation and management of activities at airports that could have potential to cause environmental harm. This includes 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 AEPR impose duties on operators of undertakings at airports 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.

The AEPR also impose extensive monitoring and reporting requirements in relation to air, water and soil pollution, as well as noise levels. This regime will be oversighted by the statutory appointment of an 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 and others for the purposes of preventing, controlling or reducing the environmental impact associated with airport operations. The ALC and others that carry out activities at the airport site will be required to take all reasonable steps to ensure the strategy is complied with. The environment strategy will be prepared as part of the master plan development process. Chapter 28 (Volume 2b) provides further detail on the arrangements for the transition from the Airport Plan to the first master plan.

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 provide for 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. Activities that result in intrusions into this prescribed airspace – such as new buildings or other structures – are termed 'controlled activities' and require approval. It is expected that prescribed airspace will be progressively provided for in relation to the airport as relevant surfaces are defined. The prescribed airspace would include airspace above the Obstacle Limitation Surface (OLS), when it is declared, and Procedures for Air Navigation Services – Aircraft Operations (PANS–OPS) surfaces.

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 to properly operate and maintain the airport.

3.3.5 Airspace management

Airservices Australia assessed airspace implications and air traffic management approaches for Sydney region airspace associated with the introduction of services at the proposed airport. This analysis indicated there are no known physical impediments that would prevent safe and efficient operations for aircraft arriving at or departing. Following its analysis, Airservices Australia developed indicative flight paths to inform a preliminary assessment of airspace implications.

The indicative flight paths were also used to model and assess the impacts of aircraft operations in the EIS. The modelling focused on the safety and efficiency of operations as a first step before considering potential opportunities for minimising noise impacts. The indicative flight paths have nevertheless enabled assessment of the potential impacts of aircraft operations at the proposed airport. The EIS has provided the opportunity for the community and stakeholders to consider the design of the indicative flight paths and express views about their assessed impacts.

The Department of Infrastructure and Regional Development will be responsible for the flight path design for the proposed Western Sydney Airport, working in close collaboration with Airservices Australia and CASA. The proposed airspace design arrangements will be formally referred under the EPBC Act. CASA would ultimately approve the proposed airspace management arrangements, including the authorisation of final flight paths, before the commencement of operations.

The airspace management and formal flight path determination process is detailed in Chapter 7.

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*. A first point of entry is required to comply with conditions imposed by the Agriculture Minister 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;
- controls related to activities such as commercial trading, liquor licensing, vehicle movements, gambling and smoking; and
- economic regulation under the Airports Act and *Competition and Consumer Act 2010*.

3.4 NSW planning framework

The Western Sydney Airport would be located on land owned by the Commonwealth within the state of NSW. Section 96C(3) of the Airports Act provides for development of the airport in accordance with the Airport Plan and section 112 of the Airport Act provides that Part 5 of the Airport Act applies to the exclusion of any state law. Accordingly, NSW planning laws will not apply in relation 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 Australian Government will continue to coordinate with the NSW Government to ensure integrated planning occurs around the airport site, including land use planning and transport infrastructure.

Table 3–1 following provides a brief summary of key elements of the NSW planning framework. Information on how NSW laws, 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

NSW legislation and planning instruments	Overview
Environmental Planning and Assessment Act 1979	The objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) 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 EP&A 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) under the EP&A Act.

NSW legislation and planning instruments	Overview
State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP)	The Western Sydney Employment Area (WSEA) was established to facilitate the use of land within the Western Sydney region with land for industry and employment. The WSEA SEPP provides a range of development controls and standards for development within the WSEA.
State Environmental Planning Policy 19 – Bushland in Urban Areas (SEPP 19)	The purpose of SEPP 19 is to protect and preserve bushland within urban areas due to its inherent aesthetic, recreational, educational, scientific 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 signage (including 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.
Liverpool Local Environmental Plan 2008 (Liverpool LEP)	The Liverpool LEP provides local environmental planning controls and standards for land in the Liverpool LGA in accordance with the relevant standard environmental planning instrument under section 33A of the EP&A Act.
Protection of the Environment Operations Act 1997	The *Protection of the Environment Operations Act 1997* aims to protect, restore and enhance the quality of the environment, having regard to the need to maintain ecologically 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* covers a number of different areas including reserving lands, managing certain reserved lands, the protection of Aboriginal objects and places, the protection of fauna and the protection of native vegetation.
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 (where appropriate) remediating land which the Environment Protection Authority considers to be significant enough to warrant remediation.

NSW legislation and planning instruments	Overview
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* aims to reduce the negative impact of weeds on the economy, community and environment.

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. Day-to-day management of the site prior to construction and operation of the proposed airport is outside the scope of this EIS.

3.5.2 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. Relocation of utility infrastructure to alternative locations is not considered as part of the action being assessed by this EIS. However, as these utility assets are the responsibility of private or state-owned owners and operators, any off-site works to relocate them would be subject to a separate process.

3.5.3 Western Sydney Infrastructure Plan

The proposed airport is supported by the Australian and NSW Governments' Western Sydney Infrastructure Plan (WSIP), which is a $3.6 billion investment over 10 years in major road infrastructure upgrades in Western Sydney. The WSIP will connect the airport site with Sydney's road network, 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 (the M12), including access to the site, between the M7 Motorway and The Northern Road, generally to the north 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 revised draft Airport Plan and this EIS. The NSW Government is responsible for delivering these projects as operator of the road network. This will include undertaking any environmental impact assessments that may be required.

3.5.4 NSW Planning – Priority Growth Areas

The NSW Government has declared priority growth areas to encourage development in Western Sydney – including the North West Priority Growth Area and the South West Priority Growth Area. The purpose of these priority growth areas is to provide capacity for residents, dwellings, employment precincts and town centres.

The North West Priority Growth Area covers an extent of about 10,000 hectares within The Hills, Blacktown and Hawkesbury local government areas about 20 kilometres north-east of the airport site. The priority growth area will add capacity for 200,000 residents; 70,000 dwellings; three employment precincts; and a town centre at Rouse Hill. The South West Priority Growth Area covers an extent of about 17,000 hectares within the Liverpool, Camden and Campbelltown local government areas. The priority growth area will add capacity for 300,000 residents; 110,000 dwellings; two employment precincts; and a town centre at Leppington.

More recently, the NSW Government has announced the Western Sydney Priority Growth Area around the airport site. This priority growth area is in an earlier stage of planning but similarly aims to provide homes, jobs, infrastructure and services to residents in the region, incorporating parts of the Liverpool and Penrith local government areas. Another key objective of the growth area is to enhance regional connectivity between the centres of Liverpool, Penrith and suburban developments around the proposed airport.

3.5.5 Western Sydney Employment Area

The NSW Government declared the Western Sydney Employment Area underpinned by the State Environmental Planning Policy (Western Sydney Employment Area) 2009. The employment area is intended to provide businesses in the region with land to facilitate employment, including transport logistics, warehousing and office space. The employment area is expected to support more than 57,000 jobs over the next 30 years. The employment area is adjacent and complementary to the Western Sydney Priority Growth Area discussed above.

3.5.6 Rail in Western Sydney

Joint Scoping Study into rail needs for Western Sydney

The Australian Government and NSW Governments are undertaking a Joint Scoping Study on the rail needs for Western Sydney, which includes the proposed airport. The study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region.

A specific alignment or station location for the airport rail link is yet to be confirmed, however planning for the airport preserves flexibility to accommodate several possible rail alignments. This would be resolved as part of the future design and planning for the proposed airport in conjunction with Transport for NSW and DP&E. Figure 3–2 depicts potential rail approaches to the airport site.

Figure 3–2 Indicative rail alignment options connecting to the airport site

South West Rail Link Extension

The NSW Government is in the process of protecting a future public transport corridor that would extend the South West Rail Link. The proposed corridor extends from Leppington to Bringelly and then heads in two directions: south to Narellan and north to the Western Line near St Marys. As part of the northern extension, the corridor is expected to provide a station at the airport site.

Outer Sydney Orbital

Transport for NSW is investigating suitable corridors for the Outer Sydney Orbital. The Outer Sydney Orbital would provide a north-south connection for a future motorway and freight rail.

The proposed airport development is to the immediate east of the corridor investigation area. Transport for NSW has committed to take into consideration the development of the future airport by coordinating and working closely with relevant government agencies in assessing corridor options for the Outer Sydney Orbital.

The corridor provides the opportunity for multimodal linkages for employment, freight and passenger movements directly related to the proposed airport.

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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 Airport Plan as determined , which forms a transitional planning instrument under the Airports Act (see Section 3.2.2). The concept design outlined in Part 2 of the revised draft Airport Plan provides the planning framework for the proposed airport until the first master plan is in place. Part 2 includes the Land Use Plan for the airport site. The Land Use Plan cannot be altered without the approval of the Infrastructure Minister.

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 Infrastructure Minister. The Land Use Plan regulates the types of development, in terms of permissible land uses, that can occur within the airport site.

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 (ABC) under the Airports (Building Control) Regulations 1996. In deciding whether to approve the building activity, the ABC 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 airport 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) must comply with section 89A of the Airports Act; this section requires the Infrastructure Minister 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 revised 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	327
AD2 Terminal and Support Services	229
AD3 Aviation Logistics and Support Facilities	238
AD4 Aviation Activity (Reservation)	511
BD1 Business Development	191
BD2 Business Development (Reservation)	155
EC1 Environmental Conservation	117
TOTAL	1,768

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 approved.

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.

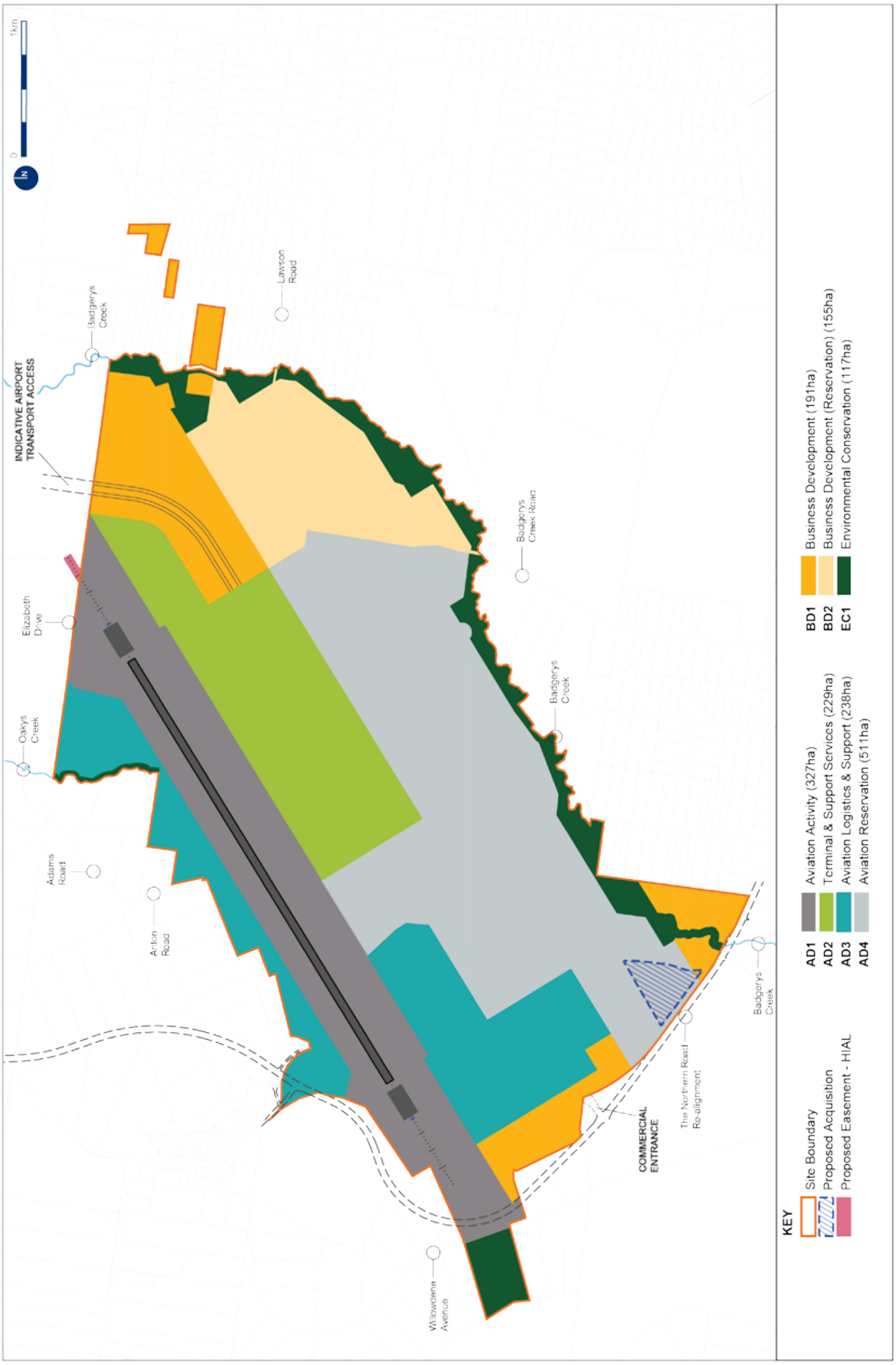

Figure 4–1 Land use zones (Stage 1)

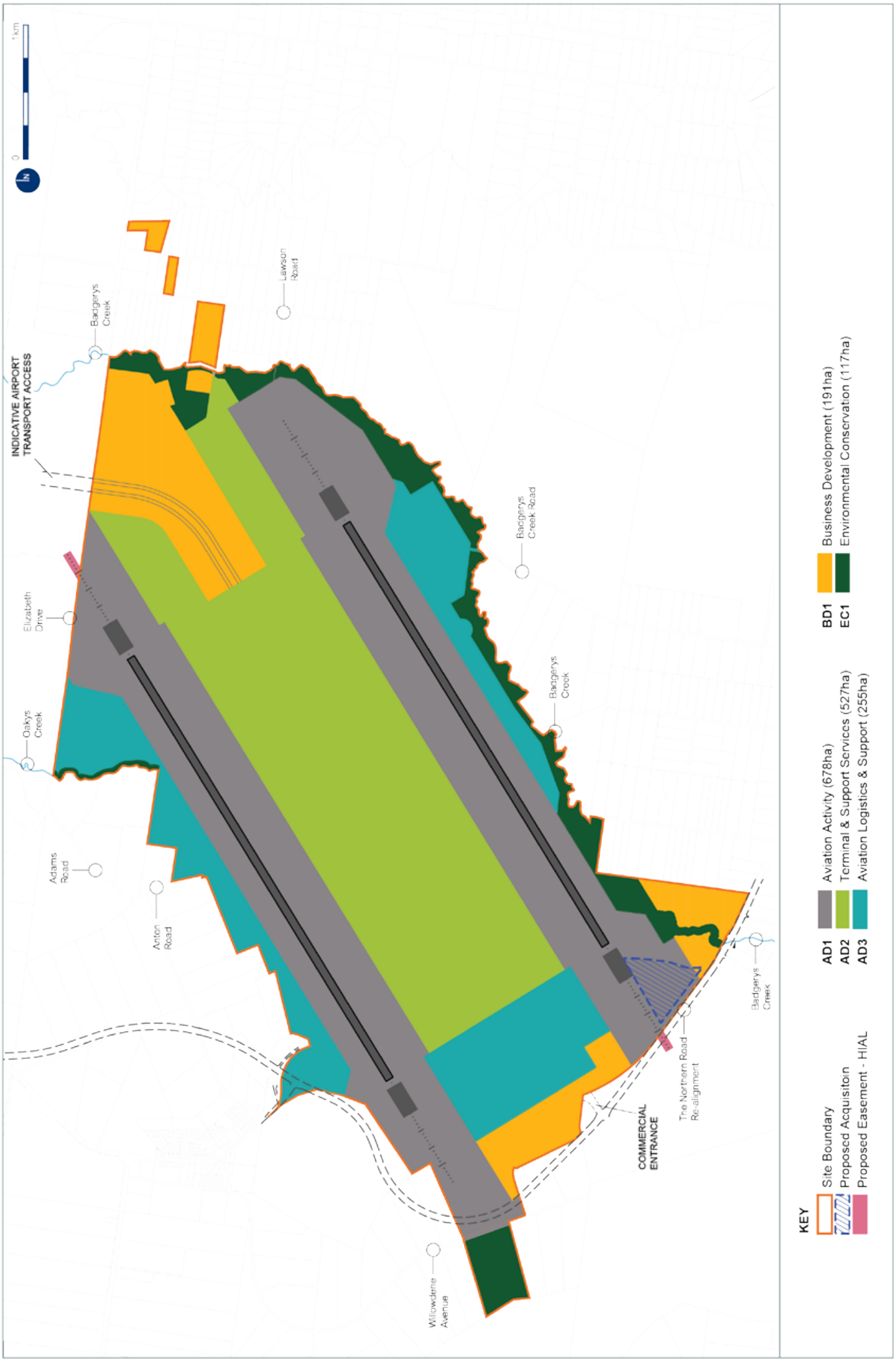

Figure 4–2 Indicative land use zones (long term)

4.3 Land use zones – objectives and permissible uses

Each land use zone encompasses a series of objectives and permissible uses as well as overarching requireemtns for some zones.

4.3.1 Objectives

In addition to meeting any overaching requiresments for the zone, any development within a zone must be consistent with the objectives for that zone. In addition, a development must not be inconsistent with following objectives:

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

4.3.2 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 B of the revised 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. A description of the land use objectives and permissible uses for each land use zone is provided below.

4.3.2.1 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 basin • 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.

4.3.2.2 AD2 Terminal and support services

This land use zone applies to the terminal precincts and terminal support facilities for the Stage 1 development.

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;	• Amusement centre • Animal boarding • Aviation activity • Aviation support facility • Business premises • Car park and parking spaces
• 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	• Child care centre[a] • Convenience store • Detention basin • 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.

[a] A child care centre is not specifically authorised by Part 3 of the Airport Plan, as a sensitive development (as defined in section 71A of the Airports Act) must comply with section 89A of the Act and requires approval from the Infrastructure Minister.

4.3.2.3 AD3 Aviation logistics and support

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

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 4–4.

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

Objectives	Permissible uses
The objectives of 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 basin • 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.

4.3.2.4 AD4 Aviation reservation

This zone is reserved for future aviation activities and aviation support facilities and has been informed by the long term operational requirements of the proposed airport. To the extent not used for the Stage 1 development, it will be incrementally released for aviation purposes as it becomes operationally required, over the next 40 years or so. This zone contains areas with biodiversity values.

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 must have regard to biodiversity values in this zone and potential advsere impacts 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 • Car park and parking spaces • Detention basin • Earth works* • Environmental protection works • Extractive industry* • Navigational aids • Passenger transport facility • Public utility undertaking • Public administration facility • Retail – low intensity

Objectives	Permissible uses
	• 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.

4.3.2.5 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 be inconsistent with:

- neighbouring environmentally sensitive areas;
- built form considerations for the airport; and
- 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 basin • Earth works* • Environmental protection works • Extractive industry* • Freight handling and protection works • Hotel or motel accommodation

Objectives	Permissible uses
	• 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.

4.3.2.6 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; and
- appropriate provisions or arrangements are in place which ensure that the land can be vacated when needed for aviation purposes.
- Development in this zone must not be inconsistent with:
- built form considerations for the airport; and
- 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 (Reservation)

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 a • Detention basin • 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.

[a] A child care centre is not specifically authorised by Part 3 of the Airport Plan, as a sensitive development (as defined in section 71A of the Airports Act) must comply with section 89A of the Act and requires approval from the Infrastructure Minister.

4.3.2.7 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 the cultural heritage values of the land; • enhance, restore and protect local biota and the ecosystem and habitats of native species; • 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 • Heritage conservation works • Public utility undertaking Note: permissible land uses outlined in the revised 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 approximately 10 million annual passengers as well as freight traffic.

As demand grows over time, 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 revised draft Airport Plan sets out a concept design including an indicative layout 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 regard 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 revised draft Airport Plan.

5.1.2 Stage 1 development

Site preparation activities would be undertaken for construction, including bulk earthworks to create a level surface for the Stage 1 development which covers approximately 1,150 hectares. Airport operations are proposed to begin around the mid-2020s and provide capacity to service approximately 10 million annual passengers, equating to approximately 63,000 annual air traffic movements. This level of demand is anticipated to occur around five years after operations commence.

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 the mid-2020s and would be capable of handling both domestic and international regular public transport services in addition to freight. An indicative layout for Stage 1 is provided in Figure 5–1.

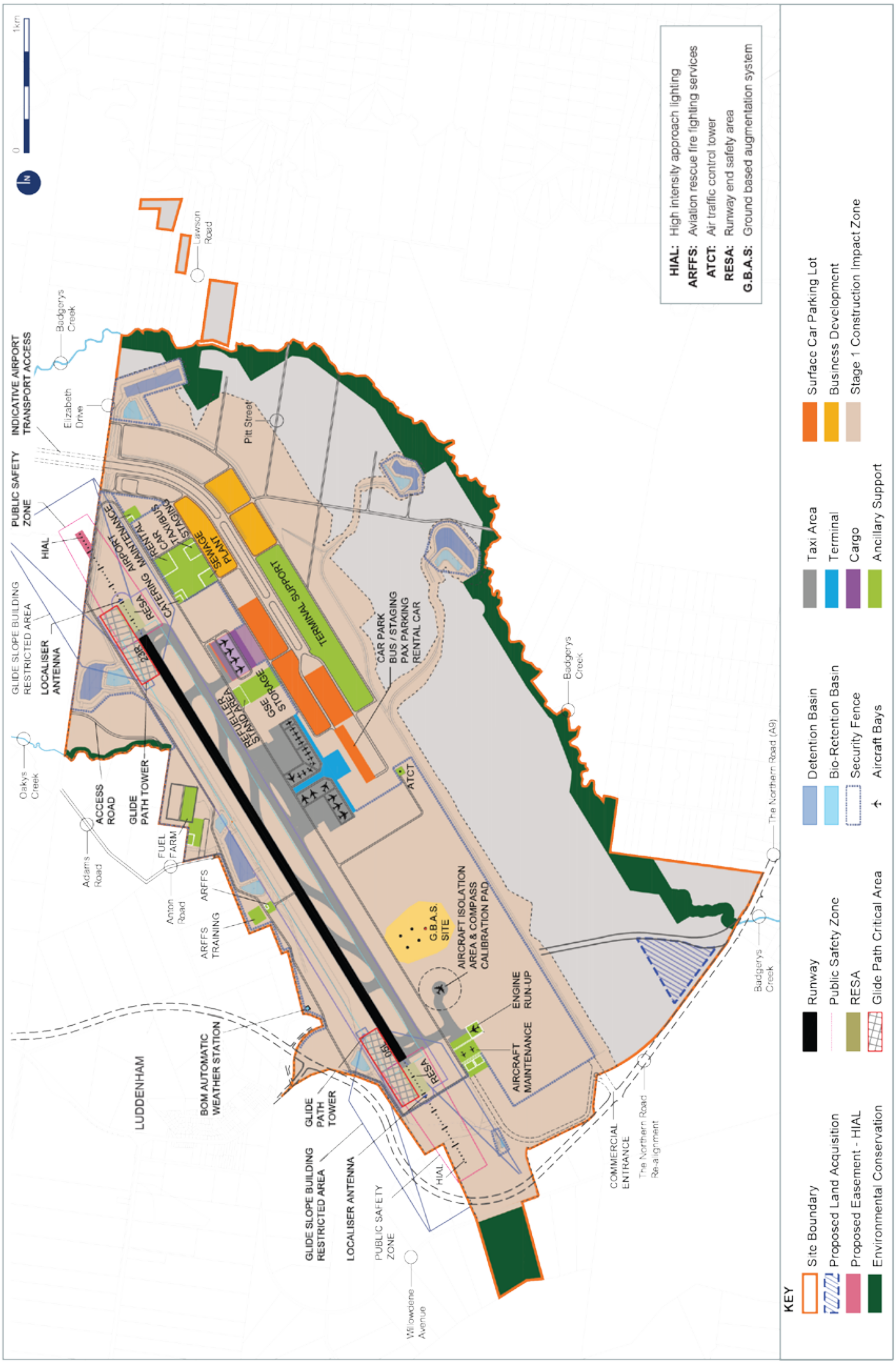

Figure 5–1 Indicative airport site layout – Stage 1 development

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 revised draft Airport Plan are presented in Figure 5–2.

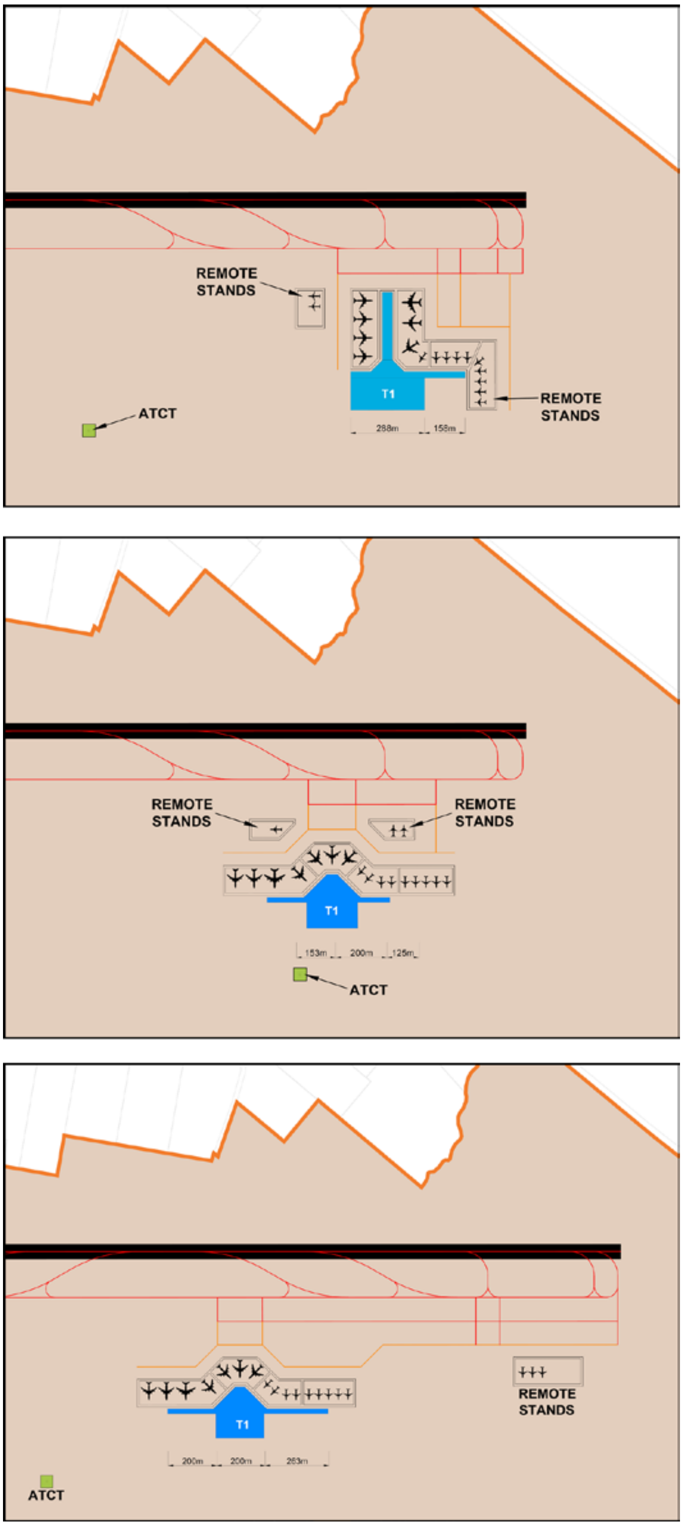

Figure 5–2 Alternative Stage 1 terminal layouts

5.1.3 Long term development

Incremental development of the proposed airport would be required at various stages as passenger demand increases and would include:

- 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; 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 its 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, at which time a second parallel runway would be required. This is equivalent to approximately 185,000 annual air traffic movements. By around 2063, the total annual air traffic movements for the proposed airport is expected to be 370,000, serving approximately 82 million annual passengers.

The Land Use Plan, as outlined in the revised 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 parallel 05/23 orientation approximately 1,900 metres apart from the first runway, permitting independent operations and maximising the size of the midfield available on the airport site, to be used for the terminal and other support facilities.

Development beyond Stage 1 would be subject to further regulatory approval in accordance with the Airports Act, including any required environmental assessment, and are not assessed as part of this EIS. However, as Stage 1 clearly facilitates the development of these future stages, it is appropriate for this 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. This 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.

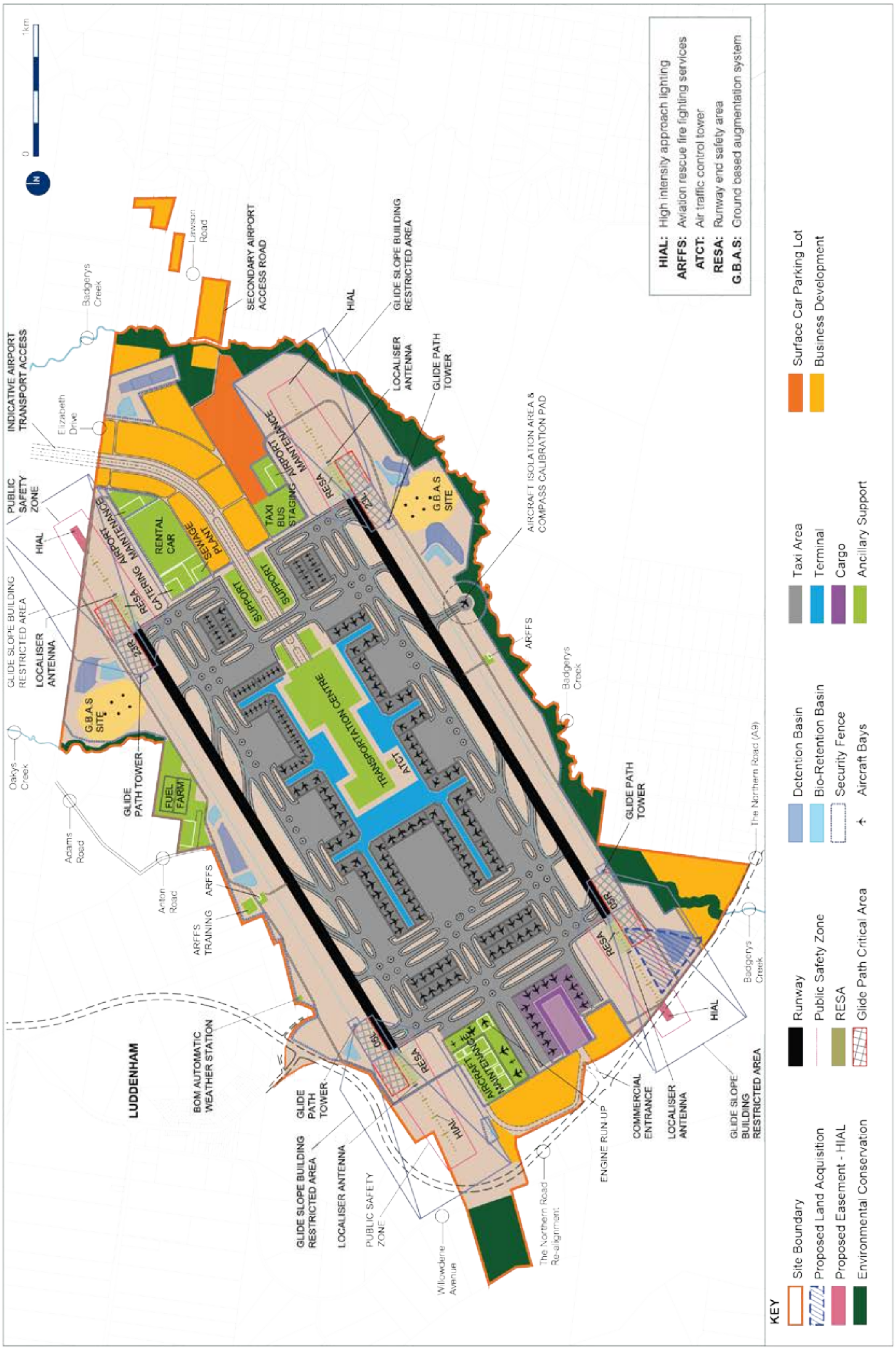

Figure 5–3 Indicative airport site layout – Long term development

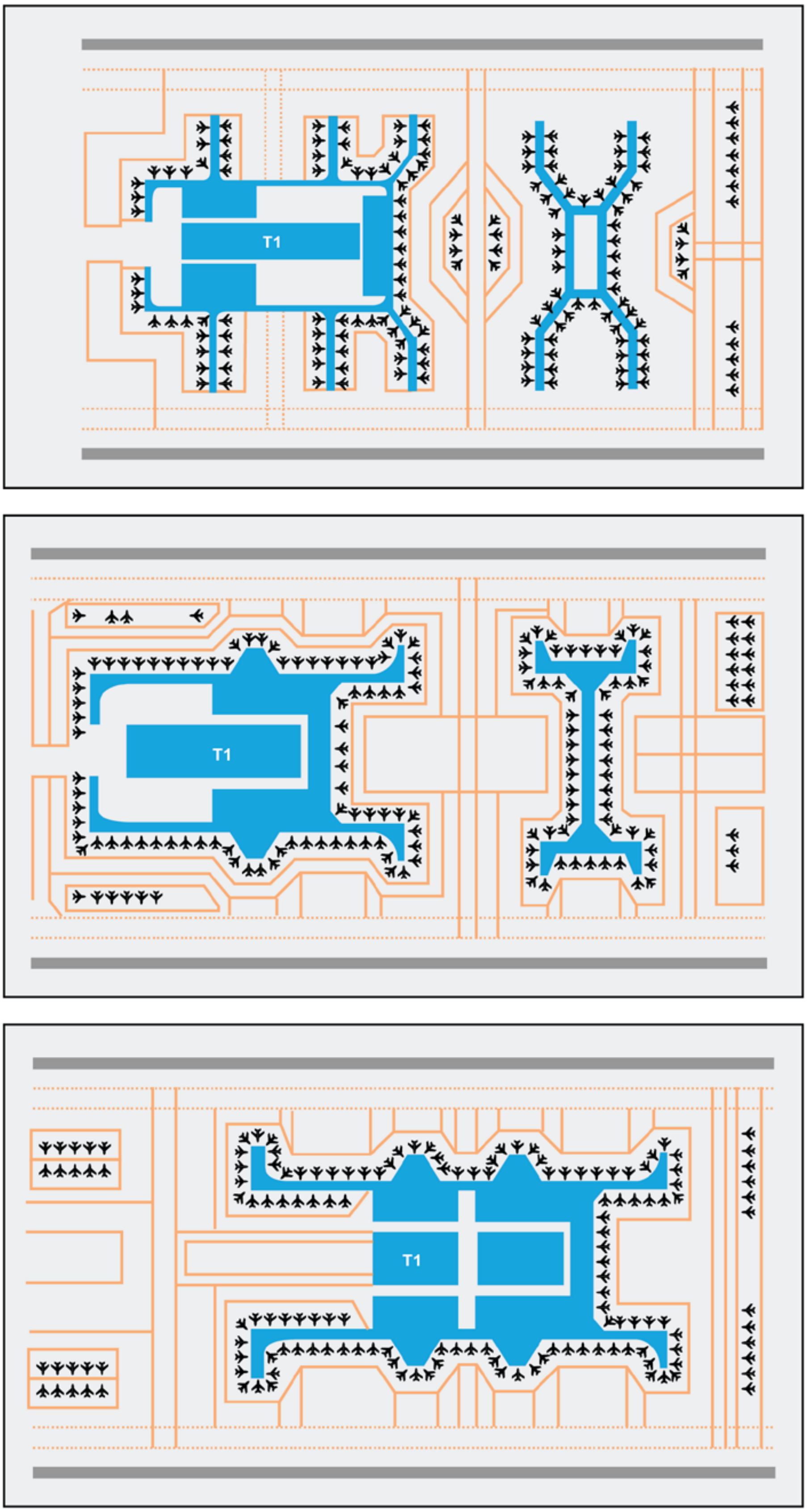

Figure 5–4 Alternative long term indicative terminal layouts

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 of the Stage 1 development approximately first five years after operations commence are provided in Table 5–1.

Table 5–1 Summary of key Stage 1 features

Feature	Details
General	
Airport site	Total area approximately 1,780 hectares
Ownership	Commonwealth
Land use	Commercial aviation
Estimated demand – Stage 1 Operations	
Annual aircraft movements – passenger	Approximately 56,000 international and domestic
Annual Aircraft movements – dedicated freight	Approximately 7,000 international and domestic
Passenger movements	Approximately 10 million per year international and domestic
Runway and lighting	
Length	3,700 metres
Width	60 metres
Aerodrome reference aircraft	Code F
Orientation	05/23 – Approximately north-east/south-west (50º/230º plus or minus up to five degrees)
On-site/ off-site lighting	900 metre high intensity approach lighting (HIAL) off end of runway threshold may require offsite interests.

Feature	Details
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	65,000 to 90,000 square metres of floor space
Ground transport links and access	
Access	Road access only
Public entrance	M12 link (100 metre wide corridor comprising up to six traffic lanes, two bus lanes and a rail corridor of sufficient width to provide for two independent rail services with two tracks for each service and provision for appropriately sized passenger railway station/s)
Freight and maintenance	The Northern Road (50 metre wide corridor comprising a minimum of four traffic lanes)
Car parking and drop-off	
Car parking spaces	Up 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	2.7 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.

The development of the revised draft 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 addition to the Airports Act and Regulations, 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 revised draft Airport Plan:

- International Civil Aviation Organization (ICAO) standards and manuals;

- *Civil Aviation Act 1988*, the Civil Aviation Safety 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;
- Biosecurity Act 2015 and Regulations;
- Airspace Act 2007; and
- Air Services Act 1995.

5.3.1 Aircraft fleet mix and aerodrome reference codes

The revised 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
Code C	Domestic	Airbus A320 Boeing 737
Code D	Domestic	Boeing 767
Code E	International	Airbus A330/ A350 Boeing 747-400 Boeing 777 Boeing 787
Code F	International	Airbus A380 Boeing 747-8

During Stage 1 operations, 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, therefore maximising the aeronautical capacity of the Airport in the long term. 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 for Stage 1 operations 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 assessed airspace implications and air traffic management approaches for the Sydney region airspace associated with the development of the proposed airport, to reaffirm that the airport site could be used as a high capacity airport to accommodate any aircraft fleet mix. It is important for long-term planning that the configuration of the airport site in Stage 1 does not preclude future development and therefore airfield capacity analysis is based on the long term, parallel runway scenario.

This analysis indicates that an airport at Badgerys Creek could potentially achieve 103 total aircraft movements per hour with parallel runway operations in the long term (anticipated to be around the 2060s). This would consist of:

- 45 landing operations; and
- 58 departure operations.

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, either landing or departing; and
- peak hour passenger and air traffic movements demand at the airport.

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 busy hour activity represents a part of a regular day during which overall aviation activity at the airport is at its highest. 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.

Within the first five years of operation, the proposed airport is expected to accommodate approximately 63,000 passenger and freight air traffic movements per year, including approximately 21 air traffic movements per hour during peak times. This could increase to 370,000 air traffic movements per in approximately 2063, including 85 air traffic movements per hour during peak times.

The Stage 1 and long term development capacity requirements for the proposed airport based on the indicative activity forecasts and the expected busy 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 operations	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)	3,300	9,500	18,700
Total annual air traffic movements (passenger and freight)	63,000	185,000	370,000
Total busy hour annual 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 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 after five years of operations the proposed airport could serve approximately 2 million international passengers annually, growing to approximately 19.5 million international passengers annually around 2050. By this time, the domestic-international split could be approximately 47 per cent domestic and 53 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 per year in Stage 1 development, increasing to 30,000 air traffic movements per year in the long term.

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 as preserved under the Strategic Direction put in place by the NSW Minister for Planning in 1985. Strategic Direction 5.8 – Second Sydney Airport: Badgerys Creek (Strategic Direction) was issued by the NSW Minister for Planning to local councils, under section 117(2) of the *Environmental Planning and Assessment Act 1979*, with the objective of avoiding incompatible development in the vicinity of any future airport at Badgerys Creek. 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.

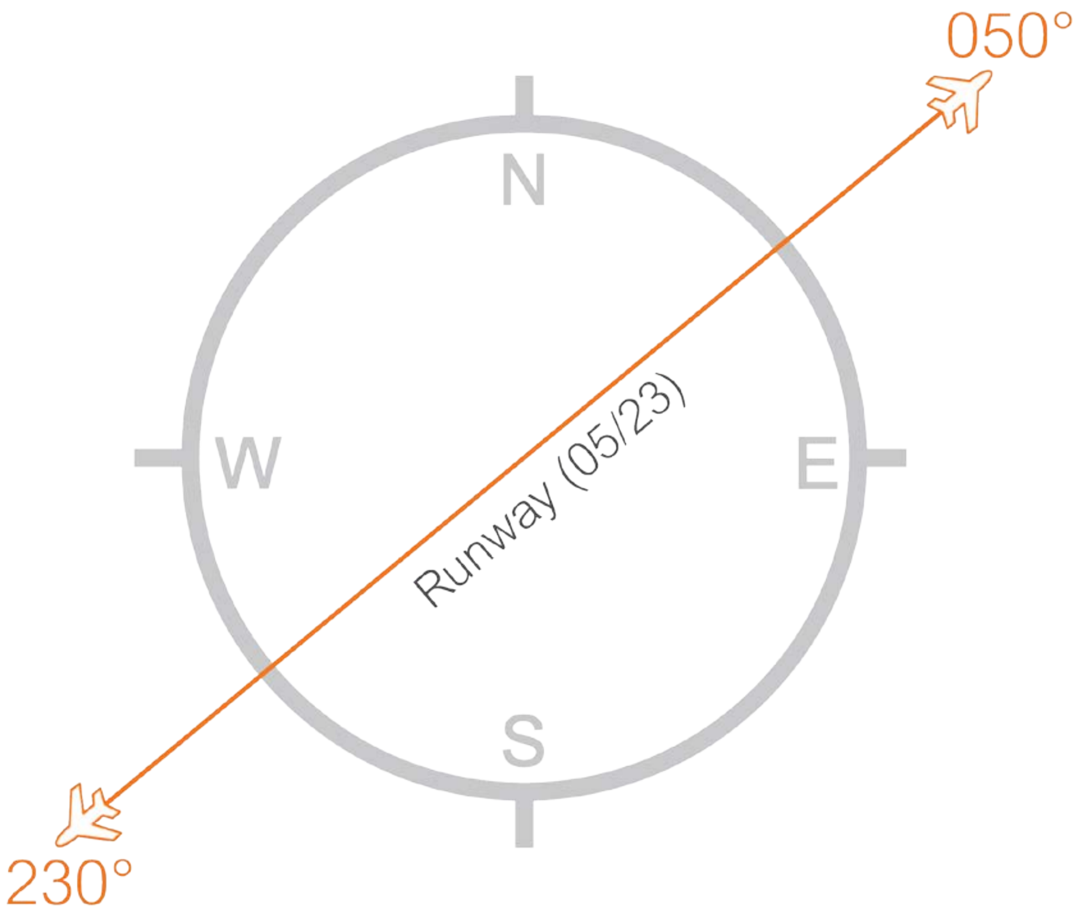

Figure 5–5 Runway orientation

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 the ICAO design standards assume 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 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 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 of equal length are proposed in the long term. This provision limits the options available for locating the first runway for Stage 1.

After around five years of operation, the Stage 1 runway is expected to accommodate approximately 63,000 passenger and freight annual air traffic movements, including approximately 21 air traffic movements per hour during peak times. This is equivalent to about 10 million annual air passengers. At full capacity (around 2050) the first runway could accommodate 185,000 annual air traffic movements per year, including 49 air traffic movements per hour during peak times – equivalent to about 37 million annual passengers. At this point a second runway would likely be required.

In the long term, two runways would be expected to service about 85 air traffic movements per hour during the busy hour, or up to 370,000 air 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’. The northern runway was selected to be the first runway at the airport site for the following reasons:

- reduced earthworks requirements (cut and fill) associated with the northern runway;
- fewer constraints on how and when a future rail line may be accommodated on the airport site;
- there would be less impacts on airport site biodiversity values if the northern runway was constructed first; and
- shortest distance to connect utility trunk lines around the airport site.

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.

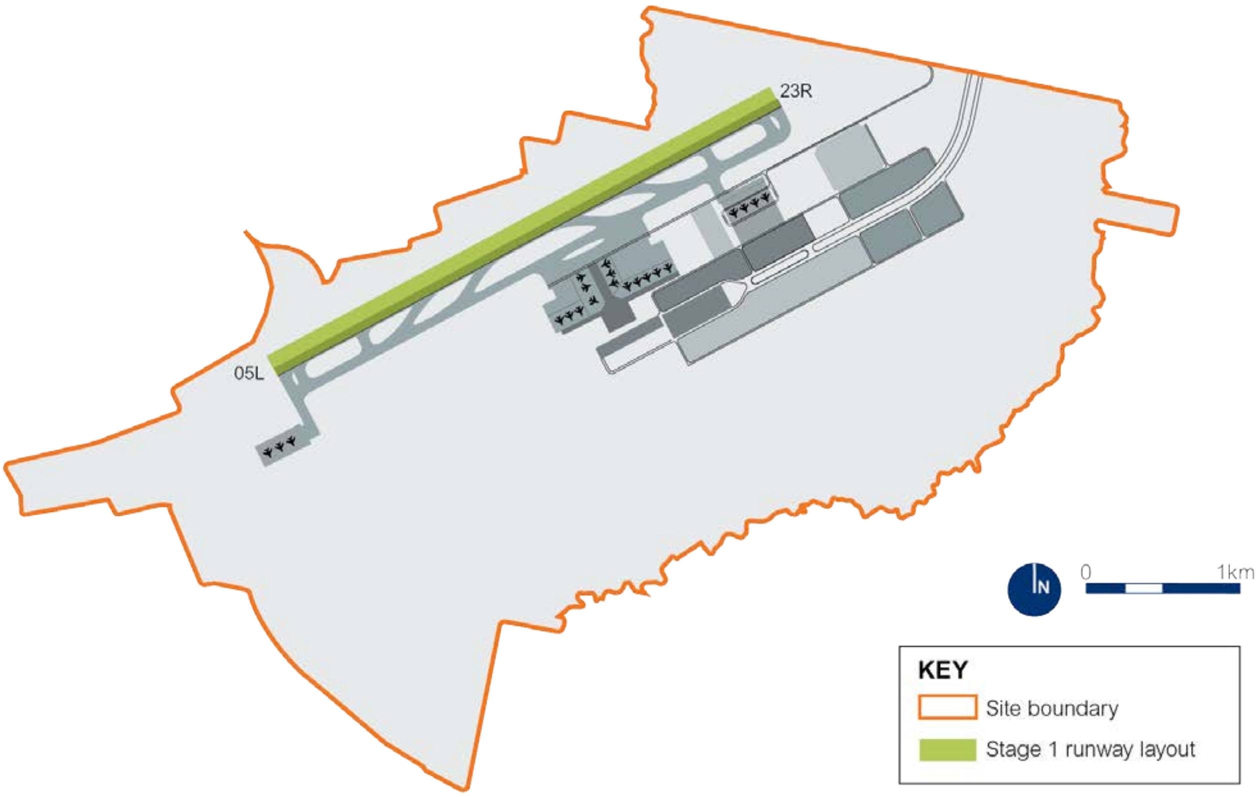

Figure 5–6 Stage 1 'northern runway' (05L–23R) layout

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[3] 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[4] 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.

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

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

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. Analysis was undertaken of the runway length required to allow the aircraft to reach its furthest possible destination if operating at maximum take-off weight. Analysis included the domestic and international operations expected at the proposed airport.

Table 5–4 Runway length requirements for critical aircraft expected to use the proposed airport

Aircraft	Code	Maximum take-off weight (kg)	Runway length requirements (m) (based on typical take-off weights)
B737-800	C	79,016	2,930
A321-200	C	93,500	2,953
B777-200	E	286,900	3,426
A380-800	F	575,000	3,544
B777-300ER	E	351,535	3,632
B747-8	F	447,696	3,662
A330-300	E	233,000	3,697
B747-400	E	396,894	3,780
B767-300ER	D	186,880	3,780
A340-600	E	380,000	4,016

Source: Aircraft Manufacturers' Manuals

The analysis highlights that, under comparable conditions, newer aircraft tend to use less runway length for take-off than the earlier generation of aircraft. This has been possible because of improved aerodynamic efficiencies and efficient modern engines.

Based on the analysis undertaken, the maximum runway length requirement is 4,016 metres for the A340-600, followed by 3,790 metres for the B747-400 and B767-300ER aircraft. However, these three aircraft are currently being phased out of most airline fleets.

The heaviest Code F aircraft, the A380-800, requires a runway length of 3,544 metres based on maximum take-off weight operations 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 B747-8 (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 development 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 indicative range with Maximum Take-Off Weight

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*[5]. These standards require a minimum separation of 1,525 metres to enable runways to operate independently of each other in poor weather.

The separation criteria for the Stage 1 development 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 development northern runway would be positioned in the north-west of the site, allowing for a separation of approximately 1,900 metres between the Stage 1 development runway and the second runway in the south-eastern 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 anticipated long-term demand of approximately 82 million annual passengers, expected to be achieved around 2063.

[5] ICAO Doc. 9643

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 (RETs) 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 development 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 RETs. Stage 1 would be designed to preserve land to expand the proposed airport in the long term.

An indicative layout of the Stage 1 taxiways is provided in Figure 5–8.

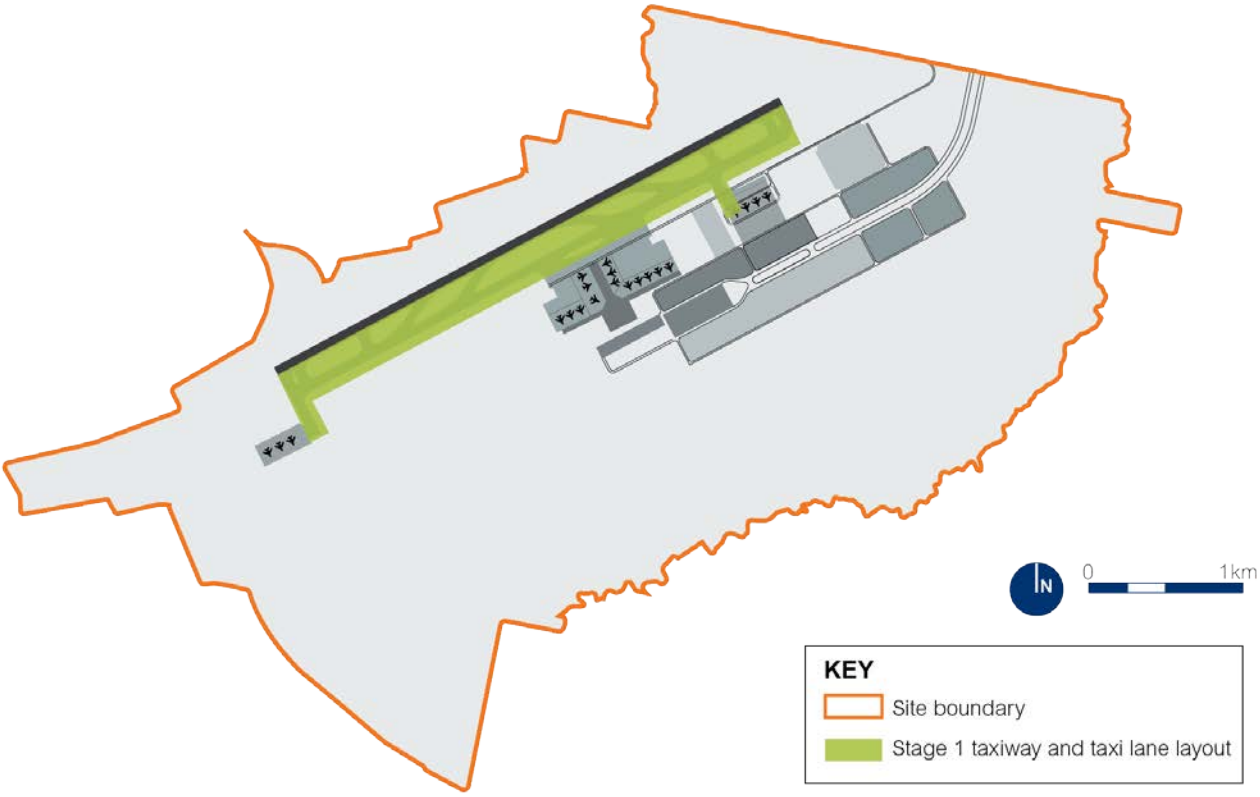

Figure 5–8 Taxiway and taxi lane layout

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 the Stage 1 development) 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 (MARS). These 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.

An indicative example of an apron and stand layout sufficient to accommodate a Code F aircraft is provided in Figure 5–9.

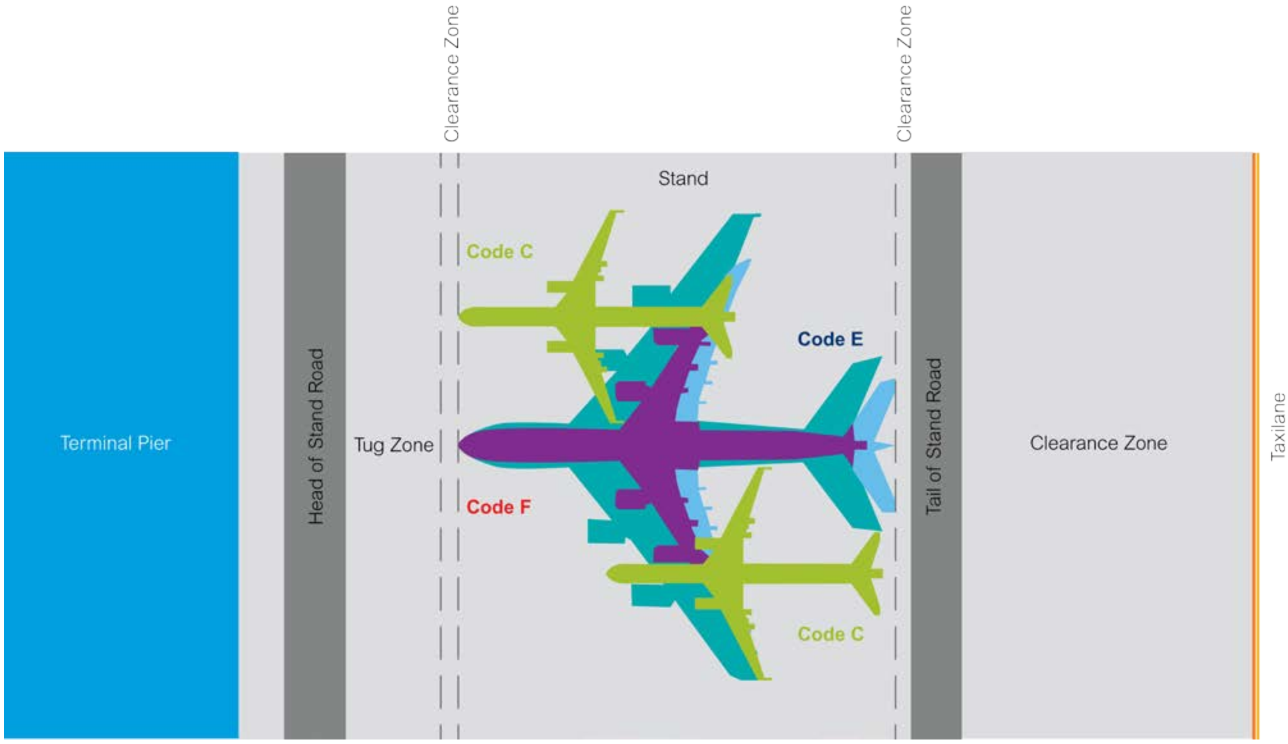

Figure 5–9 Indicative apron and stand layout for a Code F aircraft

5.4.4 Air traffic control

Air traffic control capability will be provided at the proposed airport and may be provided by an air traffic control tower (ATCT). An 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 location of an ATCT should result in the shortest possible response time. The proposed position of an ATCT should result in an approximate response time of up to four seconds, with an upper limit of five seconds in 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 a four second response time. For the airport site, this means that the ATCT would need to be at least 35 metres high.

Planning for the long term, to provide air traffic control coverage of both runways within the desired response time, an ATCT would be located in the centre of the midfield area, at a suitable location within the area shown in Figure 5–10.

The facility would be a stand-alone installation and would be segregated in a secure ATCT precinct.

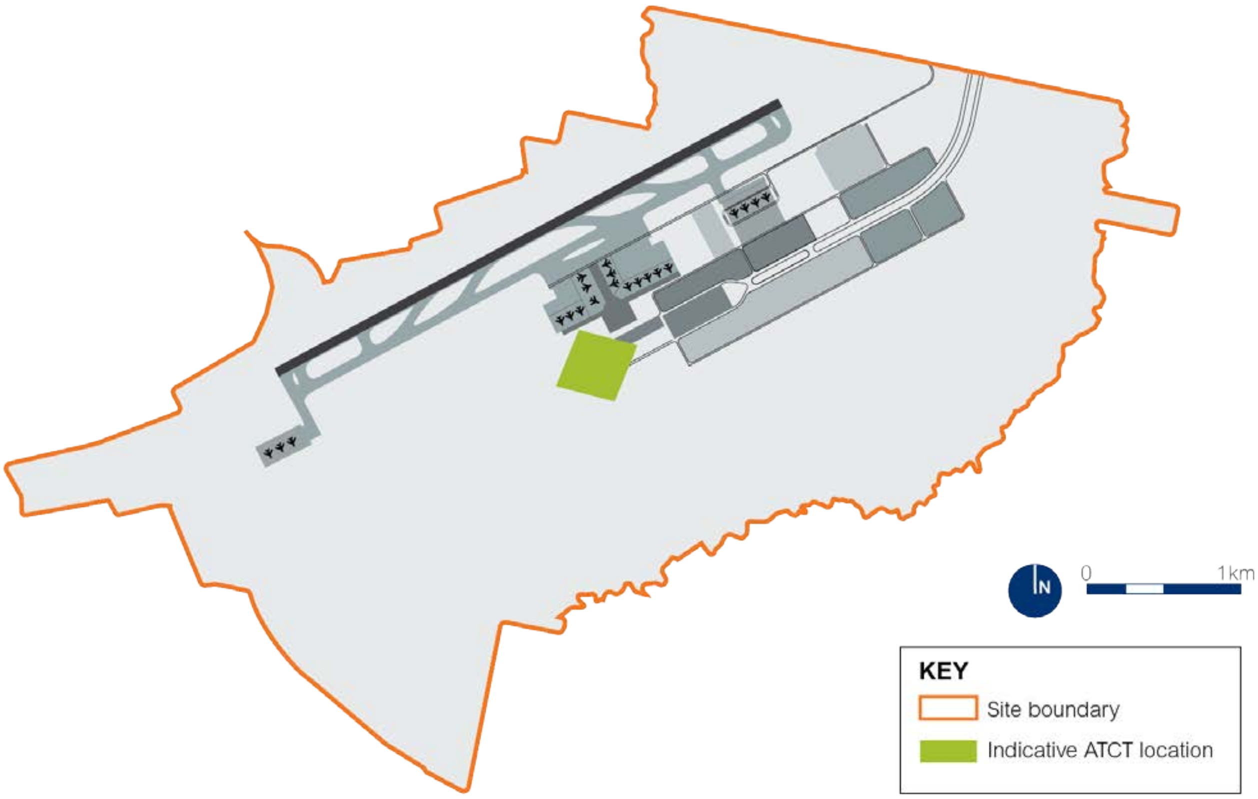

Figure 5–10 Indicative location of an air traffic control tower

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 B;
- Glide Path (GP);
- Localiser (LOC);
- Far Field Monitor (FFM);
- Distance Measuring Equipment (DME);

- Advanced-Surface Movement Guidance and Control System (A-SMGCS); and
- Ground Based Augmentation System (GBAS).

For safe airport operations, GBAS would improve 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.

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 (HIAL) – where HIAL protrudes beyond the airport site boundary, interests on the adjacent land would be acquired for the purposes of the installation of the HIAL. Indicative locations for the required HIAL are shown in Figure 5–11;
- Touchdown Zone Lights (TDZ);
- Runway Threshold Lights;
- Runway Wing Bar Lights;
- Runway End Lights; and
- Runway Guard Lights.

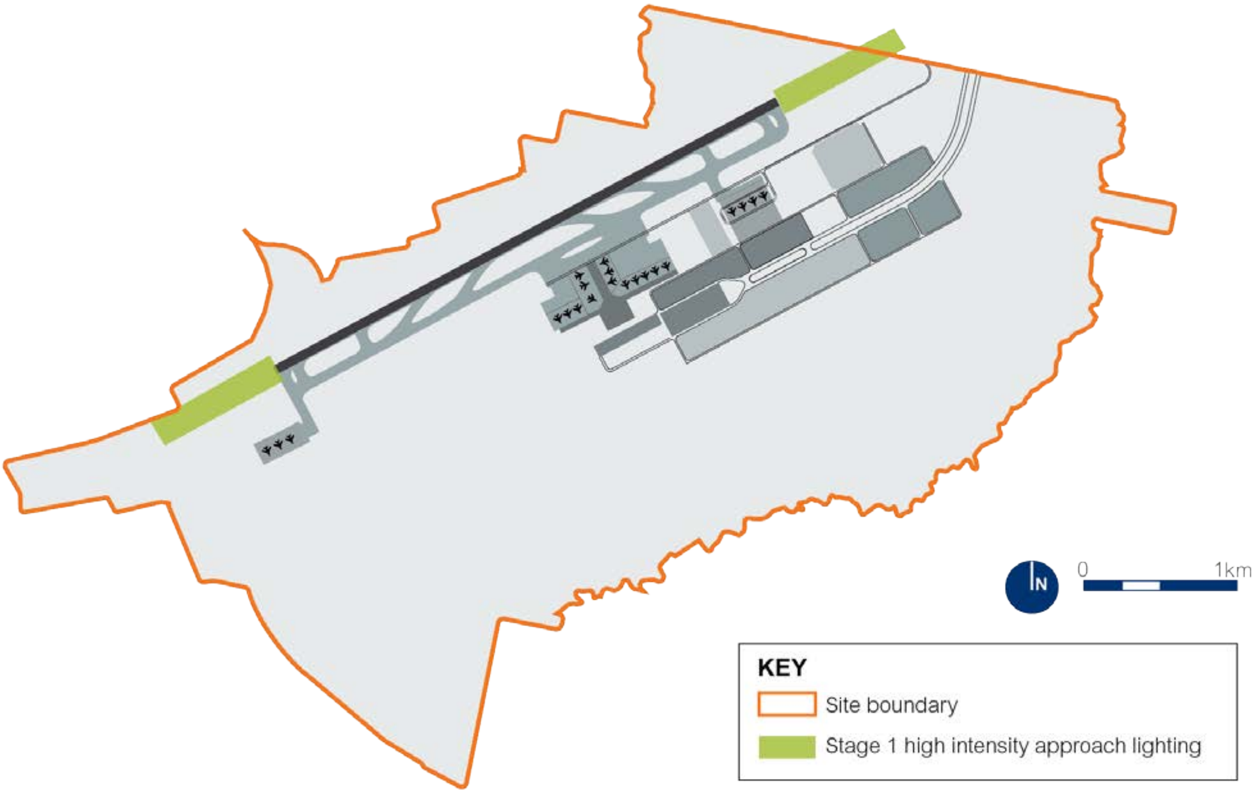

Figure 5–11 Indicative location of the required high intensity approach lighting

Taxiway lighting

Taxiway lighting would comprise the following typical elements:

- RET 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 at each runway end;
- Runway visual range – roll-out at each runway end;
- 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;
- runway end 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 (northern) runway. In the long term, a second ARFFS station may be required to service the second (southern) runway.

During Stage 1 development, 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 include staff accommodation, administration and vehicle garaging facilities, fuel storage and delivery systems, fire-fighting foam storage and run-off control facilities, and a vehicle maintenance facility.

An ARFFS training area may be provided adjacent to the ARFFS station and is likely to be positioned in the vicinity of the ARFFS station, adjacent to the airport site boundary.

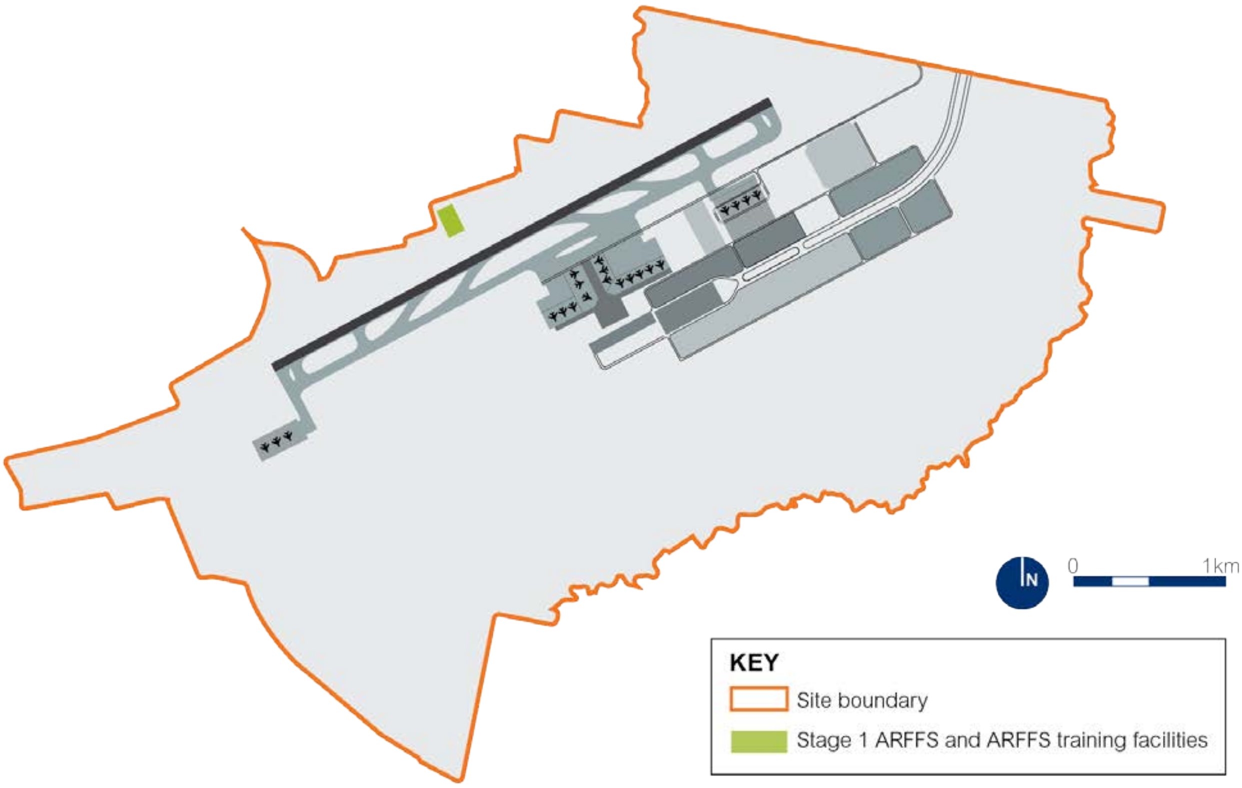

Figure 5–12 Indicative location of the ARFFS station and training facility

5.4.8 Aviation support

The proposed airport would require the provision of a range of fully serviced facilities to provide support to aviation activities. The type and scale of the support services required would change and develop over time in line with increased demand.

The Stage 1 development 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.

The indicative locations of the main functional elements providing aviation support are shown in Figure 5–13.

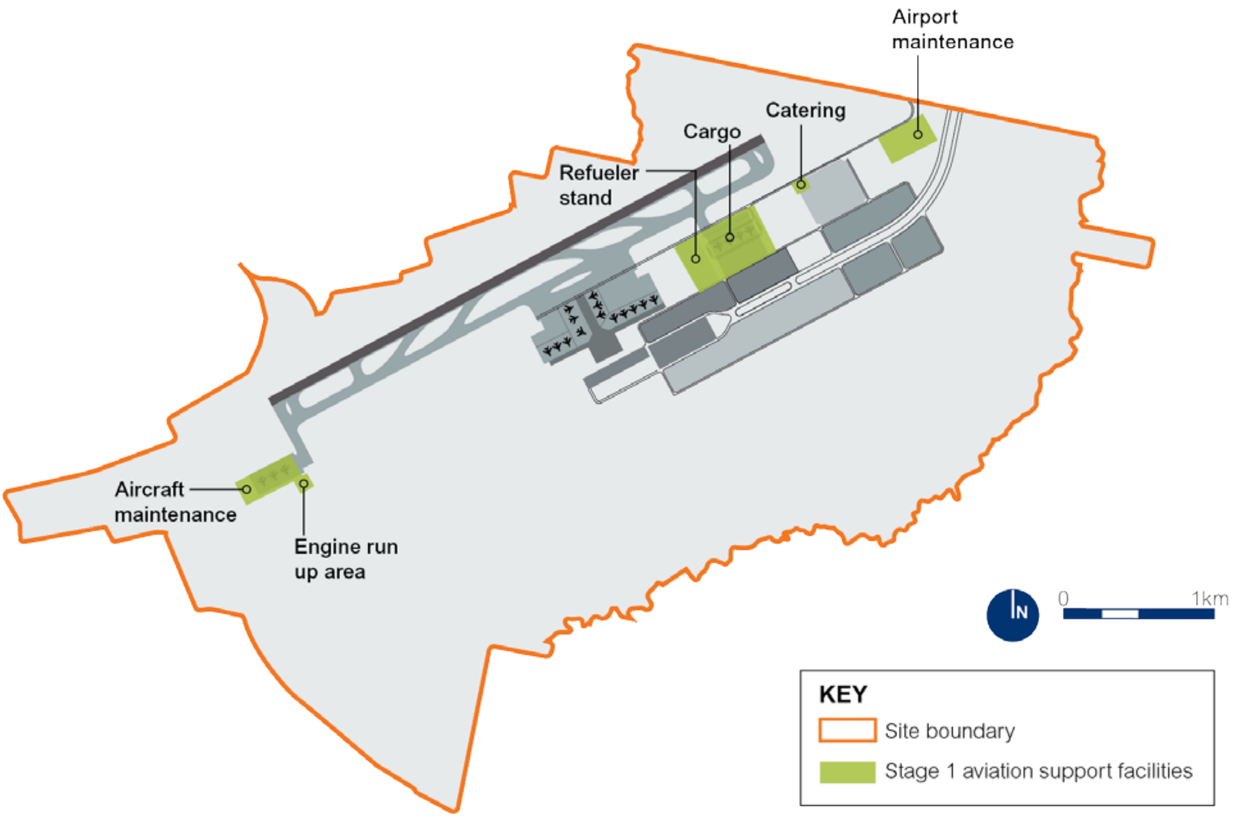

Figure 5–13 Indicative locations of the main aviation support facilities

Aircraft maintenance facilities

The Stage 1 development 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;
- provision for support activities;
- aircraft engine maintenance testing;
- compass calibration
- aircraft wash;
- staff car park; and
- fuel requirements 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 whether they capable of producing take-off thrust. A dedicated bunded location would be 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 aircraft (such as Jet A 1) and ground based vehicles (such as unleaded petrol and diesel with provision for electric vehicles and/or gas driven vehicles), in addition to fuel transfer and aircraft re/defueling.

The requirements for the storage and transfer of fuel are discussed in more detail in Section 5.6.8 of this chapter.

Freight and cargo

The Stage 1 development is expected to include a secure 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.

The Stage 1 development may include a cargo terminal complex and provision for support activities such storage facilities including for multi-level stacking racks, GSE and unit load devices, freight handling facilities and warehouses, bonded stores, associated offices for freight and government agencies, customer reception, truck docking, cargo staging, associated parking and airside and landside access roads.

General and corporate aviation

Depending on demand, the proposed airport may include facilitates for general aviation, corporate aviation and helicopters. Should such facilities be required in the future, they may be subject to separate environment and planning processes under the Airports Act.

Flight catering

The Stage 1 development 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 flight kitchen, bonded stores, cool rooms and stores, 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:

- Government agencies facilities such as those required for policing, border force requirements and quarantine;
- vehicle maintenance for ground service equipment;
- long term storage areas for various airlines;
- an aircraft waste disposal facility;
- a wastewater treatment plant; and
- a building and ground maintenance facility.

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. Parts of the perimeter road that would be used for emergency response vehicles would be sealed with two-lanes. Parts that would be remote from airside activities, and used for maintenance and inspection of support facilities only may be an unsealed all-weather 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, the connecting road to the realigned The Northern Road and possibly from internal public roads as required.

Emergency access points

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 development northern runway and the potential 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 busy hour demand, rather than individual domestic and international busy hour demands.

The Stage 1 development terminal would be designed for incremental expansion to meet the expected long-term demand and cost effectiveness, without significant disruption to operations and applying the same level of service and performance standards as Stage 1 development.

The terminal precinct would be the primary public focus of the proposed airport, serving arriving and departing international and domestic passengers. It would incorporate features to optimise the functional and aesthetic appeal of modern substantial airport operation, 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 by the ALC in accordance with the requirements of relevant laws, including the Airports (Building Control) Regulations and the *Aviation Transport Security Act 2004* and Regulations; CASA MOS; ICAO Standards and IATA 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 development 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, 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 wayfinding 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;
- design for cultural expression;
- the incorporation of Aboriginal and European heritage features;
- integrated design approach through landscaping and public art;
- the anticipated growth and ongoing maintenance in a manner that minimises impacts on operational efficiency and passenger convenience; 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 Stage 1 terminal would be constructed in the northern portion of the airport site, within the Terminal and Support Services Zone in the Land Use Plan (see Chapter 4). The terminal would provide direct access to the Stage 1 northern runway and its associated taxiway system.

Ground transport access to the terminal may be provided from the north of the site with a high capacity connection to the future M12 Motorway, to be located north of Elizabeth Drive. An indicative location for the terminal precinct is shown in Figure 5–14.

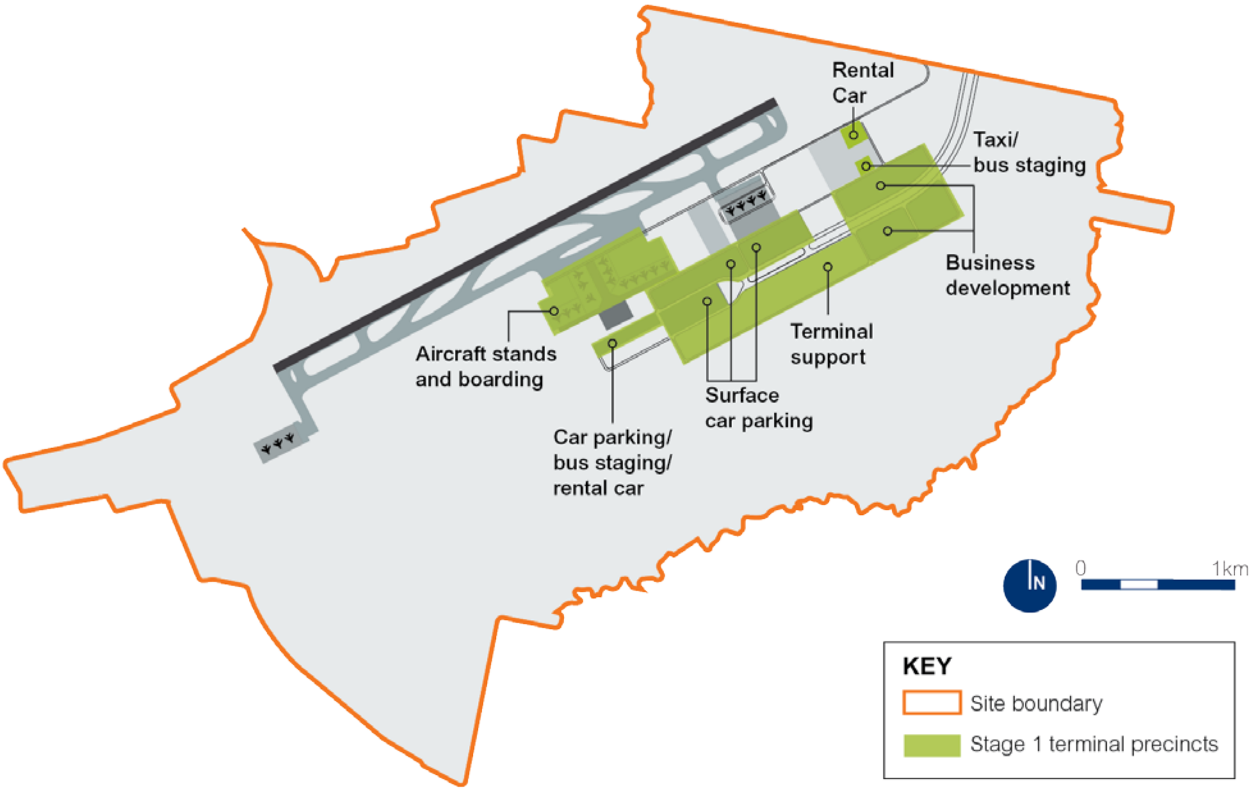

Figure 5–14 Location of the terminal precinct

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. 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 airport workers, 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

The Stage 1 development would include the reticulation of utilities including power, water, gas and telecommunications from external suppliers consistent with 24 hour operations, which anticipates the longer term needs for the proposed airport. The connections would have sufficient capacity for Stage 1 operations and would be capable of expansion as demand grows, without significant disruption to operations.

Co-ordination with utilities 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.

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.

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

The Stage 1 development will include the decommissioning and removal of a range of existing utilities. Where off-site services, such as those provided to surrounding residents and businesses, rely on existing onsite infrastructure that is inconsistent with the proposed airport’s development, the affected infrastructure will be relocated by, or in consultation with, the relevant utility provider in accordance with that provider’s established processes.

Specific requirements to ensure surrounding services to existing customers are maintained, including the need for any infrastructure relocation services, will determined as part of the detailed design process.

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.

Electricity

Elizabeth Drive contains a 33 kV sub transmission feeder as well as an 11 kV 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 moved underground.

Endeavour Energy has advised that some of 11 kV lines traversing the site provide important cross feeder/zone connections in the network and as such would need to be relocated.

The 11 kV feeder along the existing The Northern Road is expected to be relocated into a realigned The Northern Road.

The 11 kV 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 kV above ground transmission line currently runs across the south-west area of the airport site. The Stage 1 development may include the construction works required to relocate all or part of the TransGrid 330 kV transmission line crossing the airport site so that the transmission line is underground within the construction impact zone (see Chapter 6, for further information). Consultation would also occur with Airservices Australia to ensure the relocation of the 330 kV line does not have impact on operations at the proposed airport.

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 replacement cable is expected to be installed as part of the installation of utilities associated with The Northern Road realignment.

Consultation would need to occur with Telstra regarding the possible removal of the optic fibre conduit and aerial cables along Badgerys Creek Road, which connects the Elizabeth Drive optic fibre conduit to the Bringelly Exchange.

Depending on road realignments and closures and the impacts these have on existing telecommunications infrastructure, works may need to be undertaken to move existing customers to the north of Elizabeth Drive and east of Badgerys Creek from the Bringelly Exchange to the Luddenham Exchange. This is dependent on the closure of Badgerys Creek Road, in part or in full, and whether an alternative connection route to the Bringelly Exchange is established. In the event that the Badgerys Creek Road optic fibre conduit is removed in full, a new conduit would need to be run from the Luddenham Exchange along Elizabeth Drive. If closure of Badgerys Creek Road is limited to the northern portion only a connection to the existing Elizabeth Drive to Badgerys Creek Road conduit via Pitt Street and Lawson Road would be required.

5.6.4 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. The primary connection point will be located at the boundary of the airport site at Elizabeth Drive. Other connection locations may be identified in consultation with utility providers.

Non-potable and recycled water

The Stage 1 development may also include provision for the use of non-potable water for appropriate purposes.

The production of treated wastewater is expected to exceed demand for recycled water at the proposed airport. The Stage 1 development may be constructed to allow for surplus wastewater, once treated to acceptable standards, to be discharged through irrigation within the airport site, including through subsurface irrigation. The quantities of treated wastewater and, thereby, the volumes of recycled water available will be refined as part of the detailed design process.

A mechanism will be identified to allow for the recycled water to be re-used, disposed by irrigation or disposed by other means.

Redundancy

It is expected that the detailed design would accommodate redundancy requirements, currently estimated at a minimum of two days of the maximum day demand for both potable and non-potable water. This would be stored on site.

5.6.5 Sewage and wastewater

System requirements

An estimated 2.7 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 generated 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 ANZECC 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

Facilities for the management of aircraft waste will be provided, including any facilities required for quarantine waste collection and disposal for all international operations. A waste to energy facility for recovery of energy from quarantined waste may be constructed.

5.6.6 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 132kV.

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. Additional or alternative connection points may be established subject to the development of new local substations in the vicinity of the airport site

5.6.7 Gas

System requirements

The Stage 1 development is expected to require approximately 57,000 gigajoules of gas each year.

In consultation with gas supplier(s), gas supply based on anticipated demand will be determined. A distribution main reticulation with an expected pressure rating of 210 kilopascals will be designed to run through the airport site with connection points to meet the requirements of gas users.

Onsite delivery and distribution

The gas connection will be at the boundary of the airport site and is expected to occur via the 200 millimetre diameter steel secondary gas main located along Elizabeth Drive. At the connection point to the proposed airport, a pressure-reducing station is expected to be required to change the secondary mains pressure to 210 kilopascals for onsite reticulation.

All gas works would be designed and constructed in accordance with all relevant standards and codes and the gas supplier's network operation rules.

5.6.8 Aviation fuel

Fuel storage requirements and location

Stage 1 would include a fuel farm with fuel storage capacity equivalent to at least three days. 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 airport site. 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, however this would be determined as part of detailed design. Each tank would be contained in a bunded area 65 square metres and 1.5 metres high. The location, configuration, design and construction of this area would be compliant with AS1940-2004 and other standards referenced therein and would include provisions for at least two and 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.

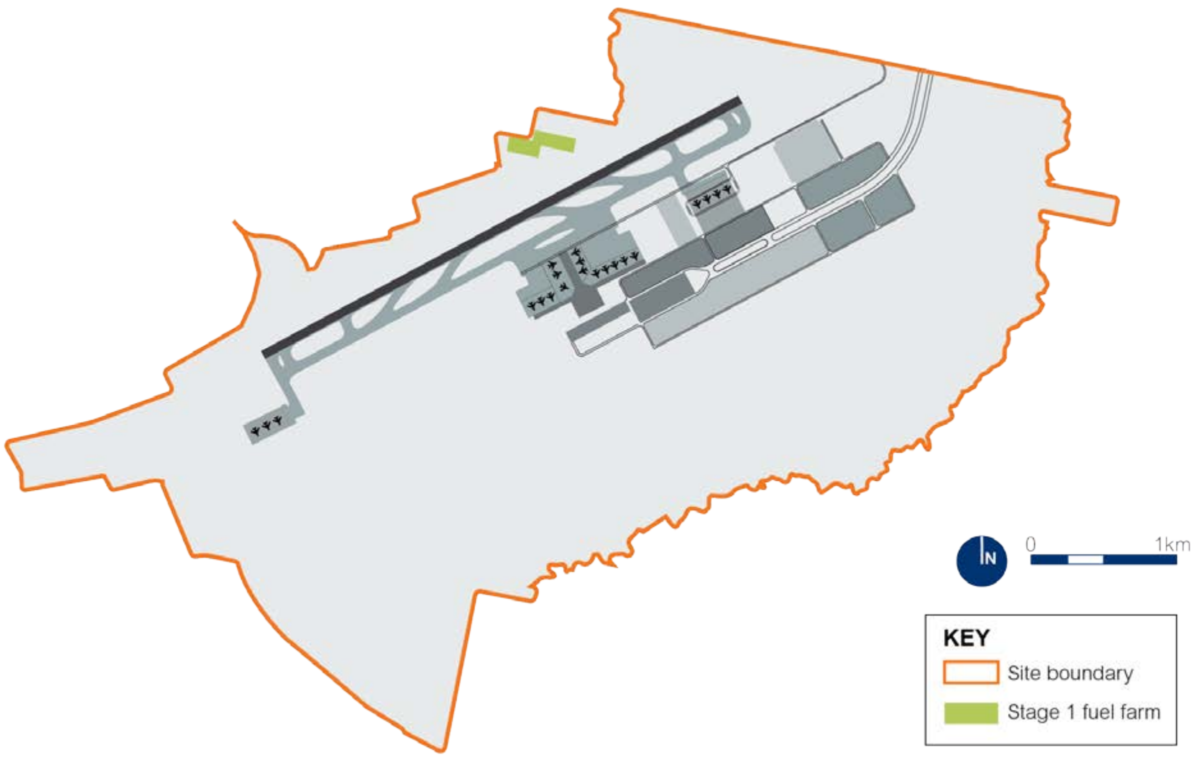

Figure 5–15 Indicative location of the fuel farm

Fuel distribution (onsite)

Fuel would be distributed onsite via a purpose built underground pipeline grid which would distribute fuel to a network of airside hydrants to be located at aircraft stands. The pipeline grind within the fuel farm and servicing the proposed airport would provide for a bypass capability and ensure adequate redundancy is in place.

For aircraft unable to connect to a hydrant, there would be provision for ground-based refuelling trucks to be filled via a designated hydrant filling stand. The stand area, within the vicinity of the terminal, may include space for a tanker garaging and support activities.

Fuel delivery (off-site)

Fuel delivery for Stage 1 would be initially supplied by road tanker and anticipated to be sourced from either the Clyde or Banksmeadow fuel terminals. Anton Road, via Adams Road, is anticipated to be the primary access point for deliveries of fuel by road tanker, and will be of a suitable standard to enable access by B-double vehicles. Any upgrade of these local roads would be subject to a separate planning and approval process. The specific route/s of travel will be determined in consultation with NSW Roads and Maritime Services and subject to relevant planning and approval processes.

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 assessments, planning and approval processes. Transport for NSW is working on developing options for a fuel pipeline corridor.

5.6.9 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.

5.6.10 Telecommunications

The Stage 1 development 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.

5.6.11 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 other meteorological equipment are expected to be required to provide relevant data to support aviation operations in accordance with international standards and recommended practices.

The automatic weather station would include a visibility sensor and ceilometer (for determining cloud base height) as well as sensors for rain, wind and temperature.

5.6.12 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:

- a location(s) for onsite waste collection that will allow for sorting and separate storage for off-site disposal of recyclable, non-recyclable and hazardous materials;
- distributed vacuum systems within the terminals and a process plant to separate the waste streams, capable of being scalable as the terminal grows;
- 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 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*[6].

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 (Volume 2a).

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.

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[6] Version 1.12: November 2014, Australian Government Civil Aviation Safety Authority

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 nine bio-retention and flood detention basins would be provided around the periphery of the airport site. The detention ponds would provide treatment and detention of stormwater run-off prior to release into the receiving watercourses of Badgerys Creek, Cosgroves Creek, Oaky Creek and Duncans 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.

Grassed swales will be established to formalise the drainage network and convey stormwater runoff from the developed areas within the airport site to the detention basins. Low flows are diverted to a smaller forebay area within each basin to allow treatment of water within a bio-retention system. Higher flows will bypass the bio-retention system and be diverted into the larger flood detention basins. The basins are designed to provide sufficient storage to allow controlled release to the receiving waters in a way that mimics the natural flows as closely as possible over a range of storm magnitudes and durations. The detention basins would operate as dry basins in order to minimise bird attraction to the site and reduce the risk of bird strike.

The size of each detention basin and the minimum bio-retention area requirements are designed for each sub-catchment within the airport site and shown in Table 5–5. It is noted that the civil design for each of the bio-retention basins has additional buffer areas set aside, to enable a greater treatment area to be provided if required to increase the level of treatment. Basins 4 and 5 are proposed to be constructed as part of the long term development. The proposed locations of the detention basins are shown in Figure 5–16.

Table 5–5 Stage 1 Detention basin volumes

Detention pond	Basin use	Bio-retention areas	Flood detention volume
1	Bio-retention and flood detention	0.6 ha	125,000 ha
2	Bio-retention and flood detention	0.22 ha	39,000 ha
3	Bio-retention and flood detention	0.6 ha	100,000 ha
4	Not used in Stage 1 development	–	–
5	Not used in Stage 1 development	–	–
6	Bio-retention and flood detention	1.0 ha	101,000 ha
7	Bio-retention and flood detention	0.5 ha	117,000 ha
8	Bio-retention and flood detention	0.2 ha	59,000 ha
9	Bio-retention	0.15 ha	–

Note: Basin 4 and Basin 5 would be integrated into the long term development.

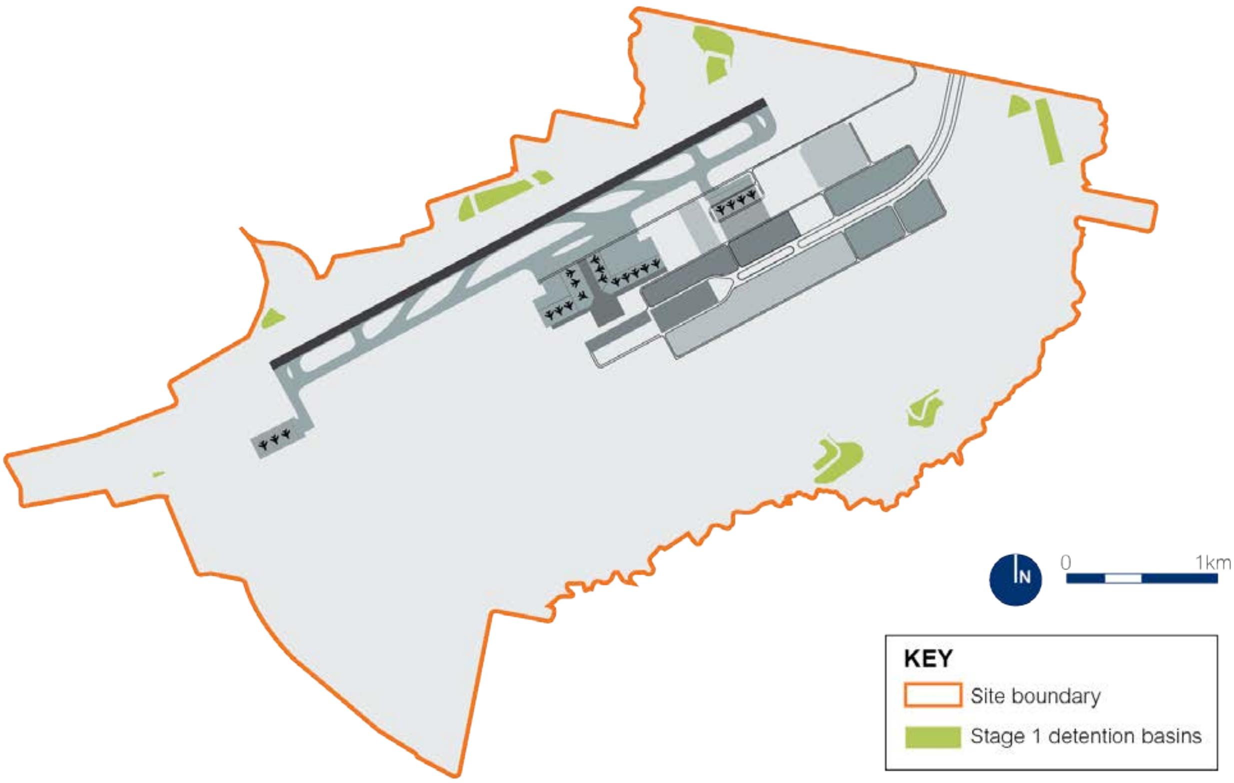


Figure 5–16 Indicative location of the detention basins

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;
- swales to manage and provide initial treatment and conveyance for stormwater runoff from the runway and taxiway areas. The bio-retention systems included in the downstream end of each of these swales and would provide secondary treatment prior to release to receiving waters;
- bio-retention basins to manage pollutants.

5.8 Ground transport

The proposed airport is located in the growing areas of Western Sydney. It is within the Western Sydney Priority Growth Area and close to the South West Priority Land Release Area 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 Infrastructure Plan and South West Rail Link Extension Corridor Preservation set the road and public transport network requirements for the region. In addition, the Australian and NSW governments are undertaking a Joint Scoping Study on the Rail Needs for Western Sydney, including the proposed airport. The Study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region. The Scoping Study will also address the question of what would it take to have rail on the airport site by the time the airport is operational.

In the long term, the proposed airport is expected to generate approximately 82 million passenger movements per year, equivalent of 224,000 passengers per day entering and leaving the airport site.

5.8.1 Landside roads

Road access will provide for private cars, commercial traffic, buses, pedestrians and cyclist. The details of road access will be prepared during the detailed design process in consultation with NSW and local government authorities, and it is expected to 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;
- modal share of traffic loads;
- 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 NSW Roads and Maritime Services (Roads and Maritime). It currently transects the airport site. It would be realigned outside the airport site by Roads and Maritime before the start of the airport's construction. Concurrently, services in easements along The Northern Road alignment would also be relocated.

A connection to The Northern Road would be constructed at the south-western airport site boundary by Roads and Maritime as part of the construction of The Northern Road on its new alignment.

The offsite realignment is subject to a separate approval process 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 (the onsite portion), may remain in place for interim uses. This would be determined in consultation with the ALC and in accordance with the Land Use Plan.

Minor internal roads within the airport site are being closed when they are no longer required or may remain in place for interim uses permitted by the Land Use Plan.

Other external roads

Other roads that would be upgraded to meet the requirements of Stage 1 include:

- Adams Road, from Elizabeth Drive at least to Anton Road to meet the needs of support traffic for the proposed airport, including B-double tanker traffic; and
- Anton Road, 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 would take account of the M12 connecting road developed by Roads and Maritime. 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, 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 plus bus lanes and shoulder in direction on the main carriageways;
- prioritisation of public transport; and
- provision for efficient and safe vehicle movement around the ground transport facilities within the terminal forecourt, including access to the commercial precinct, support areas and airport parking.

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.

Subject to revised traffic arrangements for the M12, 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
- safe undercover pedestrian access between parking, pick-up and drop-off areas and terminal facilities.

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 construction impact zone are expected to remain open.

Commercial access road (from The Northern Road realigned)

The design of the access road to and from the realigned The Northern Road 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 in each direction on the main carriageways, and have a minimum design speed of 80 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, The Northern Road connection, and any secondary access provided off Elizabeth Drive as well as via the primary M12 public entrance.

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 anticipate 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 Australian Government recognises however that rail could provide a benefit not only to passengers and employees using the airport, but also to the broader Western Sydney Region. For this reason, the Australian and NSW governments are undertaking a Joint Scoping Study on the Rail Needs for Western Sydney, including the proposed airport. The Scoping Study will consider the best options for future rail links, including decisions about timing and rail service options, both directly to the airport site and within the Western Sydney region. The Scoping Study will also address the question of what would it take to have rail on the airport site by the time the airport is operational.

Planning for rail connections at the proposed airport is being undertaken in close consultation with Transport for NSW so that airport infrastructure considerations are aligned with Transport for NSW’s planning for its rail network, including the proposed extension of the South West Rail Link. Access for rail across the proposed airport site and for one or more stations in the terminal precinct will be preserved. The rail line will be predominantly underground through the airport site to avoid critical infrastructure and will be consistent with the aviation layout and staging of the airport development while optimising ease of access for passengers. The rail alignment will preserve sufficient space for two independent rail services of two tracks each and with passenger access to the airport terminal and to a business park if required.

Subject to the findings of the Scoping Study, a final rail alignment will be determined in consultation with the NSW Government. Depending on the alignment and preferred timing to develop rail services, work may be required during the Stage 1 development to either commence construction or to future-proof the corridor. Any such work is expected to be subject to a separate approval process.

Figure 5–17 broadly indicates how rail could approach the airport site. A potential final rail alignment would be determined by governments following the Joint Scoping Study on Rail Needs for Western Sydney.

Figure 5–17 Indicative rail alignment options connecting to the airport site

5.8.5 Parking

Stage 1 would include dedicated car parking facilities for up to 12,500 vehicles to meet the expected demand and may include multi-storey or covered/uncovered surface-level facilities for:

- commercial parking for customer vehicles;
- 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 250 metres would be likely for both departures and arrivals for Stage 1.

5.8.7 Ground transport facilities

Ground transport facilities would 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 transport 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 EIS. The actual construction plan, which will include the schedule, methods and activities for construction of the Stage 1 development, would be finalised prior to the start of construction. Timing of construction would be dependent on a range of planning and preparation activities that would need to be completed prior to commencement, including the determination of the Airport Plan, vacant possession of the airport site and tenders for construction contractors.

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 1,150 hectares.

Construction activities for the Stage 1 development are anticipated to occur in three major phases as outlined below with some Preparatory Activities expected to occur prior to or simultaneous with the major phases.

- Site preparation activities including the clearing and earthworks elements of the Main Construction Works. The earthworks would include relocation of around 1.9 million cubic metres of topsoil and 22 million cubic metres of subsoil and rock to create a level site.
- Aviation infrastructure 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 activities, involving testing and commissioning of all facilities in readiness for the operation of the proposed airport.

A range of existing infrastructure located on the airport site is incompatible with the proposed airport and would need to be removed and/or relocated. These assets include The Northern Road, a TransGrid 330 kilovolt (kV) transmission line, telecommunication and electricity distribution lines and water mains. Although considered in this EIS, these assets are the responsibility of the relevant private or State owners and their removal to offsite locations would be subject to separate assessment processes.

For the purpose of this assessment, it is assumed that construction would largely 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 kV transmission line. The removal and/or relocation of existing utilities infrastructure will likely be required to occur concurrently with other activities.

Main Construction Works would occur within the construction 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 area that would be used for ancillary infrastructure such as drainage swales and detention ponds as part of the site's proposed water management system. 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. Subsequent development such as the second runway, ancillary developments, or business park developments 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, including the proposed construction program, would be subject to refinement during detailed design and tendering of the works. 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

For the purpose of this assessment, it is assumed 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 relocation of The Northern Road and a TransGrid transmission line. The site preparation activities phase would commence following relevant tenders and design work. Site preparation activities and aviation infrastructure activities are assumed 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 transition and completion of site preparation activities in each of the zones shown in Figure 6–1.

Table 6–1 Indicative construction schedule for the Main Construction Works

Construction zone	Activity	Indicative construction period	
		Start	Finish
Site preparation activities – General	Site facilities	Year 1 Q1	Year 2 Q1
	Detention ponds and preliminary controls	Year 1 Q1	Year 1 Q4
	Perimeter road	Year 1 Q3	Year 3 Q1
Site preparation activities – East	Clear and grub	Year 1 Q2	Year 2 Q2
	Bulk earthworks	Year 1 Q4	Year 3 Q1
	Rehabilitation	Year 2 Q1	Year 3 Q4
Site preparation activities – North-west and south-west	Clear and grub	Year 3 Q4	Year 4 Q2
	Bulk earthworks	Year 4 Q2	Year 5 Q1
	Rehabilitation	Year 4 Q4	Year 5 Q2

Construction zone	Activity	Indicative construction period	
	Runway completion and bulk earthworks balance	Year 5 Q2	Year 7 Q3
Aviation infrastructure activities – East	Preliminaries and establishment	Year 3 Q4	Year 6 Q4
	Services	Year 3 Q4	Year 6 Q2
	Buildings	Year 4 Q1	Year 8 Q3
	Runways	Year 4 Q2	Year 6 Q3
	Taxiways	Year 5 Q2	Year 6 Q3
	Aprons and stands	Year 5 Q4	Year 6 Q4
	Main access road	Year 6 Q1	Year 6 Q2
	Internal roads and carparks	Year 6 Q1	Year 6 Q3
Aviation infrastructure – North-west	Preliminaries and establishment	Year 6 Q2	Year 6 Q2
	Runways	Year 6 Q2	Year 7 Q2
	Taxiways	Year 7 Q1	Year 8 Q2
Aviation infrastructure – South-west	Preliminaries and establishment	Year 7 Q3	Year 8 Q4
	Aircraft maintenance and cargo facilities aprons and stands	Year 7 Q4	Year 8 Q3
	Internal access roads from The Northern Road	Year 8 Q1	Year 8 Q4
Commissioning	Testing and commissioning and operational readiness	Year 8 Q2	mid-2020s

The time periods 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 Main Construction Works.

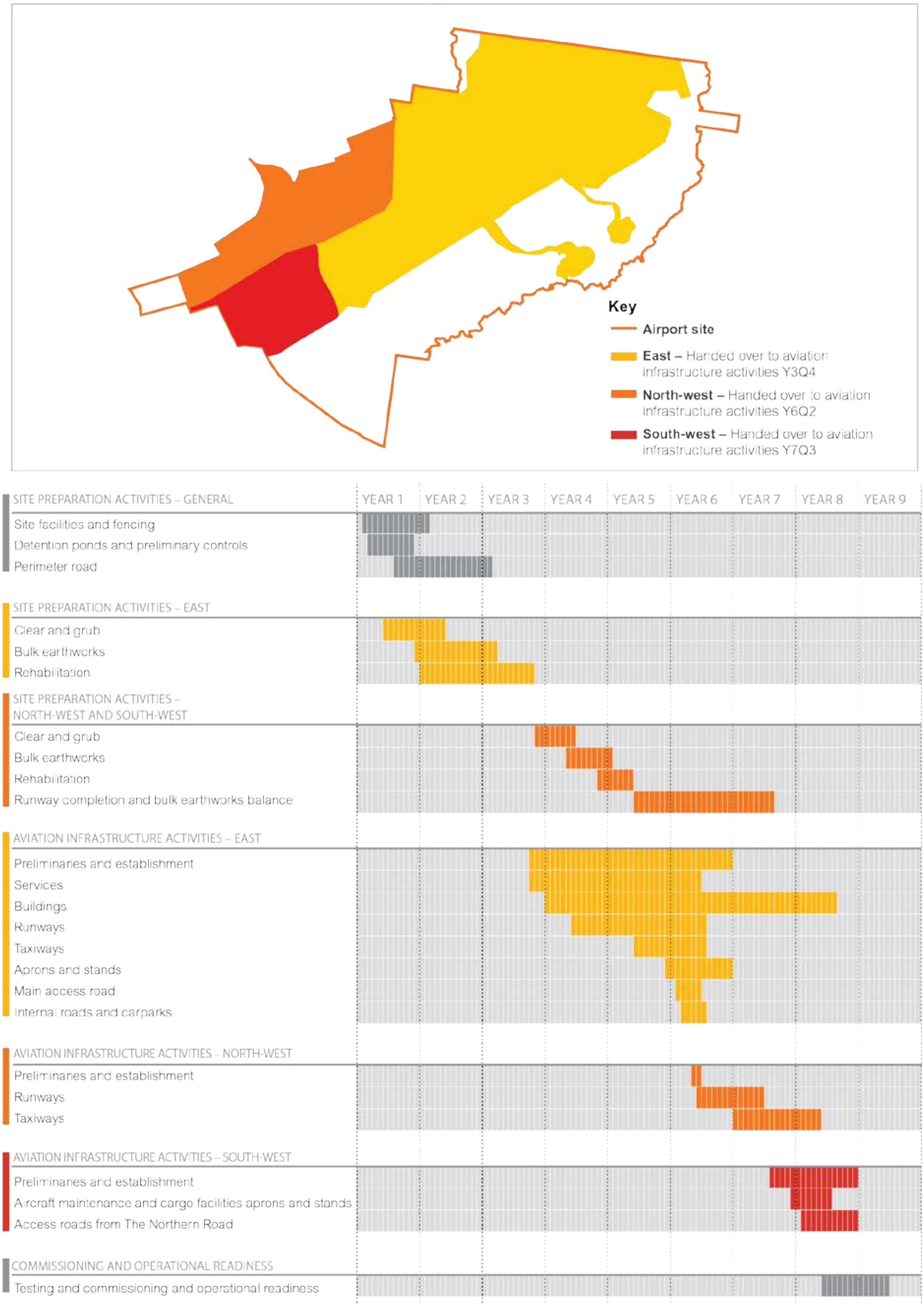


Figure 6–1 Stage 1 construction impact zone and indicative construction schedule

6.2.2 Workforce

Construction of the proposed airport would create direct 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 Main Construction Work, increasing to 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 650.

The estimated workforce numbers for direct onsite jobs to implement the indicative construction schedule are provided in Table 6–2 and shown on Figure 6–2.

The peak onsite workforce is anticipated to exceed 750 personnel at the time when site preparation activities 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 activities)

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8			
	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	Q3	Q4
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

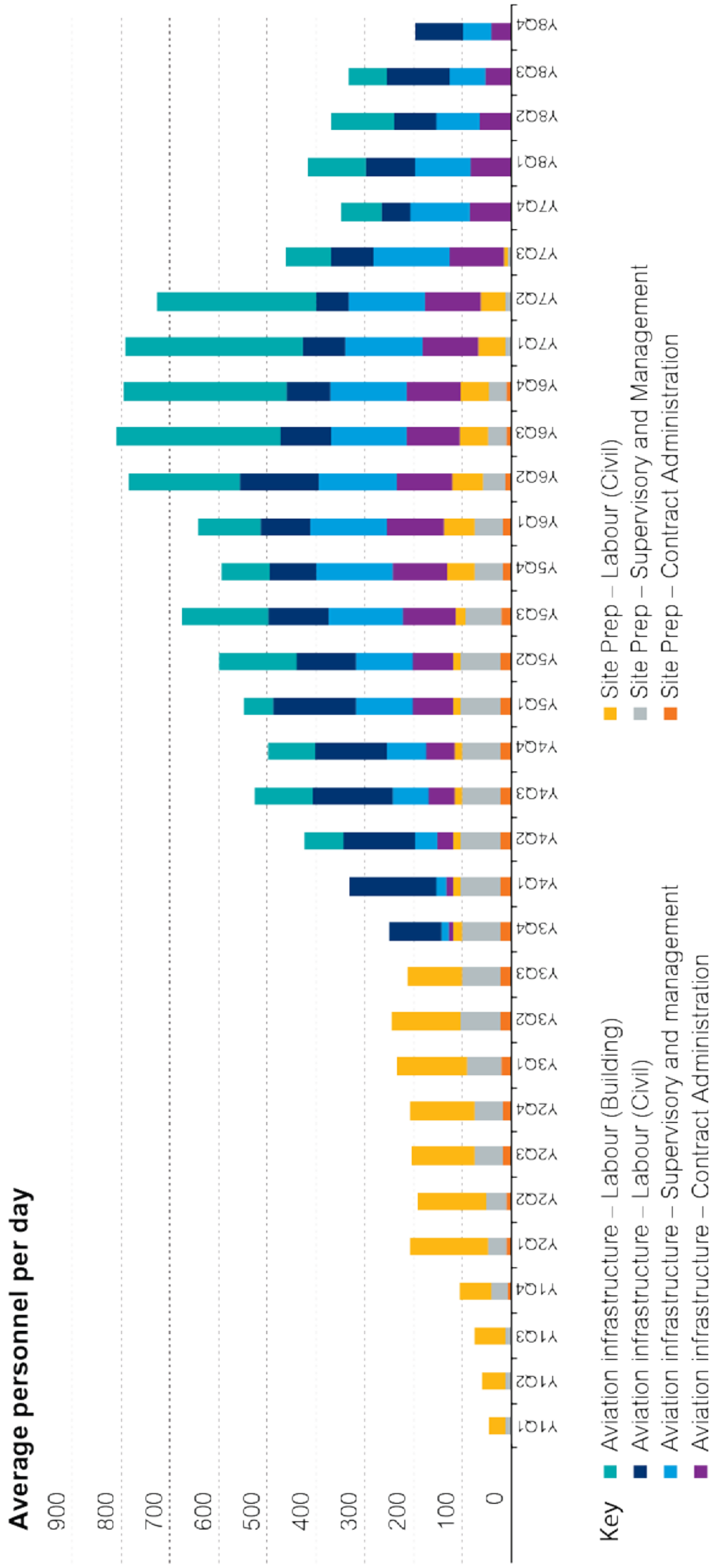


Figure 6–2 Construction workforce

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 activities, heavy and light vehicle movements to and from site are likely to occur outside these work hours. During the aviation infrastructure activities 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 outside of these hours include:

- works to existing services (if shutdowns are required);
- 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 proposed airport site covers a broad area. As such, 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 additional traffic on the regional and local road network. However, the construction of the airport is not expected to significantly impact on the surrounding transport system with the exception of potential oversize vehicle movements when mobilising equipment for the initial stages of earthworks (see Chapter 15 (Volume 2a)). Construction traffic would use the nearby road network, with most traffic expected to access the site using Elizabeth Drive, as well as potentially other routes, which will be finalised through consultation with NSW authorities. The nearby 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

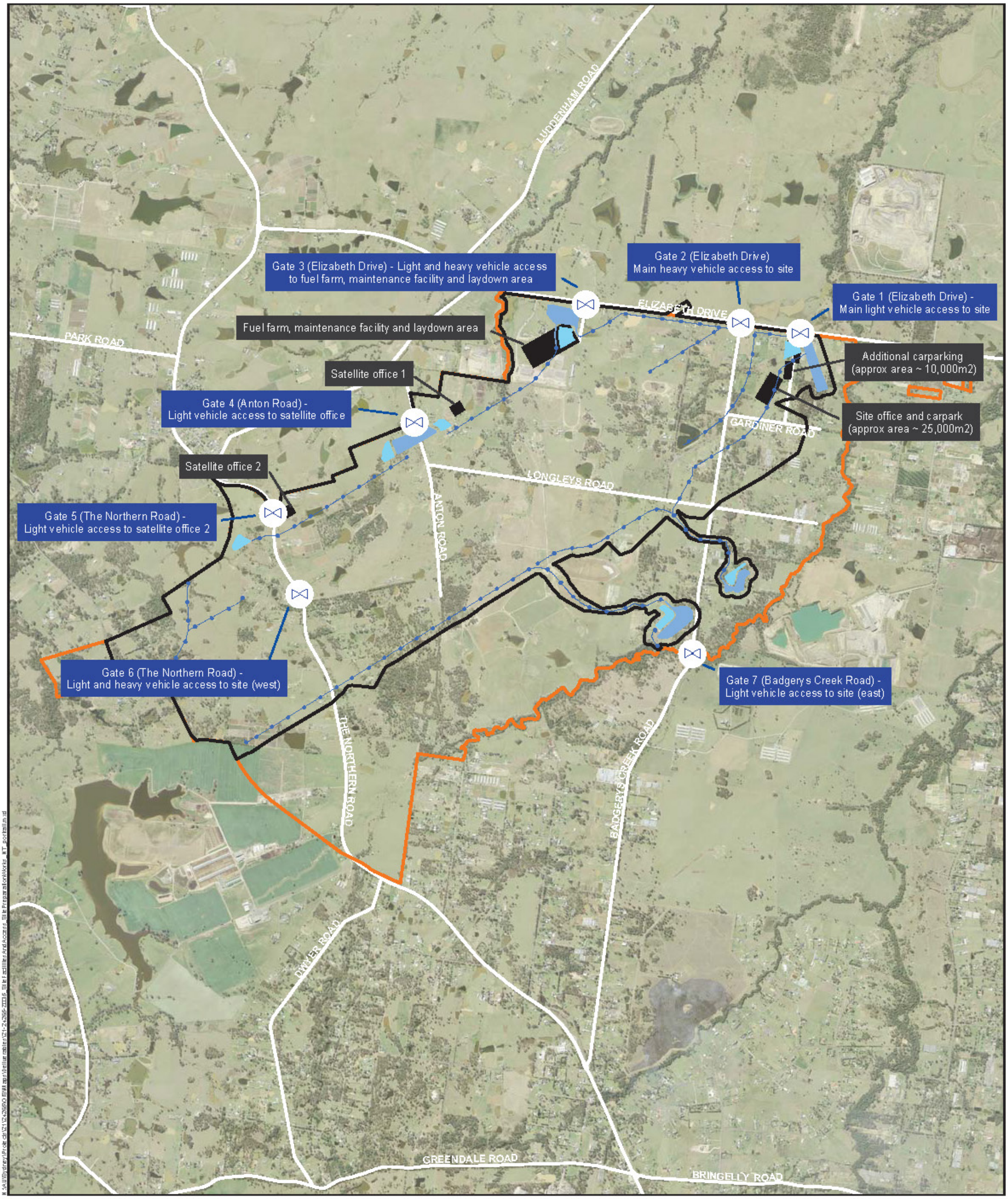
For the purpose of this assessment, seven site access gates have been assumed, as detailed in Table 6–3 and shown on Figure 6–4. Provision would be made for access by heavy and light vehicles (see Section 6.2.5).

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	Temporary 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 require the inclusion of 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. 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.

Traffic management and access to the airport site would be accounted for as part of the overall Construction Environmental Management Framework as described in Section 6.5. The Traffic and Access Construction Environmental Management Plan (CEMP) 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.



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
- Detention Basin
- Bio Retention Basin
- Drainage channels
- Site access - gates

0 250 500 1,000
Metres

Figure 6-4 - Site preparation activities - 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 to a peak of around 440 during the Main Construction Works. 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.

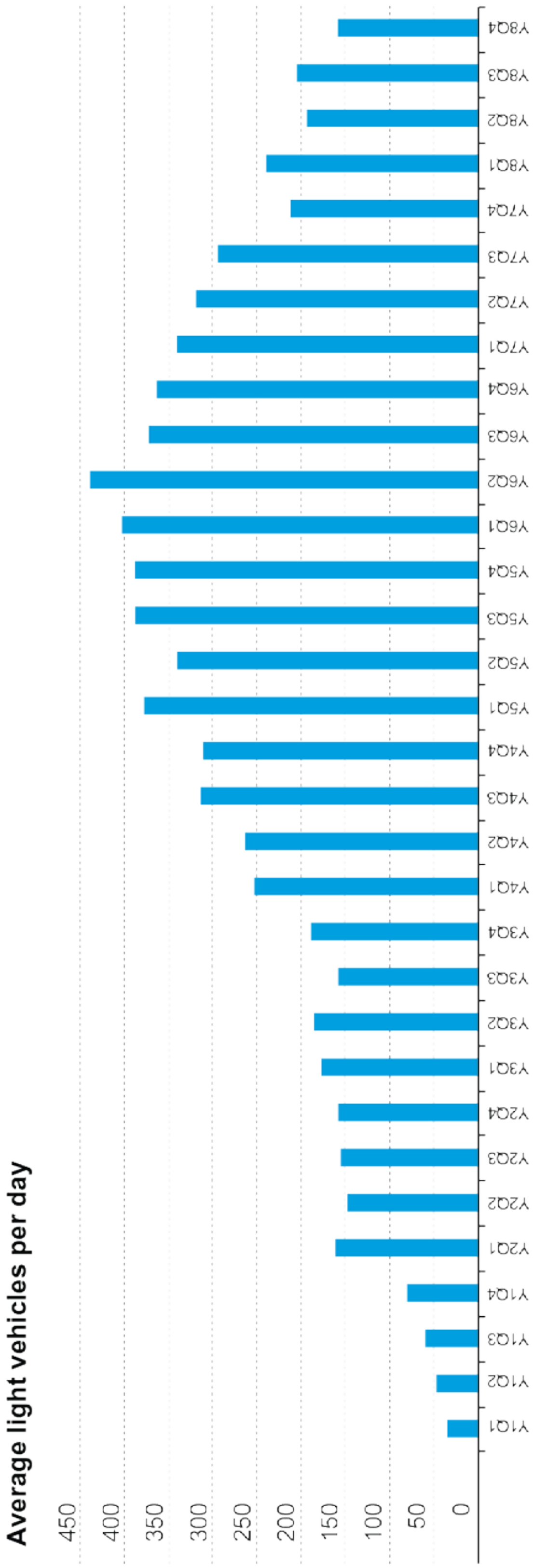


Figure 6–5 Light vehicle movements for indicative construction schedule

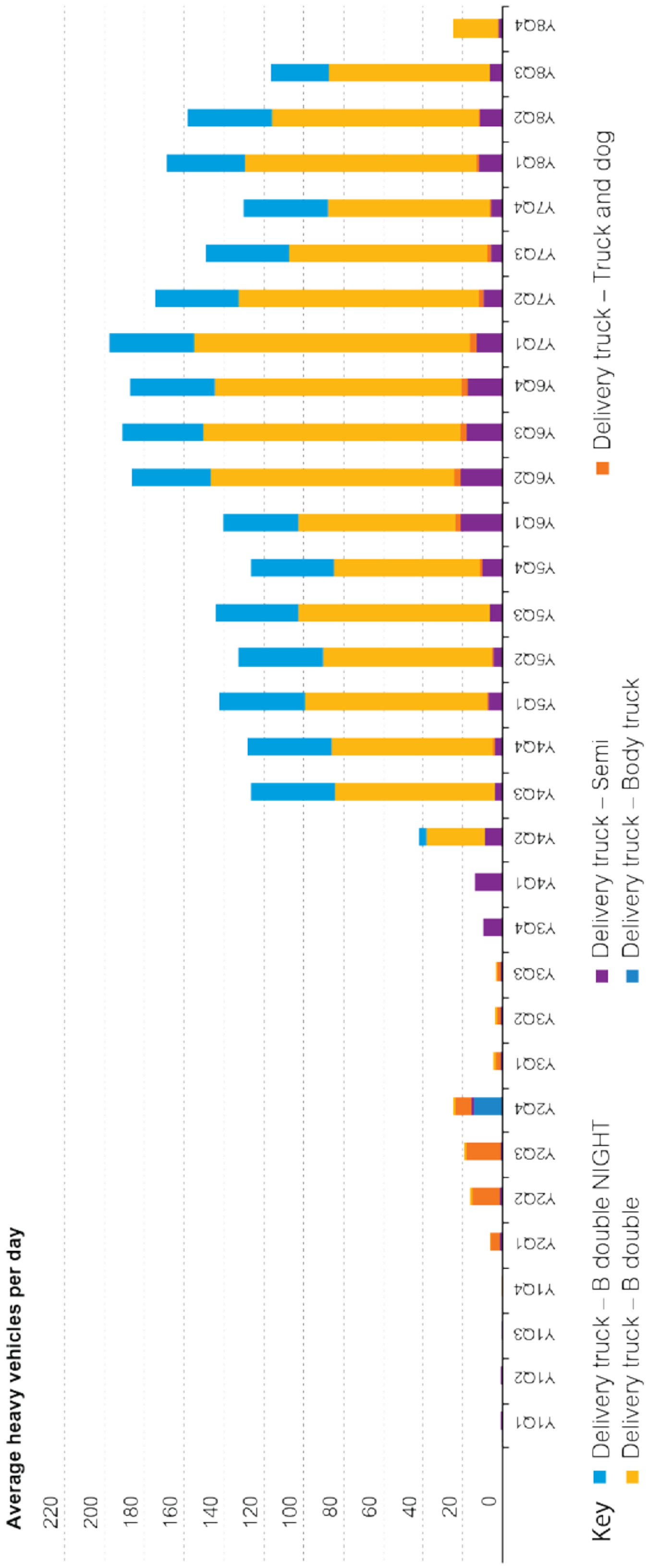


Figure 6–6 Heavy vehicle movements for indicative construction schedule

6.2.6 Construction machinery

A range of construction machinery would be used at the airport site, as listed, but not limited to that, 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

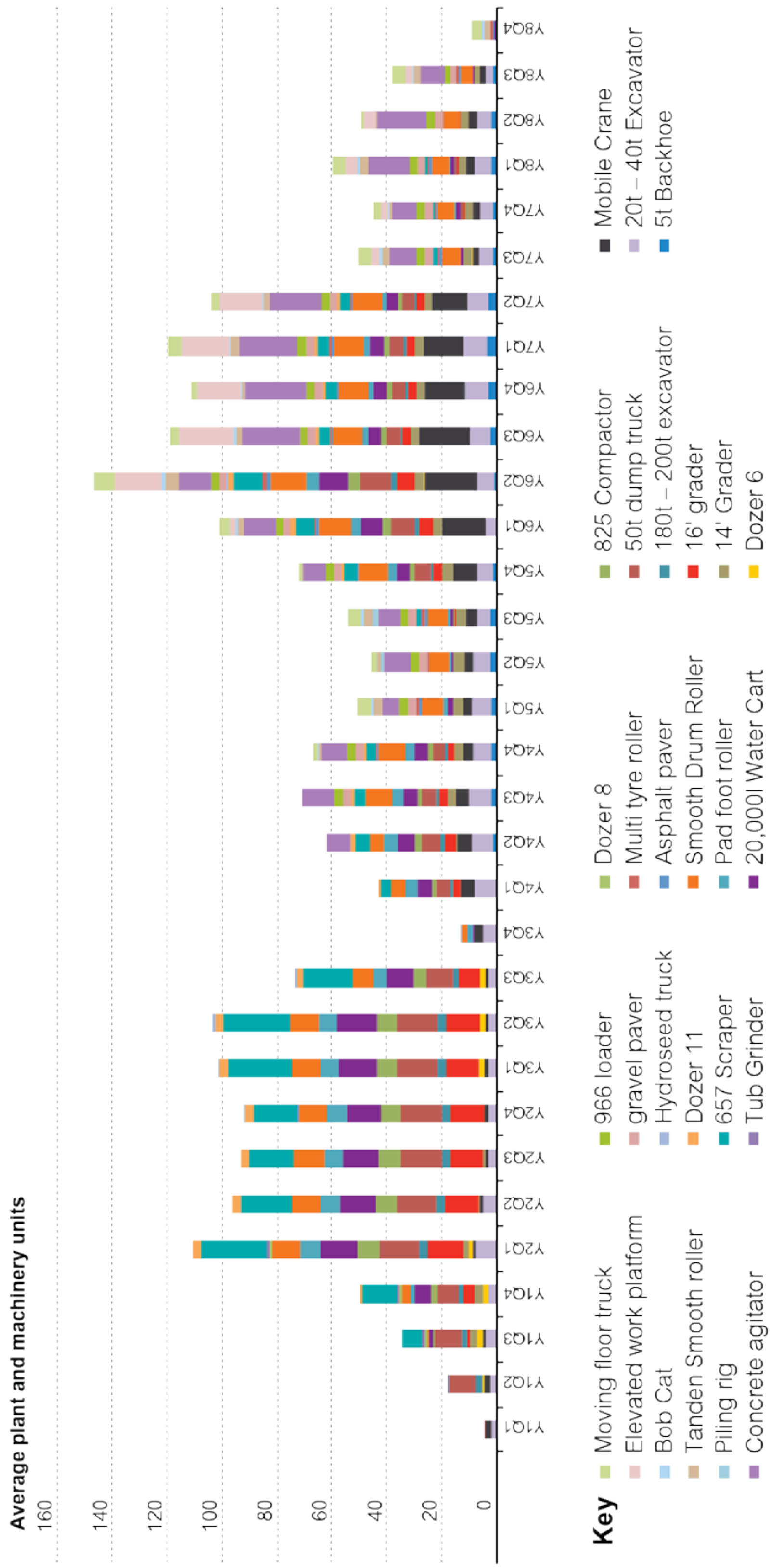


Figure 6–7 Plant and machinery for indicative construction schedule

6.3 Site preparation activities

6.3.1 Establishment of temporary construction facilities

Temporary facilities for the site preparation activities would generally be constructed within the construction impact zone as shown in Figure 6–4. The expected site facilities are outlined below. The precise facilities and their location would be refined by the construction contractor and reflected in relevant plans within the Construction Environment Management Framework.

- **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. 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 construction impact zone. 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. 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 about 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 to store 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 temporary 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 where available and 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 activities. 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, where possible, 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.
- Up to 8,200 litres of domestic wastewater and sewage estimated to be generated each day during site preparation activities 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.

6.3.2 Vegetation and site 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. Large scale 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 (see Chapter 16 (Volume 2a)).

A Biodiversity CEMP would be developed as part of the overall Construction Environmental Management Framework as described in Section 6.5. This plan would outline the key management measures and performance indicators to guide management of biodiversity matters during these activities. The following measures are generally considered standard practice and the full set of measures would be confirmed through approval of the plan.

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.

Consistent with the indicative construction schedule, 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. If a fence is in place around the construction impact zone at the time the clearing occurs, provision will be made to allow fauna to relocate out of that area.

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.

It is expected that most existing services and fencing would need to 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 and 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 and/or relocated. These assets include The Northern Road, a TransGrid 330 kV transmission line, telecommunication lines, electricity distribution and supply lines and water mains. Their removal may be prior to or concurrent with the Main Construction Activities. Although considered in this EIS, these assets are the responsibility of the relevant private or State owners and any relocation 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 and/or the ALC.

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.

Arrangements for the internal road network and connections with the local road network outside of the airport site including existing roads and new roads to be constructed as part of the Stage 1 development would be finalised as part of settling the airport site layout.

Existing roads within the construction impact zone would be closed and pavement materials removed. Any temporary or permanent road closures would be managed in consultation with NSW Roads and Maritime Services and Liverpool City Council. Minor internal roads within the airport site are already being closed when they are no longer required. Any change to road accessibility during the Main Construction Works would be subject to the provisions of a traffic and access management plan that would be prepared as part of the Construction Environment Management Framework (see Section 6.5 of this chapter and Chapter 28 (Volume 2b)).

The removal of electricity assets at the airport site, including distribution and supply lines, would be arranged by the network operator.

TransGrid is the network operator of the 330 kV overhead transmission line that crosses the site and is incompatible with airport operations. The affected transmission line will require relocation to an alternative alignment, potentially underground within the boundary of the airport site within the construction impact zone. This relocation has not been specifically assessed for the purposes of this EIS and would be subject to further consideration if it proceeds.

Once a new transmission cable alignment has been confirmed, construction completed and the line commissioned, the conductors, towers and foundations from the original aboveground transmission line will be removed. This work is completed in sections between tension structures and the sequencing is dependent on ensuring that no individual structure is over-loaded to the point of failure when conductors are detached during the de-stringing process. Dismantling of the steel lattice towers can then occur followed by demolishing of the concrete foundations, including the removal of any contaminated soil from around each tower site. All waste is to be removed from the site for re-use or recycling.

Endeavour Energy is the network operator of the smaller 11 kV and 33 kV overhead distribution and supply lines. The 11 kV overhead line along The Northern Road is expected to be relocated underground within the The Northern Road realignment. The 11 kV overhead line at Badgerys Creek Road is expected to 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 where there are airspace constraints. In each case, the location for relocations would be determined by the relevant utility provider in consultation with the Commonwealth and/or ALC where a relocation is to occur on the airport site.

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 is expected to be replaced by an underground line within The Northern Road realignment. The underground telecommunications cable that runs along Badgerys Creek Road from Elizabeth Drive to Bringelly Exchange could be relocated subject to Badgerys Creek Road remaining open south of Pitt Street. In such a case, a link could be retained by using Lawson Road and Pitt Street to connect to the existing optic fibre cable, thereby having no impact on customers north of Elizabeth Drive and east of Badgerys Creek currently reliant on the Bringelly exchange. In the event that Badgerys Creek Road is closed entirely and the existing cable removed, customers north of Elizabeth Drive and east of Badgerys Creek serviced by Bringelly Exchange would instead be expected to be by serviced by Luddenham Exchange via underground optical fibre cable along Elizabeth Drive. Regardless of the option, this process would be managed and co-ordinated by Telstra.

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 1.9 million cubic metres.

About 200,000 cubic metres of topsoil would be used to rehabilitate disturbed areas outside the construction impact zone. Rehabilitation of the disturbed areas would be associated with the demolition and removal of vacant buildings and other structures, which the Department of Infrastructure and Regional Development 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. The size of the stockpiles will be limited to a height of two metres to prevent deterioration of the material to be used as topsoil and appropriate erosion control devices will 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 approximate elevation for the airport runway is 93 metres AHD on the northern end and 73 metres AHD on the southern end. The approximate 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, at the completion of bulk earthworks the landform would be left higher. This is 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 22 million cubic metres of earth, and a similar amount of embankment construction (or fill). The majority of the bulk earthworks is expected to be undertaken by load and haul crews (either scrapers or excavator and trucks) and placement crews (compactors, rollers, graders and water carts). The use of controlled blasting may be required to excavate isolated areas of hard rock throughout the construction impact zone. Further detail about controlled rock blasting has been provided in Chapter 11 (Volume 2b) of this EIS.

The indicative construction schedule assumes that the bulk earthworks would occur in two phases:

- Phase 1 earthworks (east, north-east and south-west) would be undertaken prior to decommissioning the TransGrid power line and relocating The Northern Road; and
- 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.

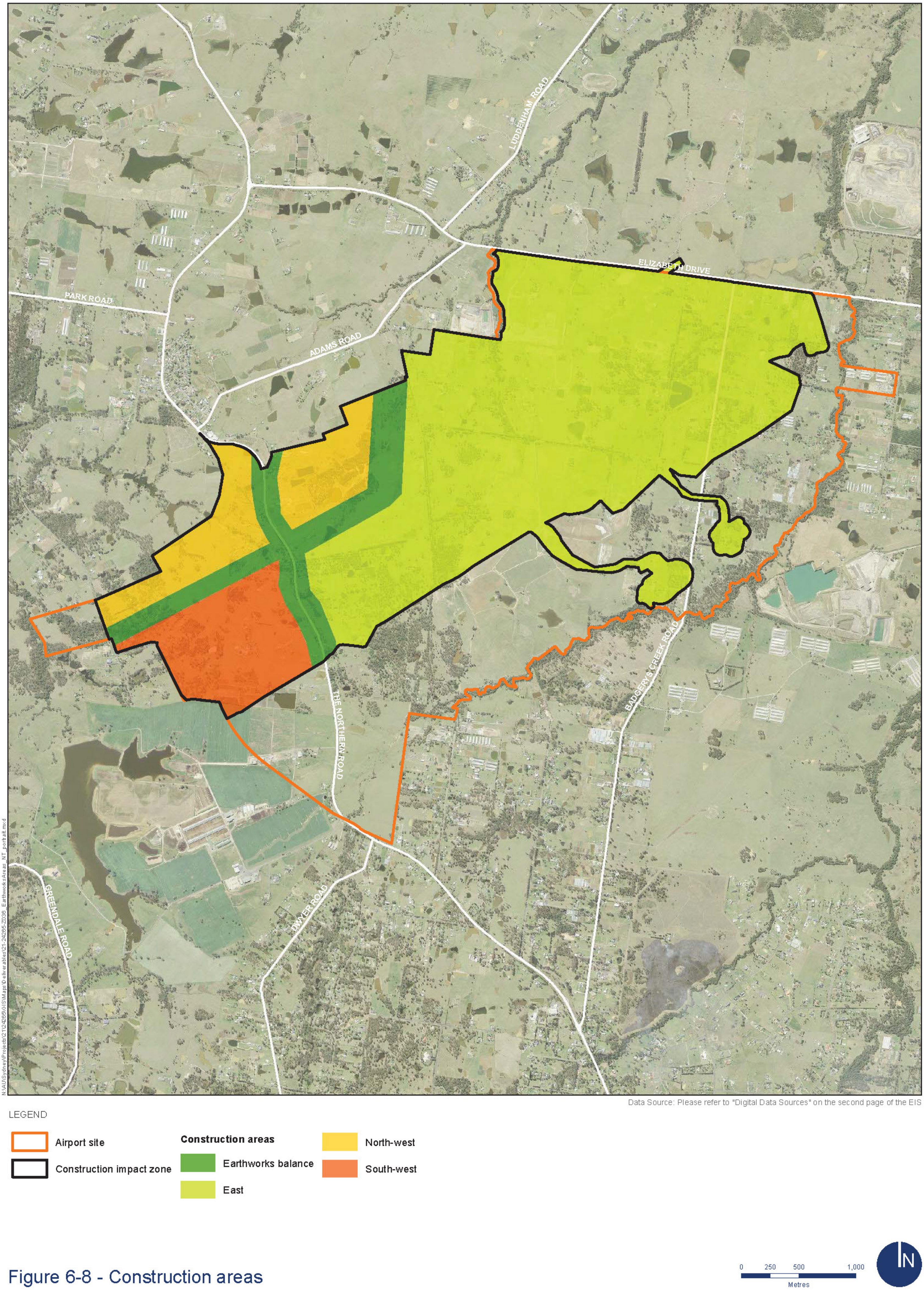


Figure 6-8 - Construction areas

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	13.0	16.6	3.6
	North-west	1.2	2.5	1.3
	South-west	3.4	.0.7	-2.7
Phase 2	Earthworks balance	4.5	1.2	-3.4
Total		22.0	20.9	-1.1

[1] Positive number is excess cut

Construction water

Up to 1.36 megalitres of water would be required per day for site preparation activities. Of this, about 8,600 litres (0.0086 megalitres) is expected to be required as potable water for the construction workforce. 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 sources. Water demand for moisture conditioning of bulk earthworks (to allow compaction) would be in the order of 650,000 cubic metres (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.

6.3.5 Installation of drainage

Stormwater management at the airport site would involve a series of grassed swales to convey runoff from the developed areas within the airport site, and a series of bio-retention and flood detention basins to manage flow quality and quantity prior to discharge to the receiving waters. It is expected that six detention basins with capacities of between 39,000 and 125,000 kilolitres would be established on the periphery of the airport site as part of the Stage 1 development. Each basin will incorporate a smaller forebay area for the provision of a bio-retention system for the treatment of low flows prior to discharge to the environment. The locations of the basins have been selected to allow discharge points consistent with existing drainage linesand would be sized to manage post-development flows to maintain predevelopment levels. A smaller bio-retention basin with no allowance for flood storage is also anticipated in the north-western corner of the site draining to Duncans Creek. The precise location and dimensions of the basins would be confirmed as part of detailed design of the earthworks and drainage solution.

The basins and their associated drains would be constructed, early in the indicative construction schedule to direct runoff for treatment before discharge from the airport site. The basin forebay would include provision for Alum (aluminium sulphate) dosing to assist with settling of dispersive sediments, improving water quality 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 earthworks. 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 construction activities. 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 activities

6.4.1 Establishment of site facilities

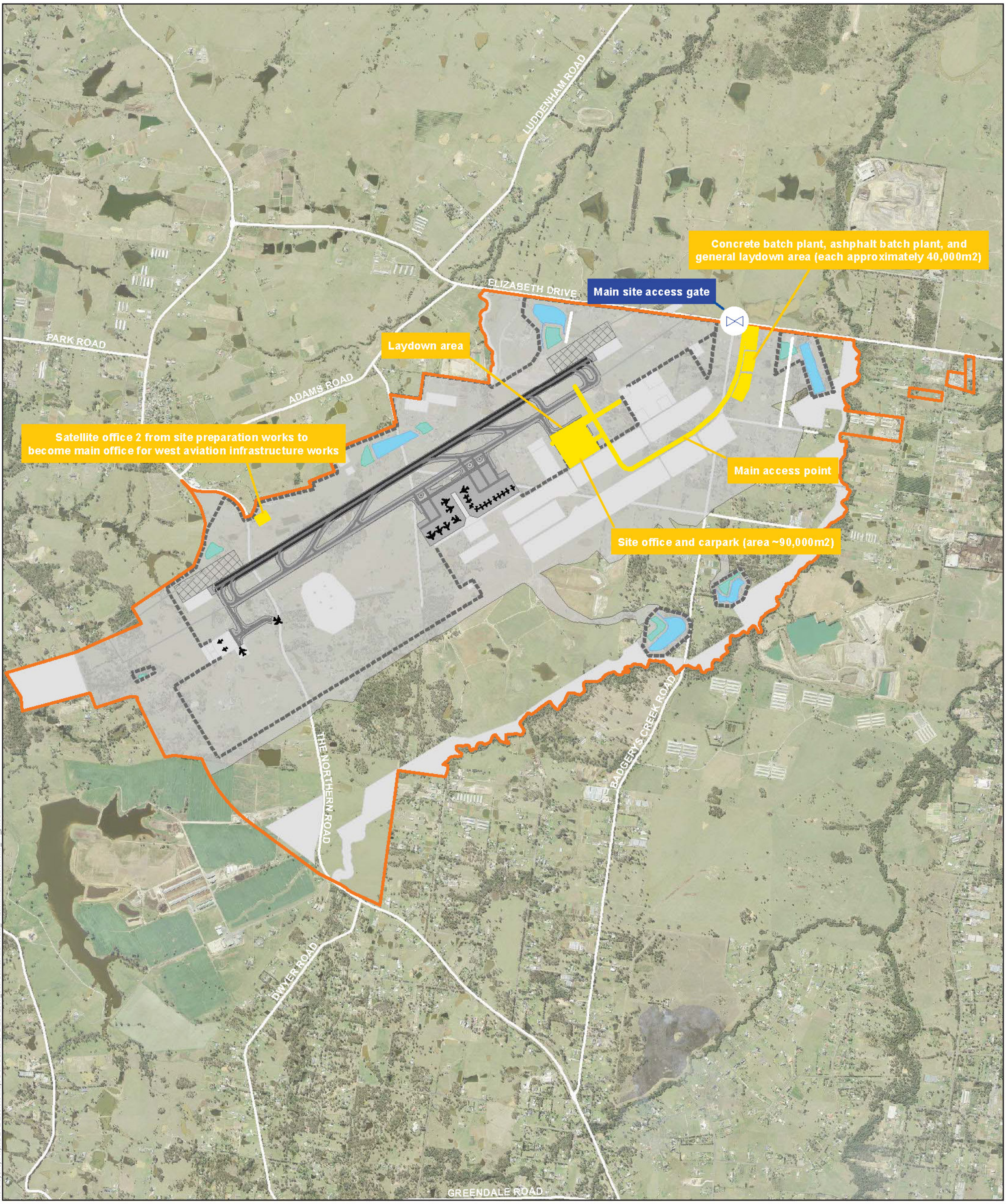
The indicative construction schedule shows that aviation infrastructure activities would be staged for progressive commencement, in line with the completion of components of the site preparation activities. Construction site facilities expected to be required are included below. The precise facilities and their location would be refined by the construction contractor and reflected in relevant plans within the Construction Environment Management Framework.

- **Site office and carpark.** A site office would be constructed in the north-east of the site with an indicative location 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 approximately 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 with some access also to occur from The Northern Road and Badgerys Creek Road, 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.



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

0 200 400 800
Metres

Figure 6-9 - Aviation infrastructure activities - facilities and access

6.4.3 Construction of paved areas

Construction of paved areas (including the northern runway, taxiways, aprons, internal roads and carparks) could involve the following.

- **Pavement box out.** Areas of pavement would be left high at the completion of the bulk earthworks (to prevent degradation of the subgrade, which could be exposed to the elements for up to two years). When the pavement preparation activities 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 activities would be retained to supply water for these activities. The general earthworks profile for the pavement box out is shown on Figure 6–10.

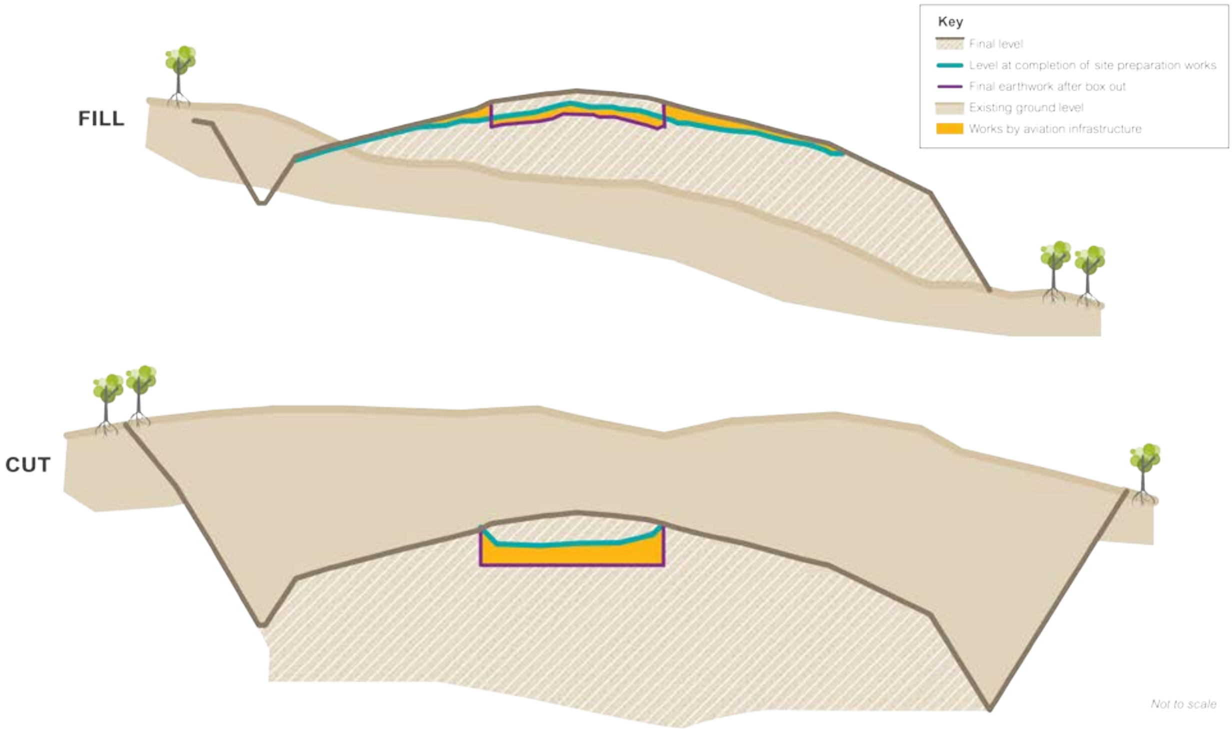


Figure 6–10 Earthworks profile

- **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 activities 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). 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 activities 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 the relevant standards.
- The 24,000 litres of wastewater and sewage estimated to be generated each day during aviation infrastructure activities 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.

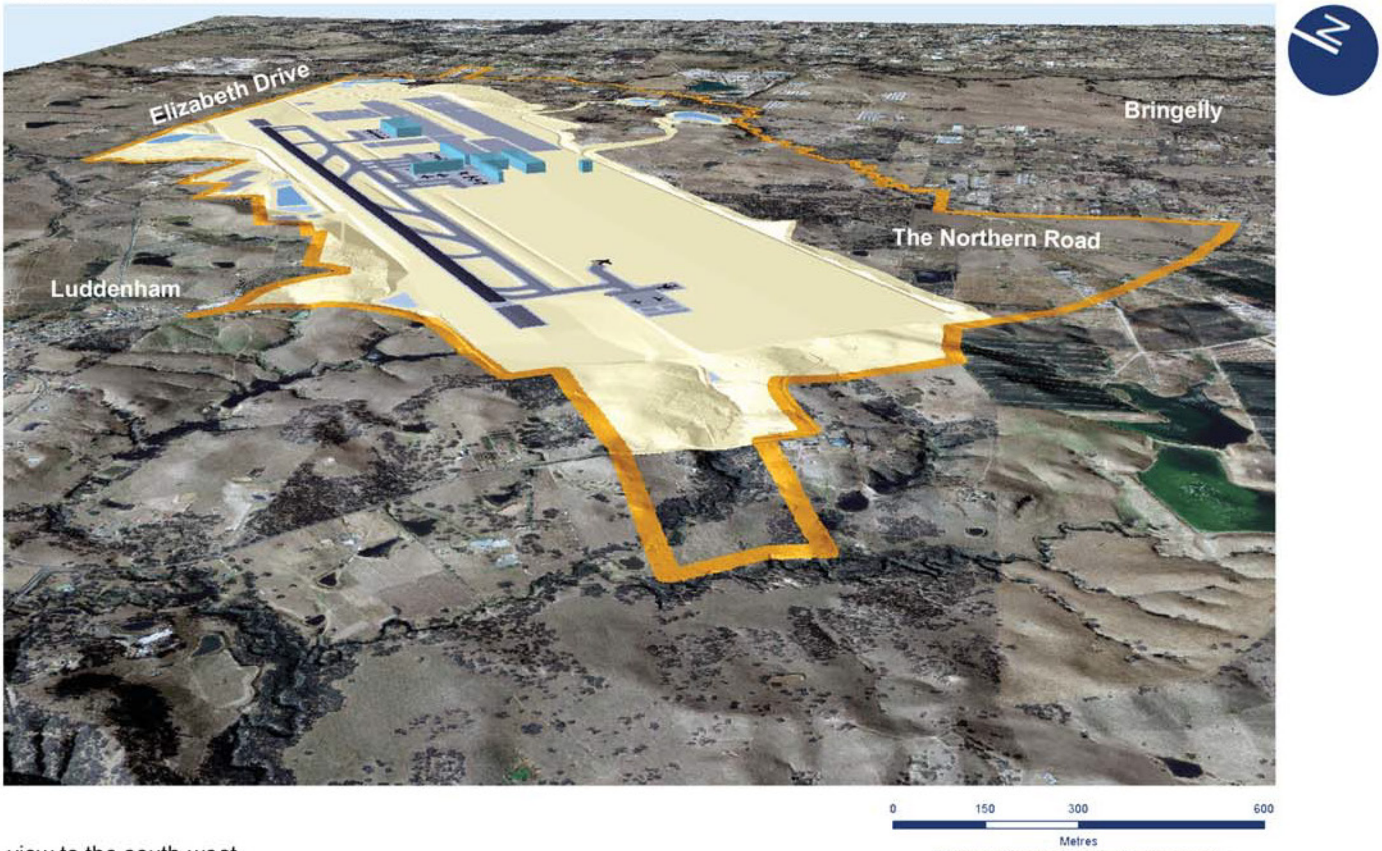
6.4.6 Construction of fuel farm

The temporary fuel farm for construction activities outlined in Section 6.3.1 would eventually be replaced with a permanent fuel farm to support the operation of the proposed airport. The fuel farm would be designed and constructed in accordance with AS 1940-2004.

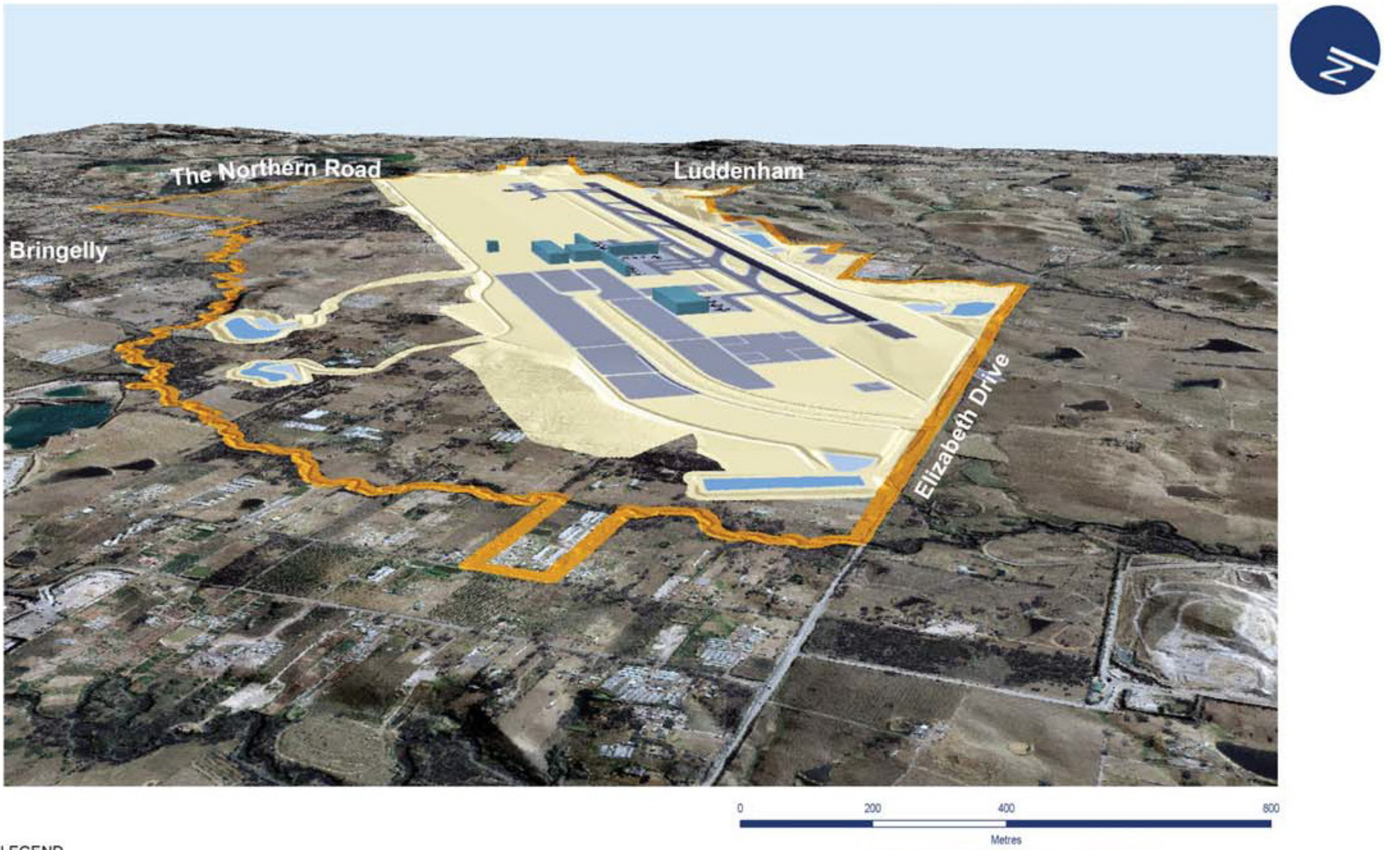
6.4.7 Final landform

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



LEGEND

- Airport site
- Terminal buildings and support facilities
- Runways
- Taxiways and aprons
- Landscape area
- Detention basin
- Bio retention basin

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 Framework. The Framework 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 having regard to mitigation measures specified by this EIS and the revised draft Airport Plan;
- 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 identified in this EIS;
- roles and responsibilities of all personnel and contractors to be employed on site;
- ongoing engagement with the community surrounding the airport site, including procedures for complaints handling and communication methods;
- a monitoring and auditing programme;
- environmental sub-plans specified in this EIS;
- an incident response procedure; and
- a contingency plan for utility disruptions.

7 Airspace architecture and operation

7.1 Airspace overview

A preliminary airspace management analysis was conducted to establish whether safe and efficient operations could be introduced at the proposed Western Sydney Airport through the development of indicative air traffic management designs and flight paths. The analysis indicates there are no known physical impediments that would prevent safe and efficient operations for aircraft arriving at or departing from the proposed airport.

The indicative flight paths developed through the preliminary analysis were used to model and assess the impacts of aircraft operations in the EIS. The flight paths assessed in the EIS represent one possible airspace design — aircraft operations on different flight paths would result in different noise outcomes from those presented. For the purposes of an EIS, the use of indicative flight paths is a valid approach for identifying and assessing the nature and scale of impacts arising from operations at the proposed airport and is generally consistent with the environmental assessment approach for runway infrastructure developments at other airports. The EIS has provided the opportunity for the community and stakeholders to consider the indicative flight paths and express views about their assessed impacts at an early stage in the airspace design process.

While the analysis based on the modelled indicative flight paths found that peak aircraft noise levels in the lower Blue Mountains would be below generally accepted thresholds for day and night time operations, comments in response to the draft EIS indicated significant community concern about the potential for flight paths to concentrate over a single point above the town of Blaxland.

The Australian Government has announced that the airspace design to be implemented for the proposed Western Sydney Airport will not converge arriving aircraft at a single point over the community of Blaxland. There is substantial scope to develop new flight paths for arrivals and departures that minimise the overflight of residential areas and reduce the impact of aircraft noise on the communities of Western Sydney and the Blue Mountains. Consistent with the Government's announcement, the detailed airspace and flight path design for the proposed airport will apply international best practice for managing airspace design and its associated environmental impacts.

The flight path design process will optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations, while minimising changes to existing airspace arrangements in the Sydney basin. The use of relatively new satellite-based navigation technologies at the proposed airport will provide greater flexibility in planning flight paths and will allow a larger range of options to be considered for managing noise from both night and daytime operations. Extensive community and stakeholder engagement will occur throughout the flight path design process, which will commence after the Airport Plan is determined by the Infrastructure Minister. An overview of the design process is presented in Section 7.8.

Key principles that will apply to the comprehensive airspace and flight path design process for single runway operations include:

- overflights of residential areas and noise sensitive facilities will be avoided to the maximum extent possible;
- aircraft arrivals will not converge through a single merge point over any single residential area;

- the use of head-to-head operations to and from the south-west, when it is safe to do so, is an important preferred option for managing aircraft noise at night. This preferred option will be thoroughly evaluated through further detailed assessment; and
- in determining the final flight paths, the community, aerodrome operators and airspace users will be consulted extensively and flight path designs will be subject to referral under the Environment Protection and Biodiversity Conservation Act 1999.

The Department of Infrastructure and Regional Development will be responsible for delivering the flight path design for the proposed Western Sydney Airport, working in close collaboration with Airservices Australia and the Civil Aviation Safety Authority (CASA). The proposed airspace design arrangements will be formally referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). CASA would ultimately approve the proposed airspace management arrangements, including the authorisation of final flight paths, before the commencement of operations.

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 varies depending on the operational parameters at an airport. In the case of Sydney (Kingsford Smith) Airport (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 additional precautions are warranted to enhance safe operations (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. If the only factors to consider were those of operating efficiency, aircraft would fly by the most direct route and at the optimum altitude for reasons of economy and efficiency of flight operations. However, when other factors are taken account of, such as noise and safety considerations and the competing demands of other airspace users, the optimum route will not necessarily be the most direct one.

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 is responsible for airspace regulation, while 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. Air traffic management procedures are published for each airport including standard instrument departures, standard arrival routes as well as associated noise management procedures.

The efficient use of airspace in the Sydney basin is influenced by the geographic location of airport sites. The relative proximity, in airspace terms, between the proposed Western Sydney Airport, Sydney Airport and other existing facilities, such as Bankstown Airport, means that aircraft operations need to be carefully coordinated.

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[7]. The review considered the airspace within 45 nautical miles (83 kilometres) of Sydney Airport. High levels of private operations, flight training activity, military operations and a 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. While the commencement of operations at the proposed airport is outside of CASA's current study period, the new airport is likely to trigger a separate airspace study before the commencement of operations.

The locations of prominent existing airports and aerodromes in the Sydney region are shown in Figure 7–1.

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 and D control zones;
- Class C and A control areas;
- Class G uncontrolled airspace;
- Restricted areas; and
- Danger areas.

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

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[7] The Sydney Basin Aeronautical Study (CASA 2015)

Sydney region airspace controls would be reviewed and varied, as necessary, to accommodate the requirements of the proposed airport and ensure the safe and efficient function of the airspace. These issues will be important considerations for the future airspace and flight path design process described in Section 7.8.

Australian airspace architecture

Class A:	This high-level en route controlled airspace is used predominately by commercial and passenger jets. Only Instrument Flight Rule (IFR) flights are permitted and they require an air traffic control (ATC) clearance. All flights are provided with an ATC service and are positively separated from each other.
Class C:	This is the controlled airspace surrounding major airports. Both IFR and Visual Flight Rule (VFR) flights are permitted and must communicate with air traffic control. IFR aircraft are positively separated from both IFR and VFR aircraft. VFR aircraft are provided traffic information on other VFR aircraft.
Class D:	This is the controlled airspace that surrounds general aviation and regional airports equipped with a control tower. All flights require ATC clearance.
Class E:	This mid-level en route controlled airspace is open to both IFR and VFR aircraft. IFR flights are required to communicate with ATC and must request ATC clearance.
Class G:	This airspace is uncontrolled. Both IFR and VFR aircraft are permitted and do not require ATC clearance.

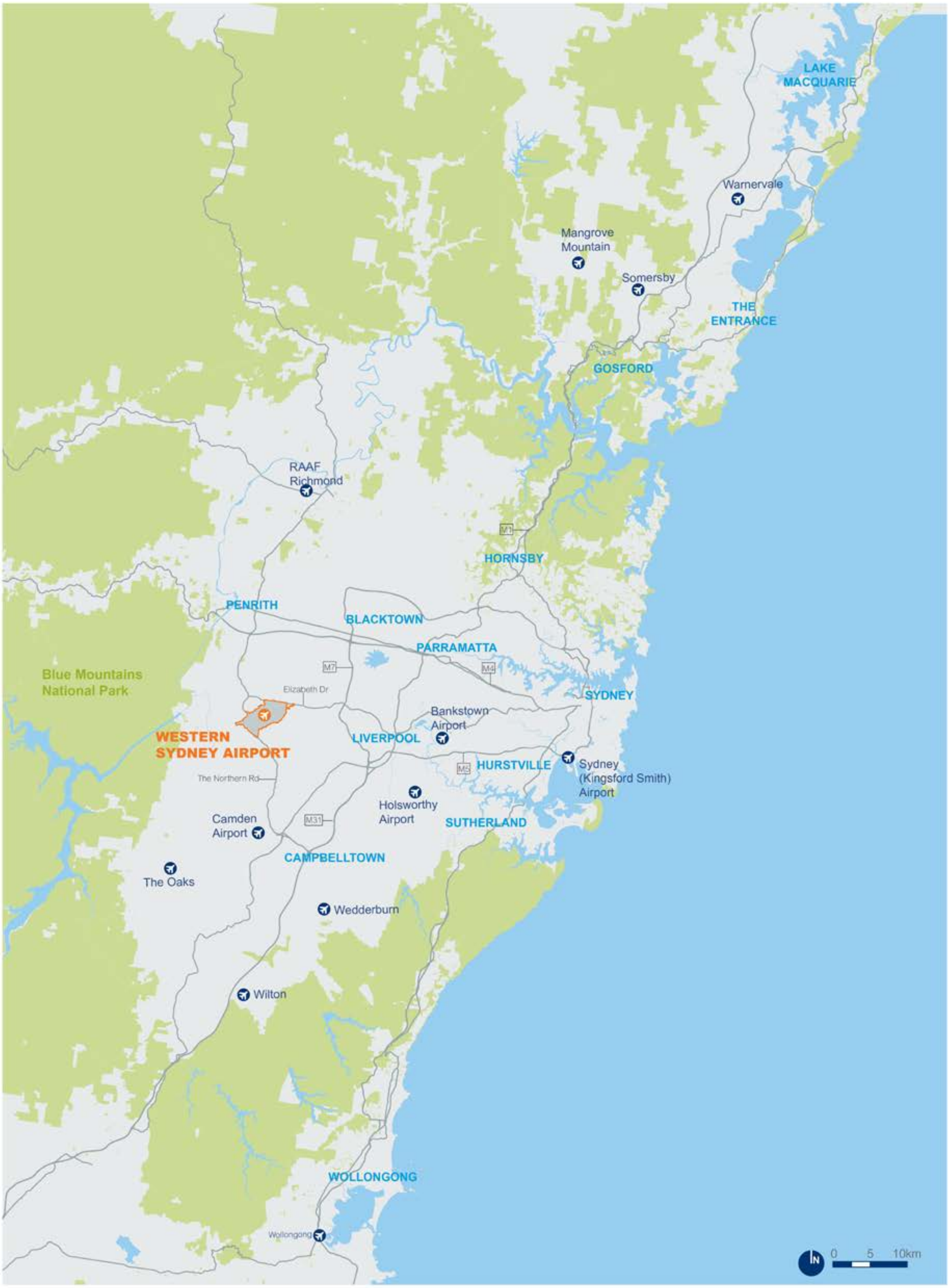


Figure 7–1 Airports and aerodromes in the Sydney region

Control zones

Control zones extend from surface level to a specified altitude in airspace surrounding major airports. There are three existing 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.

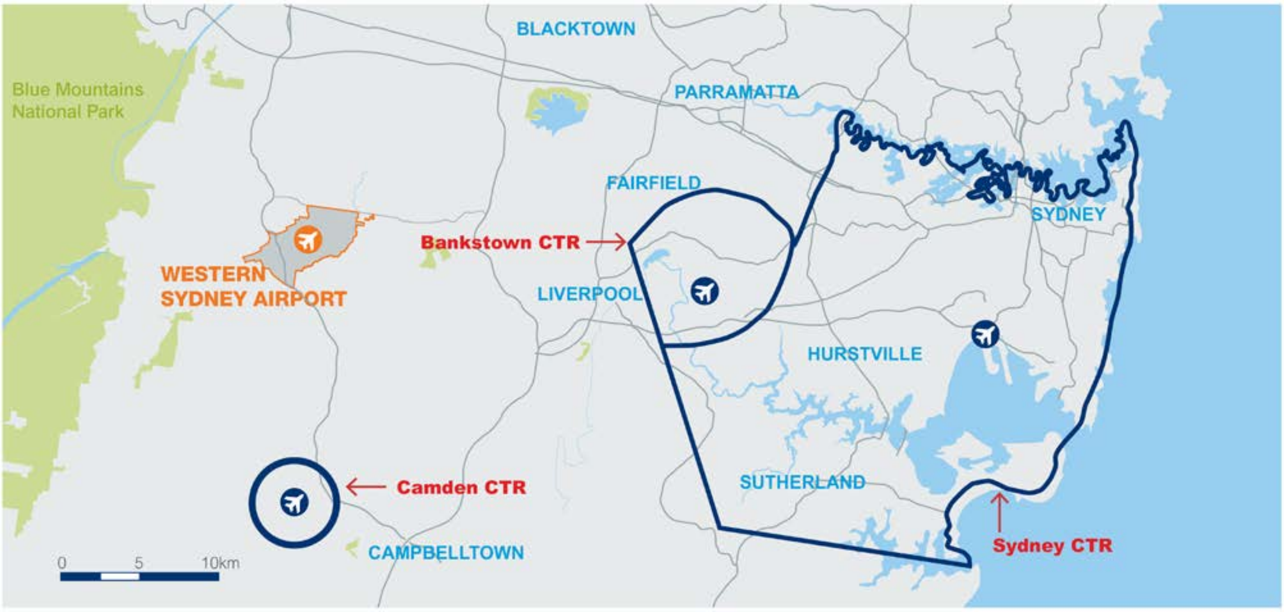


Figure 7–2 Control zones in the Sydney region

The Sydney control zone is Class C airspace from the surface to 2,500 feet (750 metres) 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) that extends from the surface to 1,500 feet (450 metres) 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 (600 metres) 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 has developed an online pre-flight visualisation tool called *OnTrack*. The *OnTrack* tool replaces Visual Pilot Guides and includes all the location-specific information previously in the guides.

In order to support light aircraft and helicopter flights between the control zones and for operations over the Sydney Central Business District and along the coast, ‘rules of entry’ have been established for VFR aircraft 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 – RA1, restricted area 2 – RA2, or restricted area 3 – RA3) which provides an indication as to the likelihood of obtaining a clearance to fly through the airspace (RA1 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 and Defence Establishment Orchard Hills (approximately 4 kilometres from the Western Sydney Airport site). 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.

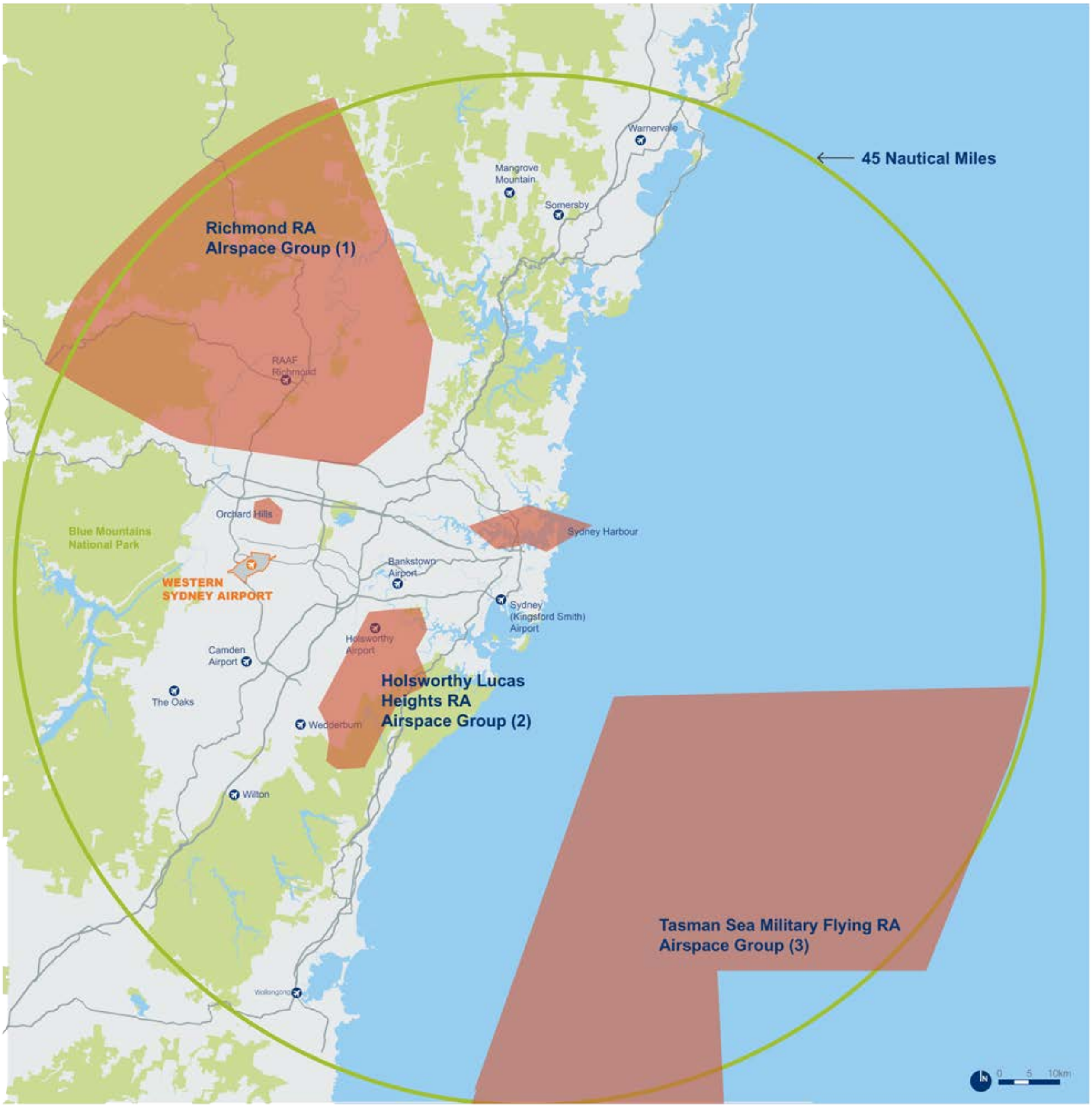


Figure 7–3 Sydney region restricted areas

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 (NOTAM) 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. Approval for flight through a danger area outside controlled airspace is not required. However, pilots are expected to check the status of danger areas (its operational hours and altitude upper and lower limits) and 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 airports. 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, temporarily, 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 NOTAM 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.

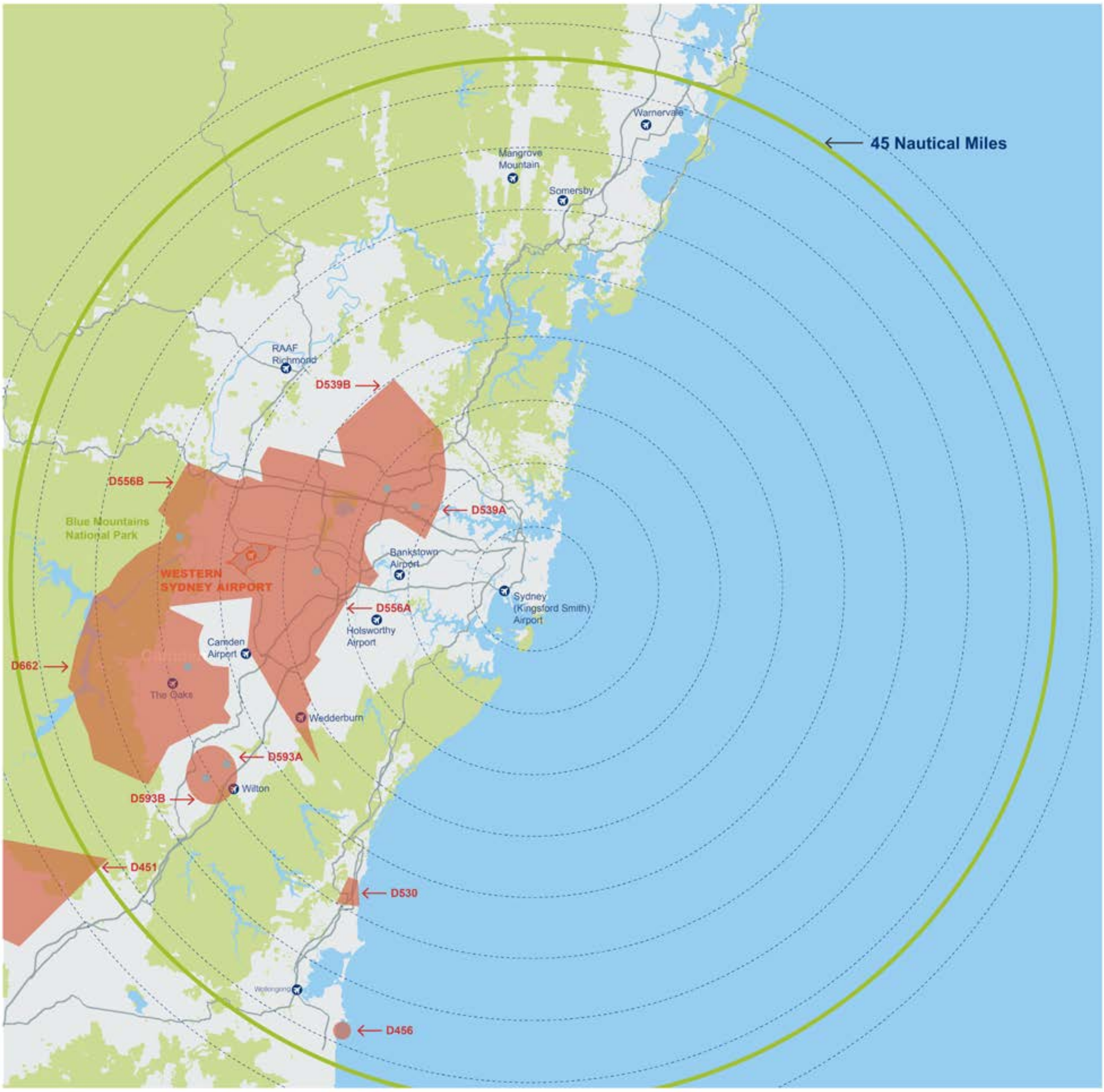


Figure 7–4 Sydney region danger areas

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, firing and demolition activities occur at this site.

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

The Western Sydney Airport - Preliminary Airspace Management Analysis report (Airservices Australia, 2015) provides 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 Stage 1 operations are potentially about ten years away (and construction for the long term second parallel runway development potentially 30 to 40 years away), the preliminary assessment undertaken by Airservices Australia is at a conceptual level of 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 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 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. As discussed further in Section 7.8, these factors will be incorporated into the final design of the airspace, which will also be subject to community and industry consultation and referral under the EPBC Act. In the meantime, this 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 safety, efficiency and 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's 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 including the removal of 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 known physical impediments that would interfere with safe and efficient operations at the airport site.

In the long term, the operation of parallel runways at the proposed airport would also be viable, although they would require the redesign of flight paths at Sydney Airport. With parallel runways, the proposed airport could potentially achieve aircraft movement rates of around 100 movements per hour (one landing or one take-off constitutes an aircraft movement).

7.4 Interactions with Sydney Airport and the broader Sydney region airspace

7.4.1 Airspace architecture and potential impacts on air traffic movement

Airservices Australia's *Western Sydney Airport - Preliminary Airspace Management Analysis* considered the potential interactions between the proposed airport and other airports in the Sydney basin including Sydney (Kingsford Smith) Airport and Bankstown Airport.

Indicative concept designs for approach and departure flight paths demonstrate that the Stage 1 Western Sydney Airport and Sydney Airport could safely operate independently as high capacity airports. They also show that an airspace design could be implemented for single runway operations at the proposed airport without changing the current design and flight path structure for Sydney Airport or Bankstown Airport.

However, as demand for aviation services grows at the proposed airport beyond Stage 1 operations, instrument flight rule operations at Bankstown Airport are expected to be incrementally constrained. This is because aircraft arriving at 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 findings of a preliminary high-level assessment of the impacts upon visual flight rule (VFR) general aviation activities in the Sydney basin from introducing single runway operations at a Western Sydney Airport include:

- operations in the Bankstown Control Zone are not expected to be affected;
- operations in the Bankstown VFR lane of entry (D539A and D539B) would be affected;
- sections of the Bankstown Flying Training Area (D566A and D556B) and the northern section of the existing Camden Flying Training Area (D552) would be affected; and
- the Bankstown instrument flight rule (IFR) arrival YSBK RNAV would have a dependency with Western Sydney Airport runway 23 arrivals.

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

Amending the Sydney basin airspace architecture to accommodate alternative general aviation flight training arrangements would be a complex task requiring detailed consideration of many safety and operational factors, and extensive consultation with airspace users and other stakeholders. This work is beyond the scope of the current assessment and would need to be considered in the context of CASA's periodic review of airspace management in the Sydney basin. Any contemporaneous review conducted by CASA would be integrated with the detailed airspace design process for Western Sydney Airport (see Section 7.8).

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. An airspace 'incident' includes events such as operational non-compliance with an air traffic control instruction, a missed approach and 'go-around', airspace infringements and non-compliance with aircraft separation standards. The rate of airspace incidents in relation to total recorded basin movements declined consistently over the five-year period between 2008 and 2013. The number of airspace related incidents more than halved (a reduction of 56.4 per cent) over this period.

Compared to other Australian capital city airports including Melbourne, Brisbane, Adelaide and Perth, Sydney has experienced the largest reduction in the rate of airspace incidents per 1,000 aircraft movements. The data indicate that despite increasing traffic at Sydney, airspace related safety has improved in the past six years.

Future considerations

Future airspace arrangements for a long term parallel runway concept would be developed much closer to the commencement of parallel runway operations. Issues that would need to be addressed as part of any future airspace design process for parallel runway operations include:

- harmonising Sydney Airport's existing flight paths with those for the proposed Western Sydney Airport to maintain independent operations at both airports 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 expected demand capacity; and
- resolution of a potential constraint associated with the restricted airspace over Defence Establishment Orchard Hills.

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. Safety is the most important consideration for operating an airport. The selection of a runway at any given time is dependent on a combination of factors including:

- weather conditions such as wind direction and speed, rain, visibility and level of cloud base;
- the number of aircraft presenting for arrival at the airport;
- the number of aircraft seeking to depart from the airport; and
- any airport policies governing the preferential use of a particular operating direction.

Standard airport operating procedures (CASA 2011) 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 crosswind component greater than 20 knots. If the runway is wet, it would not normally be selected if there is any downwind component at all. Wind conditions at the airport site therefore limit the times when a particular runway orientation may be selected and the direction in which landings and take-offs occur (see Section 5.4.1).

Based on the 05/23 runway orientation for the proposed Stage 1 development, there are two main ways the single runway would be able to be used, commonly referred to as "operating modes".

The two principal operating modes are described below.

- 'Operating mode 05', whereby aircraft will take-off and land in the 05 direction. 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. The concept of operating mode 05 is shown in Figure 7–6.
- 'Operating mode 23', whereby aircraft will take-off and land in the 23 direction. 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. The concept of operating mode 23 is shown in Figure 7–6.

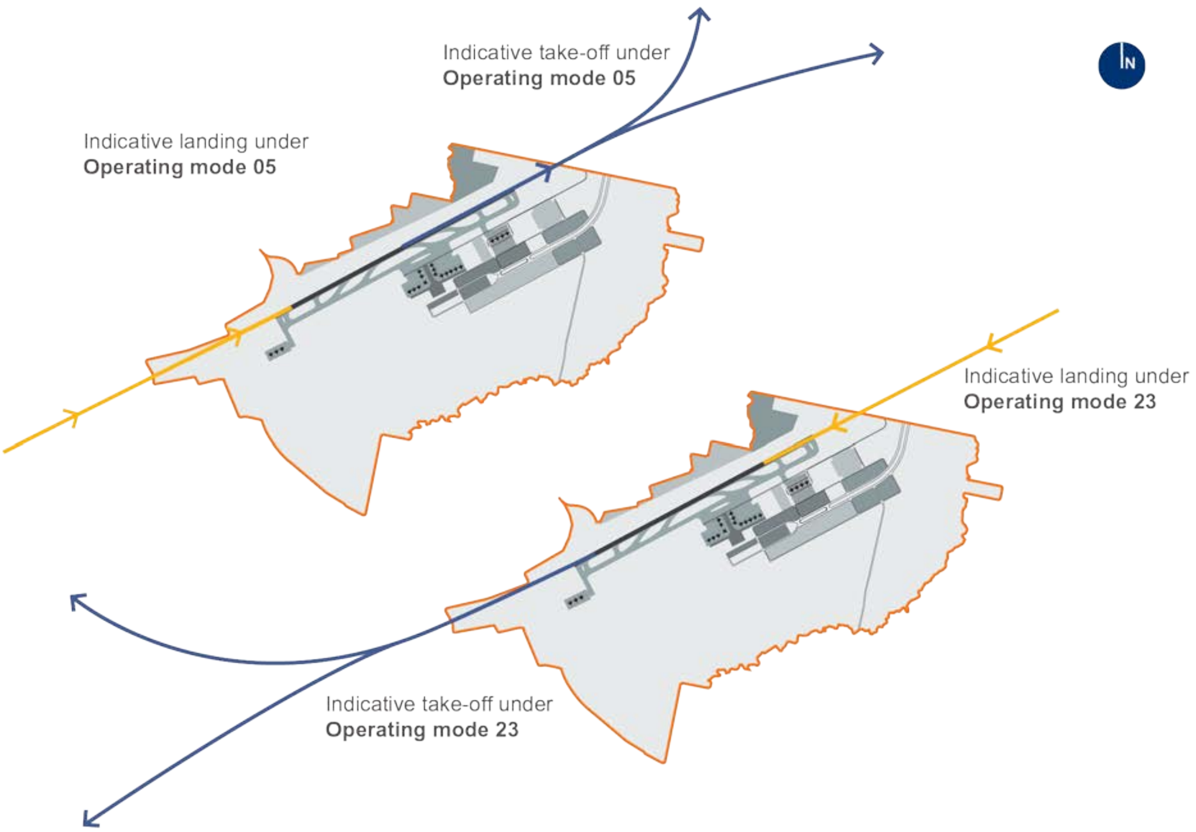


Figure 7–6 Operating modes ‘05’ and ‘23’

A third operating mode, ‘head-to-head’ — also sometimes referred to as ‘Runway Reciprocal Operations’ — may be feasible following further detailed assessment prior to the commencement of operations. This would involve all take-offs and landings occurring in opposing directions, either to and from the south-west of the airport site, which, if feasible, may result in a preferred mode, particularly late at night through to early morning, or to and from the north-east of the airport site. 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.

A head-to-head operating mode could be used when it is safe to do so and specifically when:

- the number of arriving and departing aircraft is not more than 20 per hour to permit the safe separation of aircraft; and
- the weather conditions — principally a dry runway and light downwind component — mean that it is safe to take-off or land.

This strategy is most often employed at airports that operate without a curfew as a means of minimising night time aircraft flights over residential areas. It is already in place at other airports in Australia. In Brisbane, the preferred operating mode for night hours (10.00 pm – 6.00 am) is for all arrivals and departures to occur over Moreton Bay. Head-to-head operations over Botany Bay currently occur during curfew hours at Sydney (Kingsford Smith) Airport. No passenger flights can occur during curfew hours at Sydney Airport with the exception of a limited number of international arrivals between 5.00 am and 6.00 am (no more than 24 movements per week) , although take-offs and landings of certain medium-sized freight aircraft, up to 74 per week, and other noise-compliant aircraft under 34,000 kg, without quota, are permitted during curfew periods.

Winds at inland locations such as Badgerys Creek are typically more predictable and lighter than those experienced at airports on the coast, suggesting that a high proportion of night flights could theoretically operate this way at the proposed Western Sydney Airport.

The concept of head-to-head operations is shown in Figure 7–7.

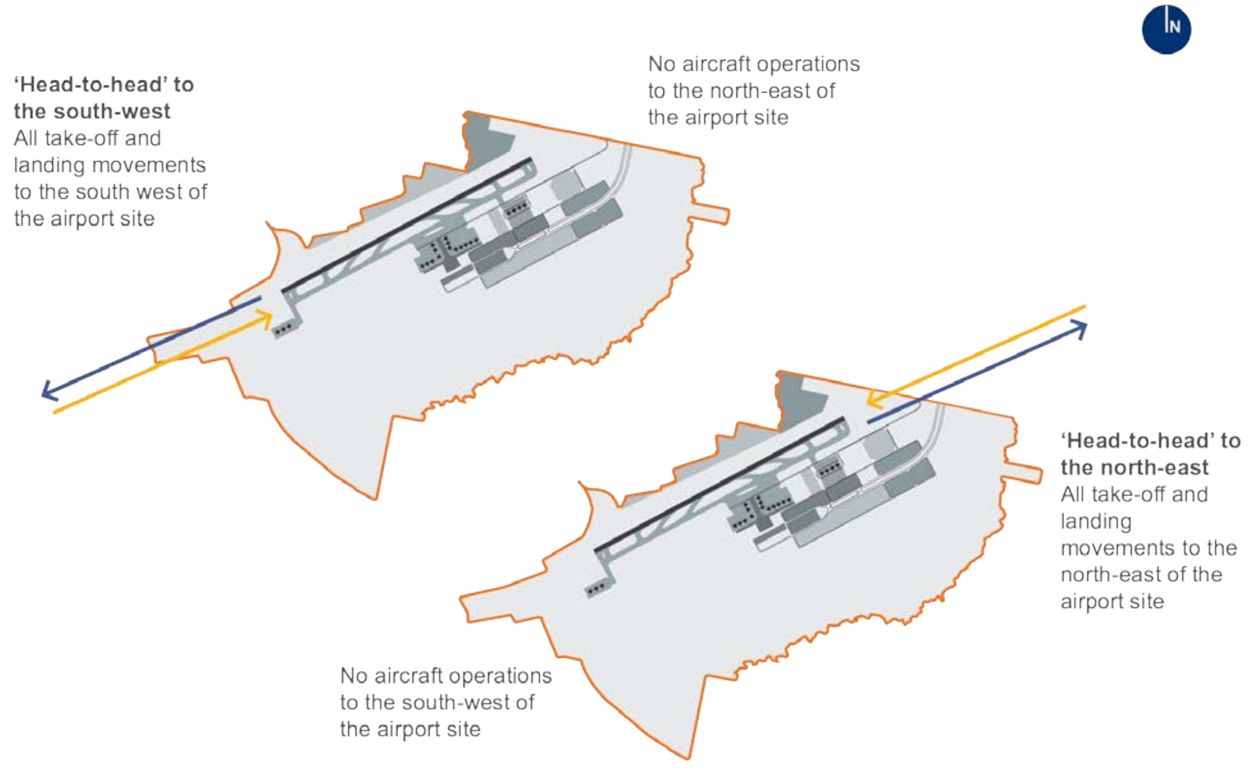


Figure 7–7 Head-to-head operating modes

Operation of the proposed airport would change 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 would result in increased noise exposure levels in some areas, particularly those locations closer to the airport under or near the standard aircraft departure and arrival flight paths. In addition, the projected future growth in air traffic beyond Stage 1 operations would generally increase total noise exposure in the future.

The use of head-to-head operations to and from the south-west, when it is safe to do so, is an important preferred option for managing aircraft noise at night that will be thoroughly evaluated through further detailed assessment.

The pattern of noise impacts that would result from operation is complex and depends on the 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 when it is safe to do so may provide a respite for noise sensitive receivers in some areas for a period of time. Potential noise abatement opportunities, such as the selection of preferred operating modes for different times of day, will form an important part of the work required to finalise the airspace design prior to implementation (see Section 7.8).

7.6 Indicative flight paths

The EIS depicts indicative flight paths for Stage 1 operations at the proposed Western Sydney Airport. The principal objective of the preliminary flight path assessment was to establish whether safe and efficient operations could be introduced at the proposed airport. Figure 7–8 and Figure 7–9 show the draft EIS Stage 1 indicative flight paths for this proof of concept, including a single indicative merge point location for aircraft arrivals, for the 05 and 23 operating modes respectively.

The Australian Government has announced that the airspace design to be implemented for the proposed Western Sydney Airport will not include a single merge point that would converge arriving aircraft over Blaxland.

Final airspace and flight path planning for the proposed airport will assess different systems for sequencing arriving aircraft and alternative flight path options. This future airspace planning and design will evaluate each system and flight path option against the key criteria of safety, aircraft operation efficiency, capacity, and noise and other environmental impacts. Further details about the system options for managing air traffic and the future airspace design process are provided in Section 7.7 and Section 7.8 respectively.

7.6.1 The design of indicative flight paths and their use in this EIS

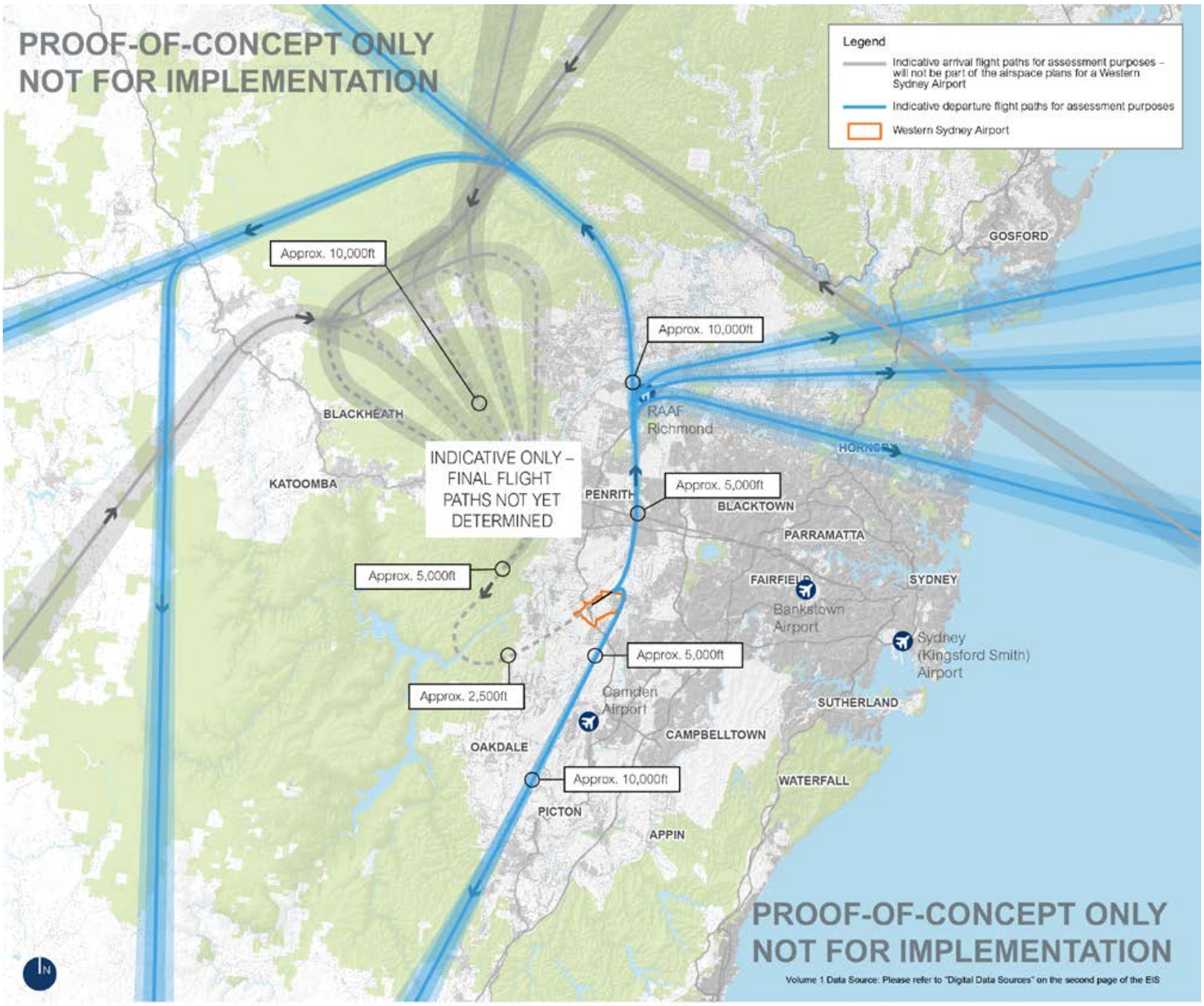
The main consideration when designing the indicative flight paths presented in the EIS was air traffic management, particularly how aircraft using the flight paths would interact with aircraft operating to and from Sydney Airport. The indicative flight paths developed by Airservices Australia were designed 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 could be made to suit local conditions without affecting the operating mode at the other.

The Airservices Australia design work and analysis was conducted using the current standards and procedures that apply to air traffic management, including:

- relevant provisions of the Civil Aviation Safety Regulations 1998;
- Procedures for Air Traffic Management (ICAO Doc 4444);
- Procedures for Aircraft Operations (ICAO Doc 8168); and
- the *Airspace Act 2007* and relevant regulations.

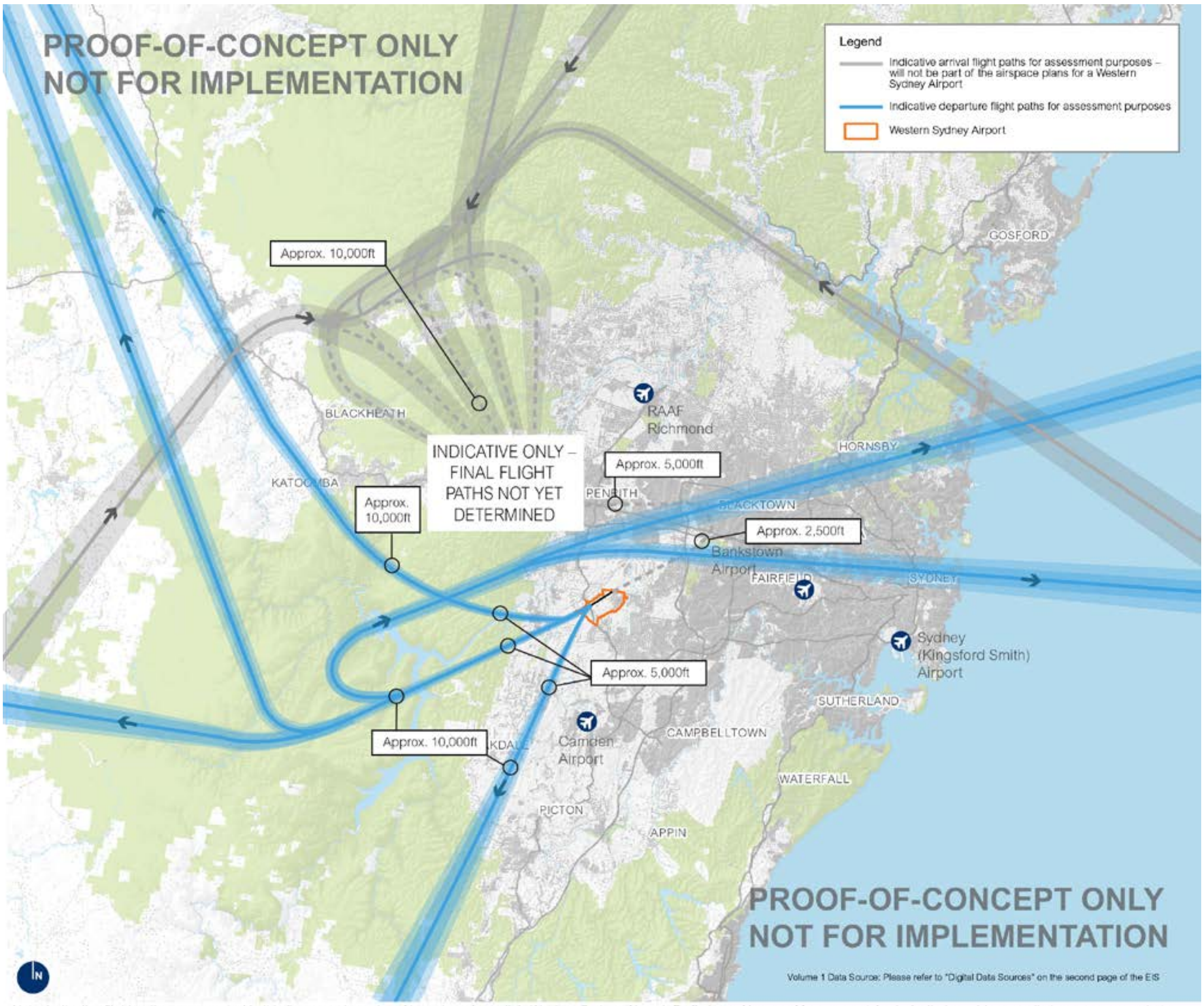
The increasing use of new satellite-based navigation technologies means that suitably equipped aircraft are able to fly more accurate and predictable flight paths than their predecessors. The expected adoption of these technologies and associated operating procedures at the proposed Western Sydney Airport is likely to result in less dispersal of aircraft around authorised flight paths compared to navigation based on conventional technologies.

The indicative flight path design prepared by Airservices Australia assumes the adoption of new navigation technologies. While flight paths are depicted in the design as single lines of travel, it is not always possible for each aircraft to fly precisely along the same line. The variation of aircraft around a nominated flight path is referred to as dispersion. The concept of dispersion is illustrated in Figure 7–8 and Figure 7–9.



Note: Indicative flight paths as presented in this figure are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis, that provides a preliminary assessment at a conceptual level of airspace management design. The Australian Government has announced that aircraft arrivals for the proposed Western Sydney Airport will not converge through a single merge point over Blaxland or any other single residential area. The formal flight path design process will start from determination of the Airport Plan and optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations.

Figure 7–8 Stage 1 indicative flight paths for the 05 operating mode



Note: Indicative flight paths as presented in this figure are based on Airservices Australia's Western Sydney Airport: Preliminary Airspace Management Analysis, that provides a preliminary assessment at a conceptual level of airspace management design. The Australian Government has announced that aircraft arrivals for the proposed Western Sydney Airport will not converge through a single merge point over Blaxland or any other single residential area. The formal flight path design process will start from determination of the Airport Plan and optimise flight paths on the basis of safety, efficiency, capacity, and noise and environmental considerations.

Figure 7–9 Stage 1 indicative flight paths for the 23 operating mode

The modelling of aircraft noise in this EIS accounted for the dispersion of departing aircraft by assigning them to one main flight path and four sub-paths — two on either side of the main flight path. No dispersion was assumed for instrument-guided arrival flight paths, on the basis that aircraft on these flight paths would be strictly controlled. It should also be noted that the use of a number of flight paths for visual approaches provides a form of dispersion for aircraft turning onto final approach before landing.

The environmental assessment of aircraft operations is based on the indicative flight paths illustrated in the EIS with some modifications as outlined in the Aircraft Overflight & Operational Noise technical report (Appendix E1, Volume 4). While the Government has announced that a single merge point over Blaxland will not be implemented, the indicative flight paths presented in the EIS provide a valid and contemporary basis for assessing the potential extent and intensity of impacts associated with aircraft operations at a Western Sydney Airport. In addition, the assessment of the head-to-head operating mode is a practical illustration of the reduction in noise impact that could be achieved if this operating mode was determined to be feasible. Using preliminary flight paths for this purpose is consistent with other environmental assessments of new runway infrastructure, including the 1997-1999 Second Sydney Airport Proposal EIS and recent proposals such as the Brisbane Airport New Parallel Runway (NPR).

Nevertheless, it is important to note that the conceptual and preliminary airspace design illustrated in the EIS has not been developed to a level of detail necessary for implementation and would require further analysis prior to the commencement of airport operations (see Section 7.8). Importantly, the conceptual designs have not been developed to consider all potential noise abatement opportunities and this would form an important part of the subsequent design work leading up to implementation.

The indicative flight paths and operating procedures described and modelled in the EIS have been used for the purposes of modelling noise exposure and other consequential impacts of aircraft overflights. No decisions have been made on a preferred approach for managing aircraft arrivals and departures.

7.6.2 Indicative arrival flight paths

In developing the preliminary flight paths, consideration was 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 and noise management.

Major airports are served by one or more Standard Terminal Arrival Routes (STARs), which are routes established by air traffic control to direct arriving aircraft to an airport. The three STARs options considered as part of the preliminary flight path design were:

- open standard terminal arrival routes with radar vectoring to final (Open STARs) — this model is a method of processing aircraft that achieves consistent arrival spacing by allowing air traffic control personnel to adjust the approach path (using radar vectoring) and aircraft speed;
- runway connected standard terminal arrival routes (Closed STARs) — this model is a method of processing terminal arrivals that enables aircraft to use a continuous descent profile defined by the aircraft's on-board flight management system with limited air traffic control intervention; and

- Point Merge system — this is a hybrid of the Open and Closed STARs models (“Open-Closed hybrid”) that provides a simple, predictable and standardised procedure for sequencing and spacing aircraft arrivals with limited air traffic control intervention.

It is important to recognise that ‘Point Merge’ is a description of a type of flight path design. A feature of such a design is that arrivals flight paths merge together into one or more merge points prior to aircraft landing.

A key principle of the detailed airspace and flight path design process is that aircraft arrivals will not converge through a single merge point over any single residential area (see Section 7.8).

Taking into account the future air traffic management requirements of the proposed Western Sydney Airport and the potential advantages and disadvantages of each system option, Airservices Australia selected the Open-Closed hybrid system as the basis for developing indicative flight paths for the proposed airport because it was capable of achieving maximum airport capacity. It is a relatively new approach for managing aircraft arrivals that has been implemented successfully at several busy international airports where it has been shown to enhance safety, efficiency and environmental outcomes.

While this system has been adopted for current proof-of-concept modelling and assessment purposes, no decision has been made about the preferred arrivals management system for implementation. All three STARs options (i.e. Open STARs, Closed STARs and Point Merge) will be examined rigorously as part of the detailed airspace design process. A description of the three options is provided in Section 7.7.2.

The future airspace design process will comprehensively evaluate a range of options for managing arrivals to ensure that the location of flight paths is optimised in terms of safety, efficiency, capacity and environmental impact (see Section 7.8)

7.6.3 Indicative departure flight paths

The proof-of-concept design shows 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 distant from the proposed airport (approximately 35 km to 45 km).

For departures to the south-west (the 23 direction) there is an indicative third flight path passing in the vicinity of the township of Warragamba that then extends in a north-west direction. This flight path has been designed for use by non-jet aircraft only, which would limit predicted noise exposure in areas beneath this route.

7.7 System options for managing aircraft arrivals and departures

The airspace model and indicative flight paths prepared by Airservices Australia provide a preliminary indicative airspace design for safe and efficient operations in the Sydney basin taking into account the introduction of flights to and from the proposed Western Sydney Airport. They are conceptual and represent one of several options for managing air traffic at the proposed airport.

Submissions on the draft EIS called for consideration of different systems to manage aircraft arrivals and departures and for flight paths to be located away from residential areas in western Sydney and the Blue Mountains. As noted in Section 7.6, the Government has announced that a single merge point for arriving aircraft as depicted over Blaxland will not be implemented. Further detailed technical work will be undertaken to optimise the design of flight paths for the proposed airport so that noise and environmental impacts are reduced as far as practicable.

The location of standard arrival and departure flight paths and options to sequence aircraft approaches will be developed in consultation with the public.

Alternative systems for sequencing arriving aircraft in a safe, predictable and standardised manner will be evaluated during the detailed airspace and flight path design process for the proposed airport. System options will be assessed within Airservices Australia's national framework for airspace and air route planning, known as the Future Airspace System. This system will modernise Australia's airspace and incorporate world's best design and practice.

7.7.1 Australia's Future Airspace System

Staged implementation of the Future Airspace System over the next 10 years is being driven by a number of factors including:

- the expected growth of air traffic across the nation;
- the need to design airspace to accommodate new runways at Brisbane, Melbourne and Perth airports;
- the development of the proposed Western Sydney Airport; and
- the commissioning of a new joint civil/military air traffic control system in the early 2020s.

Under the Future Airspace System, the current Terminal Area (i.e. the area of controlled airspace) for major Australian cities will be extended to accommodate the majority of the climb and descent phases for modern aircraft operations. For each city, the coordination of aircraft movements within this area, or Extended Manoeuvring Area (EMA), will enhance capacity and allow aircraft to operate on more efficient climb and descent paths with fewer constraints and less intervention by air traffic control. The EMAs will be designed to accommodate a range of modern air traffic control technology that has the capability of managing aircraft more efficiently and safely while reducing aircraft noise.

The Future Airspace System will transition Australia to a new air traffic management approach under which air routes are designed based on Performance Based Navigation (PBN) specifications. Unlike conventional aircraft navigation, which employs fixed ground-based beacons to guide aircraft along published routes via waypoints, PBN uses global navigation satellite systems and computerised on-board flight management systems to navigate aircraft.

A growing number of modern aircraft are fitted with navigation systems that employ satellite-assisted guidance. These systems allow aircraft to use GPS information to fly with a high degree of accuracy and efficiency. Within the EMA, airspace architecture will be designed to contain the position of an aircraft to within one nautical mile of its planned route, thereby allowing more precise tracks to be followed and less dispersion of aircraft compared to conventional navigation methods. Operationally, reduced dispersal means improved predictability. This contributes to improvements in safety and a reduced likelihood of delay for arriving aircraft.

The improved precision of satellite-based navigation technology also enables flight paths to be designed to avoid noise sensitive areas in favour of overflying industrial land or non-residential areas. Airservices Australia refers to flight paths designed for satellite navigation technology as

Smart Tracking. It is also known in the aviation industry as Required Navigation Performance-Authorisation Required, or RNP-AR.

The potential benefits of Smart Tracking include:

- the ability for suitably equipped aircraft to fly certain flight paths that they would otherwise be unable to use at night or in poor weather conditions such as low cloud. This has the potential to provide respite to noise-affected communities by enabling the use of flight paths and noise sharing procedures that would normally only be available in high-visibility, daytime conditions. It also means fewer aircraft delays for passengers and fewer diversions of arriving flights to other airports;
- the ability for aircraft to fly with greater accuracy, with only a small variation in the actual paths flown from one aircraft to another. While this has the benefit of minimising the overall noise footprint, it can also concentrate noise impacts underneath the RNP-AR flight path. Management of community noise impacts could include consideration of the periodic use of alternative flight paths to provide respite for those under a Smart Tracking path;
- greater capacity for aircraft to use continuous descent approaches and reduce their noise footprint. A continuous descent approach minimises level flight segments prior to an aircraft intercepting the runway's Instrument Landing System (ILS) and enables the aircraft to be operated with low engine thrust settings and, where possible, a low drag configuration that reduces fuel use and noise. Aircraft making an ideal continuous descent approach can essentially glide from cruising altitude to the runway in one smooth and uninterrupted descent. These approaches have been shown to reduce community noise exposure by about 4 dBA to 6 dBA in those areas under the arrivals flight path before the ILS is intercepted;
- the ability for departing traffic to utilise RNP-AR flight paths with the minimum possible restrictions thereby enabling the aircraft's flight management system to manage fuel consumption efficiently as the aircraft climbs to its cruising altitude; and
- greater flexibility in the design of arrival and departure routes and increased noise management options for both night and daytime operations.

Smart Tracking technology is fitted in most new aircraft and can be retrofitted into some older aircraft. Over the next decade, more airlines will start using Smart Tracking procedures as they receive new aircraft, retrofit older aircraft with the necessary technology and train their pilots. Smart Tracking was implemented permanently in Brisbane for all aircraft that have this capability in early 2012. The technology has subsequently been adopted at several other airports across the country and is planned for use at the proposed Western Sydney Airport.

Another integral part of Australia's next-generation satellite-based air navigation system is the Ground Based Augmentation System (GBAS), known in Australia as SmartPath. It is a satellite-based precision landing system supplemented with on-ground units that is a potential replacement for current ILSs. The system improves the accuracy of aircraft positioning and allows for a safer, more efficient descent and landing. SmartPath has been operational at Sydney Airport for several years. It is one of a number of navigational aids identified for installation at the proposed Western Sydney Airport.

Satellite technologies such as RNP-AR and GBAS provide a relatively new way of conducting precision instrument approaches that are currently equivalent to ILS Category I (CAT I). SmartPath is expected to eventually support precision approach and landing to Category III (CAT III) standards. SmartPath has the potential to overcome many ILS technical and operational limitations which currently constrain flight path flexibility (e.g. reliance on straight-line radio waves — see Figure 7–14). In contrast, suitably equipped aircraft using RNP-AR/GBAS procedures are capable of making curved approaches under minimal power that avoid long, straight-in approaches. Figure 7–11 compares theoretical RNP 1[8] approaches with a conventional ILS approach.

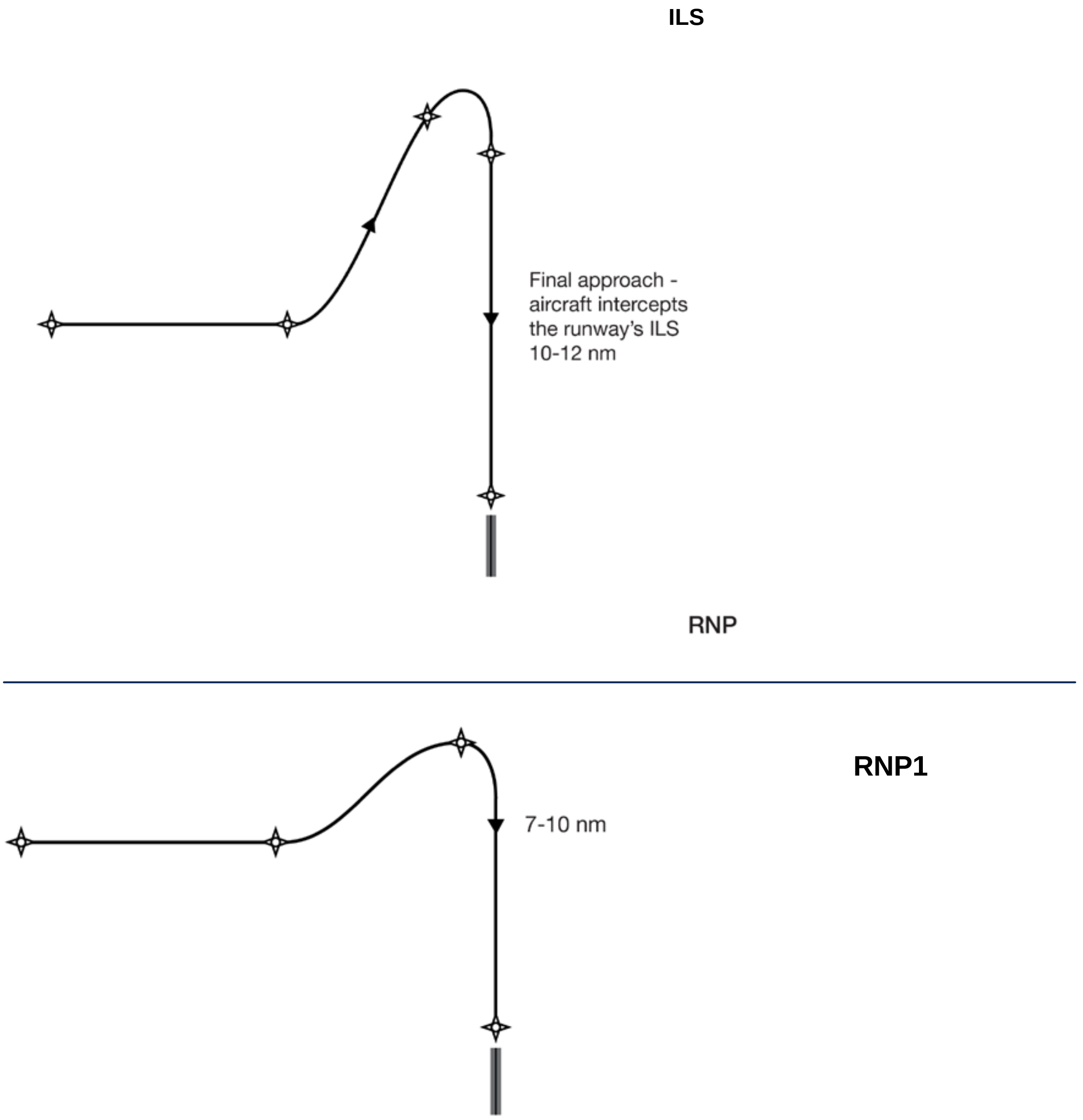


Figure 7–10 Comparison of traditional ILS approaches and potential RNP 1 approaches

[8] RNP 1 is a Required Navigation Performance specification that is applicable to terminal area arrival and departure phases of flight and to instrument approach procedures up to the final approach fix. An RNP 1 operation is conducted to a navigation accuracy of ±1 nautical mile lateral deviation from the specified flight path. RNP 1 standards require on-board performance monitoring and alerting, and verification that the aircraft and operating crew are approved for RNP 1.

Aircraft are not able to fly pre-planned tracks while being radar vectored by air traffic control. This means that fuel management is not accurate and fuel burn during descent can vary and energy management can become less predictable.

The Open STARs arrival management system is an effective method for achieving maximum runway capacity. It is used at Sydney Airport where runway demand is consistently high. The system provides accurate final spacing of aircraft and maximises runway capacity, but does not enable continuous descent operations because aircraft are always managed by radar vectors with variable tracking to final. Low altitude vectoring can result in increased aircraft noise levels. Figure 7–11 depicts a conceptual Open STARs arrivals system.

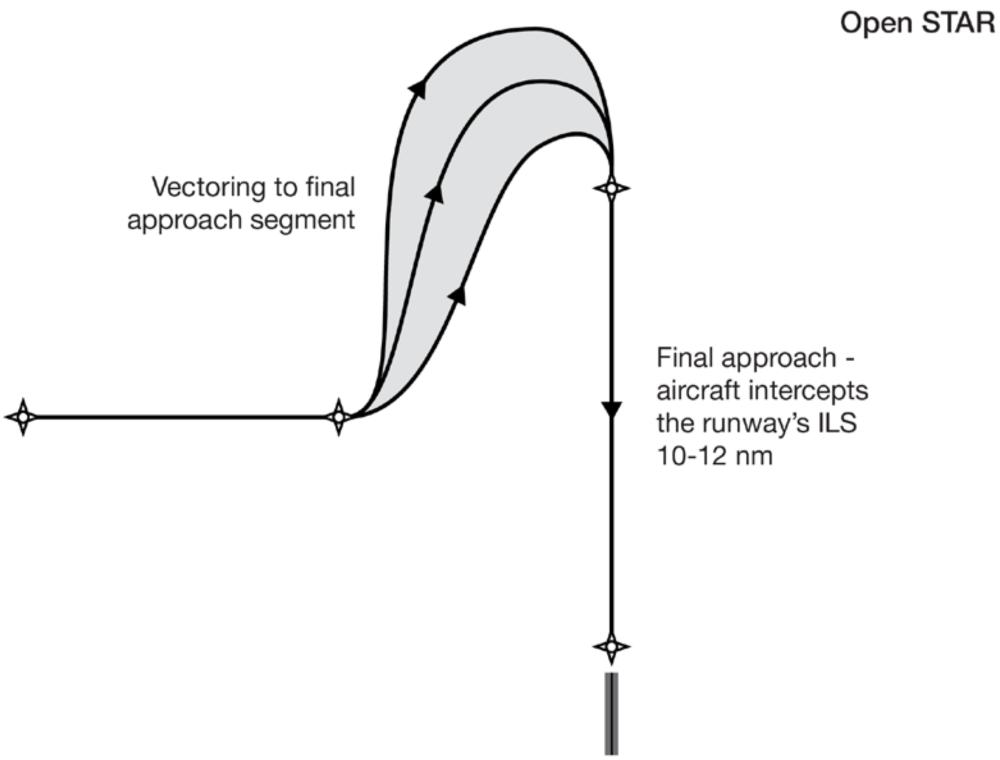


Figure 7–11 Open STARs arrivals management system

Runway connected Standard Terminal Arrival Routes (Closed STARs)

Runway connected STARs is a method of processing terminal arrivals that enables aircraft to adopt a continuous descent profile because the vertical and lateral path from the top of descent to the runway threshold is defined accurately in the aircraft's on-board flight management system. Runway connected (Area Navigation) RNAV STARs, also known as Closed STARs, are used at Brisbane, Melbourne and Perth airports. Figure 7–13 depicts a conceptual Closed STARs arrivals system.

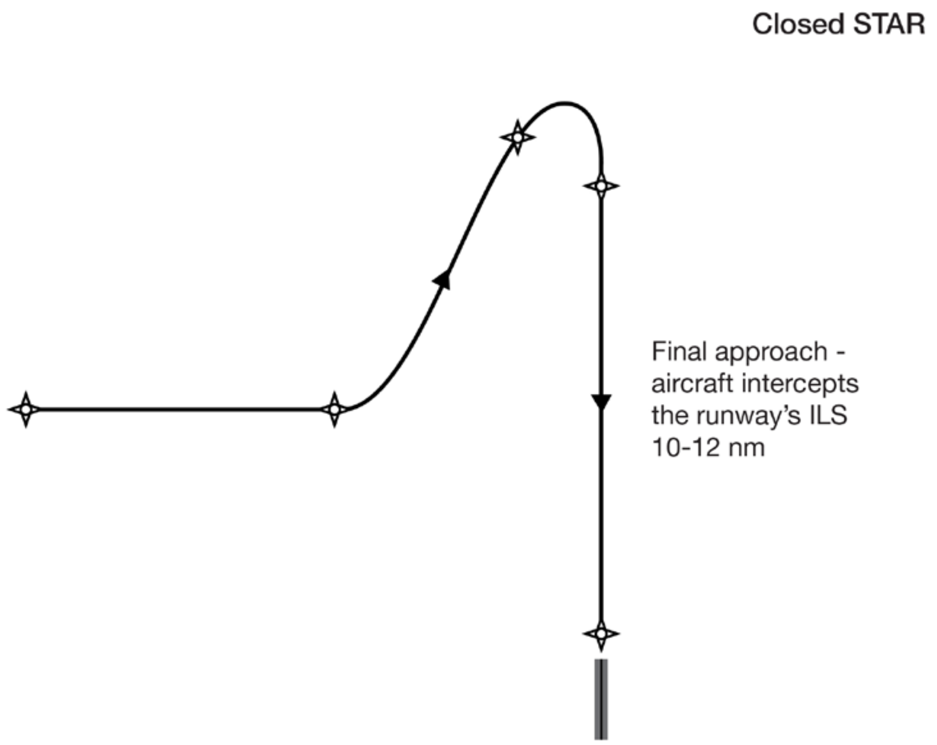


Figure 7–12 Closed STARs arrivals management system

The Closed STARs model enables accurate fuel time and energy management for aircraft with flight management system capability but it may not provide the flexibility required to maximise runway capacity. Consequently, this model of air traffic synchronisation is generally used when runway capacity is not a constraint and the use of continuous descent profile arrival procedures is a priority. These procedures are generally associated with reduced fuel consumption and lower noise levels, particularly in areas further away from the airport before aircraft intercept the runway's ILS (typically 10 nautical miles from the runway's landing threshold).

Point Merge system

Point Merge is a relatively new and innovative method for synchronising arriving aircraft that has been introduced internationally since 2011 at airports in Oslo, Dublin, Seoul, Kuala Lumpur, Lagos, Hannover, the Canary Islands, Paris (Charles de Gaulle) and London (London City and Biggin Hill). This system has been demonstrated to be an effective method of finely controlling the spacing between arrivals and for balancing the competing priorities of runway capacity and fuel efficiency (e.g. through minimising track miles) at these busy international airports. Point Merge provides a simple, predictable and standardised procedure for sequencing aircraft arrivals that can reduce noise impacts compared to alternative arrival management systems that involve more air traffic control intervention. It may also provide the easiest and most flexible method for ensuring fully independent operations can occur at the proposed Western Sydney Airport and Sydney (Kingsford Smith) Airport.

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 — which require more power and hence produce more engine noise — at low altitude. Utilising the capabilities of an aircraft's on-board flight management system, Point Merge promotes the use of a continuous descent path, which can reduce fuel consumption, emissions and noise impacts.

The concept of the Point Merge system is presented in Figure 7–13 and can be seen on the indicative flight paths presented in Figure 7–8 and Figure 7–9.

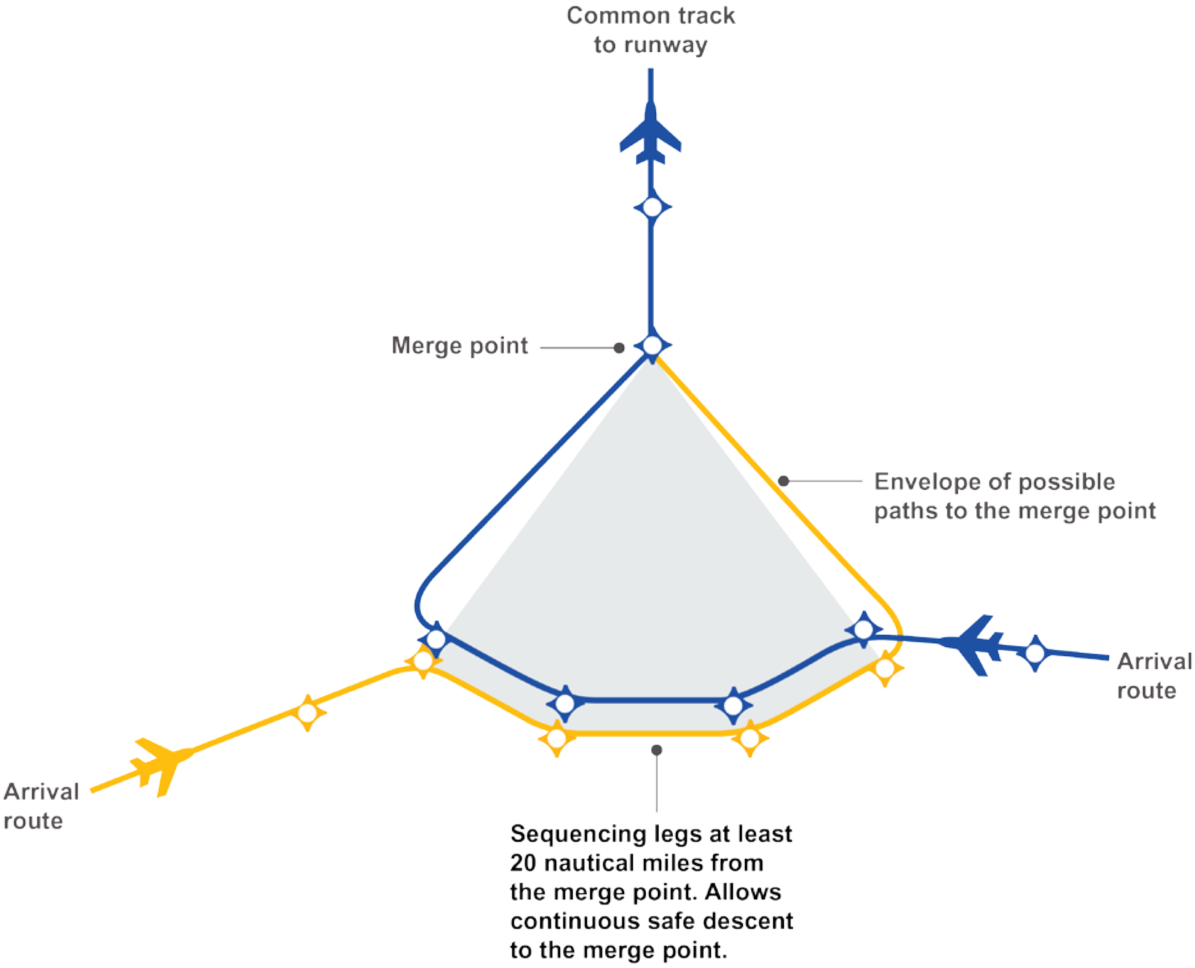


Figure 7–13 Point Merge arrivals management system

The manner in which aircraft are managed through a Point Merge system is largely dependent on the number of presenting aircraft. In the initial years of operation at the proposed airport — or during periods of the day when aircraft numbers are relatively low in later years — aircraft arrivals would be expected to use predominantly the outside tracks of the system as these represent the most direct and efficient arrival paths. As such, a Point Merge system may have few immediate advantages over traditional arrival management systems, but this needs to be assessed as part of the detailed design process.

As aircraft movement numbers increase in the future, and in particular during busy periods, aircraft approaching the proposed airport would fly an extended flight path along one of two sequencing legs (or Point Merge arcs) instead of being vectored to extend their flight path at low altitudes. The arcs for sequencing arriving aircraft from opposite directions are separated vertically by at least 1000 feet (300 metres). Aircraft fly along the appropriate arc to achieve the correct spacing with preceding aircraft, at which time air traffic control would direct the aircraft off the arc into the landing sequence. This sequencing means that aircraft are initially spread out as they fly from different points in the arc towards a merge point. Similar to procedures used at all major airports, aircraft on an instrument approach would adopt a fixed route to the operating runway after leaving the merge point.

The conceptual airspace design presented in the EIS identifies a single merge point location for managing aircraft arrivals under both the 05 and 23 modes of operation. For areas relatively close to the airport, the location of this point makes little difference to the analysis of environmental impacts, particularly noise impacts. This is because all aircraft passing over these areas are assumed to be making a straight-in final approach from 10 nautical miles (18.5 kilometres) from touchdown, guided by the runway’s ILS. Figure 7–14 shows how a terrestrial localiser beacon and ILS glide path work together to provide vertical and horizontal guidance to pilots making a typical straight-in approach.

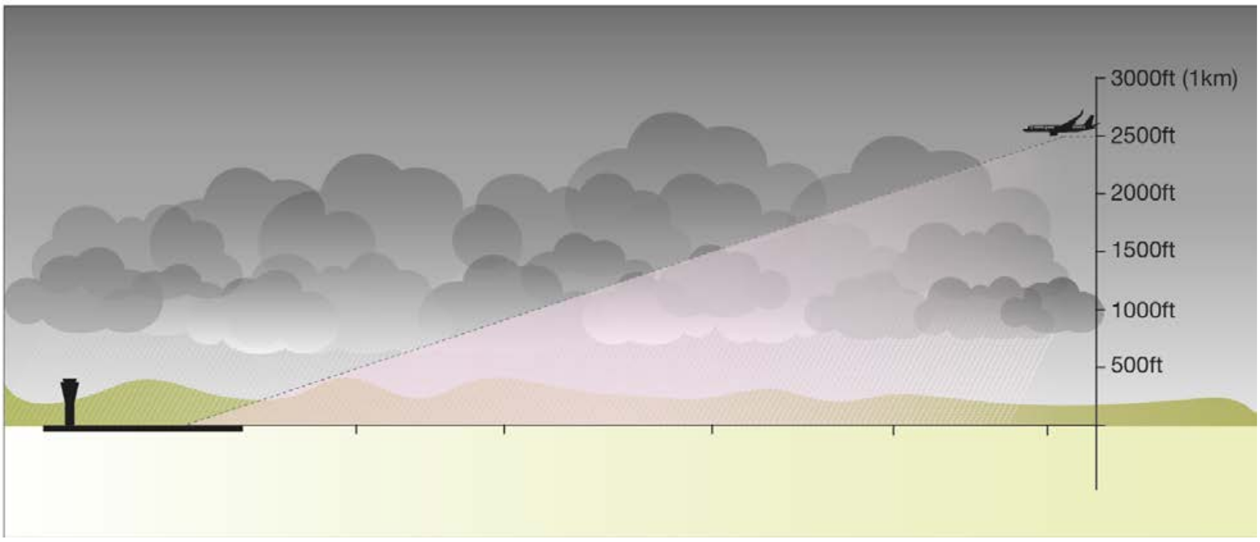


Figure 7–14 Conventional straight-in approach using a ground-based Instrument Landing System

This standard approach procedure would apply irrespective of the location of the merge point. However, the merge point location is important when considering impacts closer to the merge point and along the single arrival path extending from it. Upon reaching the merge point, aircraft and their consequent impacts are effectively concentrated along the respective 05 and 23 arrivals tracks to touchdown.

No decision has been made on a preferred approach for managing aircraft arrivals at the proposed airport. Different arrivals systems, and their associated impacts and appropriate mitigations, will be continually assessed during the future airspace design (see Section 7.8).

7.7.2 Departures

The use of new satellite-based technologies will also provide the opportunity to design departure flight paths in a more flexible way. The ability of aircraft to fly a predetermined departure route more accurately means that flight paths can be designed to reduce the impact on residential areas. For example, to avoid the overflight of residential areas, Heathrow Airport (London) has introduced operating procedures called “Noise Preferential Routes” that require departing aircraft to follow specific paths up to an altitude of 4,000 feet.

Noise abatement climb procedures can also help reduce noise levels in areas close to the departure end of a runway. These procedures are designed to encourage aircraft to gain height as quickly as safely possible and then reduce engine power and noise at the earliest opportunity, usually once the aircraft has attained an altitude of between 800 feet and 1,000 feet. Where these types of procedure have been introduced, such as for northerly departures at Sydney Airport, an aircraft is expected to maintain its assigned route until it has attained the altitude or height that represents the upper limit of the noise abatement procedure or it is necessary to make a diversion for the safety of the aircraft (e.g. to avoid severe weather or to resolve a traffic conflict). While a standard departure procedure may be stipulated at an airport, there will always be differences in climb profiles due mainly to the variation in winds and the different performance parameters of each aircraft.

The potential benefits of utilising noise abatement climb procedures, when safe to do so, at the proposed Western Sydney Airport will be considered as part of the formal airspace design process.

7.8 Future airspace design

Designing air traffic management arrangements for a new runway or airport is a large, resource intensive and complex technical task that takes several years to complete. The Australian Government is committed to undertaking this task robustly. Prior to opening of the proposed Western Sydney Airport, the Department of Infrastructure and Regional Development, in collaboration with Airservices Australia and the Civil Aviation Safety Authority, will undertake a comprehensive airspace planning and design process for single runway airport operations. This process will allow the final airspace arrangements to better reflect the operating environment closer to the time the airport opens, taking account of factors such as new aviation technology and environmental impacts.

The Brisbane Airport New Parallel Runway (NPR) project is illustrative of the process by which final flight paths are developed by Airservices Australia and how long this process can take.

Brisbane Airport New Parallel Runway Project – Flight path design process

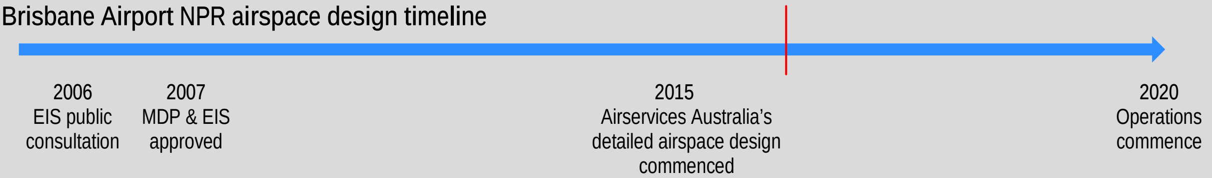
In November 2006 Brisbane Airport Corporation released a draft Major Development Plan (MDP) and draft EIS for its proposal to construct and operate a new parallel runway at Brisbane Airport. The New Parallel Runway (NPR) draft EIS included preliminary flight paths and modes of operation developed by Airservices Australia. It noted that "before any proposed flight path procedure and/or modes of operation can be finalised and implemented for the NPR system, an additional full and detailed safety case and environmental assessment will need to be completed by Airservices Australia". The NPR project was approved in late 2007.

More than eight years on, Airservices Australia has developed high level airspace concepts for the introduction of NPR operations. Undertaking this work closer to the commencement of NPR operations has enabled design of the proposed final airspace arrangements and flight paths to be informed by the most current data, including developments in air traffic management procedures and aircraft using Brisbane Airport since the EIS was prepared.

The high level airspace concepts are being assessed against four key performance areas – safety, efficiency, capacity and environment. This complex task involves the iterative design and refinement of airspace concepts, detailed simulation modelling of aircraft operations for each concept option, and qualitative and quantitative assessment of those options against the key performance measures. The options review process has robustly tested the suitability of the modelled concepts and enabled stakeholders to better understand the merits of each concept.

Following further stakeholder consultation, the preferred flight paths and aircraft operating procedures will be finalised, approved and published before parallel runway operations commence in about 2020.

Brisbane Airport NPR airspace design timeline



An iterative flight path design and evaluation process similar to that used at other airports would occur before the introduction of operations at the proposed airport. The airspace design process provides insights that can be applied to the proposed airport development. These include:

- A comprehensive, methodical approach to airspace design is critical to ensure all relevant safety and environmental issues are taken into account before the selection of a final operational design. This requires an iterative process of design and validation testing that may take several years to complete.
- While a standard process can be applied to airspace design across Australia, each airport is unique in terms of its air traffic and user requirements, fleet mix, operating constraints, environmental context and geographic relationship to surrounding communities. Consequently, the optimal solution for one airport will not necessarily be the same for another.
- It is important that all of the factors identified above are understood and taken into account in assessing airspace and flight path concepts against the key performance criteria of safety, efficiency, capacity and environment. Fundamental questions to be considered include:
  - Safety – Are all potential risks identified and addressed in the design?
  - Efficiency – Is the design efficient for aircraft operations (e.g. in terms of fuel use) and air traffic management services within the terminal area?

- Capacity – Does the design allow the runway infrastructure to reach maximum capacity?
- Environment – Does the design account for relevant environmental values and impacts, including mitigating the impact of aircraft noise on communities through the modelling and assessment of noise exposure levels and the identification of potential noise abatement procedures?

- Comprehensive and regular community consultation and stakeholder engagement is essential to ensure interested parties are aware of the design process and are able to participate meaningfully in it.

The future airspace planning and design process for the proposed Western Sydney Airport will employ the same general methodology that has been used for developing airspace concepts and flight paths for other major Australian and international airports. This process, guided by the Future Airspace System, will involve extensive community and stakeholder consultation and will ensure alignment with international best practice, aviation industry expectations and Australia's obligations under international aviation agreements.

The detailed airspace design will consider the safety of all aircraft and airspace users across the Sydney basin, aircraft operation efficiency and opportunities to minimise noise and amenity impacts on all potentially affected communities, sensitive receivers and the environment. All feasible noise abatement and noise respite opportunities will be assessed throughout the design process.

Identifying flight paths and procedures that minimise aircraft noise impacts at night will be a critical component of this work. The change in air traffic complexity at night enables greater flexibility in designing arrival and departure routes for night operations at the proposed airport and improved scope to minimise aircraft noise impacts from these particularly sensitive operations.

The future airspace design and associated noise abatement procedures will be planned in accordance with *Airservices commitment to aircraft noise management* (Airservices Australia 2013) which aligns with the strategies developed by ICAO in its *Balanced Approach to Aircraft Noise Management*. The design of flight paths for the proposed Western Sydney Airport will be guided by the principles provided below (*Future airspace design principles*). These principles closely align with the above national and international benchmarks, which are discussed further in Chapter 10 (Volume 2a).

Available systems for managing aircraft will be thoroughly evaluated, culminating in the development of standard arrival and departure flight paths for implementation. Concepts and flight path options based on each of the methods identified in Airservices Australia's Future Airspace System will be modelled, compared and rigorously assessed against the key performance criteria of safety, efficiency, capacity and environment before final arrival routes for the proposed Western Sydney Airport are authorised by the Australian Government.

Any proposal to introduce a new airspace regime for the proposed airport will also comply with national environmental law. Accordingly, the proposed airspace design arrangements including nominated flight paths will be formally referred for consideration under the EPBC Act. This will be accompanied by comprehensive community and stakeholder consultation and engagement.

The steering group established to oversee the airspace and flight path design process (see Section 7.8.1) will report to the Infrastructure Minister on its progress, consultation activities, and key considerations and outcomes on a regular basis (at least once every six months).

Future airspace design principles

The following principles will apply to the comprehensive airspace design process for single runway operations:

1. Overflights of residential areas and noise sensitive facilities will be avoided to the maximum extent possible.
   - The most advanced satellite-based navigation technologies will be used to guide the design of flight paths that avoid residential and other noise sensitive areas as far as it is possible to do so.
2. Where flight paths are unable to avoid residential areas:
   - to the extent practicable, residential areas overflown by aircraft arrivals should not also be overflown by aircraft departing the airport; and
   - noise abatement procedures should be optimised to achieve the lowest possible overall impact on the affected community, taking into account safety and other operational factors.
3. Specific noise abatement procedures will be developed to minimise the community impacts of aircraft operations at night while not constraining airport operations and the economic benefits they would bring for Western Sydney.
   - When comparing options, operations that are conducted at night or on weekends will be treated as being more sensitive than those that occur during the daytime or on weekdays.
   - The use of head-to-head operations to and from the south-west, when it is safe to do so, is an important preferred option for managing aircraft noise at night. This preferred option will be thoroughly evaluated through further detailed assessment.
4. Noise mitigation measures will be developed consistent with *Airservices* commitment to aircraft noise management and the strategies developed by the International Civil Aviation Organization (ICAO) in its *Balanced Approach to Aircraft Noise Management*.
5. Aircraft arrivals will use a continuous descent approach where possible to keep aircraft at higher altitudes with low power settings and reduced noise (and greenhouse) emissions.
6. Aircraft arrivals will not converge through a single merge point over any single residential area.
7. Consideration will be given to the impacts of aircraft operations on natural and visually sensitive areas such as the Greater Blue Mountains World Heritage Area.
8. In determining the final flight paths, the community, aerodrome operators and airspace users will be consulted extensively and flight path designs will be subject to referral under the *Environment Protection and Biodiversity Conservation Act 1999*.
9. Changes to current noise sharing arrangements at Sydney (Kingsford Smith) Airport will be avoided.
10. Current airspace restrictions such as those associated with military establishments will be reviewed to improve efficiency and environmental impacts from commercial operations, while meeting Australia’s future defence requirements.
11. The Australian Government will work with the New South Wales and local governments to ensure land use planning continues to prevent noise sensitive development in the highest noise exposure areas.
12. Safety is non-negotiable – only practical solutions that uphold Australia’s long tradition of world-leading aviation safety will be implemented.

7.8.1 Overview of the airspace design process

The planning and design phases of the formal airspace design process for single runway operations are described below. Key activities and outputs are identified for each phase.

- **Planning phase.** Preliminary airspace design options would be developed and assessed during the planning phase based on existing Sydney basin airspace and air route arrangements and future user and stakeholder requirements. Activities and outputs include:
  - establishment of an expert steering group to oversee the detailed planning and design process. The steering group, to be led by the Department of Infrastructure and Regional Development, will include representatives from Airservices Australia, the Civil Aviation Safety Authority and the Airport Lessee Company (once appointed). It will confirm the objectives and principles for the design process, provide advice in the development of design options and ensure appropriate mechanisms are in place for ongoing consultation with airlines, aerodrome operators, Sydney basin airspace users and the community. The steering group will also be responsible for ensuring that the airspace design process integrates with related processes such as any contemporaneous review of Sydney basin airspace undertaken in accordance with the Airspace Act 2007 and other relevant legislation;
  - consideration of existing Sydney basin airspace and air route arrangements and the conduct of consultations with regulatory authorities, Sydney basin aerodromes and airspace users to consolidate future user requirements. Environment and land use information will also be obtained to inform the design process;
  - comprehensive and ongoing community and stakeholder engagement. A community and stakeholder reference group will be convened by the Department of Infrastructure and Regional Development to ensure community views are taken into account in the airspace design process. The reference group will provide a forum for stakeholder representatives to exchange information on issues relating to the proposed airspace design and flight path options and their impacts. It is expected that membership will include representatives from the aviation industry, community organisations, resident groups or individuals, State or local government bodies, and local tourism bodies and business groups; and
  - development of a range of conceptual air traffic management options (e.g. standard arrival and departure flight routes and procedures) and preliminary assessment of each option against the key performance criteria of safety, efficiency, capacity and environment. Potential noise exposure levels and noise abatement procedures will be considered for the airspace concept options. This iterative design and assessment process will lead to the identification of a preferred high-level airspace concept.
- **Preliminary design and environmental assessment phase.** During this phase, the preferred high-level airspace concept will be further developed and evaluated. The environmental impacts of the proposed airspace management design will be considered under national environmental law.

Key activities during the preliminary design phase include:

    - development, evaluation and validation testing of the preferred preliminary airspace design;
    - referral of the preferred airspace design for consideration under the EPBC Act;
    - preparation and submission of any formal environmental assessment documentation required by the Environment Minister under Part 8 of the EPBC Act; and
    - comprehensive community and stakeholder consultation.

- **Detailed design phase.** This phase will include further evaluation and refinement of the selected airspace design for implementation and integrate, to the extent relevant, with the ALC's preparation of a noise management plan for the proposed airport. Activities during this phase include:
    - evaluation of noise abatement procedures identified through the preliminary design phase and considered in the EPBC Act process, including options for managing noise impacts from night time operations;
    - final development and testing of the proposed airspace design and flight paths based on the EPBC Act process, including comments received during community consultation, and input from all stakeholders to ensure the operating procedures are fit for purpose and suitable for implementation; and
    - preparation of a long term Australian Noise Exposure Forecast (ANEF) chart for parallel runway operations to inform land use planning in the vicinity of the airport site.
- **Implementation phase.** This phase will include the regulatory certification and authorisation of the proposed airspace design and its implementation. Noise abatement procedures and noise management measures developed through the airspace and flight path design process will be recorded in the ALC's noise management plan for the proposed airport. Activities during this phase include:
    - submitting the final airspace design and flight paths (in the form of an airspace change proposal) for authorisation by CASA;
    - notifying airspace and flight path changes to aviation industry stakeholders and the community ahead of the commencement of air operations at the proposed Western Sydney Airport; and
    - commencing air operations at Western Sydney Airport in accordance with the authorised airspace design and operating procedures.
- **Post implementation.** Consistent with arrangements at other major Australian airports, the ALC will establish a Community Aviation Consultation Group (CACG) and a Planning and Coordination Forum (PCF) before airport operations commence. These permanent forums will continue to operate following the commencement of airport operations, providing an ongoing mechanism for the ALC, residents affected by airport operations, local authorities, airport users and other interested parties to exchange information on issues relating to airport operations and their impacts.

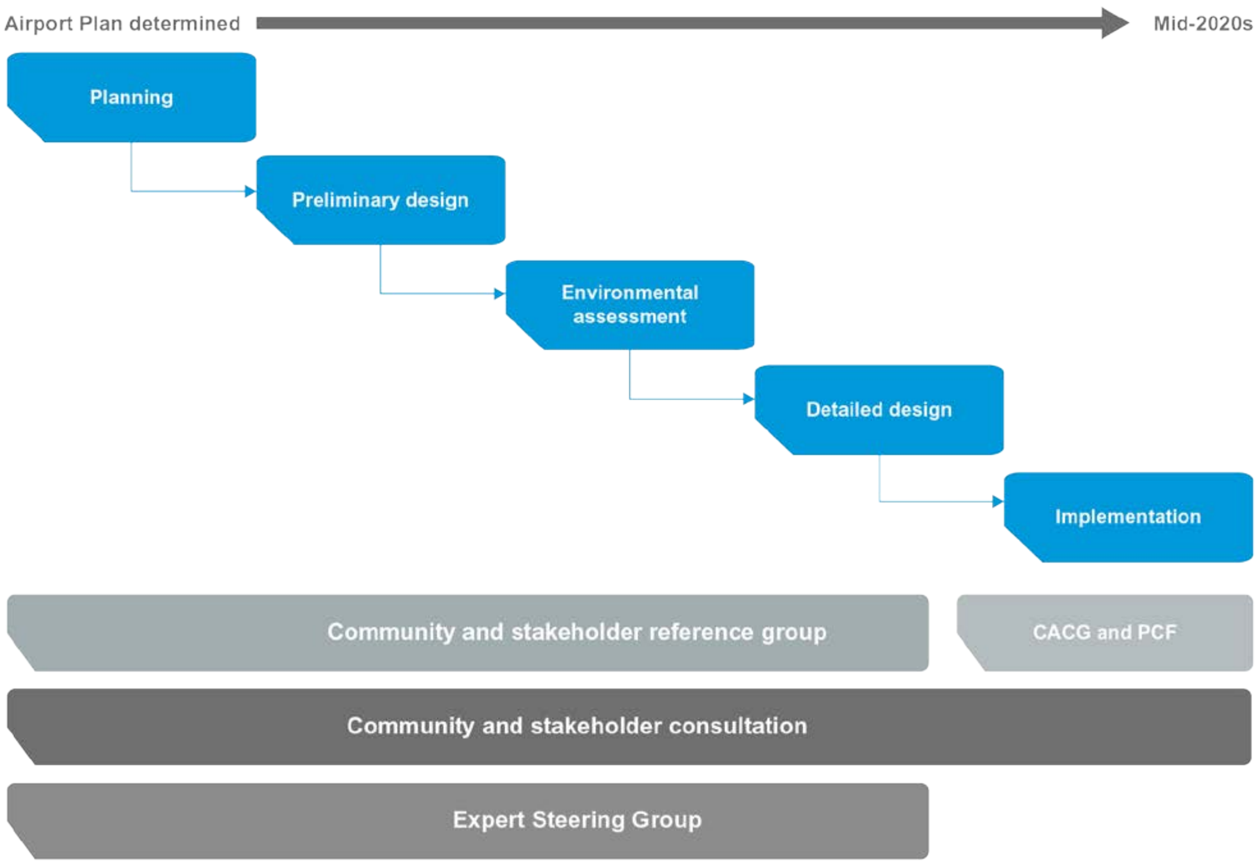
Table 7–1 summarises the phases, activities and outputs of the formal airspace and flight path design process. The table also shows the current proposed timing for the different stages of the process.

Table 7–1 Airspace and flight path design process

Phase	Key activities	Key outcomes	Timing
Planning	• Establish expert steering group • Collect stakeholder views on system requirements, including community and environmental inputs • Confirm Sydney basin airspace and air route requirements and constraints • Establish community and stakeholder reference group • Develop and undertake a preliminary environmental assessment of airspace concept options (i.e. standard arrival and departure routes)	• Consultation conducted with interested parties, including regulatory authorities, government agencies, airlines, other Sydney basin aerodrome operators and airspace users, and the community • Review of airspace concept options and potential noise abatement procedures including identification of a preferred high-level airspace concept option	Approx. 2 years starting from determination of Airport Plan
Preliminary design and environmental assessment	• Evaluate the preliminary airspace design • Refer preferred airspace design to the Environment Minister under the EPBC Act • Prepare and submit any formal environmental assessment documentation required by the Environment Minister • Public exhibition and community consultation • Policy on property acquisition and noise insulation announced	• Preferred airspace design concept	Approx. 1 year Approx. 2 years (c. 2019-2021)
Detailed design	• Evaluate, validate and refine the detailed design taking account of the EPBC Act process	• Final airspace design and noise abatement procedures for implementation • Long term ANEF chart	Approx. 1 year
Implementation	• Notify airspace and air route changes	• Airspace change proposal approved by CASA.	Approx. 2 years
		• Commencement of air operations at Western Sydney Airport in accordance with specific noise abatement procedures and noise management measures identified in the airspace design process[1]	Mid-2020s

[1] The specific noise abatement procedures and noise management measures developed through the airspace design process will be recorded in the ALC's Noise Operational Environmental Management Plan for the proposed airport.

Figure 7–15 illustrates the planning and design phases and their approximate timelines. While specific consultation activities and community engagement opportunities are identified, extensive and ongoing consultation with industry, government regulators and the community will occur throughout the planning and design phases.



Note:
CACG = Community Aviation Consultation Group
PCF = Planning and Coordination Forum

Figure 7–15 Conceptual airspace and flight path design process

7.9 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 will be protected in the interests of the safety, efficiency and 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:

- the Obstacle Limitation Surface (OLS); and
- Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) Surfaces.

7.9.1 Obstacle Limitation Surface (OLS)

Protecting the immediate airspace around airports is essential to ensuring and maintaining a safe operating environment and to provide for future growth. An OLS is designed to provide protection for aircraft operating in visual flight conditions. It is a series of virtual surfaces around a runway, which establish the height limits for objects in and around an airport. It identifies the lower limits of an airport’s airspace, which should be kept free of obstacles that may endanger aircraft during take-off, preparation to land and landing. Development of the OLS 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 will be protected under Part 12 of the Airports Act and the Airports (Protection of Airspace) Regulations 1996. The OLS is being developed based on the indicative long term layout as identified in the revised draft Airport Plan. The OLS is expected to be declared under the Airports (Protection of Airspace) Regulations in the second half of 2016.

Intrusions into the OLS can limit aircraft operations at an airport and will require approval from the Department of Infrastructure and Regional Development before they occur. The Declaration will also enable local councils and land use planning authorities to incorporate the protected airspace as appropriate in their land use planning instruments.

7.9.2 Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)

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.

PANS-OPS surfaces are also protected from intrusions under the Airports (Protection of Airspace) Regulations. Once defined, the protected airspace for the proposed Western Sydney Airport will include PANS-OPS surfaces.

A full set of PANS-OPS based on the indicative long term layout will be developed and declared following the formal flight path design and prior to commencement of operations.

7.9.3 Obstruction analysis

A preliminary analysis of terrain around the airport site was undertaken as part of the development of indicative flight paths. A survey of obstructions penetrating the proposed OLS has also been undertaken. The Blue Mountains escarpment encroaches into the OLS airspace to the south-west and 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. These include the existing TransGrid 330kV transmission line that currently crosses the airport site. This line will be relocated before the commencement of operations. Communications and electricity service providers will be consulted about any measures required for other infrastructure encroaching the OLS (e.g. safety lighting).

Vegetation in the vicinity of the airport site and close to the runway, such as tall trees, requires individual assessment and may need to be removed or lopped. Height limitations will also apply to airport buildings, street lighting and signage within the protected surfaces. Other airspace intrusions in the vicinity of the airport that remain may need to be lit or marked.

Turbulence from vertical exhaust plumes may pose a hazard to aviation and would be controlled under the Airports (Protection of Airspace) Regulations, subject to a plume rise assessment.

7.10 National Airports Safeguarding

Protection of operational airspace around airports is also covered by the National Airports Safeguarding Framework (NASF). The NASF is a nationally agreed set of guidelines implemented by each State and Territory that aims to:

- improve community amenity by minimising aircraft noise-sensitive developments near airports; and
- improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions through guidelines being adopted by jurisdictions on various safety-related issues.

The NASF includes safety-related guidelines on building generated windshear and turbulence, wildlife airport buffers to prevent bird strike, lighting restrictions to prevent pilot distraction and wind turbine risks.

As discussed in Section 21.5.2 (Volume 2a), the NASF also covers noise from aviation activity and seeks to improve community amenity by minimising aircraft noise-sensitive developments near airports.

7.10.1 Windshear and turbulence

The shape, height and arrangement of buildings in relatively close proximity to a runway may adversely affect safe aviation operations. All elements of the airport development will need to be considered for their potential windshear and turbulence effects.

7.10.2 Wildlife airport buffer

A wildlife hazard management plan to control the risk of wildlife hazards on and near the airport site would be developed by the ALC, in consultation with local authorities prior to commencement of operations.

Considerations for the wildlife hazard management plan 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 EIS (see Chapter 14 Hazards and Risks and Chapter 16 Biodiversity (Volume 2a)).

7.10.3 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. In particular, lighting intensities will need to be taken into account in the design of street lighting and signage.

7.10.4 Public Safety Zones

Public safety zones (PSZs) are areas of land at the ends of runways, within which development may be restricted in order to control the number of people on the ground at risk of injury or death in the event of an aircraft accident on take-off or landing. While Australia has an excellent aviation safety record there will always be some risk associated with flying and operation of aircraft at or around airports. The use of PSZs can further reduce the already low risk of an air transport accident affecting people near airport runways.

While there is no current ICAO standard for PSZs, some jurisdictions, such as Queensland, already have in place planning guidelines or policies that consider these risks. In the absence of any nationally agreed guidance, a nominal 1,000 m, trapezoid-shaped clearance off the end of each runway threshold is identified in the indicative layouts at Figure 5–1 and Figure 5–3 of Chapter 5 to cover the area of highest safety risk.

Where a PSZ is identified, additional scrutiny might be considered for new developments that:

- increase residential use and population density in the zone;
- attract large numbers of people, such as retail or entertainment developments;
- involve institutional uses, such as schools and hospitals;
- involve the manufacture or depot storage of noxious and hazardous materials; and
- attract significant static traffic.

7.11 Operational parameters

Based on the indicative 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.

7.11.1 Hours of operation

The development of the proposed airport is a rare opportunity to establish a major transport gateway in the Western Sydney region. As outlined in Chapter 2, 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 without a curfew and measures have been put in place at all levels of government to reflect this. Long-standing 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* — require local governments to limit noise-sensitive developments around the airport site.

7.11.2 Number of flights

Predicted future numbers of aircraft movements have been based on an estimate — or 'synthetic schedule' — of the expected number of aircraft operations for a typical busy day. This estimate breaks down each predicted movement by aircraft family, operation type (arrival or departure), time of operation and port of origin or destination. These schedules form the basis of modelling undertaken for this EIS such as noise and air quality modelling.

Predicted total aircraft movements per day for the proposed Stage 1 development and indicative long term independent operation of wide-spaced parallel runways are presented in Table 7–2. Note that these figures represent a typical busy day and the number of movements is, therefore, slightly greater than the annual average. For example, for Stage 1 operations the estimated 63,000 aircraft movements per year represents an annual average of approximately 173 aircraft movements per day, compared with 198 outlined in the schedules and Table 7–2.

Table 7–2 Total predicted daily aircraft movements by type by year

Year	Aircraft movements per day (typical busy day)		
	Freight	Passenger	Total
Stage 1 operations	28	170	198
First runway at capacity (2050)	74	480	554
Long term (2063)	104	1,006	1,110

By comparison, in 2015 Sydney (Kingsford Smith) Airport handled on average 923 aircraft movements per day. Based on current forecasts, the proposed Western Sydney Airport would not reach this level of demand for several decades, after a second runway has been built. The number of aircraft movements predicted for Stage 1 operations is roughly the mid-range between the amount of air traffic currently accommodated at Canberra and Adelaide airports (165 and 242 aircraft movements per day on average, respectively).

Table 7–3 shows the predicted daily aircraft movements for Stage 1 operations and the long term — as summarised in Table 7–2 — 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 7–3 are expected to be operating when the airport opens or in 2063. It is expected that aircraft technology will continue to improve and airlines will replace older aircraft with newer models which are generally quieter and more fuel efficient, as has been the trend over previous decades.

Table 7–3 Predicted average daily aircraft movements by aircraft family by year

Aircraft family	Aircraft movements per day	
	Stage 1 operations	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
Saab 340	12	10
Freight aircraft movements		
Airbus A330	2	2
Boeing 737	2	6
Boeing 747	10	38
Boeing 767-400	4	10
Boeing 767-300	-	6
Boeing 777-300	-	4
Boeing 777-200	-	6
Small Freight	10	32

Although the airport is proposed to operate on a curfew-free basis, there are predicted to be relatively few aircraft movements occurring during the night time period, particularly for the Stage 1 operations. Indicative aircraft movements by hour are presented in Figure 7–16.

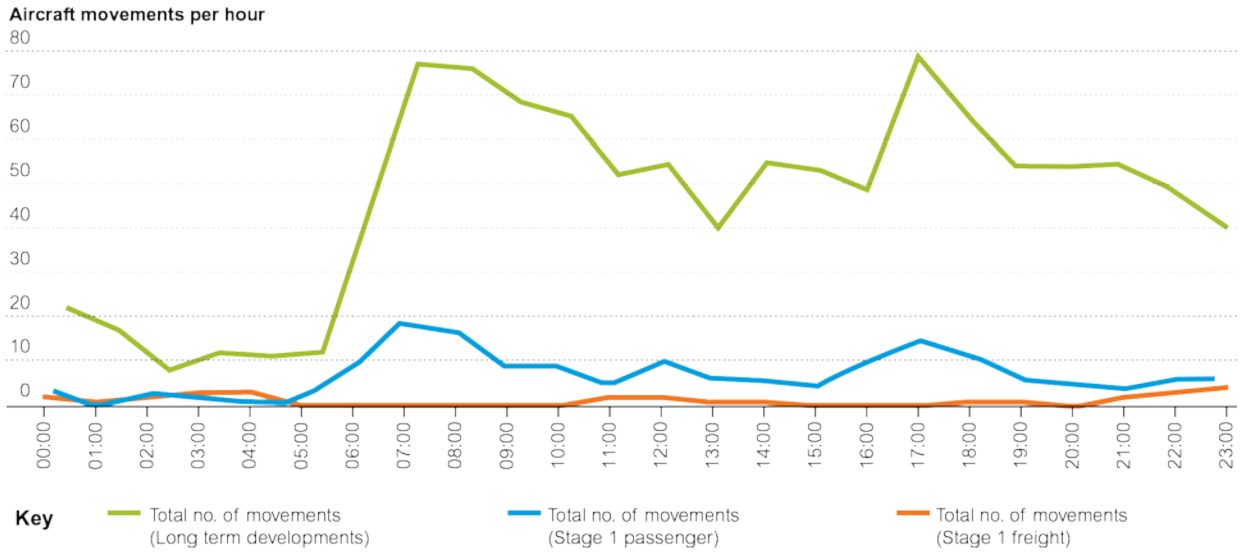


Figure 7–16 Predicted aircraft movements by hour

7.11.3 Flight altitude

The altitude of an aircraft at a particular point along a flight path will affect the degree of noise and other environmental impact on receivers beneath or in the vicinity of the flight path. At aircraft altitudes above 10,000 feet (three kilometres), the expected ground-level impacts are likely to be minor. The expected altitude of aircraft has been considered as part of the assessment required for this EIS. Further information regarding specific environmental and amenity impacts is provided in Volume 2.

7.11.4 Emergency fuel jettison (fuel dumping)

Emergency fuel jettison for civilian aircraft, commonly referred to as fuel dumping, is a rare procedure used in certain emergency situations to reduce an aircraft's weight to allow it to land safely. Aircraft do not jettison fuel as a standard procedure when landing. Indeed, most aircraft are unable to jettison fuel. Fuel jettisoning 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, and depending on the aircraft type and its intended destination, there may not be enough time to consume the amount of fuel required to get the aircraft below its maximum landing weight limit. For certain aircraft landing with a full fuel load may cause a safety issue and fuel jettison may be needed to reduce weight sufficiently and minimise the risk of structural damage.

As noted above, 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, are not capable of jettisoning fuel as they do not need to reduce their weight 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 Airbus A380, are able to jettison fuel.

If fuel is jettisoned, the exact evaporative characteristics of jettisoned fuel depend on a number of factors such as the altitude at which it was released, the atmospheric temperature and the dumping pressure. Most of the fuel evaporates rapidly within the first few hundred metres as it falls.

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 the operation 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.

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 environmental or social impacts.

7.12 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 depend 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 at Appendix D of Volume 4.

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 provides meteorological services for civil aviation in Australia in accordance with the standards and practices set out in Annex 3 to the Convention.

7.12.1 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 7–17.

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.

Figure 7–17 Topographic map of the Sydney basin

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.

7.12.2 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 7–4 and Table 7–5.

The month of January has the most days on average above 30 degrees Celsius (^{0}C) and 35 ^{0}C with 13.4 and 5.2 days respectively. July has the most number of days on average below 0 ^{0}C with 3.3 days.

Table 7–4 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 7–5 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 may affect airport operations. Temperature has an indirect relationship with air density - as temperature climbs the air becomes less dense which 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 ^{0}C for Jet A/A1) is important as liquid becomes a gas at this temperature and becomes extremely hazardous.

Data recorded at the Badgerys Creek weather station indicate that the temperature is equal to or greater than 30 ^{0}C regularly throughout the end of spring, summer and the start of autumn at the airport site. Temperatures exceeding 30 ^{0}C are most common during the middle to late afternoon. It is also not unusual to see temperatures exceed 35 ^{0}C in late spring and summer at these times of the day.

Whilst it is possible for temperatures to exceed 40 ^{0}C in late spring and summer, it is not common at the airport site. Temperatures are most likely to exceed 40 ^{0}C in January.

Low temperatures

Temperatures below zero degrees Celsius at surface level may 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 0 ^{0}C from June to August. This occurs most commonly in July, on average for more than 75 hours a month. The early morning period before sunrise is the most common time for temperatures to be recorded below 0 ^{0}C at the airport site.

Frost

Frost and ice accumulation on ground surfaces can occur at temperatures below 0 ^{0}C. Records of temperatures below 0 ^{0}C were 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 and that they were most likely in July when frost events can occur on average for over four hours. Frost is most likely to occur near sunrise.

In comparison, Canberra Airport experiences approximately 20 times more hours of frost than Badgerys Creek between the months of April to October.

7.12.3 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 per cent. In these conditions the density of super-cooled liquid water suspended in the air would be high enough to potentially cause rime icing when an aircraft's surface 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 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.

7.12.4 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 that restricts the mixing of air and causes a build-up of 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 (Volume 2a).

7.12.5 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. Such risks would be managed effectively through runway design and surface treatments at the proposed airport.

Rainfall climatology

Rainfall data for Badgerys Creek have 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 7–6.

Table 7–6 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

Average monthly rainfall in excess of 50 millimetres generally 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 reflect the shorter length of rainfall records.

7.12.6 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 that may cause a reduction in visibility, the Bureau of Meteorology has applied an additional condition of relative humidity above 95 per cent to the data analysis.

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. Instrumentation is currently unable to determine the difference between shallow fog and fog at an airport.

Most major Australian airports are equipped with ILSs which allow 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 that 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 depending 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.

The proposed airport will be designed to achieve CAT IIIB (or equivalent) instrumentation approach procedures on both runway ends. A CAT IIIB ILS provides the highest category of precision lateral and vertical navigational guidance to aircraft using a ground-based instrument approach for safe landing in poor visibility.

7.12.7 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 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 only allow for a relatively short lead-time for thunderstorm warnings at the proposed airport. For example, a thunderstorm that initiates over the Great Dividing Range and moving at 20 knots, would reach the proposed airport in approximately 30 minutes.

7.12.8 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 a lower frequency of thunderstorms.

Mitigation processes and equipment exist to deal with the operational effects of most weather phenomena that are expected to occur at the proposed airport. Crosswinds primarily determine runway availability and usability at the airport site. Based on the proposed runway alignment and the analysis of crosswind data, it is expected that the proposed airport would be usable approximately 99.5 per cent of the time.

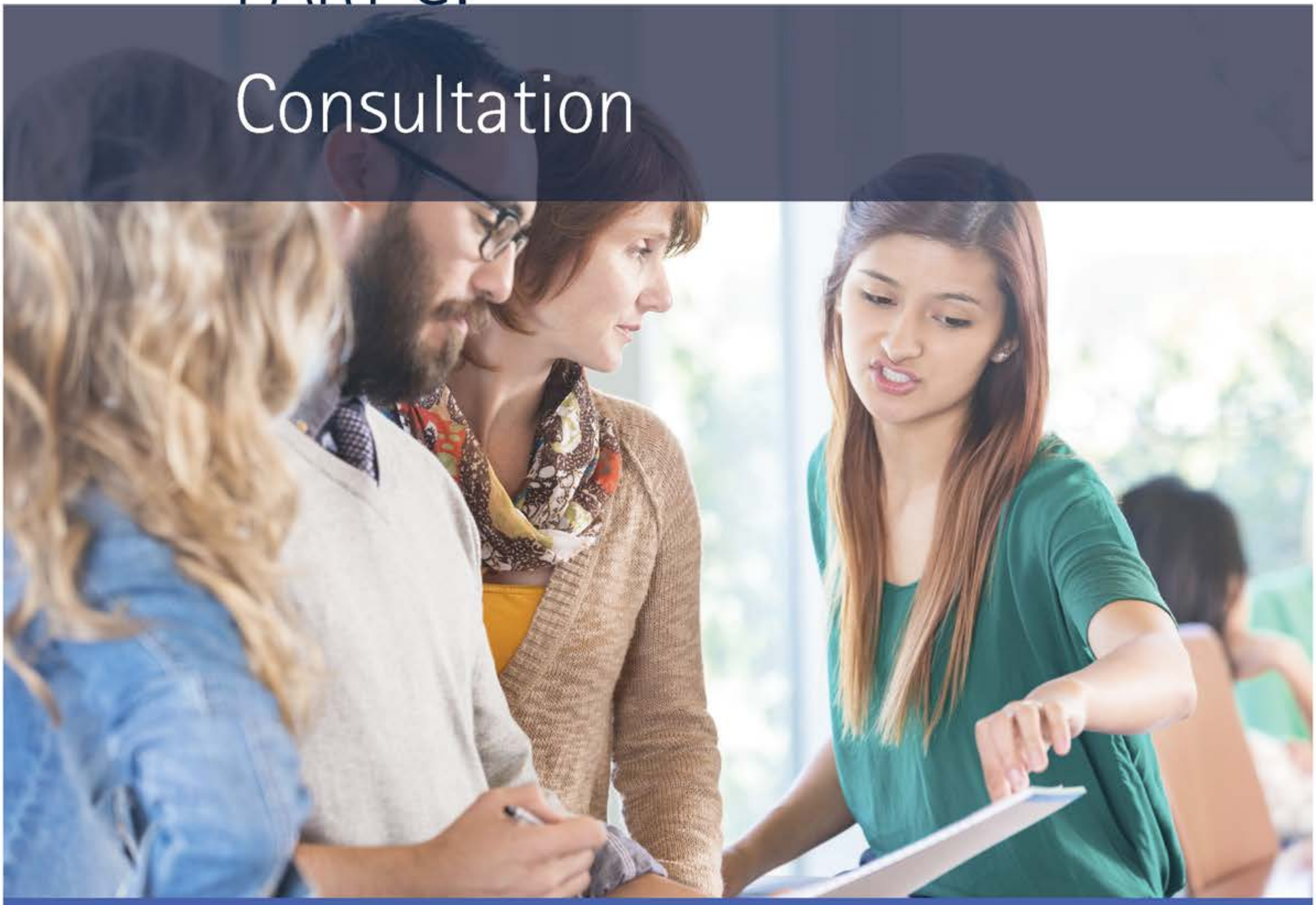
There are factors which need consideration during the operational planning of the proposed airport that are more likely to occur at the airport site than at Sydney Airport. These include weather phenomena such as high temperatures, freezing fog and frost. In some cases, these weather phenomena would 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. It often occurs for extended periods of time during winter. 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 to better understand fog climatology at the airport site and for meteorologists to improve forecasting skills into the future. However, while fogs are 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 ILS categories will likely aid airport planners in determining the navigational aids required for optimal usability of the proposed airport;
- estimating correlation between the occurrence of fog events at Sydney Airport and the proposed airport may inform decisions regarding network management;
- analysing different methods of detecting wind shear and rotors at the airport site;
- conducting a comparison study into the numerical modelling of turbulence at major airports such as Brisbane and Melbourne as required;
- researching the potential impact of freezing fog and associated management measures before implementation; and
- conducting further crosswind and headwind calculations 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. This includes an outline of the objectives of community consultation and details of the activities undertaken during the three phases of engagement:

- Phase 1: the preparation of the draft EIS and draft Airport Plan, from September 2014 to October 2015;
- Phase 2: the public exhibition of the draft EIS and draft Airport Plan, from 19 October 2015 to 18 December 2015; and
- Phase 3: the finalisation of the EIS and preparation of the revised draft Airport Plan, from 19 December 2015 onwards, which will extend after after publication of the EIS.

These three phases include activities undertaken to raise awareness, provide information and answer questions community members may have regarding the EIS, Airport Plan and other aspects of the project. Activities were held at locations across Western Sydney and the Blue Mountains, and the project website also provided a comprehensive, clear and accessible source of information.

Community members were able to have their say and make submissions on the draft EIS and draft Airport Plan during the exhibition period (Phase 2). In total, 4,975 submissions were received from 3,973 unique submitters. For more information about the submissions and how they were addressed in the final EIS, see Volume 5 – the Submissions Report.

This chapter addresses the consultation and engagement requirements from the Australian Government Department of the Environment EIS guidelines (see Appendix C in Volume 4), and Schedule 4 of the EPBC Regulations 2000.

8.2 Approach and objectives for community consultation

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* was prepared to support the proposed airport, including the development of the EIS and communication with the community and stakeholders about the project's progress. The communication 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 communication 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 representative of age, gender and location. 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 there 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 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 was guided by the Core Values and Code of Ethics of the International Association for Public Participation (IAP2) and, given the Department of Infrastructure and Regional Development is a Commonwealth agency, the Australian Public Service Values and Code of Conduct. 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.

Phase	Task	Opportunity for engagement
PHASE 1 EIS preparation	The Department of Infrastructure and Regional Development submits referral under the *Environmental Protection and Biodiversity Conservation* (EPBC) *Act 1999* for the proposed Western Sydney Airport project.	Minister for the Environment invites public comment on the proposed application for the legislated 10 business day period. Public comment period was extended for an additional two days
	Minister for the Environment provides decision that the proposed Western Sydney Airport will be assessed through an EIS process.	
	Guidelines for the preparation of the EIS are issued to the Department of Infrastructure and Regional Development.	
	A draft EIS is prepared addressing the matters outlined in the EIS Guidelines.	Input to the proposal and environmental studies for the EIS including: • discussions with government agencies, local councils, the community, industry and other stakeholders. • pop-up displays at community events to understand local issues and areas of concern. • information published online and regularly updated. • information sessions in conjunction with NSW agencies. • community newsletters and fact sheets. • project team available to talk directly to community and stakeholders via information line and email.
PHASE 2 EIS exhibition	Draft EIS placed on public exhibition for public review and comment from 19 October to 18 December 2015. Draft Airport Plan exhibited at the same time.	Input on the proposal, relevant impacts, mitigation measures and environmental studies for the draft EIS, with activities including: • discussions with agencies, local councils, the community, industry and other stakeholders. • 16 information sessions in Western Sydney and the Blue Mountains • information published online and regularly updated. • project team available to talk directly to community and stakeholders via information line and email.
PHASE 3 EIS finalisation and consideration	Final EIS in prepared. Public comments are collated, reviewed and taken into account.	Engagement activities continue during preparation of final EIS, including: • discussions with government agencies, local councils, the community, industry and other stakeholders. • pop-up displays at community events. • information published online and regularly updated. • information sessions in conjunction with NSW agencies. • community newsletters and fact sheets. • project team available to talk directly to community and stakeholders via information line and email.
	Final EIS is provided to Environment Minister and made publicly available. Revised draft Airport Plan is also made publicly available.	The final EIS includes a Submissions Report that details how public comments have been addressed in the final EIS.
	The Airport Plan is determined by the Infrastructure Minister, including any environmental conditions or provisions specified by the Environment Minister.	Consultation and engagement activities will continue after the publication of the final EIS.

Figure 8–1 EIS and Airport Plan process and consultation flowchart

8.2.4 Stakeholder engagement

Engagement with key stakeholders has been a key component of communication and engagement activities and has been ongoing during all three phases. The engagement work undertaken ensures stakeholders are informed and are able to assist their broader communities in accessing information about the project. Table 8–1 below lists stakeholders engaged and the level of consultation which took place.

Table 8–1 Key stakeholder engagement undertaken during all three phases

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 and Energy Department of Immigration and Border Protection Department of Agriculture and Water Resources Department of Defence	• One-on-one meetings and briefings • Letters • Organisational briefings • Telephone and email communication

Stakeholder group	Stakeholder	Level of consultation
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 Greater Sydney Commission Western Sydney Parklands Trust	• One-on-one meetings • Telephone and email communication • Letters • Briefings
Local government	Cumberland Council (formerly Auburn City Council, Holroyd City Council and part of Parramatta City Council) Bankstown City Council Blacktown City Council Blue Mountains City Council Camden Council Campbelltown City Council Fairfield City Council Hawkesbury 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 • Letters • Briefings

Stakeholder group	Stakeholder	Level of consultation
Other stakeholders	Australian Attractions Australian Tourism Export Council Bankstown Airport and Camden Airport Blue Mountains Accommodation and Tourism Association Blue Mountains Chamber of Commerce Blue Mountains Lithgow and Oberon Tourism Board of Airline Representatives Australia Bus and Coach Association NSW Camden Chamber of Commerce & Industry Campbelltown Chamber of Commerce Committee for Sydney Endeavour Energy Fairfield Chamber of Commerce Greater Blacktown Business Chamber Infrastructure Partnerships Australia Liverpool Chamber of Commerce Macarthur Regional Organisation of Councils NBNCo NSW Business Chamber NSW Land Council Office of Penrith Lakes Penrith Valley Chamber of Commerce Property Council of Australia SITA Australia Southern Cross Airports Association Sydney International Regatta Centre TAFE NSW TransGrid Transport and Tourism Forum University of NSW University of 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 Regional Organisation of Councils Western Sydney University	• 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 draft 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, see Chapter 19 (Volume 2a) and Appendix L1 (Volume 4).

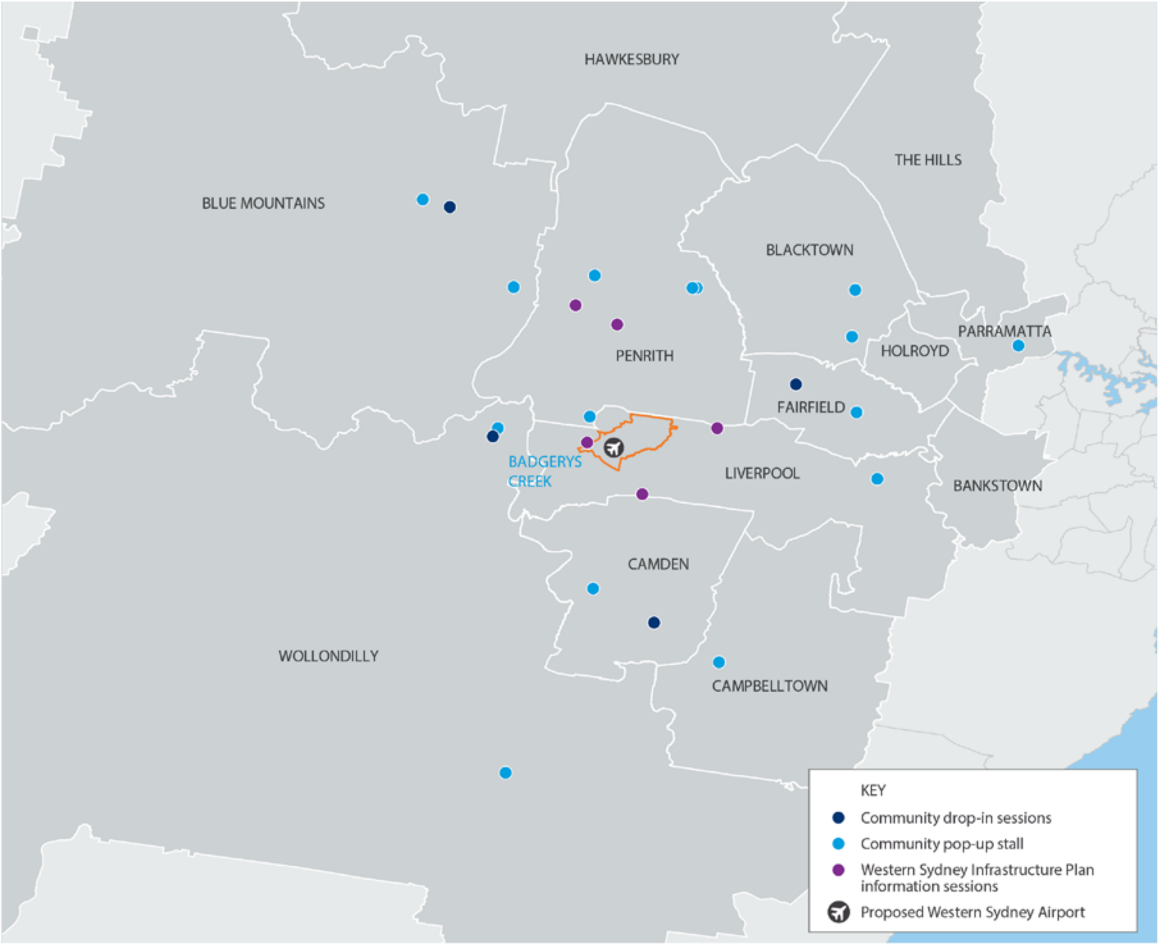
8.3 Phase 1 – preparation of the draft EIS and draft Airport Plan

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.

During Phase 1, the engagement programme focused on raising awareness, providing information and consulting with the community and key stakeholders. This consultation approach was designed to inform stakeholders about the proposed airport and encourage participation in a conversation, allowing the development of the proposal to benefit from stakeholder knowledge and understanding of specific needs. Table 8–2 below summarises the consultation with stakeholders and the community undertaken prior to the release of the draft EIS and draft Airport Plan for public exhibition.

A variety of activities to engage the community and stakeholders were undertaken during Phase 1, from September 2014 through to the beginning of the exhibition of the draft EIS and draft Airport Plan in October 2015. This included conducting focus groups, stakeholder meetings, community pop-up displays and information sessions, and the launch of a dedicated information line and email. A dialogue has been established with Federal and State Members of Parliament (MPs) and local councils representing the electorates surrounding the site, in consultation with relevant Ministers' offices. In addition, a range of materials were developed to inform community and stakeholders about the project, including a dedicated project website, fact sheets and regular newsletters. Figure 8–2 below lists all community pop-up displays and information sessions undertaken during Phase 1.

Section 8.3.4 provides a summary of issues raised by community members and stakeholders during Phase 1 of consultation, including how they were addressed in detail in the draft EIS.



Month	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 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	WSIP and airport information sessions	Bringelly
	Liverpool	WSIP and airport information sessions	Luddenham
	Penrith	WSIP and airport information sessions	South Penrith
AUGUST	Camden	Community pop-up stall	Cobbitty Markets
	Liverpool	WSIP and airport information sessions	Luddenham
	Penrith	WSIP and airport information sessions	Glenmore Park
	Penrith	WSIP and airport information sessions	Kemps Creek
	Penrith	Community pop-up stall	Penrith Show
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
	Fairfield	Community pop-up stall	Fairfield City Markets
	Campbelltown	Community pop-up stall	Macarthur Square Shopping Centre
	Parramatta	Community pop-up stall	Western Sydney University Parramatta Campus
	Wollondilly	Community pop-up stall	Warragamba DamFest

Figure 8–2 Summary of community pop-up displays and information sessions between February and October 2015

Table 8–2 Summary of stakeholder engagement and community consultation activities during Phase 1

Activity	Description
Briefings and meetings	Discussions were held with a variety of stakeholders including government agencies, businesses, local councils, industry peak bodies, and tourism and community groups as well as elected officials. This work was part of the whole-of-government approach, ensuring community members received consistent information from different sources. Over 70 meetings were held with individuals or groups.
Community events	A total of 16 community pop-up displays at local events were held between February and October 2015. 4,153 community members approached 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. These included 4 information sessions held by the project team for the proposed airport and attendance at a further 6 information sessions hosted by other government agencies on associated projects. 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 the June 2015 stakeholder workshop.
Surveys	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, including summer 2014 released in November 2014; autumn 2015 released in May 2015; and winter 2015 released in July 2015. Each edition of the newsletter was distributed to around 7,500 households near the airport site, made available on the project website, distributed to local councils and emailed to subscribers.
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.
Website content and updates (www.westernsydneyairport.gov.au)	An online presence was launched in order to provide a comprehensive and authoritative 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 April 2015. The website is updated regularly with the latest project information. There were over 23,700 visits to the website between April and September 2015, including over 66,700 page views.
Information line and email to project team	A project specific free-call phone number and email were setup during Phase 1 for individuals wishing to speak to the project team. Approximately 225 phone calls and over 200 emails were received.
Media releases	Media releases were issued throughout Phase 1 in order to provide updates on project progress. 12 media releases about the project were issued, in addition to 10 media releases about the Western Sydney Infrastructure Plan.

8.3.1 Stakeholder engagement during Phase 1

Stakeholders representing government agencies, local councils, industry and community groups were consulted throughout Phase 1. This included an ongoing schedule of meetings and briefings, letters, and phone and email communication. Table 8–2 provides a full list of the stakeholders engaged during all three phases and the level of communication that has occurred.

8.3.2 Community consultation during Phase 1

Community consultation for the proposed airport began in 2014 and has been an ongoing focus of the project. The key community consultation activities undertaken before the release of the draft EIS and draft Airport Plan for public exhibition are described below and are summarised in Figure 8–2 above and described in detail below.

Community pop-up stalls

A total of 16 community pop-up stalls at local events were carried out between February and October 2015. The stalls provided information about the project to the Western Sydney community and an opportunity to engage with the project team. Resources available at these stalls included newsletters, fact sheets and maps.

The stalls were held at locations throughout Western Sydney, including nine local government areas. Approximately 4,153 community members approached the stalls for information. Table 8–3 below provides details of the number of community members who approached the stalls and discussed the project with the team. Information on issues raised by community members is detailed in Table 8–6.

Table 8–3 Summary of visits to community pop-up stalls

Location	Local government area	Date	Attendees (approximate)
Luddenham Show, Luddenham	Liverpool/Penrith	21-22 February 2015	225
Blacktown Show, Blacktown	Blacktown	7-8 March 2015	158
Fairfield City Markets, Prairiewood	Fairfield	11 April 2015	180
Glenbrook Markets, Glenbrook	Blue Mountains	18 April 2015	230
Picton Markets, Picton	Wollondilly	3 May 2015	90
Blue Gum Rotary Markets, Faulconbridge	Blue Mountains	23 May 2015	120
Liverpool Night Markets, Liverpool	Liverpool	6 June 2015	113
Blacktown Markets, Blacktown	Blacktown	14 June 2015	407
St Marys and Mt Druitt Rotary Club Market, St Marys	Blacktown	28 June 2015	72
Cobbitty Village Markets, Cobbity	Camden	1 August 2015	430
Penrith Show, Penrith	Penrith	29 August 2015	382
St Marys Spring Festival, St Marys	Penrith	5 September 2015	670
Fairfield City Markets, Prairiewood	Fairfield	12 September 2015	174

Location	Local government area	Date	Attendees (approximate)
Macarthur Square Shopping Centre, Campbelltown	Campbelltown	26 September 2015	320
Western Sydney University Parramatta Campus, Parramatta	Parramatta	30 September 2015	170
Warragamba DamFest, Warragamba	Wollondilly	18 October 2015	412

Western Sydney Infrastructure Plan information sessions, July-August 2015

In July and August 2015, NSW Roads and Maritime Services held 6 information sessions on the Western Sydney Infrastructure Plan (WSIP). As the WSIP comprises a number of projects around the airport site, representatives from the project team attended the sessions in order to provide information and answer any questions about the Western Sydney Airport project. This contributed to the whole-of-government approach used for community consultation, ensuring community members had access to consistent and clear information.

Projects funded under the WSIP include:

- 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.

In total, approximately 925 community members made enquiries about the Western Sydney Airport project at these information sessions. Table 8–4 below summarises the WSIP information sessions.

Table 8–4 Summary of WSIP information sessions

Location	Local government area	Date	Attendees (approximate)
Penrith Anglican College, Orchard Hills	Penrith	22 July 2015	200
Bringelly Community Centre, Bringelly	Liverpool	25 July 2015	200
Holy Family Primary School, Luddenham	Liverpool/Penrith	29 July 2015	200
Glenmore Park Youth & Community Centre, Glenmore Park	Penrith	1 August 2015	60
Kemps Creek Public School, Kemps Creek	Liverpool/Penrith	6 August 2015	150
Holy Family Primary School, Luddenham	Liverpool/Penrith	8 August 2015	115

Survey results at WSIP information sessions

Attendees at the WSIP information sessions had the opportunity to fill out a survey about their attitude toward the proposed airport and aspects of the project of interest to them. 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 positive overall, 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.

The survey results are summarised in Figure 8–3 below.

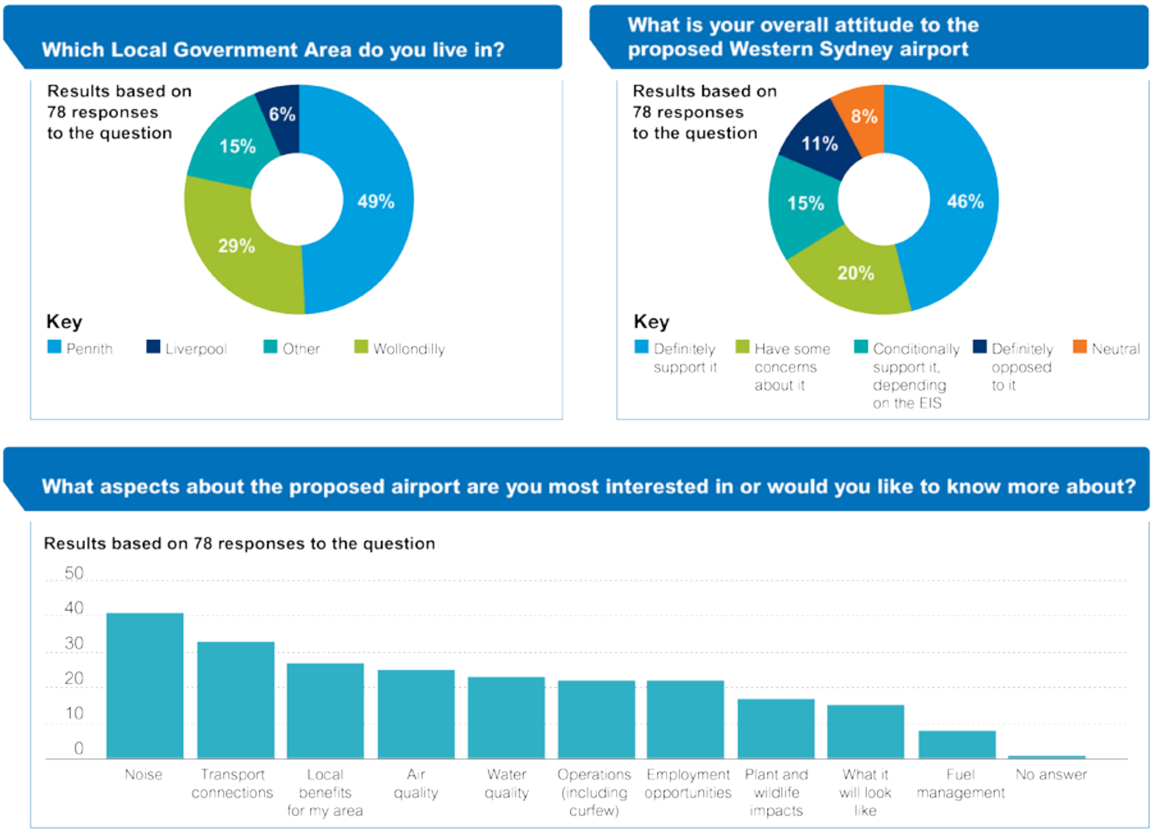


Figure 8–3 Summary of results from the WSIP information session questionnaire

Additional information sessions during Phase 1

Additional information sessions relating only to the proposed airport were also held during Phase 1. The purpose of these sessions was to make project information more accessible in advance of the release of the draft EIS and draft Airport Plan, in addition to reaching a broader audience than those who attended the WSIP sessions.

These additional information sessions provided the same information as the WSIP information sessions; however, for greater geographic coverage of Western Sydney, they also included areas further away from the airport site, including the Blue Mountains, Wollondilly, Camden and Fairfield local government areas. 211 community members attended the additional information sessions, details are provided in Table 8–5 below.

Table 8–5 Summary of Phase 1 information sessions

Location	Local government area	Date	Attendees (approximate)
Blue Mountains Theatre and Community Hub, Springwood	Blue Mountains	10 September 2015	74
Narellan Child, Family & Community Centre, Narellan	Camden	12 September 2015	36
Warragamba Town Hall, Warragamba	Wollondilly	17 September 2015	69
Horsley Park Hall, Horsley Park	Fairfield	19 September 2015	32

Survey results at the additional information sessions

A total of 127 responses were received with the largest number from residents of the Blue Mountains (42 per cent) and Wollondilly (23 per cent). Attitudes were negative overall, with 41 per cent opposed to the project and 25 per cent having some concerns.

Aircraft noise, air quality and water quality were among the aspects of the project that community members expressed interest in. The survey results are summarised in Figure 8–4 below.

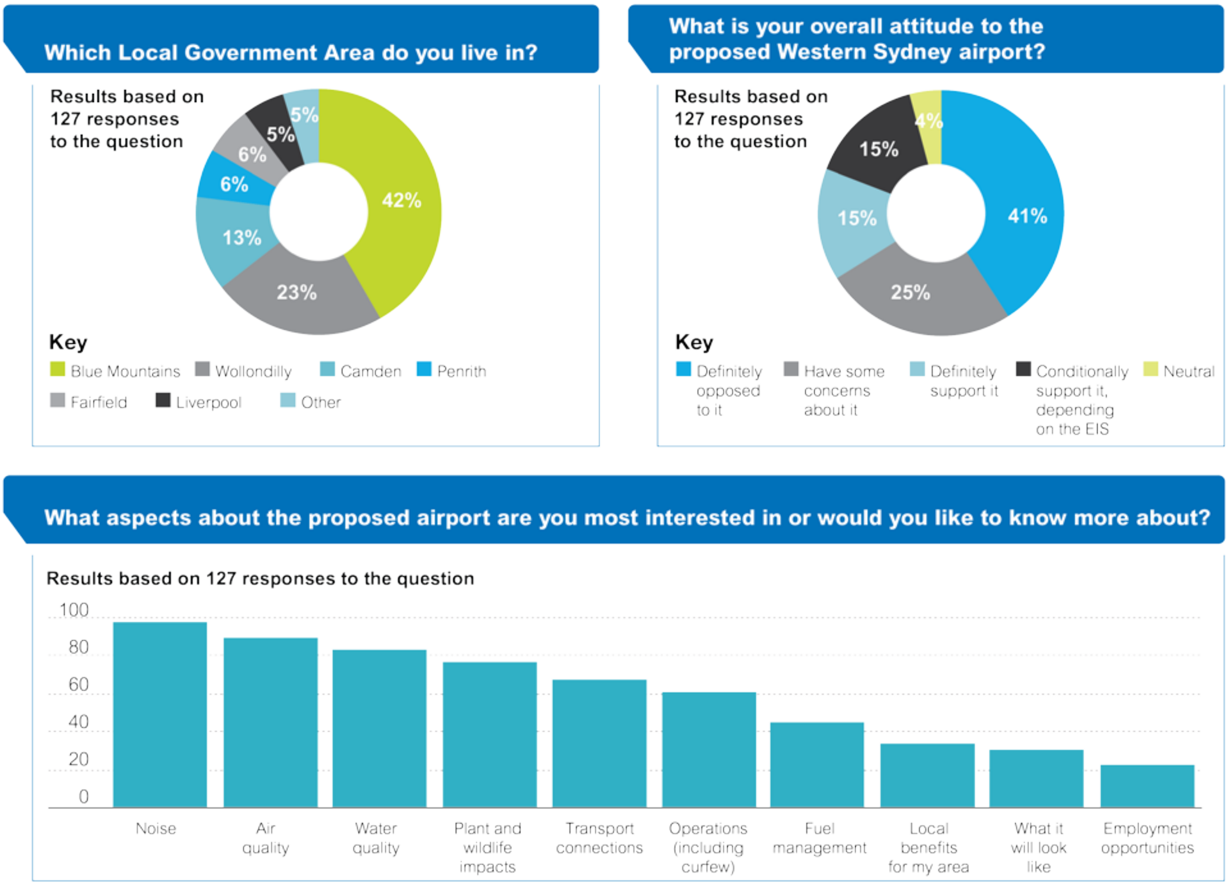


Figure 8–4 Summary of results from the additional information session questionnaire

8.3.3 Community attitudes research during Phase 1

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 below in Figure 8–5.

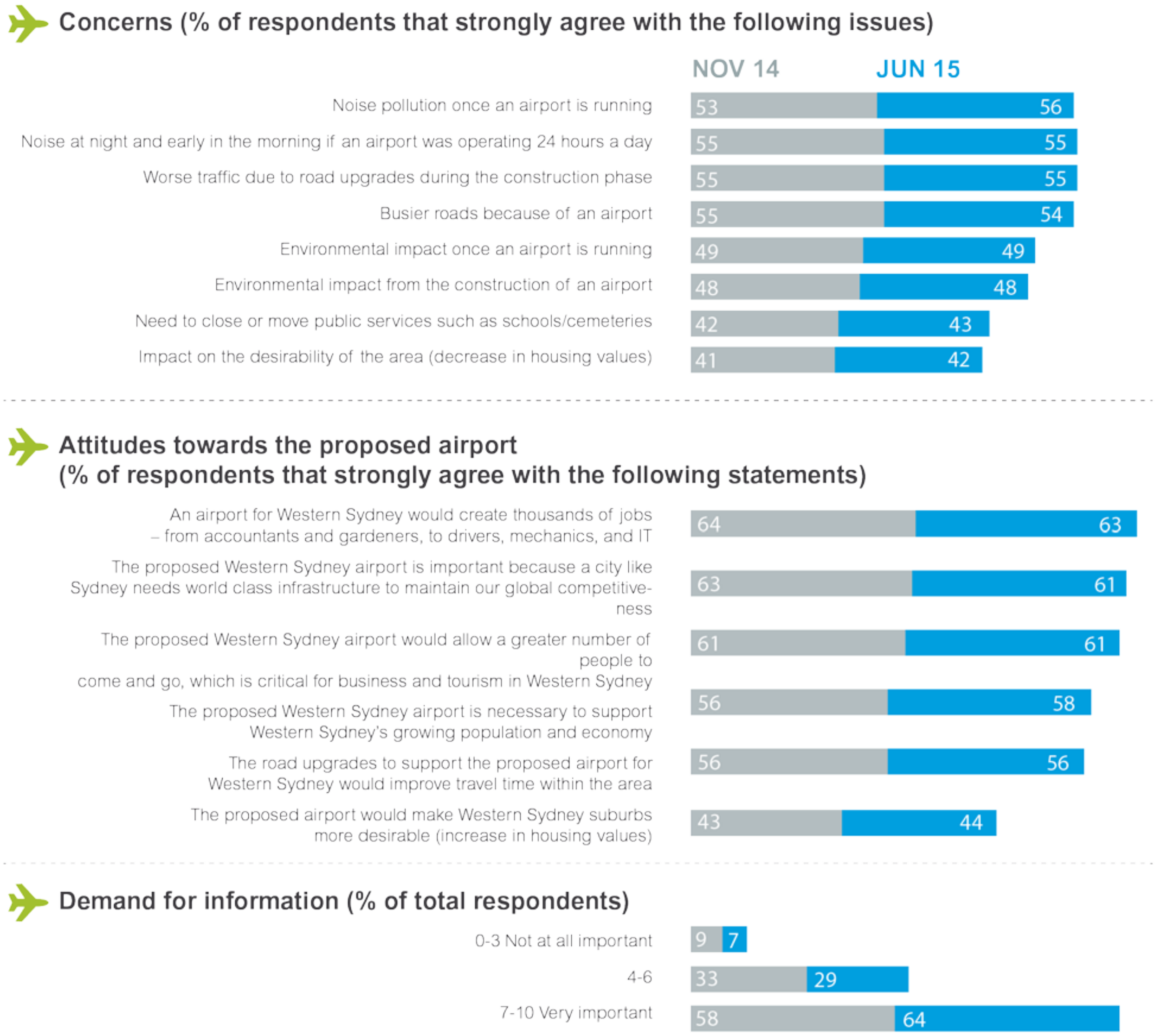


Figure 8–5 Summary of key community research results from November 2014 and June 2015

8.3.4 Summary of engagement, issues and responses during Phase 1

Community and stakeholder consultation during Phase 1 identified a broad range of issues which were taken into account in the draft EIS. The issues raised by government agencies, stakeholders and community members are listed in Table 8–6, along with a cross-reference to where they were addressed in the draft 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 draft EIS

Category	Issue raised during consultation before the release of the draft EIS (Phase 1)	Response provided in the draft EIS and where addressed in detail in the draft 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 were explained in Chapters 10 and 11 (Volume 2 of the draft EIS).
Need for the proposed airport	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. Further detail was provided in Chapter 2 (Volume 1 of the draft EIS).
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 was provided in Chapter 7 (Volume 1 of the draft EIS).
Employment opportunities from the proposed airport	Positive economic impact of the proposed airport on Western Sydney	• It is expected that the construction and operation of the proposed airport would result in significant economic and employment opportunities for the Western Sydney region. Benefits would be accrued beyond the aviation industry, and extend to businesses and employees in industries such as construction, utilities, trade, transport, accommodation, retail, professional services and administration. • During peak construction, it is estimated that the benefits will include approximately 700-800 additional jobs. • By the early 2030s, Western Sydney Airport is expected to provide nearly 9,000 direct jobs and over 4,000 in on-site business parks. This is projected to grow as the proposed airport grows. Further detail was provided in Chapters 23 and 24 (Volume 2 of the draft EIS) and Appendix P1 (Volume 4 of the draft EIS).

Category	Issue raised during consultation before the release of the draft EIS (Phase 1)	Response provided in the draft EIS and where addressed in detail in the draft 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 Services. Further detail was provided in Chapter 15 (Volume 2 of the draft EIS).
Traffic and transport	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 10 year road investment plan for Western Sydney Further detail was provided in Chapters 15 and 21 (Volume 2 of the draft EIS).
	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. • Initial rail services are expected to be provided to the Airport through the extension of the existing Sydney metropolitan rail network. A final alignment will be determined in consultation with the New South Wales Government. Further detail was provided in Chapter 15 (Volume 2 of the draft EIS).
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 is expect to 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 consultation with NSW Roads and Maritime Services and Liverpool City Council. Further detail was provided in Chapter 6 (Volume 1 of the draft EIS).
	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 was provided in Chapter 15 (Volume 2 of the draft EIS).
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 was provided in Chapter 23 (Volume 2 of the draft EIS) and Appendix P2 (Volume 4 of the draft EIS).

Category	Issue raised during consultation before the release of the draft EIS (Phase 1)	Response provided in the draft EIS and where addressed in detail in the draft EIS
	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 was provided in Chapter 23 (Volume 2 of the draft EIS) and Appendix P1 (Volume 4 of the draft 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 was provided in Chapter 23 (Volume 2 of the draft EIS) and Appendix P1 (Volume 4 of the draft EIS).
Operational issues	Location of fuel pipe and storage	• The fuel farm for Stage 1 is expected to 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 a corridor for a future fuel pipeline will be undertaken in conjunction with the NSW Government. Further detail was provided in Chapter 5 (Volume 1 of the draft EIS).
	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 for Stage 1 operations. Further detail was provided in Chapter 15 (Volume 2 of the draft EIS).
	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 was provided in Chapter 7 and Chapters 10 and 11 (Volume 2 of the draft EIS).
Pollution levels in Western Sydney	Potential for impact on water quality in Warragamba Dam	• Warragamba Dam is located approximately eleven kilometres west of the site. • Construction of the proposed airport is not located within the catchment area for Warragamba Dam or Prospect Reservoir. There is potential however that airborne particles from the airport construction may be deposited within these two waterbodies through dispersion of airborne dust. 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 was provided in Chapter 13 (Volume 2 of the draft EIS).

Category	Issue raised during consultation before the release of the draft EIS (Phase 1)	Response provided in the draft EIS and where addressed in detail in the draft 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 draft 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 ALC, the Department of Infrastructure and Regional Development, NSW Roads and Maritime Services and relevant construction contractors. • During operations the ALC 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 was provided in Chapter 27 (Volume 2 of the draft EIS).
	Impact of fuel dumping on the local area, including on human health and water quality	• 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, property, on the groundwater and 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 was provided in Chapter 13 (Volume 2 of the draft EIS).
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 was provided in Chapter 13 (Volume 2 of the draft EIS).

8.4 Phase 2 – public exhibition of the draft EIS and draft Airport Plan

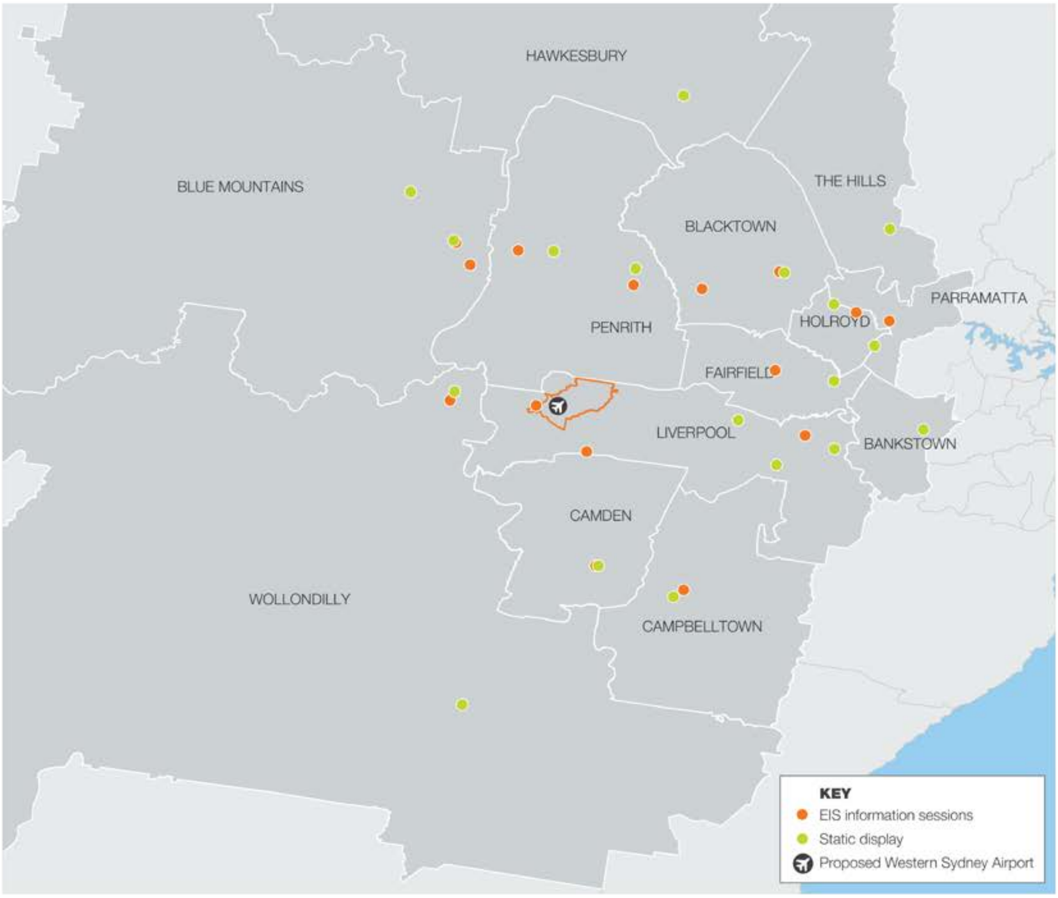
A programme of community and stakeholder consultation activities took place throughout the public exhibition of the draft EIS and draft Airport Plan from 19 October to 18 December 2015. The programme of activities was designed to raise awareness, provide consistent and accurate information, and answer questions raised by community members, who were invited to have their say and make submissions on the draft EIS and draft Airport Plan.

Activities were held across Western Sydney and the Blue Mountains throughout the exhibition period, and the project website also provided community members with access to information, resources and updates. All activities undertaken are listed in Table 8–7 below, and a map showing locations of activities is at Figure 8–6 below.

Table 8–7 Summary of stakeholder engagement and community consultation activities during Phase 2

Activity	Description
Community information sessions	The project team set up and staffed community information sessions at 16 locations in Western Sydney and the Blue Mountains. Each session provided local community members with the opportunity to review the draft EIS and draft Airport Plan, look at detailed maps, use the noise modelling tool, and speak to a member of the project team. Other government agencies also attended sessions in locations where local projects were occurring.
Static displays at local libraries	The draft EIS and draft Airport Plan, as well as summary information and other resources, were displayed at 19 local libraries across Western Sydney and the Blue Mountains, as well as 3 in the Sydney CBD and Canberra.
Website content and updates (www.westernsydneyairport.gov.au)	The westernsydneyairport.gov.au site was updated regularly throughout the exhibition period. Throughout the exhibition period accessible copies of the draft EIS, draft Airport Plan, noise modelling tool, summary document, fact sheets, community newsletter and responses to frequently asked questions were available online. Visits to the website during the exhibition period included over 36,000 individual user sessions comprised of almost 83,000 page views. Information about community information sessions and static displays was also available on the website.
Noise modelling tool	An online interactive mapping tool was launched during the exhibition period. It provided community members and stakeholders the opportunity to look up a specific address and provided a visual representation of the noise mapping information in the draft EIS and draft Airport Plan.
Project summary document	A plain English summary of the draft EIS and draft Airport Plan was developed for stakeholders and the community. It was available at all community information sessions, online and at static display locations.
Fact sheets	12 fact sheets were developed for a number of key topics to assist in the explanation of the outcomes of the draft EIS and the draft Airport Plan.
Community newsletter	The Spring 2015 community newsletter was released to coincide with the exhibition of the draft EIS and draft Airport Plan. The newsletter was sent to 7,500 local residential properties, provided to community members at community information sessions and static display locations, emailed to website subscribers, distributed to councils and made available on the project website.
Stakeholder briefings and meetings	Over 100 stakeholder briefings and meetings were held with government agencies, local councils, representatives from industry and the community, Federal and State MPs and Senators, and other stakeholders. These briefings provided information on aspects of the draft EIS and draft Airport Plan and were part of the whole-of-government approach, ensuring community members received consistent information from different sources.
Doorknocking	On Tuesday 20 October 2015, 75 properties that shared a boundary with the airport site or were in close proximity were doorknocked by the project team to provide project information and invite residents to the local community information session in Luddenham.
Letters	Letters were sent out to 75 residences near the airport site, 70 local organisations and 79 political representatives at the beginning of the exhibition period, providing information on the draft EIS and draft Airport Plan and engagement opportunities.
Postcard	A postcard was distributed to over 430,000 residential properties and was available at static displays and from local councils. It was used to inform the community of the exhibition of the draft EIS and draft Airport Plan and the opportunities to engage with the project.

Activity	Description
Newspaper notifications	Consistent with publication requirements of the EPBC Act and Regulations, 59 notifications were placed in 14 national, Sydney metropolitan and local newspapers and 10 foreign language newspapers. Each notification provided details of the draft EIS and draft Airport Plan exhibition activities.
Emails	Throughout the exhibition period, six informative emails were sent to over 600 individuals who provided an email address to be kept informed of the project.
USB copies of the EIS	The draft EIS and draft Airport Plan were available on USB drives. Any community member who requested a copy of the draft documents was provided a USB.
Translation services	Translation services were available throughout the exhibition period in languages spoken in Western Sydney. A language translation symbol was available on project documents and the project website offered translation assistance. Ten languages were selected according to analysis of linguistic diversity in Western Sydney, including: Arabic; Assyrian/Aramaic; Dari; Greek; Hindi; Italian; Serbian; Simplified Chinese; Spanish; and Vietnamese.
Information line and email to project team	The project team continually monitored calls and emails during the exhibition period. A total of 162 calls and 64 emails were received.
Surveys	A further round of research was conducted in December 2015, two weeks before the end of the exhibition period. The research was used to gauge community attitudes towards the project since the previous round of research in June 2015. 502 participants representative of age, gender and location in Western Sydney were surveyed, with results indicating greater awareness and an increase in positive sentiment towards the airport.



	LGA	Event type	Location
OCTOBER	**Liverpool**	EIS information session	Holy Family Primary School
	Blue Mountains	EIS information session	Blaxland Community Hall
	Penrith	EIS information session	St Mary's Memorial Hall
NOVEMBER	**Liverpool**	EIS information session	Bringelly Community Centre
	Liverpool	EIS information session	Hilda M. Davis Senior Citizens Centre
	Campbelltown	EIS information session	Campbelltown Civic Hall
	Holroyd	EIS information session	Wentworthville Community Centre
	Camden	EIS information session	Narellan Child Family Community Centre
	Penrith	EIS information session	Melrose Hall
	Penrith	EIS information session	St Marys Memorial Hall
	Parramatta	EIS information session	Parramatta Town Hall
	Blacktown	EIS information session	Minchinbury Neighbourhood Centre
	Wollondilly	EIS information session	Warragamba Town Hall
	Fairfield	EIS information session	Prairiewood Community Centre
DECEMBER	**Blacktown**	EIS information session	Alpha Park Hall
	Blue Mountains	EIS information session	Glenbrook School of Arts Hall
OCTOBER – DECEMBER	**Bankstown**	Static display	Bankstown City Library
	Blacktown	Static display	Max Webber Library
	Blue Mountains	Static display	Katoomba Library
	Blue Mountains	Static display	Springwood Library
	Blue Mountains	Static display	Blaxland 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
	The Hills	Static display	Castle Hill Library
	Holroyd	Static display	Merrylands Central Library
	Liverpool	Static display	Liverpool City Library
	Liverpool	Static display	Green Valley Library
	Liverpool	Static display	Moorebank Library
	Parramatta	Static display	Parramatta City Library
	Penrith	Static display	Penrith City Library
	Penrith	Static display	St Marys Library
	Wollondilly	Static display	Wollondilly Library
	Wollondilly	Static display	Warragamba Silverdale Neighbourhood Centre
	Sydney	Static display	City of Sydney Library

Figure 8–6 Summary of community consultation activities between October and December 2015

8.4.1 Community information sessions

During the exhibition period, 16 community information sessions were held across Western Sydney and the Blue Mountains. In addition to staff from the draft EIS and draft Airport Plan project team, representatives from New South Wales government agencies with local projects were invited to the sessions, providing community members with access to accurate information across a range of local matters. Over 1,450 community members attended the sessions, where they had the opportunity to gather information about the project including by:

- reviewing copies of the draft EIS and draft Airport Plan;
- speaking to a project team member or a representative from another government agency;
- using the noise modelling tool, which was available at staffed computer terminals;
- picking up copies of the draft EIS summary document and factsheets;
- viewing information boards and large-scale displays of maps and charts from the draft EIS and draft Airport Plan; and
- requesting a USB copy of the draft EIS and draft Airport Plan.

The information sessions were promoted through a number of channels, including newspaper and radio advertisements, emails to those subscribed to the project website, information in the Spring 2015 community newsletter, doorknocking households adjacent to the airport site, advice to Councils and letters sent to residents and organisations in the vicinity of the airport site.

The schedule of 16 information sessions was designed to be as accessible as possible to community members. The sessions were held across 12 local government areas on different days of the week at venues of suitable size and with sufficient parking. The first information session was held in Luddenham on 28 October 2015, 10 days after the exhibition period began, and the final session was held at Glenbrook on 9 December 2015, 10 days before the exhibition period closed. Table 8–8 below provides a summary of the session locations, dates and attendees.

Table 8–8 Community information session summary

Location	Local government area	Date	Attendees (approximate)
Holy Family Primary School, Luddenham	Liverpool/Penrith	Wednesday, 28 October 2015 4 pm to 7 pm	131
St Marys Memorial Hall, St Marys	Penrith	Thursday, 29 October 2015 4 pm to 7 pm	25
Blaxland Community Hall, Blaxland	Blue Mountains	Saturday, 31 October 2015 12 pm to 3 pm	235
Prairiewood Community Centre, Prairiewood	Fairfield	Wednesday, 4 November 2015 4 pm to 7 pm	101
Campbelltown Civic Hall, Campbelltown	Campbelltown	Thursday, 5 November 2015 4 pm to 7 pm	63

Location	Local government area	Date	Attendees (approximate)
Bringelly Community Centre, Bringelly	Liverpool	Saturday, 7 November 2015 12 pm to 3 pm	251
Parramatta Town Hall, Parramatta	Parramatta	Wednesday, 11 November 2015 4 pm to 7 pm	50
Warragamba Town Hall, Warragamba	Wollondilly	Saturday, 14 November 2015 12 pm to 3 pm	128
Wentworthville Community Centre, Wentworthville	Holroyd	Wednesday, 18 November 2015 4 pm to 7 pm	33
Melrose Hall, Emu Plains	Penrith	Saturday, 21 November 2015 12 pm to 3 pm	112
St Marys Memorial Hall, St Marys	Penrith	Monday, 23 November 2015 4 pm to 7 pm	23
Hilda M. Davis Senior Citizens Centre, Liverpool	Liverpool	Tuesday, 24 November 2015 4 pm to 7 pm	3
Minchinbury Neighbourhood Centre, Minchinbury	Blacktown	Wednesday, 25 November 2015 4 pm to 7 pm	84
Narellan Child, Family Community Centre, Narellan	Camden	Thursday, 26 November 2015 4 pm to 7 pm	115
Alpha Park Hall, Blacktown	Blacktown	Tuesday, 8 December 2015 4 pm to 7 pm	11
Glenbrook School of Arts Hall, Glenbrook	Blue Mountains	Wednesday, 9 December 2015 4 pm to 7 pm	108

On arriving at the information sessions, attendees were asked to register and provide their residential postcode. They could also provide a contact email address if they elected to receive project updates.

The postcodes provided indicate that residents from across Western Sydney attended the information sessions, with 10 per cent from the postcode 2774 (Blaxland, Blaxland East, Mount Riverview and Warrimoo), 9 per cent from 2773 (Glenbrook and Lapstone) and 9 per cent for 2745 (Glenmore Park, Greendale, Luddenham, Mulgoa, Regentville and Wallacia).

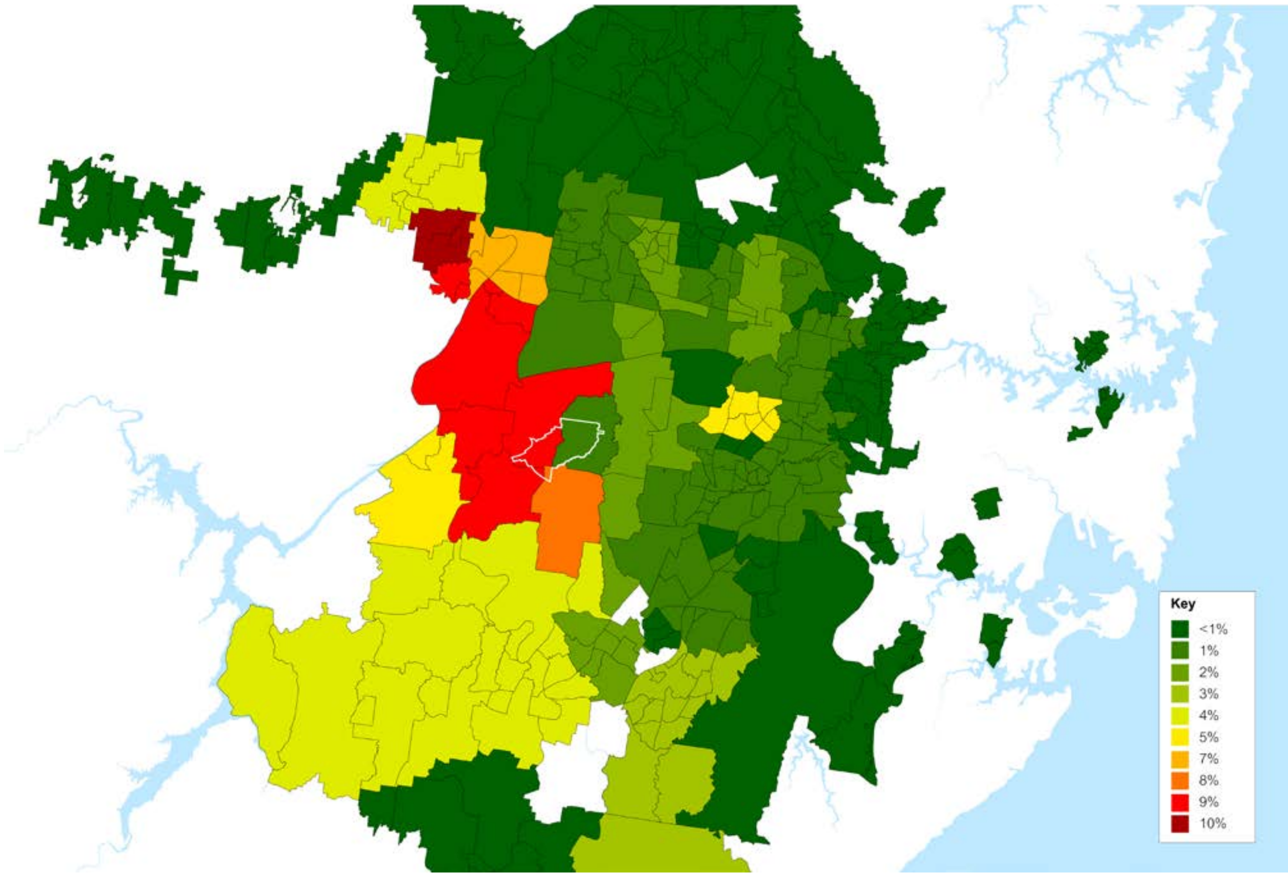


Figure 8–7 Summary of attendees at the community information sessions

8.4.1.8 *Survey results at the community information sessions*

Attendees at the community information sessions had the opportunity to fill out a survey about how they received information and their level of satisfaction with the information presented at the information session. A total of 393 responses were obtained across all 16 information sessions. The largest number were completed by residents of the Blue Mountains (36 per cent) and Liverpool (15 per cent) local government areas. Respondents indicated that they heard about the sessions through a variety of means, with the largest number referring to information mailed out to residents (34 per cent), word of mouth (18 per cent) and newspaper advertising (13 per cent). The majority of respondents felt neutral or satisfied with the information available at the sessions (65 per cent), while 35 per cent were dissatisfied with the information presented.

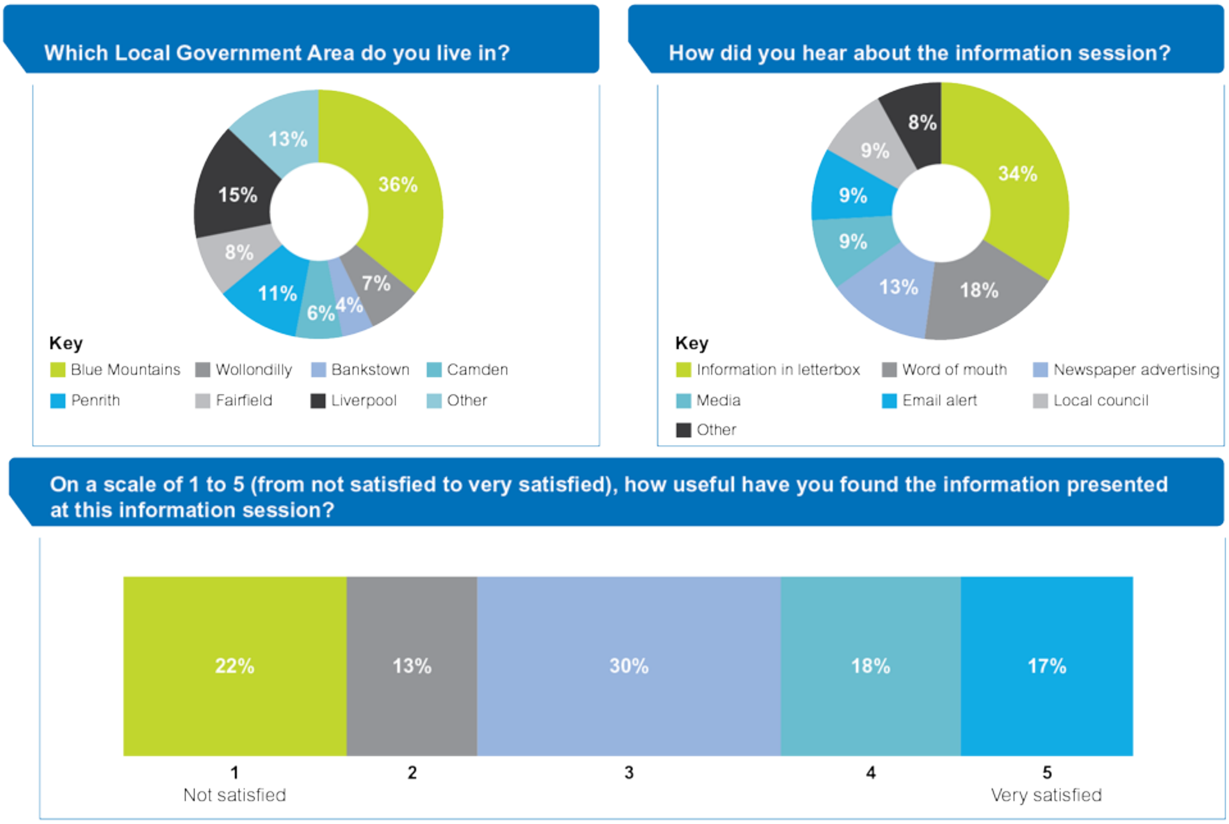


Figure 8–8 Summary of results from the community information sessions

8.4.2 Static displays at local libraries

Printed copies of the draft EIS and draft Airport Plan, as well as supporting resources, were displayed at 19 local libraries across 13 local government areas in Western Sydney and the Blue Mountains, as well as 3 in the Sydney CBD and Canberra. The documents were available to view during normal operating hours throughout the exhibition period. Locations are detailed in Table 8–9 below. All but one local library elected to keep copies of the draft EIS and draft Airport Plan for reference.

Table 8–9 Locations of static displays

LGA	Venue
Bankstown	Bankstown City Library, Bankstown
Blacktown	Max Webber Library, Blacktown
Blue Mountains	Katoomba Library, Katoomba
Blue Mountains	Springwood Library, Springwood
Blue Mountains	Blaxland Library, Blaxland
Camden	Narellan Library, Narellan
Campbelltown	HJ Daley Library, Campbelltown
Fairfield	Fairfield Library, Fairfield
Hawkesbury	Hawkesbury Library Service, Deerubbin Centre, Windsor
The Hills	Castle Hill Library, Castle Hill
Holroyd	Merrylands Central Library, Merrylands
Liverpool	Green Valley Library, Green Valley
Liverpool	Liverpool City Library, Liverpool
Liverpool	Moorebank Library, Moorebank
Parramatta	Parramatta City Library, Parramatta
Penrith	Penrith City Library, Penrith
Penrith	St Marys Library, St Marys
Wollondilly	Camden Library, Wollondilly
Wollondilly	Warragamba Silverdale Neighbourhood Centre, Warragamba
Sydney	City of Sydney Library, Customs House, Circular Quay
Sydney	NSW Department of Planning and Environment
Canberra	Australian Government Department of the Environment

8.4.3 Website content and updates

Throughout the exhibition period the Western Sydney Airport project website <*http://westernsydneyairport.gov.au*> was an accessible, comprehensive and clear source of information on the draft EIS, the draft Airport Plan and all other aspects of the project. All resources were accessible on the website, including:

- full copies of the draft EIS and draft Airport Plan;
- supporting information, including the project summary document and factsheets;
- information on other aspects of the Western Sydney Airport project;
- maps and images;
- locations and details of static displays and community information sessions;

- the noise modelling tool;
- answers to frequently asked questions, updated throughout the exhibition period;
- copies of previous studies, reports and community newsletters, including the two previous EISs and the 2012 Joint Study on aviation capacity in the Sydney region;
- contact information for the project team information line and email; and
- links to further official information, such as the Western Sydney Infrastructure Plan.

The website was updated throughout the exhibition period. This included providing details for upcoming information sessions as well as continually adding to and updating responses to issues raised by community members.

The website was visited by individuals in over 36,000 sessions in the period from 19 October 2015 to 18 December 2015. These sessions included almost 83,000 page views.

Table 8–10 Number of website hits during the exhibition period (19 October to 18 December 2015)

Sessions (individual visitors visiting one or more pages/files on the site in one continuous session)	Page views (number of times each webpage was viewed)
36,452	82,964

During the exhibition, a typographical error from an earlier version of the draft EIS was corrected in the standalone digital copies of Chapters 12 and 32 on the website. The typographical error did not alter the overall findings of the draft EIS. When this error was recognised, these chapters were amended to be consistent with the accurate information contained in the printed versions of these chapters, the consolidated digital version of the draft EIS and the versions on USB flash drives. The accurate information in the consolidated version of the draft EIS was available on the website and USBs, and in printed form at static displays, throughout the consultation period.

8.4.4 Noise modelling tool

An aircraft noise modelling tool was launched during the exhibition period. The tool used aircraft noise modelling and indicative flight paths from the draft EIS and presented it on an interactive online map. By entering an address, community members and stakeholders were able to find out information on potential aircraft operations and aircraft noise impacts at specific locations.

The noise modelling tool was made available on the project website, with an accompanying guide for users, and was also presented on staffed terminals at information sessions.

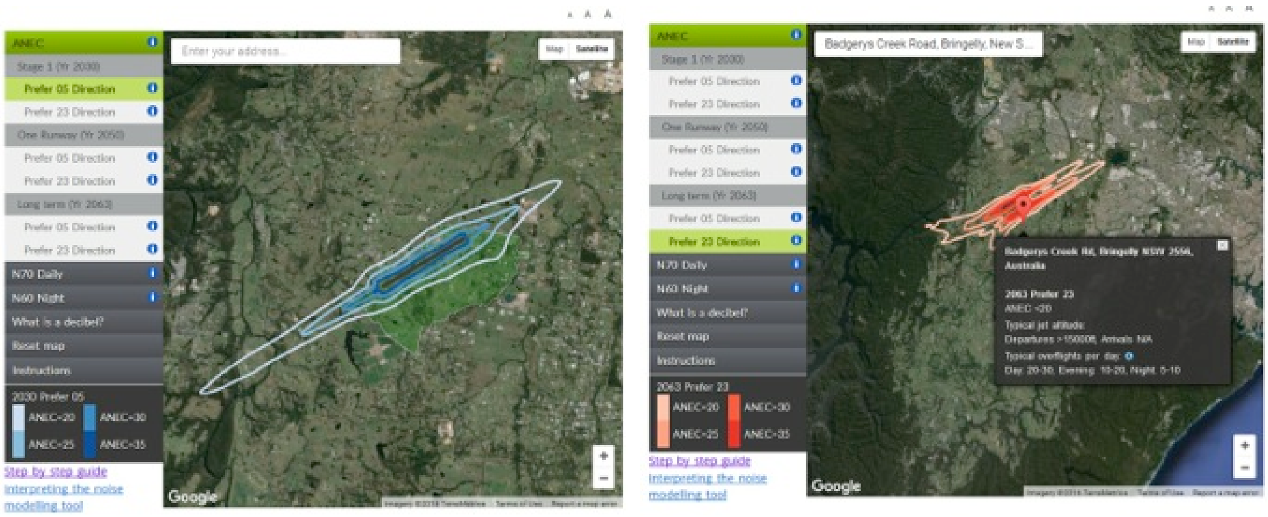


Figure 8–9 Screen shots of the noise modelling tool

There were over 9,000 visits to the noise modelling tool webpage during the exhibition period. Table 8–11 provides a breakdown of statistics of page views on the noise modelling tool and noise modelling tool guide.

Table 8–11 Noise modelling tool website statistics

Page views noise tool	Page views noise tool guide	Total page views
6,668	2,542	9,210

8.4.5 Project summary document

A project summary document was developed to provide an overview of the proposed Western Sydney Airport project, the draft EIS, and the draft Airport Plan in plain English. The 18 page document provided a summary of the need for an airport for Western Sydney, the expected job creation figures, technical information, maps, indicative flight paths and indicative airport layouts, as shown in Figure 8–10 below.

Figure 8–10 Project summary document

Printed copies of the project summary document were available at community information sessions, static displays and via mail. A digital version was also available on the project website for download and review.

8.4.6 Fact sheets

Eleven fact sheets were developed to assist in explaining the information contained in the draft EIS and the draft Airport Plan, in anticipation of community members' questions. Ten fact sheets were released at the beginning of the exhibition. The fact sheets addressed the main aspects of the draft EIS, including topics that the community expressed interest in during Phase 1 consultation. An additional fact sheet, 'Western Sydney Airport and aerial firefighting,' was produced to answer questions about emergency services operations which were raised by some community members during the exhibition period.

All fact sheets were available throughout the exhibition on the project website and at all community information sessions and static displays. The fact sheets available included:

- 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;

- Indicative flight paths;
- Health risk assessment;
- Managing aircraft noise;
- Social and economic benefits;
- Traffic, transport and access; and
- Western Sydney Airport and aerial firefighting.

An existing fact sheet about Sydney Airport Group's right of first refusal to develop and operate a Western Sydney Airport was also distributed at information sessions and online.

8.4.7 Community newsletter

The Western Sydney Airport community newsletter provides a regular project update to local community members. The spring 2015 community newsletter was provided to coincide with the exhibition of the draft EIS and draft Airport Plan.

The newsletter included information on the content and structure of the draft EIS and draft Airport Plan, upcoming information sessions, and how to make a submission. It also provided contact details for the project team hotline and email. The front of the newsletter is shown in Figure 8–11 below.

Figure 8–11 Spring 2015 Community Newsletter

The newsletter was available at all community information sessions and static display locations, emailed to website subscribers, distributed to local councils and placed on the project website for viewing or download. The newsletter was also sent to approximately 7,500 local residential properties during the period 19 October 2015 to 30 October 2015. The distribution area was the same used for all community newsletters in 2015 and included the following suburbs:

- Badgerys Creek;
- Bringelly;
- Erskine Park.
- Greendale;
- Horsley Park;
- Kemps Creek;
- Luddenham;
- Rossmore; and
- Wallacia.

8.4.8 Stakeholder briefings and meetings during Phase 2

A schedule of over 100 stakeholder briefings and meetings took place throughout the exhibition period. The briefings provided information on the draft EIS and draft Airport Plan and ensured that consistent information was shared across all levels of government and stakeholders. This contributed to the whole-of-government approach to community consultation, providing community members with access to accurate information from different sources.

Stakeholders included government agencies, local councils, representatives from industry and the community, Federal and State MPs and Senators, and other groups. Over 120 stakeholders from government agencies, local councils and other groups also attended a large briefing held at the beginning of the exhibition period on 20 October 2015 in Parramatta.

Table 8–2 provides a full list of stakeholders engaged during all three phases.

8.4.9 Door knocking

On Tuesday 20 October 2015, 75 surrounding properties were door knocked to provide project information and invite residents to the local community information session in Luddenham. The properties shared a boundary with the airport site or were in close proximity.

8.4.10 Letters

Letters were sent out to the surrounding community, local organisations and political representatives at the beginning of the exhibition period. The letters provided information on how to access the draft EIS and draft Airport Plan and the opportunities for gathering more information and speaking to the project team at upcoming information sessions.

Residential properties surrounding the airport site were contacted by letter, which was delivered alongside the doorknocking. Furthermore, letters were sent to over 70 local organisations, including educational facilities, places of worship and other community facilities.

In order to inform appropriate political representatives, 50 Federal and 29 New South Wales Members of Parliament, Senators and Ministers were also contacted by letter. This was consistent with the whole-of-government approach to community consultation, ensuring that community members were able to access consistent and clear information from official sources.

A summary of letters sent is included in Table 8–12 below.

Table 8–12 Summary of letters sent

Community or stakeholder group	Number of letters sent
NSW State MPs and Ministers	29
Federal MPs, Senators and Ministers	50
Sensitive receivers in close proximity to the site *(e.g. churches, educational institutions, child care and progress associations)*	78
Residents adjacent to site	75

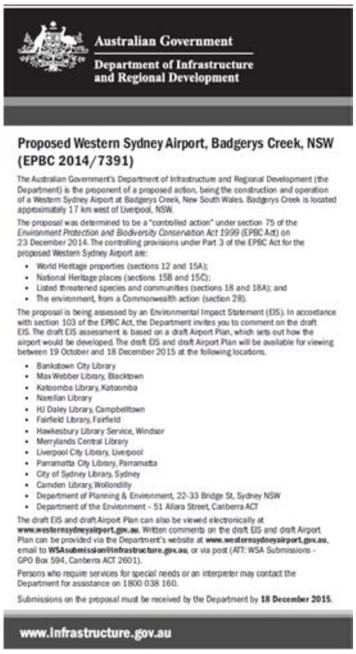
8.4.11 Postcards

A project postcard was used to inform the community of the exhibition of the draft EIS and draft Airport Plan, and the many opportunities to engage with the project. Although the postcard was initially planned to be sent to around 480,000 residential properties, difficulties with timing meant the postcard was sent to over 430,000 residential properties during the exhibition period. In order to reach as many community members as possible, the postcard was made available at static displays and provided to local councils to distribute.

Figure 8–12 Copy of the postcard

8.4.12 Newspaper notifications

In accordance with publishing requirements in the EPBC Regulations, notifications were placed in metropolitan and local newspapers throughout the exhibition period. These notifications raised awareness of the release of the draft EIS and draft Airport Plan and directed readers to the project website for further information, or to call the dedicated hotline number or email. Examples of the advertisements are shown in Figure 8–13 and Figure 8–14 below.



Australian Government
Department of Infrastructure and Regional Development

Proposed Western Sydney Airport, Badgerys Creek, NSW (EPBC 2014/7391)

The Australian Government's Department of Infrastructure and Regional Development (the Department) is the proponent of a proposed action, being the construction and operation of a Western Sydney Airport at Badgerys Creek, New South Wales. Badgerys Creek is located approximately 17 km west of Liverpool, NSW.

The proposal was determined to be a "controlled action" under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 23 December 2014. The controlling provisions under Part 3 of the EPBC Act for the proposed Western Sydney Airport are:

- World Heritage properties (sections 12 and 15A);
- National Heritage places (sections 15B and 15C);
- Listed threatened species and communities (sections 18 and 18A); and
- The environment, from a Commonwealth action (section 28).

The proposal is being assessed by an Environmental Impact Statement (EIS). In accordance with section 103 of the EPBC Act, the Department invites you to comment on the draft EIS. The draft EIS assessment is based on a draft Airport Plan, which sets out how the airport would be developed. The draft EIS and draft Airport Plan will be available for viewing between 19 October and 18 December 2015 at the following locations.

- Bankstown City Library
- Max Webber Library, Blacktown
- Katoomba Library, Katoomba
- Narellan Library
- HJ Daley Library, Campbelltown
- Fairfield Library, Fairfield
- Hawkesbury Library Service, Windsor
- Merrylands Central Library
- Liverpool City Library, Liverpool
- Parramatta City Library, Parramatta
- City of Sydney Library, Sydney
- Camden Library, Wollondilly
- Department of Planning & Environment, 22-33 Bridge St, Sydney NSW
- Department of the Environment - 51 Allara Street, Canberra ACT

The draft EIS and draft Airport Plan can also be viewed electronically at **www.westernsydneyairport.gov.au**. Written comments on the draft EIS and draft Airport Plan can be provided via the Department's website at **www.westernsydneyairport.gov.au**, email to **WSAsubmission@infrastructure.gov.au**, or via post (ATT: WSA Submissions - GPO Box 594, Canberra ACT 2601).

Persons who require services for special needs or an interpreter may contact the Department for assistance on 1800 038 160.

Submissions on the proposal must be received by the Department by **18 December 2015**.

www.infrastructure.gov.au

Figure 8–13 Newspaper advertisement giving notice of the draft EIS in accordance with the EPBC Act – the Australian, Daily Telegraph and Sydney Morning Herald (19 October 2015).

Australian Government
Department of Infrastructure and Regional Development

WESTERN SYDNEY AIRPORT

Exhibition of draft Airport Plan and draft Environmental Impact Statement

The Australian Government is progressing plans towards an airport for Western Sydney at Badgerys Creek.

A draft Airport Plan and draft Environmental Impact Statement (EIS) are complete and are available for review and comment from 19 October 2015 until 18 December 2015 via www.westernsydneyairport.gov.au

You are invited to one of a number of drop in information sessions to be held during the exhibition period to find out more and speak with the project team.

Wednesday 28 October 2015 Liverpool 4pm-7pm Holy Family Primary School Lot 32 Willowdene Avenue, Luddenham	Thursday 29 October 2015 Penrith 4pm-7pm St Marys Memorial Hall Great Western Highway and Mamre Road, St Marys	Saturday 31 October 2015 Blue Mountains 12pm-3pm Blaxland Community Hall 33 Hope Street, Blaxland
Wednesday 4 November 2015 Fairfield 4pm-7pm Prairiewood Community Centre 194- 222 Restwell Road, Prairiewood	Thursday 5 November 2015 Campbelltown 4pm-7pm Campbelltown Civic Hall 91 Queen Street, Campbelltown	Saturday 7 November 2015 Liverpool 12pm-3pm Bringelly Community Centre 5 Greendale Road, Bringelly
Wednesday 11 November 2015 Parramatta 4pm-7pm Parramatta Town Hall 182 Church Street, Parramatta	Saturday 14 November 2015 Wollondilly 12pm-3pm Warragamba Town Hall 158 Fourteenth Street, Warragamba	Wednesday 18 November 2015 Holroyd 4pm-7pm Wentworthville Community Centre 2 Lane Street, Wentworthville
Saturday 21 November 2015 Penrith 12pm-3pm Melrose Hall Cnr Park Street & Great Western Highway Emu Plains	Wednesday 25 November 2015 Blacktown 4pm-7pm Minchinbury Neighbourhood Centre 46 Minchin Drive, Minchinbury	Thursday 26 November 2015 Camden 4pm-7pm Narellan Child, Family and Community Centre Queen Street, Narellan

Find out more:
www.westernsydneyairport.gov.au
ph: 1800 038 160
email: wsu@infrastructure.gov.au

www.infrastructure.gov.au

Australian Government
Department of Infrastructure and Regional Development

西悉尼機場

《機場規劃》草圖與《環境影響說明》草案公示

Find out more:
www.westernsydneyairport.gov.au
電話：1800 038 160
電郵：wsu@infrastructure.gov.au

www.infrastructure.gov.au

Figure 8–14 Newspaper adverts promoting upcoming information sessions - Liverpool City Champion (28/10/2015) and Australian Chinese News Weekly (30/10/2015)

In order to reach as many community members as possible, notifications were placed in a range of national, Sydney metropolitan, local and foreign language newspapers, selected according to analysis of their readership numbers and area of distribution.

Notifications were included in the metropolitan papers The Australian, Daily Telegraph and Sydney Morning Herald on Monday 19 October, the first day of exhibition. Notifications in local newspapers appeared were placed to appear before the dates of local information sessions. Table 8–13 below provides a summary of the newspapers and dates which featured notifications.

Table 8–13 Newspaper notification schedule

Newspaper	Date of publication
English language newspapers	
The Australian	Monday 19 October
Blacktown City Sun	Tuesday 17 November Tuesday 24 November Tuesday 1 December Tuesday 8 December
Blue Mountains Gazette	Wednesday 21 October Wednesday 28 October Wednesday 2 December Wednesday 9 December
Camden Advertiser	Wednesday 18 November Wednesday 25 November

Newspaper	Date of publication
Campbelltown/Macarthur Chronicle	Tuesday 27 October Tuesday 3 November
Daily Telegraph	Monday 19 October Saturday 24 October
Fairfield City Champion	Wednesday 28 October Wednesday 4 November
Liverpool City Champion	Wednesday 21 October Wednesday 28 October Wednesday 4 November Wednesday 18 November
Liverpool Leader	Wednesday 21 October Wednesday 28 October Wednesday 4 November Wednesday 18 November
Parramatta Sun	Thursday 5 November Thursday 12 November
Penrith City Gazette	Thursday 22 October Thursday 29 October Thursday 12 November Thursday 19 November
Penrith Press	Thursday 22 October Tuesday 27 October Thursday 12 November Tuesday 17 November Thursday 19 November
Sydney Morning Herald	Monday 19 October Saturday 24 October
Wollondilly Advertiser	Wednesday 4 November Wednesday 11 November
Foreign language newspapers	
An Nahar	Thursday 29 October Thursday 12 November
Australian Chinese News Weekly	Friday 30 October Friday 13 November
Bayanihan News	Monday 2 November

Newspaper	Date of publication
Greek Herald	Saturday 31 October Saturday 14 November
La Fiamma	Thursday 29 October Thursday 12 November
The Indian Link	Friday 6 November Friday 20 November
Novosti	Thursday 29 October Thursday 12 November
Persian Herald	Thursday 29 October Thursday 12 November
Spanish Herald	Friday 30 October Friday 13 November
Viet News	Friday 30 October Friday 13 November

8.4.13 Emails

Emails were sent throughout the exhibition period to approximately 600 individuals and organisations who had provided email contact details to be kept informed of the project. Email was used to send out reminders of upcoming information sessions, as well as the closing date for submissions. Table 8–14 below provides a summary of the dates, message and number of receipts of each email.

Table 8–14 Email schedule

Date	Content	Number of recipients
26 October 2015	Community information sessions reminder for the Luddenham, St Marys and Blaxland sessions	584
3 November 2015	Community information sessions reminder for the Prairiewood, Campbelltown, and Bringelly sessions	606
10 November 2015	Community information sessions reminder for the Parramatta and Warragamba sessions	607
17 November 2015	Community information sessions reminder for the Wentworthville, Emu Plains, St Marys and Liverpool sessions	599
4 December 2015	Community information sessions reminder for the Blacktown and Glenbrook sessions	601
15 December 2015	Reminder of the submissions period closing soon	603

8.4.14 USB copies of the draft EIS

USB flash drives containing digital copies of the draft EIS and draft Airport Plan were made available to individuals who requested a copy, and were also handed out at stakeholder briefings. This provided an efficient and accessible means of distributing documents containing 14 separate volumes with over 5,000 pages. Over 400 USBs were handed out, including 84 sent to community members and stakeholders who requested a copy.

8.4.15 Translation services

- Arabic;
- Assyrian/Aramaic;
- Dari;
- Greek;
- Hindi;
- Italian;
- Serbian;
- Simplified Chinese;
- Spanish; and
- Vietnamese.

Figure 8–15 Translation symbol

As shown in Figure 8–16 below, the ‘An airport for Western Sydney’ fact sheet was also translated into the languages listed above and made available at all community information sessions and online.

Figure 8–16 Samples of translated fact sheets

8.4.16 Project team information line and emails

A dedicated 1800 information line (1800 038 160) was available throughout the exhibition period for individuals wishing to speak to the project team. A dedicated email (wsu@infrastructure.gov.au) was also available to community members and stakeholders to connect with the project team about specific queries.

During the exhibition period a total of 162 calls were made to the 1800 information line and 64 emails sent to the project email.

8.4.17 Community research during Phase 2

A third round of research was undertaken in December 2015, two weeks before the end of the exhibition period. The research followed from previous surveys and focus groups to understand attitudes towards the proposed Western Sydney Airport and to ensure communication activities are tailored to meet the needs of the community and stakeholders.

The third round of research involved an online survey of 502 participants, selected representative of age, gender and location in Western Sydney. Outcomes of the surveys showed greater awareness of the project among the community and a slight increase of positive sentiment towards the proposed airport.

Outcomes of the surveys and focus groups were used by the project team to better understand the communication needs of the community and inform future communication and engagement strategies. The findings on attitudes, concerns and demand for information are summarised in Figure 8–17 below.

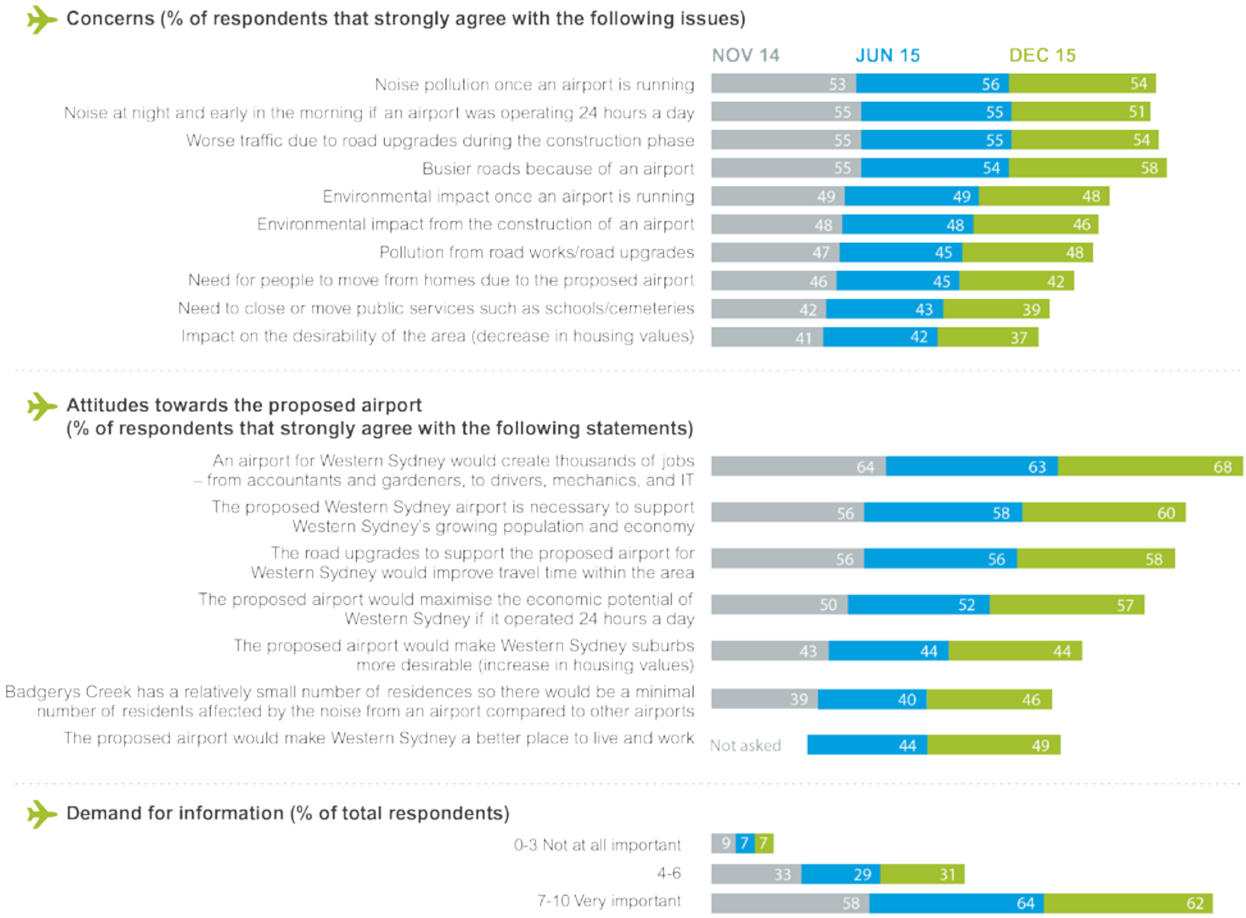


Figure 8–17 Summary of key community research results from November 2014, June 2015 and December 2015

8.5 Phase 3 – finalisation, release and consideration of EIS

Phase 3 began on 19 December 2015 after the end of the public exhibition period for the draft EIS and draft Airport Plan. During Phase 3, activities are being undertaken to keep the community and stakeholders informed about the project as the EIS is finalised alongside a revised draft Airport Plan. Following release of the EIS and determination of the Airport Plan, some of these activities are expected to continue as part of the project's broader community and stakeholder engagement work.

Activities undertaken during Phase 3 were a continuation of activities undertaken in previous phases. These activities have focused on providing information on how submissions and community concerns were reviewed and addressed in the final EIS and revised draft Airport Plan, updating the community and stakeholders on project progress, publication of the EIS and revised draft Airport Plan. Table 8–15 below provides a summary of the activities undertaken to date in.

Having received feedback about the draft EIS and draft Airport Plan during the public exhibition in Phase 2, the focus of work in Phase 3 involved collating, reviewing and addressing all submissions as part of the process to finalise the EIS and the revised draft Airport Plan. For detailed information about the submissions received and how they were addressed in the EIS and revised draft Airport Plan, see Volume 5 – the Submissions Report.

Table 8–15 Summary of stakeholder engagement and community consultation activities during Phase 3

Activity	Description
Briefings and meetings	Discussions have been held with a variety of stakeholders including government agencies, businesses, local councils, industry peak bodies, and tourism and community groups as well as elected officials. This work has been part of the whole-of-government approach, ensuring stakeholders and community members receive consistent information from different sources. Over 40 meetings were held with individuals or groups from January to August 2016. Briefings are expected to continue after the release of the final EIS and Airport Plan.
Community events	A total of nine community pop-up displays at local events have been held between January and August 2016. 2016 community members approached the stalls for information. Pop-up displays are expected to continue at local events following the release of the final EIS and Airport Plan.
Information sessions	The project team has attended a total of four information sessions hosted by other government agencies for associated infrastructure projects between January and August 2016. The purpose of attendance at these information sessions has been to provide information on the proposed airport. 295 community members attended the information sessions.
Surveys	Online surveying was used to gauge interest and existing understanding of the proposed Western Sydney Airport. Online surveys were completed in December 2015 and April 2016. A total of 1001 community members from Western Sydney and greater Sydney have completed online surveys during Phase 3.
Community newsletters	Two community newsletters have been released during Phase 3, including Autumn 2016 released in April 2016 and Winter 2016 released in August 2016. Following feedback from the community during the consultation period, the area of distribution for the community newsletter was expanded. Each edition of the newsletter was distributed to around 10,000 households in the Western Sydney area, made available on the project website, distributed to local councils and emailed to subscribers.

Activity	Description
Fact sheets	A number of fact sheets were available at all community events as well as online. Fact sheets available during Phase 3 included: • Air quality; • Biodiversity, water and heritage; • The draft Airport Plan and draft Environmental Impact Statement; • Greater Blue Mountains Heritage Area; • Health risk assessment; • Indicative flight paths; • Managing aircraft noise; • Western Sydney Airport and aerial firefighting; • An airport for Western Sydney; • Social and economic benefits; • Traffic Transport and access; • Budget 2016: Western Sydney Airport; • Employment hub for Western Sydney; • The right of first refusal; • Badgerys Creek cemeteries; and • Badgerys Creek: minor road closures.
Website content and updates (www.westernsydneyairport.gov.au)	The project website continued to be updated in order to provide a comprehensive and authoritative source of information for the community and stakeholders. The website will continue to be maintained and updated following the release of the final EIS. Over 65,000 visits to the website between 19 December 2015 and 17 August 2016, including over 140,000 page views.
Noise modelling tool	The noise modelling tool was still available online during Phase 3 and will be available after the release of the final EIS. The noise tool and guide have been viewed almost 6,000 times between 1 December 2015 and 17 August 2016
Emails	Throughout Phase 3, two informative emails were sent to almost 800 individuals and organisations who provided an email address to be kept informed of the project. Updates will continue to be sent via email after the release of the final EIS.
Information line and email to project team	An information line and email for individuals wishing to speak to the project team continued to be available during Phase 3. This will continue to be monitored after the release of the final EIS. Approximately 160 phone calls and over 170 emails were received between 19 December 2015 and August 2016.
Media releases	Media releases were issued throughout Phase 3 in order to keep the community and stakeholders informed. Five media releases about the project were issued between 19 December 2015 and August 2016.
Notification for the release of the final EIS	Consistent with publication requirements of the EPBC Act and Regulations, notifications will be placed in one national, two Sydney metropolitan,11 local newspapers and 10 foreign language newspapers. Each notification will provide details of the publication of the final EIS and revised draft Airport Plan.

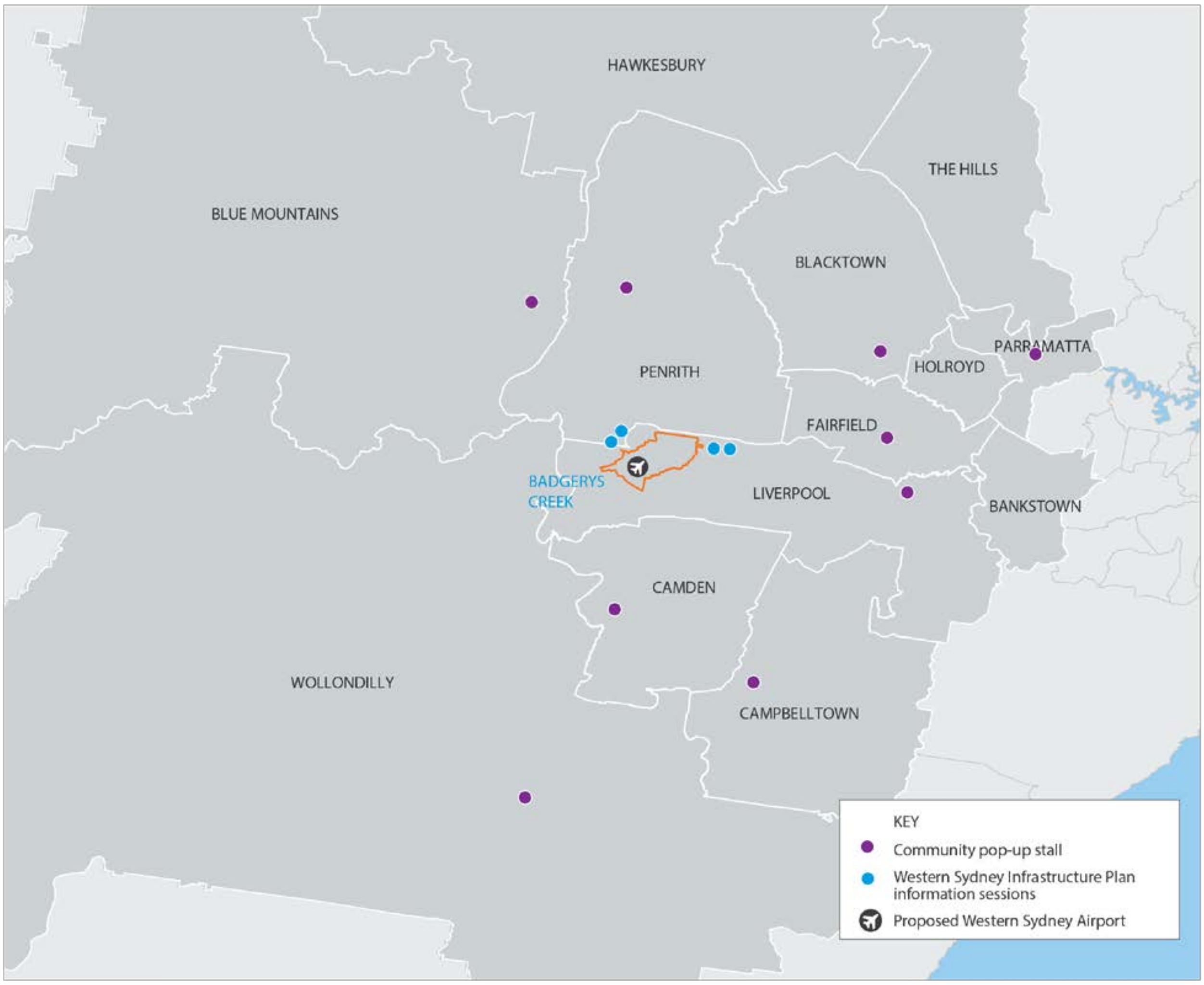
8.5.1 Stakeholder engagement during Phase 3

Stakeholder engagement has been an ongoing focus of the project. The rolling schedule of meetings and briefings, letters, and phone and email communication continued in Phase 3, including after the release of the EIS.

Table 8–2 provides a full list of stakeholders consulted during all three phases.

8.5.2 Community consultation during Phase 3

Community consultation activities continued during Phase 3, including after the release of the EIS. Figure 8–18 summarises the community pop-up displays and information sessions undertaken between February – May 2016.



	LGA	Event type	Location
FEBRUARY 2016	Liverpool	Western Sydney Infrastructure Plan information sessions	Holy Family Primary School
	Liverpool/Penrith	Western Sydney Infrastructure Plan information sessions	Kemps Creek Public School
	Camden	Community pop-up stall	Cobbity Village Markets
	Campbelltown	Community pop-up stall	Macarthur Markets
MARCH 2016	Liverpool/Penrith	Western Sydney Infrastructure Plan information sessions	Kemps Creek Public School
	Liverpool	Western Sydney Infrastructure Plan information sessions	Holy Family Primary School
	Blacktown	Western Sydney Infrastructure Plan information sessions	Blacktown Markets
	Liverpool	Western Sydney Infrastructure Plan information sessions	Liverpool Night Markets
	Penrith	Western Sydney Infrastructure Plan information sessions	Penrith CBD Festival
APRIL 2016	Fairfield	Community pop-up stall	Fairfield City Markets
	Blue Mountains	Community pop-up stall	Glenbrook Markets
	Parramatta	Western Sydney Infrastructure Plan information sessions	Western Sydney University Parramatta Campus
MAY 2016	Wollondilly	Western Sydney Infrastructure Plan information sessions	Wollondilly illuminARTe Festival

Figure 8–18 Summary of community consultation activities between February and May 2016

Community pop-up stalls

A total of nine community pop-ups stalls at local events were carried out between February and May 2016. The stalls provided information about the project to the Western Sydney community and an opportunity to engage with the project team. Resources available at these stalls included newsletters, fact sheets and maps.

The stalls were held at locations throughout Western Sydney and the Blue Mountains, including nine local government areas. Approximately 1,606 community members approached the stalls for information. Table 8–16 below provides details of the number of community members who approached the stalls.

Table 8–16 Summary of visits to community pop-up stalls

Location	Local government area	Date	Attendees (approximate)
Macarthur Markets, Macarthur	Campbelltown	28 February 2016	80
Liverpool Night Markets, Liverpool	Liverpool	5 March 2016	107
Blacktown Markets, Blacktown	Blacktown	6 March 2016	245
Penrith CBD Festival, Penrith	Penrith	19 March 2016	200
Cobbitty Village Markets, Cobbitty	Camden	2 April 2016	150
Fairfield Markets, Fairfield	Fairfield	9 April 2016	103
Glenbrook Rotary Craft Market, Glenbrook	Blue Mountains	16 April 2016	146
University of Western Sydney, Parramatta Campus	Parramatta	28 April 2016	67
Wollondilly illuminARTe Festival	Wollondilly	7 May 2016	508

Joint information sessions, February-March 2016

In February and March 2016, NSW Roads and Maritime Services held 4 consultation sessions on proposed routes for the M12 and The Northern Road realignment under the Western Sydney Infrastructure Plan (WSIP). As these projects are based around the airport site, representatives from the EIS and Airport Plan project teams attended the sessions in order to provide information and answer any questions about the Western Sydney Airport project. This contributed to the whole-of-government approach used for community consultation, ensuring community members had access to consistent and clear information.

In total, approximately 295 community members made enquiries about the Western Sydney Airport project at these information sessions. Table 8–17 below summarises the WSIP information sessions.

Table 8–17 Summary of visits to WSIP information sessions

Location	Local government area	Date	Attendees (approximate)
Holy Family Primary School, Luddenham	Liverpool/Penrith	24 February 2016	115
Kemps Creek Public School, Kemps Creek	Liverpool/Penrith	27 February 2016	80
Kemps Creek Public School, Kemps Creek	Liverpool/Penrith	2 March 2016	50
Holy Family Primary School, Luddenham	Liverpool/Penrith	5 March 2016	50

8.5.3 Community research during Phase 3

A fourth round of research was undertaken in April 2016. The research followed from previous surveys and focus groups to understand attitudes towards the proposed Western Sydney Airport and to ensure communication activities are tailored to meet the needs of the community and stakeholders.

The fourth round of research involved an online survey of 499 participants. Respondents were representative of age, gender and location in Western Sydney. Outcomes of the surveys and focus groups were used by the project team to better understand the communication needs of the community following the public exhibition of the draft EIS and draft Airport Plan in late 2015 and other announcements on the proposed Western Sydney Airport and associated infrastructure. The results were also used to inform future communication and engagement strategies. The findings on attitudes, concerns and demand for information are summarised in Figure 8–19 below.

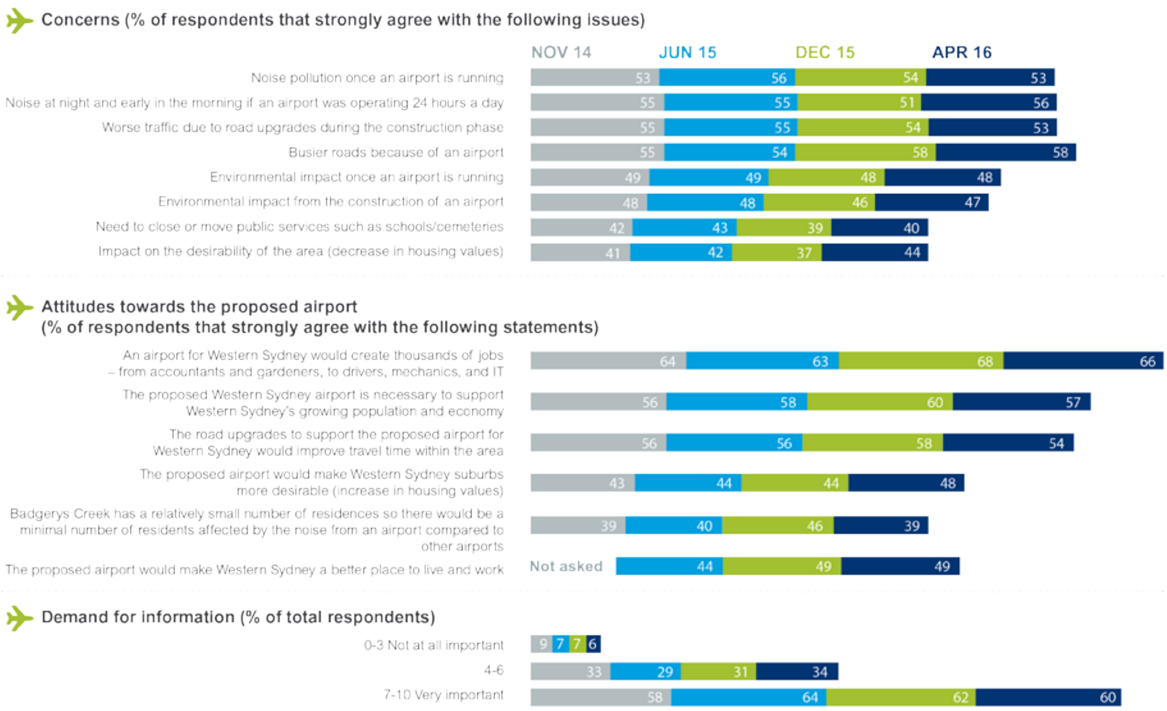


Figure 8–19 Summary of key community research results from November 2014, June 2015, December 2015 and April 2016

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