26 Greater Blue Mountains World Heritage Area

The Greater Blue Mountains World Heritage Area (GBMWHA) covers 1.03 million hectares of sandstone plateaus, escarpments and gorges dominated by temperate eucalypt forest. The site constitutes one of the largest and most intact tracts of protected bushland in Australia and is noted for its representation of the evolutionary adaptation and diversification of the eucalypts in post-Gondwana isolation on the Australian continent. The Greater Blue Mountains Area was inscribed on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List in 2000 for its outstanding universal value, including representative examples of the evolution of Eucalyptus species (World Heritage Listing Criterion ix) and diversity of habitats and plant communities (Criterion x). In addition to the features recognised by the World Heritage Committee as having World Heritage value, the GBMWHA has a number of other important values which complement and interact with these values 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 GBMWHA is approximately seven kilometres from the proposed airport at its closest point. 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 from aircraft overflights have been assessed in detail.

Based on the preliminary airspace design, aircraft passing over locations within the GBMWHA are generally expected to be at an altitude greater than 5,600 feet above sea level and most would be more than 10,000 feet above sea level. Indicative flight paths at altitudes of less than 5,000 feet above sea level are limited to the eastern boundary of the Blue Mountains National Park, which is predicted to experience 50 to 100 flights per day in around 2030.

A number of tourism and recreation areas within the GBMWHA were selected as representative sites to conduct the impact assessment. No flights are expected to occur below approximately 6,500 feet above local ground level in the vicinity of these 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.

Generally across the GBMWHA, aircraft maximum noise levels are not expected to exceed 55 dBA. Noise modelling has taken into account the topography of the area and the height of aircraft above ground level. Echo Point at Katoomba would not experience maximum 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 of the Boeing 747.

Fuel dumping is a very rare event and has been assessed as unlikely to have an impact on the GBMWHA. In 2014 there were only 10 instances of civilian aircraft jettisoning fuel in Australia, representing approximately 0.001 per cent of all aircraft movements in Australia.

Mitigation and management of potential noise impacts would be achieved through the implementation of flight planning and airspace design. The measures would include requirements regarding flight paths, flight altitude and operational parameters for different aircraft. The potential noise and amenity impacts from aircraft flying over wilderness areas of the GBMWHA, and Aboriginal sites promoted for public visitation, would be considered in the future development of formal flight paths for the proposed airport, subject to requirements for safe and efficient aircraft operations. This assessment concludes that the proposed airport would not have a significant impact on the GBMWHA or its recognised World Heritage values.

26.1 Introduction

This chapter considers the potential impacts of the proposed airport on the World Heritage and National Heritage values and other values of the Greater Blue Mountains World Heritage Area (GBMWHA) and National Heritage place. The chapter draws upon detailed environmental and social assessments undertaken for the proposed airport which are included in Volume 4 as well as the relevant assessment chapters in Volume 2a and 2b.

The assessment has been carried out in accordance with the *Guidelines for the Content of a Draft Environmental Impact Statement – Western Sydney Airport* (EIS guidelines) issued by the Commonwealth Department of the Environment.

In this chapter, the term Greater Blue Mountains Area is used to refer to the area inscribed on the World Heritage List in 2000 for its outstanding universal value. The term Greater Blue Mountains World Heritage Area, or GBMWHA, is generally used elsewhere.

26.2 Methodology

The assessment of impact on the GBMWHA involved:

- identification of the property's World Heritage and National Heritage values, as outlined in the Statement of Outstanding Universal Value;
- identification of other values that complement and interact with the property's World Heritage and National Heritage values;
- collation of baseline environmental information including baseline noise levels and aircraft flight paths associated with Sydney Airport;
- assessment of impacts on World Heritage and Natural Heritage values and integrity of the World Heritage property based on the EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DoE 2013a) and the property's Statement of Outstanding Universal Value;
- assessment of impacts on other values of the Greater Blue Mountains Area; and
- a statement of significance of the identified impacts.

26.3 Existing environment

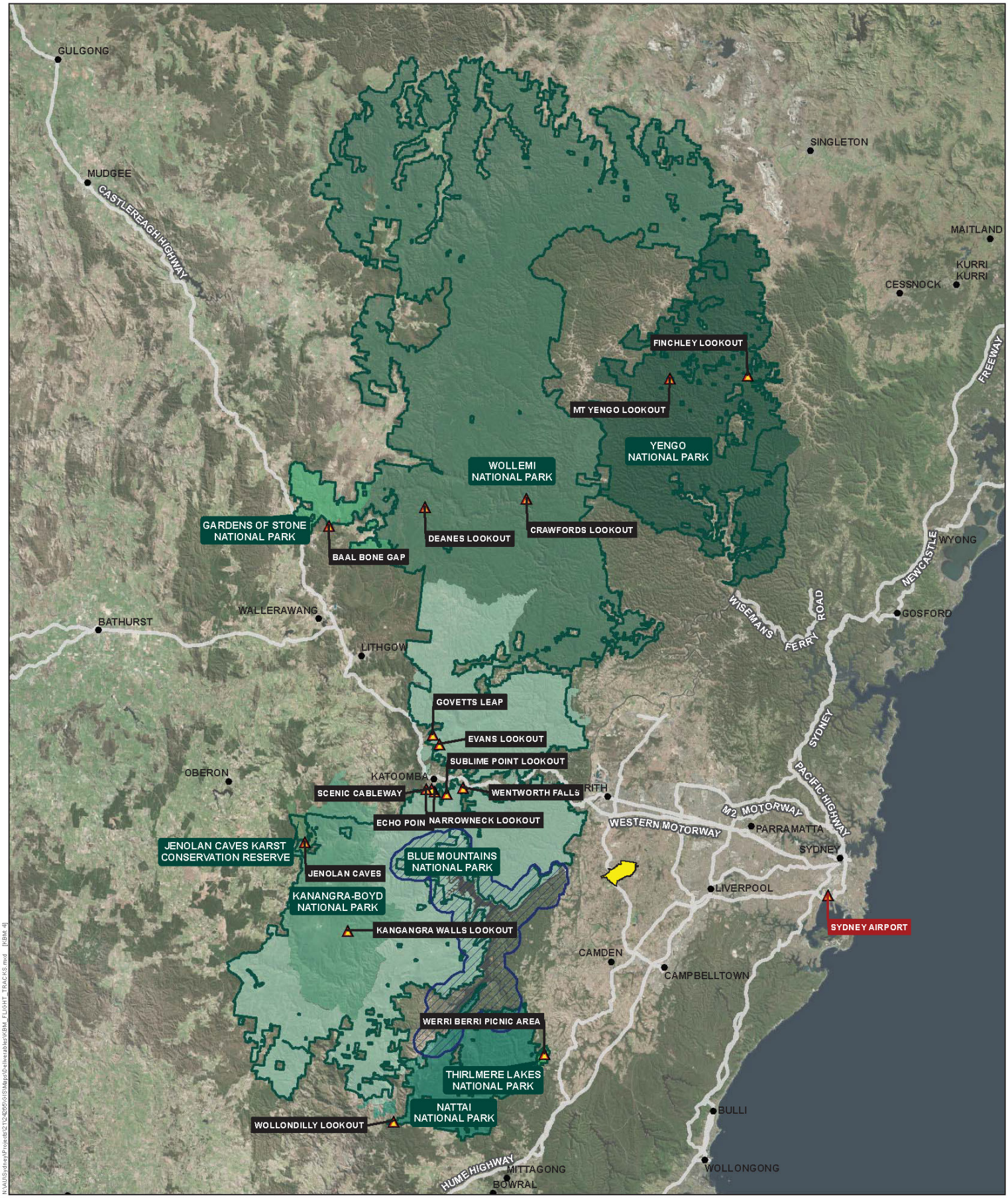
26.3.1 Greater Blue Mountains World Heritage Area

At its closest point, the GBMWHA is approximately seven kilometres from the airport site. The GBMWHA covers 1.03 million hectares of sandstone plateaus, escarpments and gorges dominated by temperate eucalypt forest (UNESCO 2015). The GBMWHA constitutes one of the largest and most intact tracts of protected bushland in Australia and is noted for its representation of the evolutionary adaptation and diversification of the eucalypts in post-Gondwana isolation on the Australian continent (UNESCO 2015). The Greater Blue Mountains Area was inscribed on the World Heritage List in 2000. This listing formally recognises that the area has outstanding universal value under the World Heritage Convention.

The GBMWHA comprises eight protected areas (see Figure 26–1):

- Blue Mountains National Park;
- Wollemi National Park;
- Yengo National Park;
- Nattai National Park;
- Kanangra-Boyd National Park;
- Gardens of Stone National Park;
- Thirlmere Lakes National Park; and
- Jenolan Caves Karst Conservation Reserve.

The GBMWHA provides a significant representation of Australia's biodiversity with 10 per cent of the country's vascular flora and significant numbers of rare or threatened species (UNESCO 2015). In addition to its outstanding eucalypts, the area also contains ancient, relict species of global significance including the Wollemi pine (*Wollemia nobilis*), one of the world's rarest species that was thought to have been extinct for millions of years (DoE 2015d). The few surviving trees are known only from three small populations located in remote, inaccessible gorges within the Greater Blue Mountains (DoE 2015d).



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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
- Drinking Water Catchment – No Entry Area

Figure 26-1 - Greater Blue Mountains World Heritage Area

0 5 10 20
Kilometres

N

26.3.2 Outstanding universal value

26.3.2.1 World Heritage values

The Greater Blue Mountains Area was inscribed on the World Heritage List because it satisfies two of the criteria for natural values of outstanding universal value. While the criteria for outstanding universal value have changed over time, the underlying concepts have remained constant (UNESCO 2015). The two criteria for which the property is listed are criterion ix and criterion x.

Criterion ix

Criterion ix is defined in the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2015) as follows:

> *to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.*

The GBMWHA includes outstanding and representative examples of the evolution and adaptation of the genus *Eucalyptus* and eucalypt-dominated vegetation in a relatively small area of the Australian continent (UNESCO 2015). It is a centre of diversification for Australian scleromorphic flora, including significant aspects of eucalypt evolution and radiation (UNESCO 2015). The GBMWHA includes primitive species of outstanding significance to the evolution of the planet's plant life such as the Wollemi pine and the Blue Mountains pine (*Pherosphaera fitzgeraldii*). These are examples of ancient, relict species with Gondwanan affinities that have survived past climatic changes and demonstrate the highly unusual juxtaposition of Gondwanan taxa with the diverse scleromorphic flora (UNESCO 2015).

Criterion x

Criterion x is defined in the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2015) as follows:

> *to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

The GBMWHA includes an outstanding diversity of habitats and plant communities and a significant proportion of the Australian continent's biodiversity, especially its scleromorphic flora, (UNESCO 2015). As described above, the GBMWHA includes primitive and relict species with Gondwanan affinities and supports many plants of conservation significance including 114 endemic species and 177 threatened species (UNESCO 2015). Habitat diversity has also resulted in an outstanding representation of Australian fauna with more than 400 vertebrate taxa recorded (of which 40 are threatened) including 52 native mammals, 265 bird species (one third of the Australian total), 63 reptile species and more than 30 frog species (UNESCO 2015).

26.3.2.2 Integrity

In addition to meeting at least one of the criteria for outstanding universal value, a World Heritage property listed for natural values also needs to meet conditions of integrity. Integrity is a measure of the 'wholeness and intactness' of the natural heritage and its attributes (UNESCO 2015). Examining the condition of integrity requires assessing the extent to which the property:

- includes all elements necessary to express its outstanding universal value;
- is of adequate size to ensure the complete representation of the features and processes that convey the property's significance; and
- suffers from adverse effects of development and/or neglect (UNESCO 2015).

The Statement of Outstanding Universal Value for the GBMWHA states that the eight protected areas that comprise the listed property are of sufficient size to protect the biota and ecosystem processes, although the boundary has several anomalies that reduce the effectiveness of its one million hectare size. These anomalies are explained by historical patterns of clearing, private land ownership and topography such as escarpments that act as barriers to potential adverse impacts from adjoining land (UNESCO 2015).

A number of historical land uses have affected the integrity of the area in the past including Warragamba Dam, cattle grazing, logging, land clearing, coal mining, oil shale mining, military activities and fire regimes (IUCN 1999). However, active management has reduced these impacts and the landscape is in recovery (IUCN 1999).

The World Heritage property is largely protected by adjoining public lands of State forests and State conservation areas. Additional regulatory mechanisms serve to further protect the integrity of the GBMWHA. These include the statutory wilderness designation of over 65 per cent of the property, part of the closed and protected catchment for Lake Burragorang (Warragamba Dam) and additions to the conservation reserves that comprise the area (UNESCO 2015).

The plant communities and habitats within the GBMWHA occur almost entirely as an extensive, mostly undisturbed matrix almost entirely free of structures, earthworks and other human intervention (UNESCO 2015). Because of its size and connectivity to other protected areas, the area will continue to provide opportunities for adaptation and shifts in range for flora and fauna species within it. The area's integrity depends upon the complexity of its geological structure, geomorphology and water systems, which have created the conditions for the evolution of its outstanding biodiversity (UNESCO 2015).

Aboriginal people from six language groups continue to have a custodial relationship with the area through ongoing practices that reflect both traditional and contemporary presence (UNESCO 2015). Sites of Aboriginal occupation, including important rock art provide physical evidence of the longevity of the strong Aboriginal cultural connections with the land. The conservation of these associations contributes to the integrity of the GBMWHA (UNESCO 2015).

26.3.2.3 Protection and management

All properties inscribed on the World Heritage List must have adequate protection and management mechanisms in place, the nature of which can vary so long as they are effective (DSEWPC 2012). In most cases, both the Australian and State or Territory governments are responsible for managing and protecting Australia's World Heritage properties, with State and Territory agencies taking responsibility for on-ground management where relevant.

World Heritage properties are protected under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) and are considered 'matters of national environmental significance'. The EPBC Act provides for the development and implementation of management plans for world heritage properties, which describe aspects of the property and how it will be managed.

The New South Wales Office of Environment and Heritage manages the GBMWHA. The GBMWHA is protected and managed primarily under the following State legislation:

- *National Parks and Wildlife Act 1974 (NSW)*, and
- *Wilderness Act 1987 (NSW).*

Other relevant legislation includes the New South Wales *Threatened Species Conservation Act 1995*, the *Environmental Planning and Assessment Act 1979,* the *Sydney Water Catchment Management Act 1998* and the *Heritage Act 1977*.

The Greater Blue Mountains World Heritage Area Strategic Plan (DECC 2009c) provides a framework for the property's integrated management, protection, interpretation and monitoring. The key management objectives set out in the Strategic Plan provide the philosophical basis for the management of the area and guidance for operational strategies, in accordance with requirements of the World Heritage Convention and its Operational Guidelines (UNESCO 2015). These objectives are also consistent with the Australian World Heritage management principles, contained in regulations under the *EPBC Act* (UNESCO 2015).

The Strategic Plan (DECC 2009c) identifies the following threats to the integrity of the area:

- uncontrolled and inappropriate use of fire;
- inappropriate recreation and tourism activities, including development of tourism infrastructure;
- invasion by pest species including weeds and feral animals;
- loss of biodiversity and geodiversity;
- impacts of human enhanced climate change; and
- lack of understanding of heritage values.

26.3.3 National Heritage place

The Greater Blue Mountains Area was one of 15 World Heritage properties included in the National Heritage List in 2007. The National Heritage values identified for the listing are the same as the values recognised for the World Heritage area. As such the following assessment against the World Heritage values is taken to address both the World Heritage and National Heritage values of the Greater Blue Mountains Area.

26.3.4 Other values of the Greater Blue Mountains Area

In addition to the attributes recognised by the World Heritage Committee as having World Heritage value, the Greater Blue Mountains Area has a number of other important values which complement and interact with its World Heritage values (DECC 2009c). Protection of these values is considered to be integral in managing individual protected areas and the GBMWHA as a whole (DECC 2009c). Table 26–1 provides a summary of the values, identified by the NPWS in the GBMWHA Strategic Plan, that contribute to the overall values of the area.

Table 26–1 Other important values of the GBMWHA

Value	Description
Geodiversity and biodiversity	In addition to the outstanding biodiversity of the GBMWHA, the area also has a diversity of landscapes and geological features including the most extensive sandstone canyon system in eastern Australia. The site also contains karst landscapes with several cave systems including Jenolan Caves, the world's oldest open cave system. Other features include prominent basalt-capped peaks, quaternary alluvial deposits and perched perennial freshwater lakes.
Water catchment	The GBMWHA protects a large number of pristine and relatively undisturbed catchment areas, some of which make a substantial contribution to maintaining high water quality in a series of water storage reservoirs supplying Sydney and adjacent rural areas.
Indigenous heritage values	Although no comprehensive surveys have been undertaken, known Aboriginal sites within the area are widespread, diverse and include landscape features of spiritual significance and rock art sites. Given the wilderness nature of the area and the limited survey to date, there is high potential for the discovery of further significant Aboriginal sites.
Historic heritage values	The GBMWHA includes numerous places of historic significance some of which date back to the early years of European settlement and exploration in Australia. Recorded sites demonstrating post-1788 human use are associated with rural settlement, pastoral use, timber getting, mining, transport routes, tourism and recreation. The sites include small graziers' huts, logging roads, stock routes and the ruins of mines.
Recreation and tourism	The GBMWHA has high recreational values due to the area's intrinsic beauty, natural features and accessibility from major population centres. Recreational opportunities are wide ranging and include canyoning, bushwalking, rock climbing, nature observation, caving, picnicking, camping and photography. The regional economy surrounding the GBMWHA is increasingly supported by tourism with the area contributing directly and indirectly to the employment, income and output of the region.
Wilderness	The high wilderness quality of much of the GBMWHA constitutes a vital and highly significant contribution to its World Heritage values and has ensured the integrity of its ecosystems and the retention and protection of its heritage value. The wild and rugged landscapes, diverse flora and fauna, and opportunities for solitude, self-reliant recreation and reflection are attributes that promote inspiration, serenity and rejuvenation of the human mind and spirit. Such experiences are valued by individuals and society.
Social and economic	The regional economy surrounding the GBMWHA is increasingly supported by tourism. The reserves within the GBMWHA have considerable social and economic value and contribute directly and indirectly to the employment, income and output of the regional economy. While visitation data for specific locations would be highly variable, given the broad range of uses and vast area of the property, it is expected that overall visitation to the GBMWHA is increasing—reflecting the region's importance as a tourist destination.
Research and education	The GBMWHA is ideal for research and educational visits due to the variety of ecological communities, landscape and associated cultural sites. The high scientific value reflects what has been discovered and what remains to be discovered as large gaps in knowledge remain in regard to Aboriginal use and occupation of the area and the ecological needs of threatened species and communities.
Scenic and aesthetic	Dramatic scenery within the GBMWHA includes striking vertical cliffs, waterfalls, ridges, escarpments, uninterrupted views of forested wilderness, extensive caves, narrow sandstone canyons and pagoda rock formations.

Value	Description
Bequest, inspiration, spirituality and existence	Combining a number of the above values, the GBMWHA offers attributes that promote inspiration, serenity and rejuvenation of the human mind and spirit. These feelings are valued by individuals and society and inspire a number of creative endeavours including philosophy, painting, literature, music and photography. The contributions have, and continue to, promote a sense of place for Australians who desire such places to be protected.

Source: NSW NPWS 2009

26.3.5 Wilderness areas

Wilderness areas comprise one of the key features of the GBMWHA. These areas are located primarily in the northern section of the property. The National Wilderness Inventory (AHC 2003) identifies 83.5 per cent of the GBMWHA as wilderness area.

The identified wilderness areas exclude the northern portions of both the Blue Mountains National Park and Kanangra-Boyd National Park associated with the Katoomba region.

26.3.6 Land use and cumulative impacts

Historical uses have had a cumulative impact on the Greater Blue Mountains Area. These include cattle grazing, logging, coal and oil shale mining, military activities, and clearing for farming and roads. Construction of Warragamba Dam created Lake Burragorang, which supplies approximately 70 per cent of Sydney's water requirements and covers an area of about 75 km^2. The reservoir does not form part of the World Heritage property. While there remains evidence of these past activities, associated impacts are being reduced by active management and landscape recovery.

The GBMWHA is split in two by a central corridor of urban development, including a major highway and rail infrastructure that connects the region and areas further west to Greater Sydney. The majority of the city's 80,000-strong population resides along the spine of development either side of the Great Western Highway. Blue Mountains City Council predicts that the city's population will grow to 82,869 by 2036, an increase of over 5 per cent (Blue Mountains City Council 2016).

The GBMWHA Strategic Plan states that the property's mostly rugged terrain and close proximity to urban development adds to the difficulty of implementing on-ground measures to control strategic threats to its World Heritage values. These include measures such as fire management, pest animal and weed control, storm water control and the regulation of access.

A large number of freehold properties adjoin the GBMWHA. Land uses adjacent to or near the World Heritage property include tourism facilities, grazing, forestry, agriculture, manufacturing and mining. The GBMWHA Strategic Plan identifies siltation of streams, pesticide drift from aerial spraying, fire, straying cattle and companion animals and the spread of exotic plants and animals as potential threats posed by these land uses.

State agencies and local government implement management measures such as monitoring, restoration, pollution reduction and pest control strategies to reduce the impact of surrounding land uses on the GBMWHA.

26.3.7 Key sensitive tourist and recreation areas

In 2015, the Blue Mountains received 843,000 domestic overnight visitors, 102,000 international overnight visitors, and nearly 2.6 million domestic daytrip visitors (Destination NSW 2016).

Key sensitive tourism and recreation areas were selected for this assessment based on the identification of important attractions and associated viewing locations within the GBMWHA (Table 26–2). The assessment considered the remoteness, accessibility and accommodation options as an indication of the type of tourism and recreational experiences available at each location.

The Great Western Highway provides the primary access to a majority of lookouts and other destinations included in the table. These areas and attractions are also potentially accessed by other transport infrastructure including rail and Katoomba airfield and numerous smaller sealed and unsealed roads.

Table 26–2 Key sensitive tourist and recreational areas, viewing locations and accessibility

National park	Key attractions	Key viewing locations	Location	Accessibility	Accommodation
Blue Mountains National Park	Jamison Valley including the Thee Sisters	Echo Point Lookout, Sublime Point Lookout, Perrys Lookdown, Evans Lookout, Mt Hay, Lockleys Pylon, Pulpit Rock Lookout, Gladstone Lookout, Moya Point Lookout, Sunset Rock Lookout, Cleary Memorial Lookout, Honeymoon Lookout, Queen Elizabeth and Drum Lookouts, Scenic Cableway and Scenic Railway, Narrowneck Lookout, Castle Head Lookout, Cahills Lookout, Peckmans Plateau Lookout, Eaglehawk Lookout, Hildas Lookout, Norths Lookout, McMahons Lookout, Peckmans Plateau Lookout, Norths Lookout, Nepean Narrows Lookout, Nepean Gorge Lookout, Nepean Lookout, Freds Lookout, Erskine Lookout, Mt Portal Lookout, Rileys Lookout, The Rock Lookout Greenfields Lookout, Melville Lookout, Wynnes Rocks Lookout, Point Pilcher Lookout, Du Faurs Lookout, Mt Banks Lookout, and Walls Lookout.	Katoomba	Sealed road	Hotels, motels, guesthouses, bed and breakfasts, cabins, cottages, caravan parks.
	Wentworth Falls waterfall	Wentworth Falls lookout	Wentworth Falls	Sealed road	Retreat, guesthouses, bed and breakfasts, cabins, cottages.
	Grose Valley	Evans lookout Govetts Leap lookout	Blackheath	Sealed road	Hotel, motel, bed and breakfasts, cabins, cottages, caravan park
	Wilderness, bushwalking, rock-climbing, trail bike riding, picnicking and remote camping	Views from walking tracks such as National Pass, Federal Pass, Mt Solitary, and Narrowneck Firetrail	Southern sections of the park	Sealed roads and unsealed roads, vehicular tracks, walking tracks	Campgrounds within park
Wollemi National Park	Wilderness Bushwalking, rock climbing, canoeing, picnicking	Deanes lookout Crawfords lookout	Non-specific	Unsealed roads, vehicular tracks, walking tracks	Campgrounds within park
Yengo National Park	Wilderness Bushwalking, horse riding, trail bike riding, picnicking	Finchley lookout Mt Yengo lookout	50 km south-west of Cessnock	Unsealed roads, walking tracks	Campgrounds within park – tent, camper trailer, vehicle

National park	Key attractions	Key viewing locations	Location	Accessibility	Accommodation
Nattai National Park	Wilderness Bushwalking, remote camping	Wollondilly lookout Starlights trail Couridjah Corridor walk	30 km north of Mittagong	Vehicular tracks, walking tracks	No facilities within park. Remote backpack camping only at Emitts Flat.
Kanangra-Boyd National Park	Kanangra Walls Mount Cloudmaker	Kanangra-Boyd lookout, Kowmung Lookout, Rigby Rock Lookout, Moorilla Lookout, Mt Dingo Lookout, and Kanangra Walls Lookouts	50 km south-east of Oberon	Unsealed road from park entrance	Boyd River Campground – tent, camper trailer, caravan, vehicle
	Wilderness, bushwalking, rock-climbing, trail bike riding, picnicking and remote camping	Non-specific	Southern sections of the park	Sealed roads and unsealed roads, vehicular tracks, walking tracks	Campgrounds within park
Gardens of Stone National Park	Baal Bone Gap, four-wheel driving	Baal Bone Gap picnic area	35 km north of Lithgow	Unsealed road requiring 4WD vehicle	No facilities within park. Remote backpack camping only.
Thirlmere Lakes National Park	Birdwatching, picnicking, walking and swimming	Werri Berri picnic area	Couridjah	Sealed road	No facilities within park.
Jenolan Caves Karst Conservation Reserve	Jenolan Caves	Not applicable	Jenolan	Sealed road	Cabins, cottages and hostels

The upper Blue Mountains, with its extensive system of scenic lookouts and walking tracks, is one of the major nature-based tourism destinations in Australia (NPWS 2001). Echo Point at Katoomba is the main lookout over the Jamison Valley, including the Three Sisters rock formation, and attracts around two million visitors each year (NPWS 2001; NSW Government 2015). Other key attractions include Wentworth Falls and the Grose Valley viewed from Govetts Leap lookout and Evans lookout at Blackheath.

The Wollemi wilderness area is primarily accessed at Newnes Plateau Cliffs on the western boundary and via Putty Road on the eastern side of Wollemi National Park. Most campgrounds and park facilities are located within proximity to the park boundaries. While only Dunns Swamp-Ganguddy and Wheeny campgrounds are accessible to caravans, Coorongooba and Newnes campgrounds are open to tent, camper trailer and vehicle camping. Colo Meroo campground is only accessible by foot and is suitable for tent and remote/backpack camping. Deanes lookout (west) and Crawfords lookout (east) are accessible by foot and provide views of the Wollemi wilderness area.

Yengo National Park and wilderness area is accessed via unsealed roads, vehicle tracks and walking tracks. Campgrounds are accessible to tent, camper trailer and vehicle camping. Bushwalking is popular in the park and other popular forms of recreation include horse riding, trail bike riding, mountain bike riding and bird watching. Mt Yengo lookout (west) and Finchley lookout (east) provide views over the Yengo wilderness area.

Nattai National Park offers opportunities for bushwalking and backpack camping in a relatively untouched wilderness environment. Wollondilly lookout near the south-east boundary provides views of eucalypt forests, sandstone cliffs and mountain ranges. Other areas of the park and wilderness areas are accessible via walking tracks.

The Kanangra Walls and wilderness area is the main focus of activity in Kanangra-Boyd National Park. Baal Bone Gap picnic area within the Gardens of Stone National Park is accessible to four wheel drive vehicles. The site includes examples of rock pagoda formations, sheer cliffs and scenic views over Baal Bone Gap. No significant viewpoints were identified within the Thirlmere Lakes National Park or Jenolan Caves Karst Conservation Reserve.

The following areas within the GBMWHA were identified as representative sensitive tourist and recreation areas in relation to potential impacts of the proposed airport development on noise, air quality and visual amenity (see Figure 26–1):

- Jamison Valley south of Echo Point lookout and the Scenic Cableway at Katoomba and Wentworth Falls lookout;
- Grose Valley east of Evans lookout and Govetts Leap lookout;
- the wilderness area between Deanes lookout and Crawfords lookout within Wollemi National Park;
- the wilderness area between Mt Yengo lookout and Finchley lookout within Yengo National Park;
- Nattai wilderness area;
- Kanangra Walls and wilderness area east of Kanangra-Boyd lookout; and
- Baal Bone Gap within Gardens of Stone National Park.

26.4 Assessment of impacts during construction

Construction of the proposed airport would involve a range of activities at the airport site. Given the seven kilometre distance between the airport site and the GBMWHA, there will not be any direct or indirect impacts on the GBMWHA arising from airport construction.

A portion of the GBMWHA fronts the Nepean River downstream of its confluence with Duncans Creek. The Duncans Creek catchment only covers approximately 11 per cent of the airport site and the proposed adoption of best-practice water quality control measures during construction of the proposed airport means there is very low potential to impact water quality in the creek and the Nepean River. The remainder of the site discharges to the South Creek catchment which joins the Nepean River downstream of the GBMWHA.

26.5 Assessment of impacts during operations

26.5.1 Direct operational impacts

There would be no direct impacts on the GBMWHA or its values from the operation of the proposed airport.

26.5.2 Indirect operational impacts

Operation of the proposed airport may have several indirect impacts on the GBMWHA, primarily from the overflight of aircraft. These potential impacts include:

- noise;
- air quality; and
- visual amenity.

26.5.2.1 Noise

The NSW *Industrial Noise Policy* (INP) (EPA 2000) provides guidance on acceptable noise exposure levels in rural areas incorporating wilderness areas. However, unlike aircraft noise levels, which represent maximum noise values associated with a single noise event, the INP criteria are based on equivalent continuous noise levels produced by industrial noise sources. Accordingly, the INP criteria are not relevant to this assessment.

No other specific aircraft noise criteria for conservation and wilderness areas have been developed. In Australia, assessments of new airport developments use the 70 dBA L_{Amax} and 60 dBA L_{Amax} noise exposure levels as impact thresholds for day and night time operations respectively. The overflight noise assessment for this EIS shows that the GBMWHA is largely outside the area predicted to experience aircraft noise at or above these threshold values (see Chapter 10).

In recognition of the natural amenity values of the GBMWHA, the EIS identifies areas of the World Heritage property that are predicted to experience noise levels above 50 dBA L_{Amax} and 55 dBA L_{Amax} for single event flights. Noise levels between 50 dBA and 55 dBA are equivalent to quiet conversational noise.

The noise modelling methodology is described in detail in Appendix E (Volume 4). Noise modelling of the GBMWHA incorporates the topography of the area and as such, the height of aircraft above ground level as they overpass the GBMWHA. This captures the variance in noise across peaks and valleys within the GBMWHA. Noise levels from specific aircraft have been modelled as detailed in Appendix E1 (Volume 4). The highest predicted noise levels are associated with a departing Boeing 747 aircraft, an aircraft type that is generally being phased out by airlines, while the more common and likely future noise levels are represented by a departing Airbus 320.

Figure 26–2 to Figure 26–5 show the indicative noise contours for a single event departure and arrival (for both 05 and 23 directions) for the Boeing 747 and Airbus A320 respectively on all indicative arrival and departure flight paths. The Boeing 747 is the maximum noise event for all aircraft arriving and departing the proposed airport. However, it is important to note that a Boeing 747 flying to the south would only be expected to depart on average once every two days during operation of the Stage 1 development. As shown in Figure 26–2 and Figure 26–3, noise levels above 50 dBA L_{Amax} and 55 dBA L_{Amax} for the Boeing 747 are experienced in some areas of the GBMWHA.

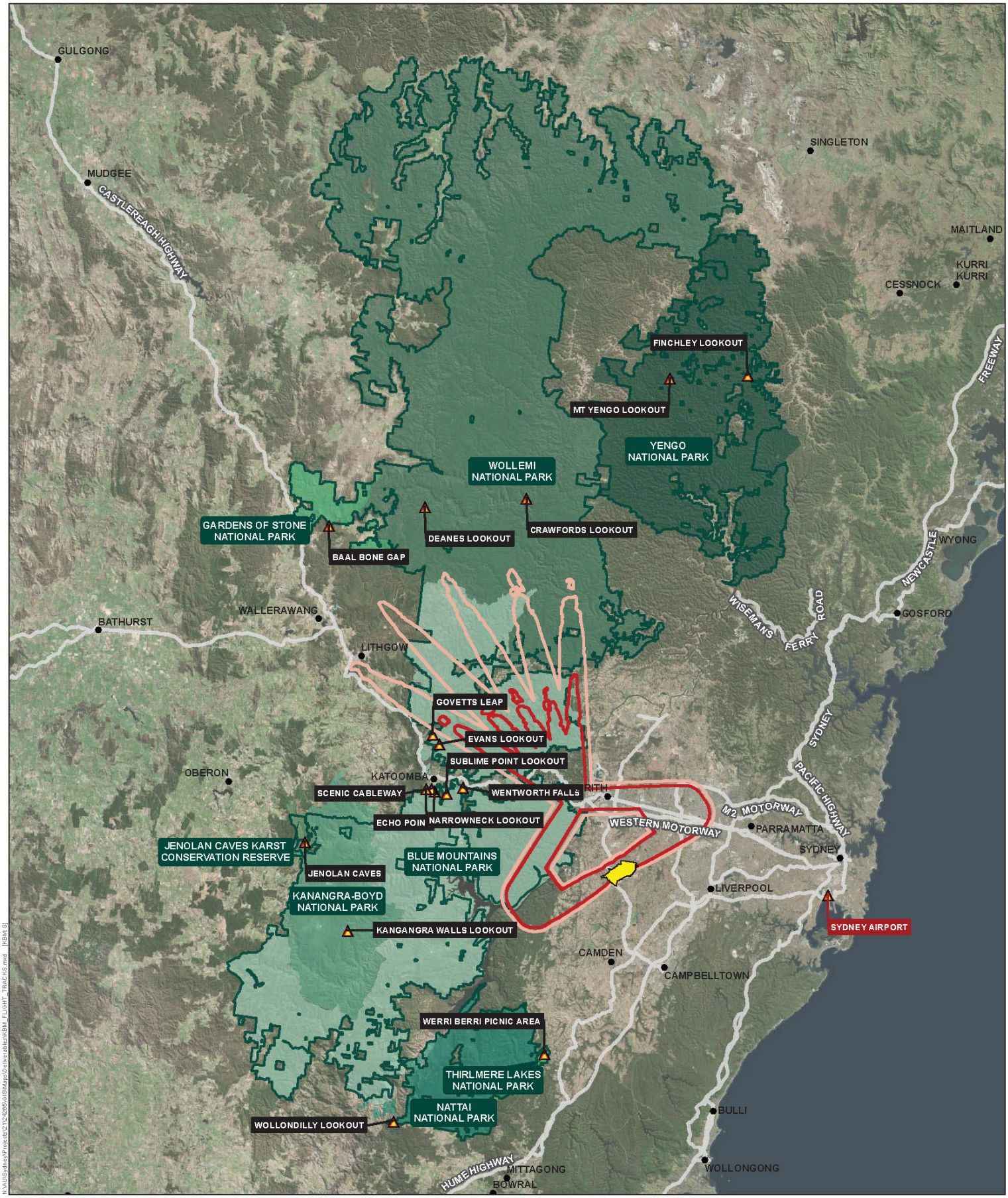
Figure 26–4 and Figure 26–5 indicate that noise exposure levels above 50 dBA L_{Amax} from Airbus A320 aircraft arrivals would be experienced only in the lower Blue Mountains and in southern parts of the GBMWHA during departures. Generally, across the GBMWHA, areas exposed to noise levels above 55 dBA from Airbus A320 operations are limited. As shown in Table 26–3, three of the areas identified for this assessment do not experience noise levels at or above 50 dBA L_{Amax}, and the majority of areas would only be affected by noise above this level during the infrequent operation of the Boeing 747.

No areas of the GBMWHA would experience noise levels above the general assessment level of 70 dBA L_{Amax} on a regular basis during operation of the Stage 1 development for any aircraft type considered (see Chapter 10).

Noise levels over 50 dBA L_{Amax} may be experienced occasionally by users of walking trails within the eastern area of the Nattai wilderness area. However, impacts on recreational users would be moderated by vegetation cover and the natural topography, as most walking trails are located at lower elevations within valley areas and along creeks. Similarly, areas affected by increased noise levels within the Wollemi National Park wilderness area are accessible only on foot and impacts would be reduced by the nature of the steep terrain and vegetation cover.

Table 26–3 Estimated maximum noise levels at key sensitive areas

Area	Single event B747		Single event A320	
	50 dBA	55 dBA	50 dBA	55 dBA
Jamison Valley south of Echo Point lookout and the Scenic Cableway at Katoomba and Wentworth Falls lookout	< 50 dBA	< 55 dBA	< 50 dBA	< 55 dBA
Grose Valley east of Evans lookout and Govetts Leap lookout	Potential > 50 dBA at lookouts	< 55 dBA	< 50 dBA	< 55 dBA
Wilderness area between Deanes lookout and Crawfords lookout within Wollemi National Park	Potential > 50 dBA on north-eastern alignment	< 55 dBA	< 50 dBA	< 55 dBA
Wilderness area between Mt Yengo lookout and Finchley lookout within Yengo National Park	< 50 dBA	< 55 dBA	< 50 dBA	< 55 dBA
Nattai wilderness area	Potential > 50 dBA on eastern wilderness area	Potential > 55 dBA on eastern wilderness area	< 50 dBA	Potential > 55 dBA on eastern wilderness area
Kanangra Walls and wilderness area east of Kanangra-Boyd lookout	Potential > 50 dBA on eastern wilderness area	Potential > 55 dBA at lookout	< 50 dBA	< 55 dBA
Baal Bone Gap within Gardens of Stone National Park	< 50 dBA	< 55 dBA	< 50 dBA	< 55 dBA



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LEGEND

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

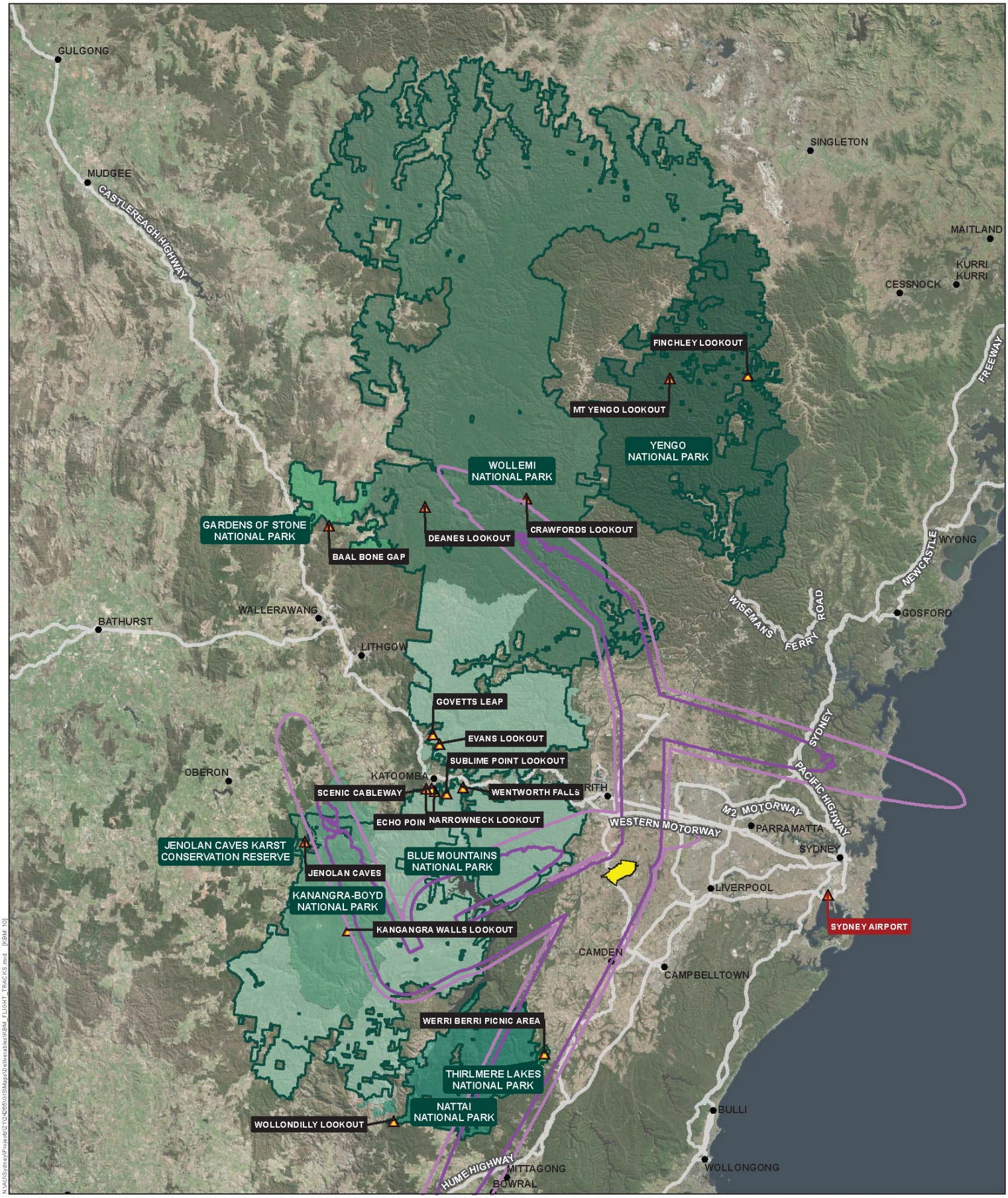
- Airport site
- Greater Blue Mountains World Heritage Area
- 50 dba LA max noise contour (arrivals)
- 55 dba LA max noise contour (arrivals)

NB: The indicative arrival flight paths depicted will not be part of the airspace plans for a Western Sydney Airport

Figure 26-2 - Single event noise level for a B747 arrival

0 5 10 20
Kilometres

N



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LEGEND

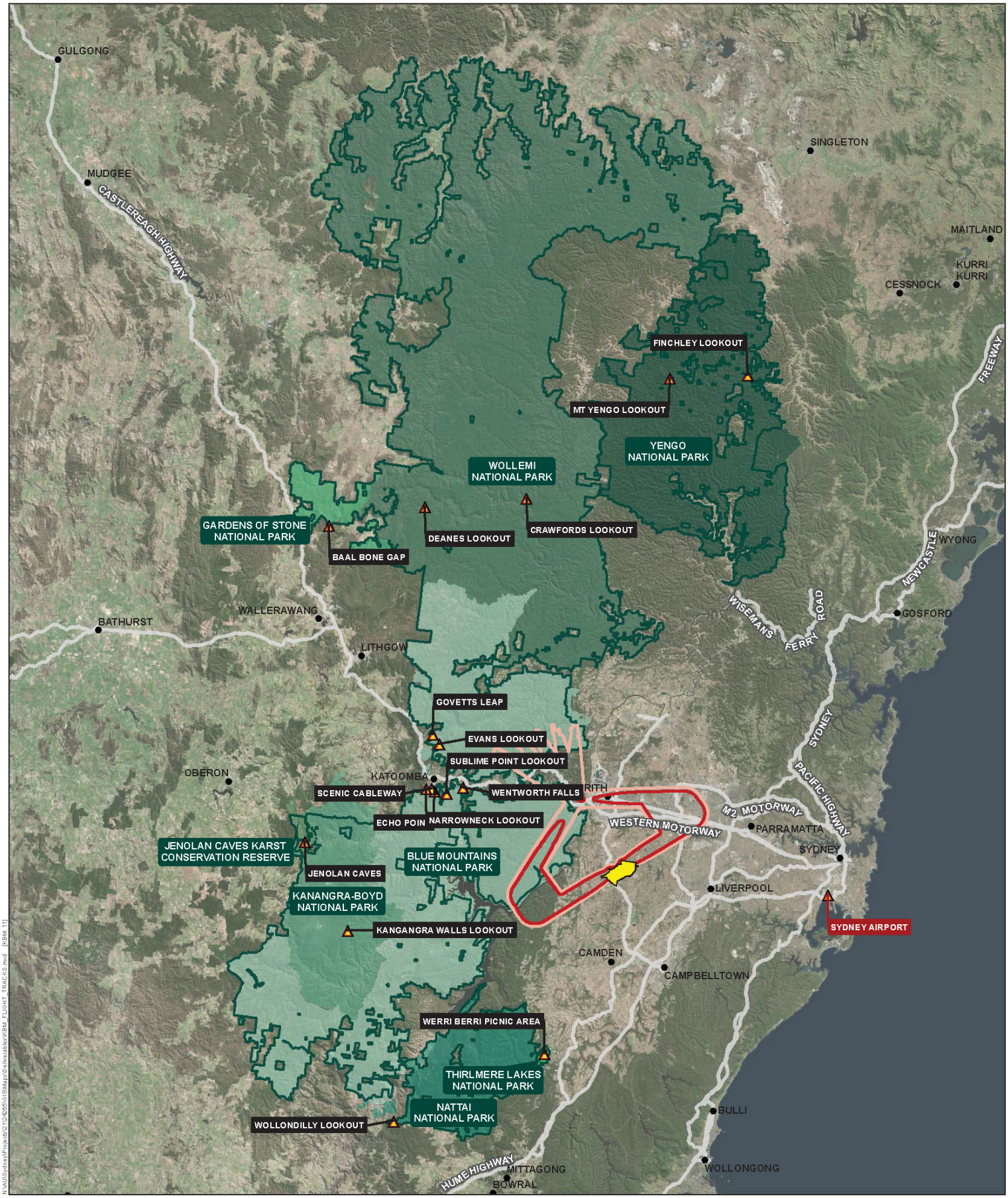
Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

- Airport site
- Greater Blue Mountains World Heritage Area
- 50 dba LA max noise contour (departures)
- 55 dba LA max noise contour (departures)

0 5 10 20
Kilometres

N

Figure 26-3 - Single event noise level for a B747 departure



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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

50 dba LA max noise contour (arrivals)

55 dba LA max noise contour (arrivals)

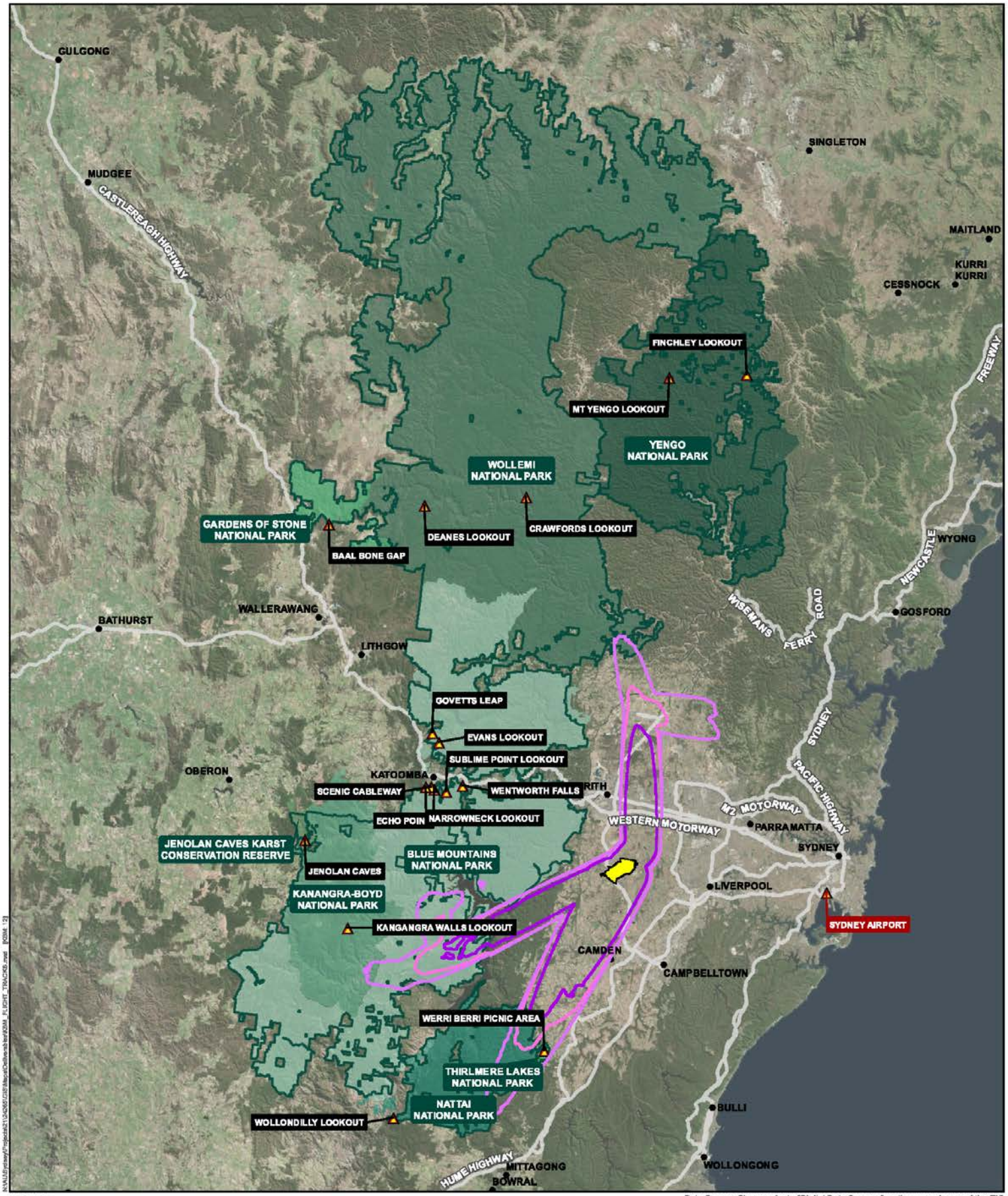
NB: The indicative arrival flight paths depicted will not be part of the airspace plans for a Western Sydney Airport

Figure 26-4 - Single event noise level for an A320 arrival

0 5 10 20

Kilometres

N



LEGEND

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

- Airport site
- Greater Blue Mountains World Heritage Area
- 50 dba LA max noise contour (departures)
- 55 dba LA max noise contour (departures)

0 5 10 20
Kilometres

N

Figure 26-5 - Single event noise level for an A320 departure

Noise has been shown to have a variety of impacts on fauna, including changing foraging behaviour, impacting breeding success and changing species occurrences. Very low-flying aircraft can cause flight response in some species, causing them to abandon nests. Other species are known to avoid higher elevation areas where noise levels are higher, potentially resulting in fragmentation of habitat (Ellis, Ellis, & Mindell 1991). Most of these impacts occur when noise levels are greater than 65 dB. Given the altitude at which flights to and from the proposed airport are likely to occur over the GBMWHA, these impacts are unlikely.

While noise would increase above background levels on an intermittent basis, fauna are likely to become habituated to any increase in noise levels in the long term (Conomy et al 1998), particularly as aircraft would not be flying at low altitudes over the GBMWHA. Operation of aircraft at the proposed airport is highly unlikely to permanently alter foraging or breeding behaviour of any fauna species. Any impacts would likely be localised, with impacts occurring under the main flight paths. The majority of fauna within the vast GBMWHA would not be impacted by aircraft noise. As such, noise would not result in a loss of biodiversity and would not interfere with the ecological viability and capacity for ongoing evolution of species within the GBMWHA.

26.5.2.2 Air quality

Air quality impacts relevant to the GBMWHA have been assessed in regard to three principal elements:

- regional air pollutants (ozone);
- contribution to climate change; and
- emissions from fuel jettisoning.

Regional air pollutants (ozone)

Ozone is formed through photochemical reactions of precursor gases. The air quality assessment for the Stage 1 development models emissions of ozone, as well as precursor gases such as nitrogen oxide, volatile organic compounds and carbon monoxide. This assessment is detailed in Chapter 12.

The regional air quality assessment considers the dispersion of ozone across the NSW Greater Metropolitan Region, which includes the GBMWHA.

Background ozone levels in Western Sydney regularly exceed the National Environment Protection Measure (NEPM) guidelines, generally in the summer months. At Bringelly—near the airport site—there have been exceedances of the ozone standards in eight of the past 10 years.

The assessment of the Stage 1 development identified that the peak predicted 1-hour ozone concentrations between the 2030 base case (without the airport) and the 2030 ‘with airport’ case were unchanged and within the error range of the modelling conducted.

International studies have shown that emissions from airport operations are small when viewed in the context of regional emissions inventories (Ratliff et al. 2009). This is supported by data presented in the Air Emissions Inventory for the Greater Metropolitan Region in New South Wales (NSW EPA 2012), which shows that emissions from existing airport operations in Sydney are less than three per cent of total emissions for the Sydney region.

The modelled contribution of emissions from the proposed airport to peak ozone levels is unlikely to be significant in a regional context. Accordingly, changes in ozone levels due to operations at the proposed airport are not expected to impact the amenity of the GBMWHA.

Contribution to climate change

Climate change is identified as a threat to the GBMWHA due to its potential to alter the frequency and intensity of fires and for increased temperatures to impact upon biodiversity and ecosystem function (UNESCO 2015). Greenhouse gas (GHG) emissions are identified as a contributing factor to global climate change.

The proposed airport is expected to contribute approximately 0.11 per cent of Australia's projected 2030 transport-related GHG emission inventory. Given the small percentage of contribution, it is concluded the GHG emissions from the proposed airport would not represent a significant contribution to climate change or to the potential impact of global climate change on the GBMWHA.

Emissions from fuel jettisoning

Emergency fuel jettisoning (commonly referred to as fuel dumping) is a procedure used by an aircraft in certain emergency situations. Aircraft do not jettison fuel as a standard procedure when landing. Indeed, many of the commonly used aircraft in Australia, such as the A320 and the B747, are unable to jettison fuel. The objective of fuel jettisoning is to reduce an aircraft's weight sufficiently to allow it to land safely in an emergency; that is, only a portion of the fuel is jettisoned.

Instances of fuel jettisoning are extremely rare worldwide. In Australian airspace, there were 10 reported instances of civilian aircraft dumping fuel in 2014 from 698,856 domestic air traffic movements and 31,345 international movements (approximately 0.001 per cent of all movements). There are no recorded cases in Australia of fuel jettisoned from civilian aircraft reaching the ground.

The procedure for jettisoning fuel is specified in the En Route supplement of the Aeronautical Information Package published by Airservices Australia as outlined in Chapter 7 (Volume 1). When fuel jettisoning is required, the pilot requests authority from air traffic control before commencing a fuel jettison and must:

- take reasonable precautions to ensure the safety of persons or property in the air and on the ground;
- where possible, conduct a controlled jettison in clear air at an altitude 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 unauthorised jettisoning of fuel in flight is an offence. The Air Navigation (Fuel Spillage) Regulations 1999 prescribe penalties for the unauthorised release of fuel from an aircraft other than in an emergency.

Fuel jettisoning is very unlikely to have any impact on 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 on fuel jettisoning altitudes and locations. In the unlikely event that fuel is required to be jettisoned over land, research indicates that it vaporises and disperses rapidly. Further details are provided in Chapter 12.

26.5.2.3 Visual amenity

The potential for visual amenity impacts has been assessed by reviewing the density and altitude of flights to provide a cumulative measure of the visibility of overflights.

Almost all aircraft approaching or departing the proposed airport would be at an altitude in excess of 5,600 feet above sea level when passing over the GBMWHA. Based on the indicative flight paths used for this assessment, the elevation of aircraft could range as low as approximately 3,700 feet above sea level for arrivals in the 05 direction. However, operations at this altitude would be confined to the eastern edge of the Blue Mountains National Park only. The anticipated altitude of arriving and departing flights is shown on Figure 26–6 and Figure 26–7.

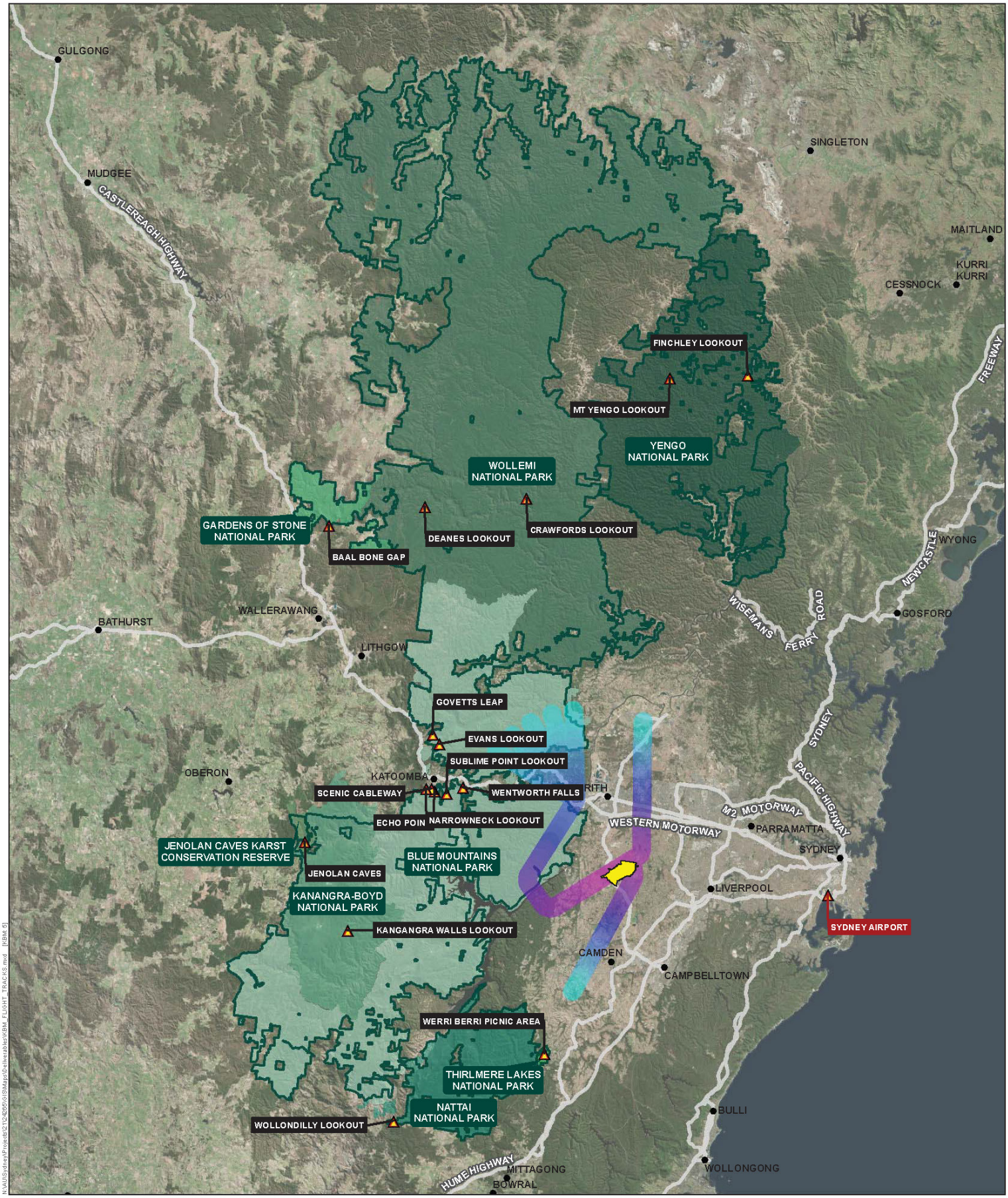
The altitude of key sensitive areas and the average altitude of aircraft above ground level relative to these sensitive areas are shown in Table 26–4. No flights would be expected to occur below around 6,000 feet (approximately 1.8 kilometres) above ground level in the vicinity of the key sensitive areas considered in this assessment.

Table 26–4 provides the predicted altitude of overflights for each sensitive area relative to lookouts locations which are typically at higher elevations within the GBMWHA. Some areas in these key locations, frequented by tourists and recreational users, are at significantly lower altitudes such as the Jamison Valley walking tracks (1,570 feet), the Starlights trail within the Nattai wilderness area (305 feet at Nattai River) and Wollemi Creek within the Wollemi wilderness area (450 feet). The visual impact of aircraft overflights on recreational users in these lower altitude areas will be further reduced compared to the higher altitude sensitive areas considered in this assessment due to the increased separation distance.

Table 26–4 Flight levels above key sensitive areas

Area	Site elevation (ASL)	Flight altitude (ASL)	Aircraft height above ground level
Jamison Valley south of Echo Point lookout and the Scenic Cableway at Katoomba and Wentworth Falls lookout	3,350 feet	> 10,000 feet	> 6,650 feet
Grose Valley east of Evans lookout and Govetts Leap lookout	3,350 feet	> 10,000 feet	> 6,650 feet
Wilderness area between Deanes lookout and Crawfords lookout within Wollemi National Park	3,000 feet	> 10,000 feet	> 7,000 feet
Nattai wilderness area	2,150 feet	> 10,000 feet	> 7,850 feet
Kanangra Walls and wilderness area east of Kanangra-Boyd lookout	3,550 feet	> 10,000 feet	> 6,450 feet
Baal Bone Gap within Gardens of Stone National Park	3,050 feet	> 10,000 feet	> 6,950 feet

Note: See Figures 26-6 and 26-7 for indicative flight altitudes.



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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

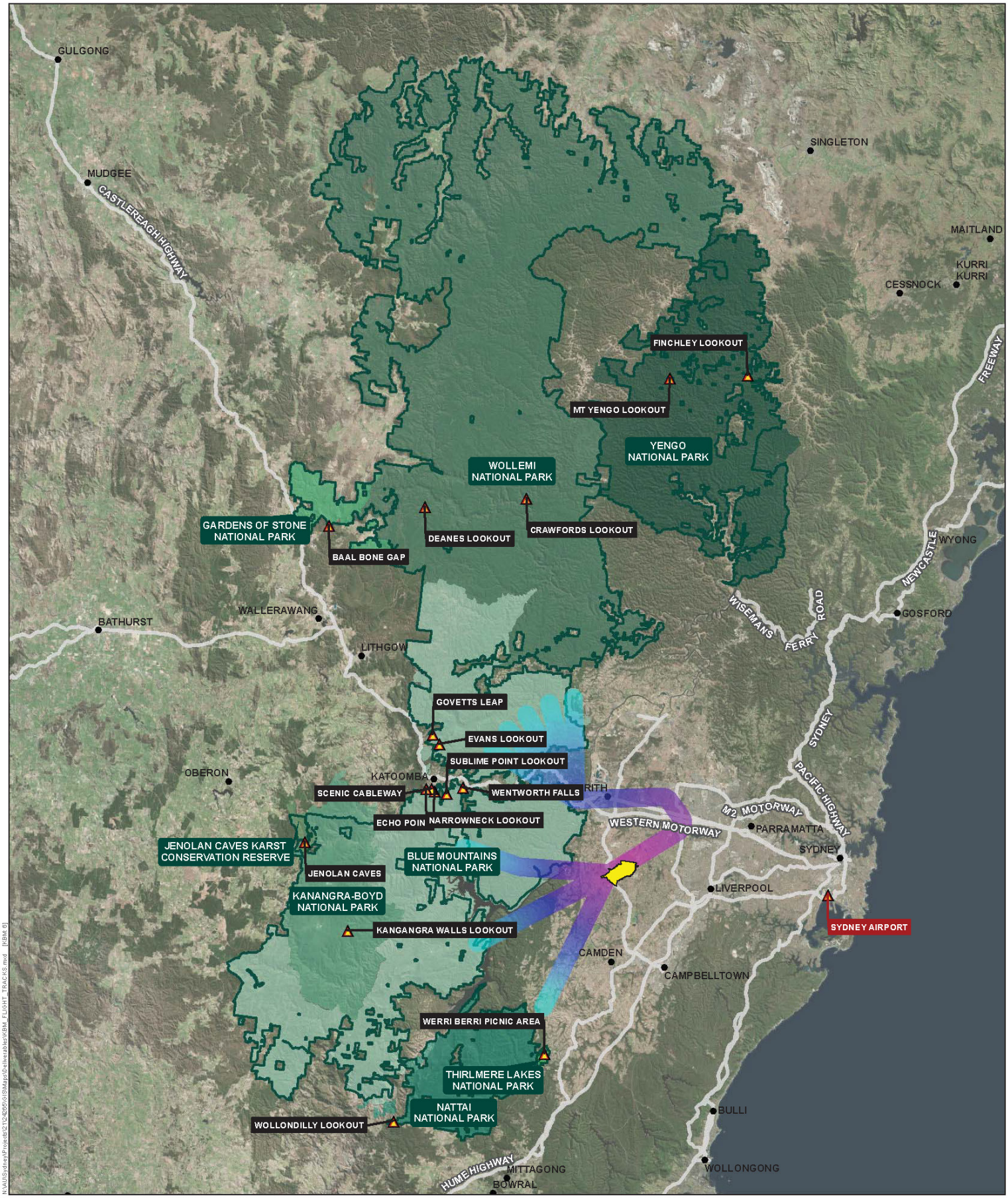
NB: The indicative arrival flight paths depicted will not be part of the airspace plans for a Western Sydney Airport

Figure 26-6 - Flight track altitude below 10,000 feet above sea level, 05 operating mode single runway

0 5 10 20

Kilometres

N



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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

NB: The indicative arrival flight paths depicted will not be part of the airspace plans for a Western Sydney Airport

Figure 26-7 - Flight track altitude below 10,000 feet above sea level, 23 operating mode single runway

0 5 10 20

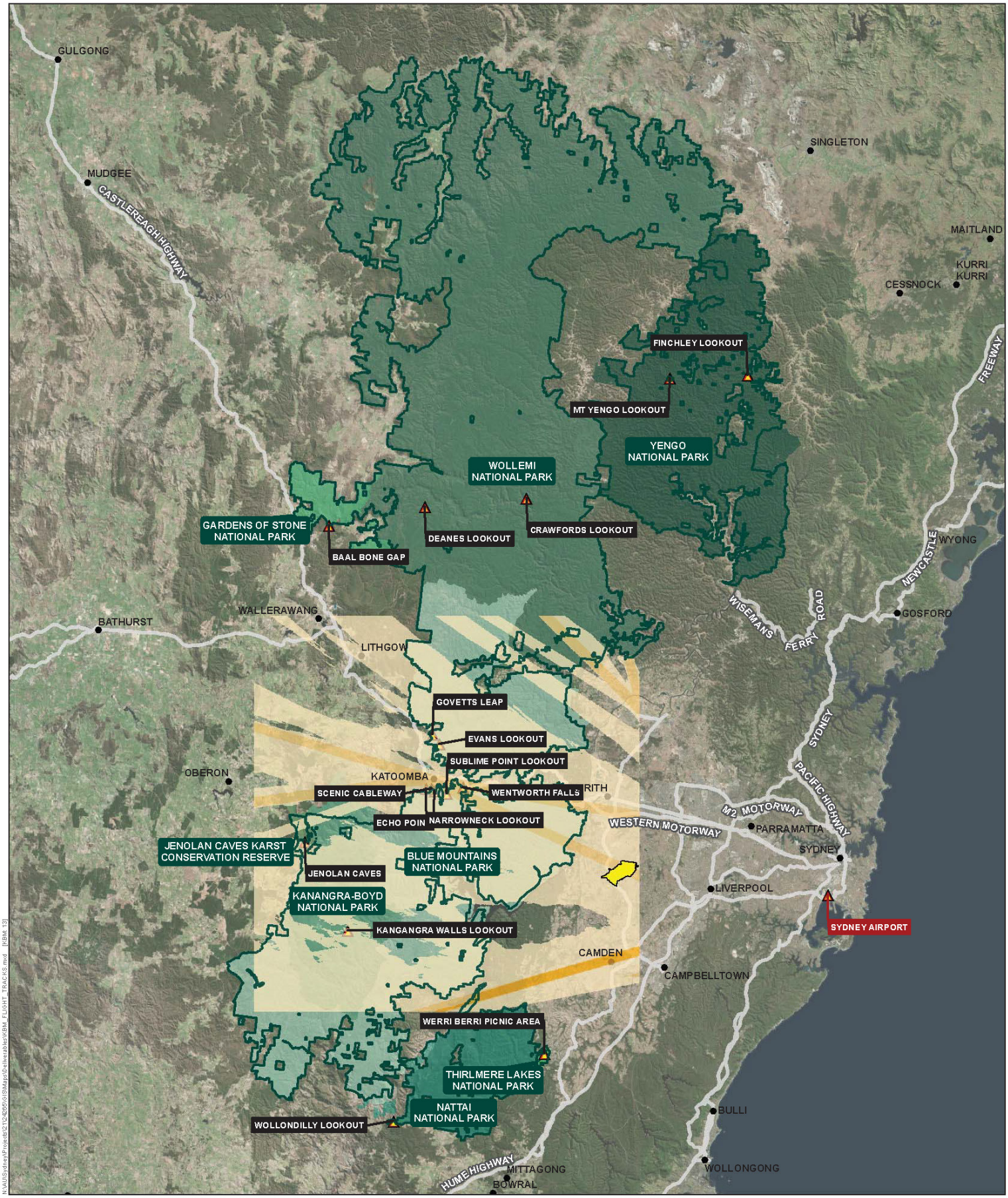
Kilometres

N

An analysis was undertaken of the number or density of aircraft movements likely to occur over the GBMWHA based on historical flight data provided by Airservices Australia. The density of flights represents the total number of aircraft overflights at all altitudes. Figure 26–8 shows the flight density chart for the 2015 base case (i.e. existing Sydney Airport flights). Figure 26–9 shows both the 2015 Sydney Airport flights as well as arrival and departures at the Stage 1 development assuming a Prefer 23 operating strategy. As illustrated, between one and 10 flights per day currently occur over southern parts of the GBMWHA, with a few specific flight paths experiencing up to 50 flights per day. Most of these aircraft operations are high-altitude commercial flights from Sydney Airport but some flights by low-altitude general aviation aircraft are also represented.

Approximately 200 aircraft movements per day are predicted at the proposed airport in 2030. Figure 26–9 shows the increase in flight density resulting from the addition of flights along the indicative flight paths servicing the proposed airport. In only a few cases, such as the Kanangra-Boyd and Blue Mountains National Parks, are new flight paths established over areas not currently overflown. When viewed in the context of flight altitudes shown in Figure 26–6 and Figure 26–7, the majority of aircraft using the indicative flight paths in these newly-affected areas would be at altitudes exceeding 10,000 feet above sea level.

As shown in Photograph 26-1, aircraft at 3,000 feet are not prominent visual features although they are visible from the ground. When viewed from the key sensitive areas identified in Table 26–4, aircraft are likely to be at least 6,500 feet above ground level. At this altitude, intermittent aircraft movements are likely to be difficult to discern and are not considered to be visually obtrusive.



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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

Flights per day

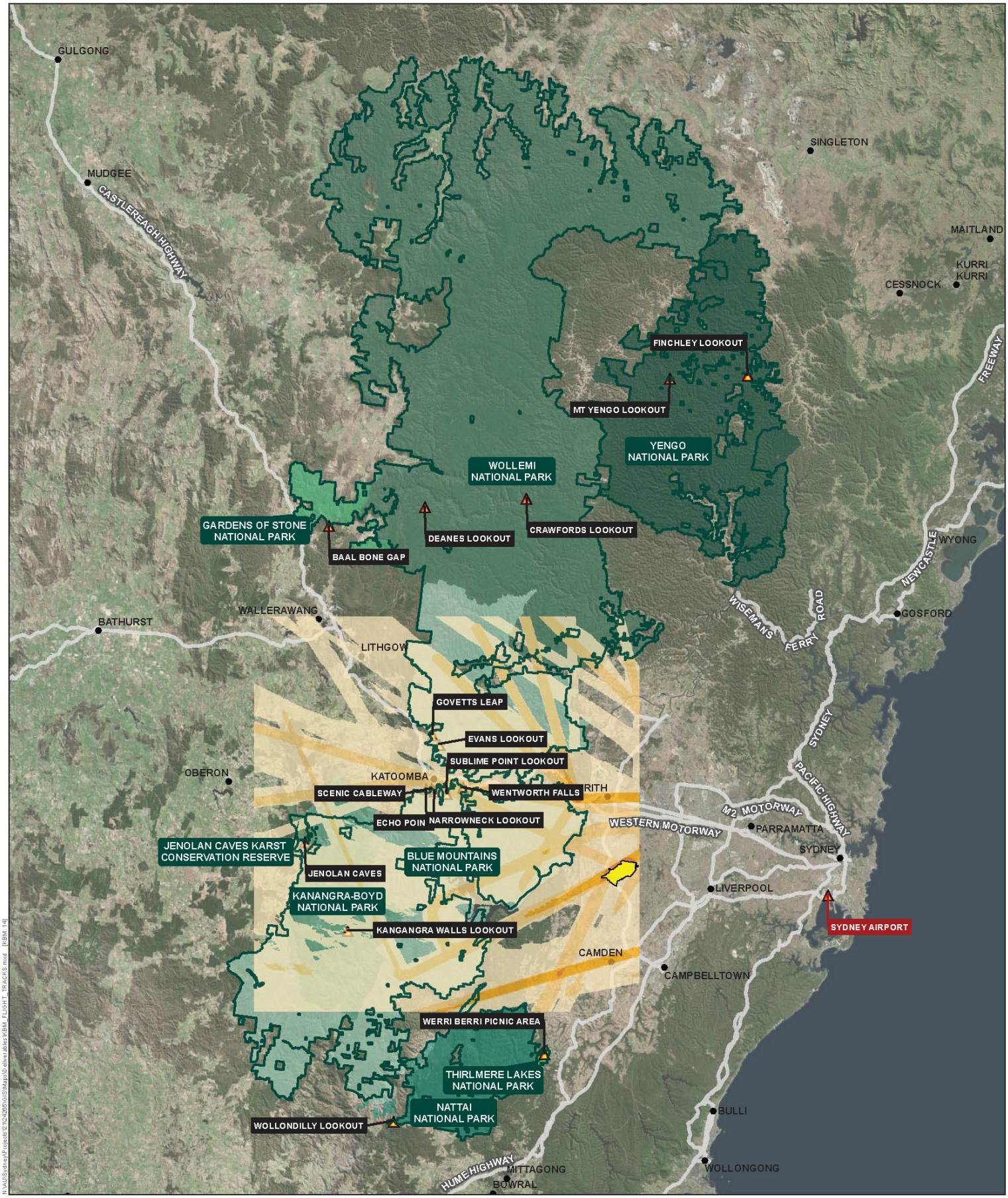
0 - 1 | 1-10 | 10-50 | 50-100 | 100-200 | above 200

Figure 26-8- Track density - existing 2015 aircraft movements

0 5 10 20

Kilometres

N



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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

Flights per day

0 - 1 | 1-10 | 10-50 | 50-100 | 100-200 | above 200

Figure 26-9 - Track density, exisitng and WSA 2030 aircraft movements - Prefer 23 operating strategy

0 5 10 20

Kilometres

N

Photograph 26-1 Aircraft at approximately 3,000 feet on a clear day at a ground distance of 2.75 kilometres from the viewer

The airport site may potentially be visible from Nepean lookout and Mount Portal lookout – both located between 13 and 14 kilometres from the airport site. A detailed assessment of the visual impact of the airport site is included in Chapter 22.

From these vantage points, the proposed airport would be viewed as a background feature, with closer residential areas at Wallacia, Mulgoa and Glenmore Park being more visually prominent to an observer. The visual prominence of the Stage 1 development would also be reduced by ongoing development in the Western Sydney Employment Area, the South West Priority Growth Area and the Western Sydney Priority Growth Area as well as other major road infrastructure either currently proposed or being planned. The effect of the proposed airport on the visual amenity of the GBMWHA is therefore expected to be very limited.

Amenity could also be influenced by light spill from the proposed development at night resulting in sky glow. During night-time hours, lights from aircraft operations, carparks, apron lighting and other ancillary airport infrastructure may be perceptible in the distance. However, at a landscape level, and having regard to the substantial future urban development planned across the intervening landform of Western Sydney, the proposed airport would be one of many sources of night time light contributing to urban sky glow. This contribution from the Stage 1 development is unlikely to impact amenity in the GBMWHA.

26.5.3 Outstanding universal value

Operation of the proposed airport would have no direct impact on the outstanding universal value of the GBMWHA. Indirect effects on the property's outstanding universal value are expected to be limited to potential noise and air quality impacts. These potential impacts are described and their significance assessed in Table 26–5.

The assessment of significance is based on the requirements of the EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance, which state that an action is likely to have a significant impact on the World Heritage values of a declared World Heritage property if there is a real chance or possibility that it will cause:

- one or more of the World Heritage values to be lost,
- one or more of the World Heritage values to be degraded or damaged, or
- one or more of the World Heritage values to be notably altered, modified, obscured or diminished.

26.5.4 Other values

Table 26–5 provides an assessment of the potential operational impacts of the proposed airport on the additional values of the GBMWHA identified in the Strategic Plan (DECC 2009c). These values complement and interact with the property's World Heritage values but are not part of the defined natural values for which the property is listed.

Table 26–5 Operational impacts on the outstanding universal value of the GBMWHA

Criterion/ element	Attributes	Operational impacts	Assessment of significance
Criterion (ix) ongoing evolutionary processes	• Outstanding and representative examples of: ▪ evolution and adaptation of the genus *Eucalyptus* and eucalypt-dominated vegetation on the Australian continent; and ▪ products of evolutionary processes associated with the global climatic changes of the late Tertiary and the Quaternary; • Centre of diversification for the Australian scleromorphic flora, including significant aspects of eucalypt evolution and radiation; • Primitive species of outstanding significance to the evolution of the earth's plant life: ▪ Wollemi pine (*Wollemia nobilis*); and ▪ Blue Mountains pine (*Pherosphaera fitzgeralii*).	Impacts on these attributes would only occur if there were direct loss through ground disturbance or significant pollution resulting in loss of habitat or alteration to evolutionary processes. Noise and air emissions represent indirect impacts and given the distance from the airport site and the predicted emission levels, would not pose a threat to these listed values. The assessment of these impacts indicates that noise from overflights would not impact evolutionary processes. Air emissions from airport operations are not considered to represent a material contribution to global climate change which may impact these processes. Direct emissions from fuel jettisoning are rare and fuel evaporates and disperses rapidly before reaching the ground. As such, air emissions would not have an impact on evolutionary processes. Outstanding and representative examples of evolutionary processes relate to pre-historical processes associated with climatic, geological, biological and ecological factors which have shaped the development of the GBMWHA. Similarly, the significant aspects of scleromorphic flora and the existence of primitive species present in the GBMWHA are representative of evolutionary processes. No direct or indirect operational activities would have an impact on these processes in the GBMWHA and, as such, no discernible impact on the attributes under this criterion would likely occur as a result of operation of the proposed airport.	The operation of the proposed airport would not result in direct impacts on the attributes demonstrated within the GBMWHA relevant to evolutionary processes. The indirect impacts of the proposed airport would not result in a World Heritage value being lost, degraded or damaged, or notably altered, modified, obscured or diminished. Accordingly, the proposed action would not have a significant impact on the attributes identified for this World Heritage criterion.

Criterion/ element	Attributes	Operational impacts	Assessment of significance
Criterion (x) biological diversity	• Outstanding diversity of habitats and plant communities; • Significant proportion of the Australian continent's biodiversity (scleromorphic flora); • Primitive and relictual species with Gondwanan affinities; • Plants of conservation significance including 114 endemic species and 177 threatened species; and • Habitat that supports 52 mammal species, 63 reptile species, over 30 frog species and about one third of Australia's bird species.	Impacts on these attributes would only occur in the unlikely event of an aircraft crash or from significant pollution resulting in loss of habitat or other effects on biota. Any such impacts would be localised and are unlikely to have a significant impact on biota and habitats. Noise and air emissions represent indirect impacts and given the distance from the airport and predicted emission levels, would not pose a threat to these listed values. The assessment of these impacts indicates that noise from overflights would not impact biological diversity values. While peak noise levels associated with overflights may temporarily disturb species close to operations, flights to and from the proposed airport would generally be more than 6,500 feet above ground level at most locations in the GBMWHA, and noise levels would not exceed 55 dBA. These intermittent noise levels are unlikely to disturb fauna within the GBMWHA. Air emissions from the operation of the proposed airport would not represent a material contribution to climate change which may impact biodiversity. Direct emissions from fuel jettisoning would not impact biological diversity values given the rarity of such events and that fuel is unlikely to reach the ground. An assessment of the potential for the proposed development to impact upon biodiversity is provided in Chapter 15. Based on that assessment, no direct or indirect operational activities would impact upon biological diversity of the GBMWHA and as such, no discernible impact on the attributes under this criterion would likely occur as a result of operation of the proposed airport.	The operation of the proposed airport would not result in direct impacts on the examples of biological diversity present within the GBMWHA. The indirect impacts of the proposed airport would not result in a World Heritage value being lost, degraded or damaged, or notably altered, modified, obscured or diminished. Accordingly the proposed action would not have a significant impact on the attributes identified for this World Heritage criterion.

Criterion/ element	Attributes	Operational impacts	Assessment of significance
Integrity	• Sufficient size to protect the biota and ecosystem processes; • Largely protected by adjoining public lands of state forests and state conservation areas; • Statutory wilderness designation over 83.5 per cent of the property; • Closed and protected catchment for the Warragamba Dam; • Plant communities and habitats occur almost entirely as an extensive, largely undisturbed matrix almost entirely free of structures, earthworks and other human intervention; and • Custodial relationship of Aboriginal people from six language groups through ongoing practices that reflect both traditional and contemporary presence.	The operation of the proposed airport would not directly affect the physical size of the GBMWHA or the adjoining lands. Statutory provisions which provide protection to wilderness areas and the Warragamba Dam would not change. An airport would not directly encroach upon wilderness areas and indirect impacts are not expected to alter the wilderness values for which these areas have been designated under the National Wilderness Inventory. The operation of the proposed airport would have no direct or indirect impact on the plant communities and habitats within the property. The operation of the airport would not directly or indirectly impact the maintenance of Aboriginal cultural practices within the GBMWHA.	The proposed airport would not result in the loss of any elements necessary for the property to express its outstanding universal value. The proposed airport would not reduce the size or change the boundary of the GBMWHA and would not impact on any features and processes that convey the property's outstanding universal value. As described in Section 26.5.5, the proposed airport would not exacerbate existing threats to the integrity of the GBMWHA.

Table 26–6 Operational impacts on other important values of the GBMWHA

Value	Attributes	Operational impacts	Assessment of significance
Geodiversity and biodiversity	• Extensive dissected sandstone plateaus; • Karst landscapes with several cave systems; • Prominent basalt-capped peaks; and • Quaternary alluvial deposits.	Potential impacts on this value would only occur in the unlikely event of an aircraft crash or from significant pollution resulting in loss of biota at a localised level. Any such impacts would be localised and are unlikely to have a significant impact on biota and habitats. No direct or indirect operational activities would have an impact on these processes and as such no impact on this value would occur as a result of operation of the proposed airport.	The proposed airport would not have a significant impact on the geodiversity and biodiversity values associated with the GBMWHA.

Value	Attributes	Operational impacts	Assessment of significance
Water catchment	• Wild rivers; • Pristine and relatively undisturbed catchment areas; and • Substantial contribution to maintaining high water quality.	Potential impacts on this value would only occur if there were direct loss through ground impacts or pollution resulting in harm to a water catchment. A portion of the GBMWHA fronts the Nepean River downstream of its confluence with Duncans Creek. The Duncans Creek catchment only covers approximately 11 percent of the airport site, the majority of which is outside of the footprint of the proposed works. The proposed adoption of best-practice water quality control measures at the airport site means there is very low potential to impact water quality and hydrology in the creek and the Nepean River. The remainder of the site discharges to the South Creek catchment, which joins the Nepean River downstream of the GBMWHA. No direct or indirect operational activities would have an impact on these catchments and waterways, and as such, no impact on these values would occur as a result of operation of the airport.	The proposed airport would not have a significant impact on the water catchment values associated with the GBMWHA.
Indigenous heritage values	• Prominent landscape features with spiritual significance: ▪ Mt Yengo; and ▪ Coxs River and Wollondilly River valleys • Aboriginal rock art; and • Potential for uncovering further significant sites.	Operation of the proposed airport would not directly impact sites within the GBMWHA that have Indigenous heritage values. The only form of indirect impact on cultural heritage values that can be reliably anticipated by this assessment is the temporary loss of contextual value from the periodic intrusion of low levels of aircraft noise. Mt Yengo is located in the north-eastern extent of the GBMWHA and is not expected to be impacted by overflights or noise from aircraft having regard to the noise assessment criteria. Similarly, the Coxs River and Wollondilly River valley are located in areas of little to no predicted noise impact.	The proposed airport would not have a significant impact on the Indigenous heritage values associated with the GBMWHA.
Historic heritage values	• Small graziers' huts; • Cedar logging roads and stock routes; • Ruins of oil shale mines and coal/shale mines; • Road and transport routes; and • Recreation and tourism.	Operation of the proposed airport would not directly or indirectly impact on sites of historic cultural heritage within the GBMWHA. Indirect impacts on recreation and tourism are considered below.	The proposed airport would not have a significant impact on the historic heritage values associated with the GBMWHA.

Value	Attributes	Operational impacts	Assessment of significance
Recreation and tourism	• Canyoning, bushwalking, rock climbing, nature observation, scenic driving, photography; • Picnic sites and basic camping facilities; • Catering, tours, accommodation; and • Direct and indirect contribution to the employment, income and output of the regional economy.	Key recreation and tourism areas have been identified and assessed in regard to potential impacts from operation of the proposed airport. Whilst, based on conservative modelling assumptions, some areas are expected to experience intermittent noise levels above 50 dBA. These areas are limited in the context of the entire World Heritage property. Similarly, visual and lighting impacts are not considered to represent a significant change to existing conditions for recreation and tourism. The major tourism areas around Katoomba and Wentworth Falls would not be significantly impacted by aircraft noise. Increased tourism in the region may be associated with higher levels of road traffic. However, any impacts from airport induced traffic growth are expected to be minor and limited to existing traffic routes. Some increases in tourism development and infrastructure may occur, as a result of increased tourist numbers induced by the proposed airport. However, potential impacts from these facilitated developments can be effectively managed through the implementation of existing management plans for the region.	The proposed airport would not have a significant impact on the recreation and tourism values associated with the GBMWHA.

Value	Attributes	Operational impacts	Assessment of significance
Wilderness	• Extensive natural areas; • Absence of significant human interference; • Opportunity to maintain integrity, gradients and mosaics of ecological processes; • Opportunities for solitude and self-reliant recreation; and • Aesthetic, spiritual and intrinsic value.	The wilderness areas of the GBMWHA are generally associated with the Nattai National Park and the Wollemi National Park. Aircraft operations may also affect the Grose and Kanangra Boyd wilderness areas within the Blue Mountains and Kanangra Boyd National Parks. Access to these areas is generally limited to hikers and low impact tourism. These limitations restrict the number of people within the areas and as such limit the number of people potentially affected. Some areas of Nattai National Park and Wollemi National Park would be affected by noise associated with infrequent overflights of Boeing 747 aircraft, an aircraft type gradually being phased out by airlines. A small proportion of the wilderness areas may be impacted by visual and lighting changes from aircraft overflights; however, these are considered to be insignificant for the vast majority of wilderness areas. The proposed airport would be only one component of an expanding urban area when viewed from distant vantage points and only one of many sources of night time light contributing to urban sky glow.	The majority of aircraft using the proposed airport such as the Airbus 320 (see Figure 26–4 and Figure 26–5) would generally produce peak noise levels below 50 to 55 dBA L_{Amax} when passing over areas of the GBMWHA. Some new generation aircraft such as the Boeing 787 which are already in use in Australia have less noise impact than the A320. It is expected that future generations of aircraft would utilise quieter engine technologies and reduce noise impacts further. In addition, the current generation of larger aircraft (i.e. Boeing 747) are predicted to use the proposed airport infrequently (once every two days on average). Aircraft passing over the majority of wilderness areas of the GBMWHA on approach to or departure from the proposed airport would generally be at least 5,000 to 10,000 feet (and in some cases much more) above ground level and are unlikely to be visually intrusive. Based on these factors it is not expected that a significant impact on wilderness values would occur as a result of the operation of the airport.
Research and education	• High scientific value discovered and undiscovered; • Scientific research into the identification, conservation and rehabilitation of World Heritage values, best management practice and threat abatement; and • Education value for schools and universities.	Operation of the proposed airport is not expected to have an impact on the biological diversity of the GBMWHA and, as such, the availability of the area for scientific investigation and research would not be limited.	The proposed airport would not have a significant impact on the research and education values associated with the GBMWHA.
Scenic and aesthetic	• Vertical cliffs, waterfalls, ridges, escarpments; • Outstanding vistas, uninterrupted views of forested wilderness; • Extensive caves; and • Sandstone canyons and pagoda rock formations.	Aircraft overflying key tourism and recreation areas would be more than 6,500 feet above the relevant ground level and at this altitude, would have limited visual intrusion. Similarly, visual and lighting impacts of the airport are not considered to represent a significant change to existing conditions for scenic and aesthetic amenity.	Based on the altitude of aircraft overflying scenic areas and the distance of the airport site from vantage points within the GBMWHA, it is not expected that a significant impact would occur as a result of the operation of the proposed airport.

Note: values for Social and Economic and Bequest, Inspiration, Spirituality and Existence are addressed in the above table within the values of Recreation and Tourism and Wilderness respectively

26.5.5 Influence on existing threats

Table 26–7 provides a description of the proposed airport's influence on existing threats identified in the GBMWHA Strategic Plan (DECC 2009c).

Table 26–7 Operational impacts on other important values of the GBMWHA

Threat	Project influence
Uncontrolled and inappropriate use of fire	The only risk of fire associated with the operation of the proposed airport would be as a result of an aircraft crash. This would be a very rare and unlikely event and is not considered to be a contributory factor in the overall threat of uncontrolled and inappropriate use of fire. Airport operations would not impact fire fighting or fire hazard reduction burning.
Inappropriate recreation and tourism activities, including development of tourism infrastructure	The proposed airport would provide progressively increasing aviation capacity in the Sydney region, which could also parallel a growth in tourism and visitation to the GBMWHA. Such an increase in tourism may influence the potential for inappropriate tourism development. However, it is very unlikely that the proposed airport would directly contribute to inappropriate development or uncontrolled visitor access particularly within the context of existing management plans which are in place for the World Heritage property. Other factors such as Sydney's expanding population are likely to drive the need for any new management responses to threats posed by increased visitations and tourism infrastructure development.
Invasion by pest species including weeds and feral animals	All aircraft arriving in Australia from overseas are subject to Australian biosecurity requirements administered by the Australian Government. The proposed airport and airlines using it would be required to comply with all Australian laws relating to biosecurity, similar to existing Australian airports. No direct impacts on biodiversity are expected as a result of the proposed airport. It is very unlikely that the proposal would contribute to threats associated with weed and pest species.
Loss of biodiversity and geodiversity	A localised loss of biodiversity and geodiversity would only occur in the unlikely event of an aircraft crash or from significant pollution resulting in loss of habitat or alteration to evolutionary processes. Noise and air emissions from overflying planes are not expected to adversely impact biodiversity or geodiversity. As such the indirect impacts associated with the proposed airport are not considered to be a contributing factor to this threat.
Impacts of human enhanced climate change	The proposed airport is expected to make a marginal contribution to national transport-related GHG emissions. A contribution of 0.11 per cent of GHG emissions to 2030 predicted GHG emissions is considered to be negligible. As such, the proposed airport is not considered to be a contributing factor to this threat.
Lack of understanding of heritage values	This threat would be relevant if no assessment of potential impacts was undertaken. An assessment of heritage values has been undertaken and as such the proposed airport is not considered to be a contributing factor to this threat.

26.6 Mitigation and management measures

Noise modelling and impact assessment for this EIS are based on indicative flight paths and a preliminary analysis of airspace arrangements undertaken by Airservices Australia. Formal design of airspace arrangements and flight paths for the proposed airport would commence after the Airport Plan is determined by the Infrastructure Minister (as detailed in Chapter 7 (Volume 1)). That design process would take account of all relevant factors, including potential environmental impacts on sensitive areas such as the GBMWHA, in determining final flight paths and operating procedures for the proposed airport.

The current assessment based on the indicative flight paths shows that the impacts of the proposed airport on the Greater Blue Mountains, including the World Heritage values of the GBMWHA, 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. This process will also take into account the detailed management plans that are in place for the GBMWHA, including the GBMWHA Strategic Plan.

26.7 Conclusion

The GBMWHA, which is located on the western fringe of the Greater Sydney metropolitan area, is bisected by a major urban and transport corridor. Existing urban development adjoins the boundaries of the GBMWHA and substantial new urban development is envisaged in Western Sydney over the coming decades.

At its closest point, the GBMWHA is approximately seven kilometres from the proposed airport. As such, no direct impacts are expected on World Heritage or National Heritage values from the construction or operation of the proposed airport. Potential indirect impacts on World Heritage and National Heritage values from the operation of the airport were assessed having regard to the attributes identified in the Statement of Outstanding Universal Value for the GBMWHA and the complementary values of the area as defined in the GBMWHA Strategic Plan. The assessment considered noise, air quality and visual amenity from aircraft overflights, lighting and traffic.

The assessment's findings are that the proposed airport would not have a significant impact on the World Heritage and other values of the GBMWHA. In particular, the indirect impacts of airport operation would not result in an attribute of the property being lost, degraded or damaged, or notably altered, modified, obscured or diminished.