38 Greater Blue Mountains World Heritage Area

38.1 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 considers the potential impacts associated with the proposed Stage 1 development presented in Chapter 26 (Volume 2a) and draws on detailed environmental and social assessments undertaken for the proposed airport which are included in Volume 4.

The assessment of the long term development recognises the uncertainty in predicting impacts that may occur nearly 50 years into the future. Flight paths and airport operating procedures that may be used in the long term are subject to further development of the airport site and further assessment and approval requirements under the Airports Act.

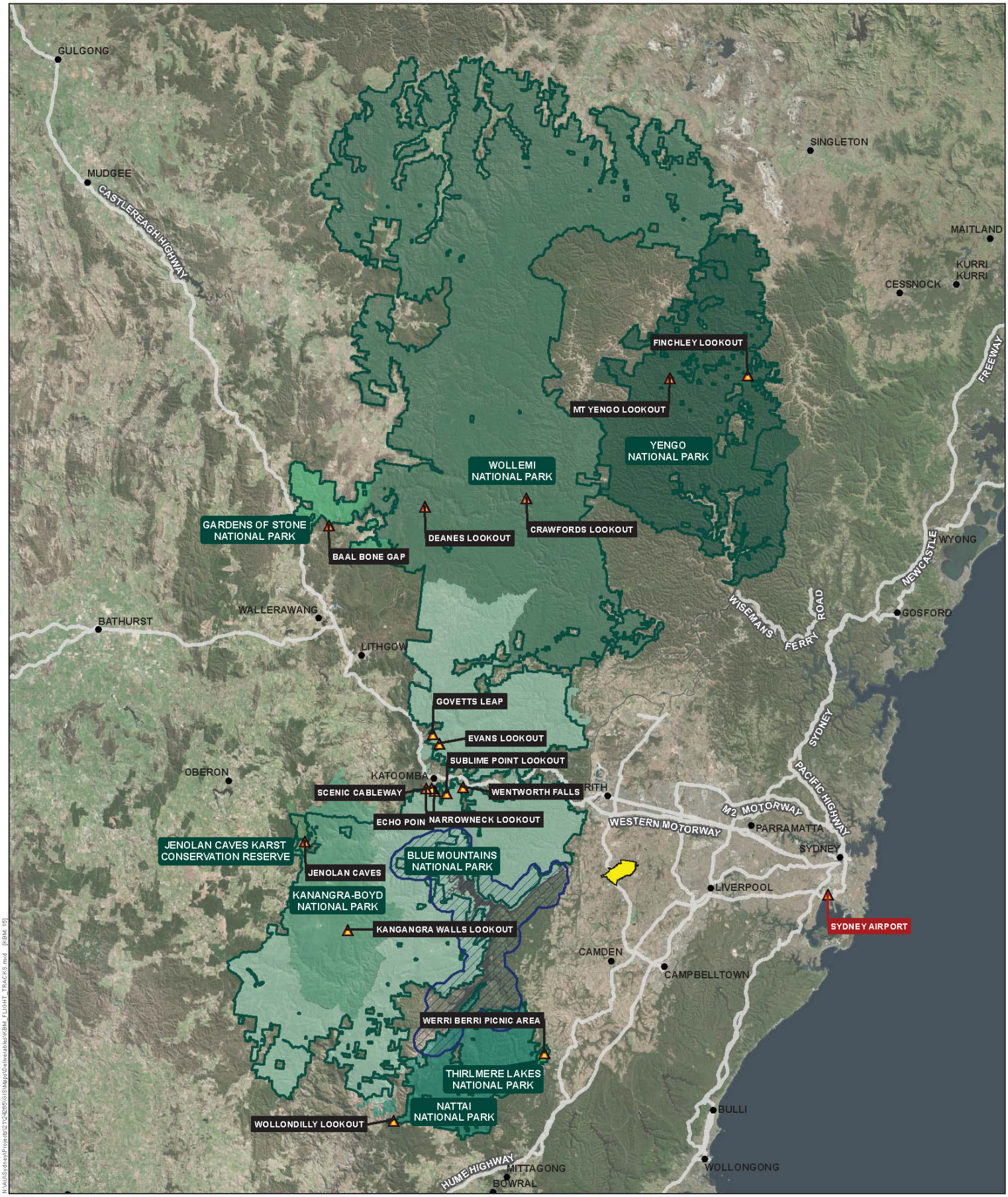
In this chapter, the term Greater Blue Mountains Area is used to refer to the area inscribed on the World Heritage List in 2000 for its outstanding universal value. The term Greater Blue Mountains World Heritage Area, or GBMWHA, is generally used elsewhere.

38.2 Environmental values

At its closest point, the GBMWHA is approximately seven kilometres from the site of the proposed Western Sydney Airport. The GBMWHA covers 1.03 million hectares of sandstone plateaus, escarpments and gorges dominated by temperate eucalypt forest (UNESCO 2015). 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 eucalypts in post-Gondwana isolation on the Australian continent (UNESCO 2015).

The GBMWHA comprises eight protected areas (see Figure 38–1):

- 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.



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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 38-1 - Greater Blue Mountains World Heritage Area

0 5 10 20
Kilometres

The GBMWHA provides a significant representation of Australia's biodiversity, with 10 per cent of the country's vascular flora as well as 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).

The Greater Blue Mountains area was inscribed on the World Heritage List because it satisfies, in the following ways, two of the criteria for natural values of outstanding universal value: representative examples of the evolution of Eucalyptus species (Criterion ix) and diversity of habitats and plant communities (Criterion x). Further detail of the outstanding universal value recognised in the World Heritage listing is presented in Chapter 26 (Volume 2a).

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).

The Statement of Outstanding Universal Value for the GBMWHA states that the eight protected areas that comprise the GBMWHA 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 impacted 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).

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).

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 NSW *Threatened Species Conservation Act 1995*, *Environmental Planning and Assessment Act 1979, Sydney Water Catchment Management Act 1998* and *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 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.

The Greater Blue Mountains Area was included on the National Heritage List in 2007. The National Heritage values identified for the listing are the same as the values for the World Heritage Area. As such, the following assessment against the World Heritage values is taken to address both the National Heritage and World Heritage 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 38–1 provides a summary of the values identified by the NSW National Parks and Wildlife Service in the GBMWHA Strategic Plan which contribute to the overall values of the area.

Table 38–1 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 taken, known Aboriginal sites within the area are widespread and 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 (DoE 2015). 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.
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

The following areas within the GBMWHA were identified as sensitive tourist and recreation areas in relation to potential impacts of the long term development such as noise, air quality and visual amenity:

- 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.

38.3 Assessment of impacts during operation

38.3.1 Direct operational impacts

There would be no direct impacts on the GBMWHA or its values from construction activities and operations associated with the proposed airport in the long term. 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, the majority of which is outside of the footprint of construction works required for a second runway. The proposed adoption of best-practice water quality control measures at the airport site 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.

38.3.2 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.

As noted in Chapter 30, indicative flight paths developed by Airservices Australia for the long term development were used to model and assess the impact of aircraft operations. The process for establishing initial flight paths for the airport is set out in Chapter 7 (Volume 1) of this EIS. Flight paths and airport operating procedures that may be used in the long term would be subject to detailed development and approval taking into account potential impacts on the GBMWHA prior to commissioning of a second runway. Long term flight path design would be undertaken through a future approval process, which would include extensive public consultation and further environmental assessment.

38.3.2.1 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 A320.

In comparison to Stage 1 operations, noise events would be experienced over a wider area due to the additional flight paths associated with the second runway. Indicative noise exposure levels for long term aircraft operations are shown in Figure 38–2 and Figure 38–3. Figure 38–2 shows that a Boeing 747 aircraft operating on certain departure paths would produce noise levels exceeding 60 dBA over areas of the GBMWHA. In some areas, primarily within the Warragamba exclusion zone, the maximum noise level would exceed 70 dBA. A south-west departure by an Airbus A320 is predicted to produce noise levels of 60 to 65 dBA in the southern area of the Blue Mountains National Park.

It should be noted that aircraft technology is continually evolving to improve the noise performance of aircraft, with the latest generation of aircraft being about 75 per cent quieter than those designed 40 years ago. Given that the full operating capacity of the long term development is not anticipated to be achieved for close to 50 years, it is likely that older generation aircraft, including the Boeing 747, would have been replaced by quieter and more efficient aircraft as technology continues to improve.

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 exceed 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.

38.3.2.2 Air quality

Regional 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 quality (ozone)

Air pollutants can contribute to regional photochemical smog which may have an impact on the amenity of the GBMWHA. This includes ozone, formed by the photochemical reaction of precursor emissions from the proposed airport.

The National Environment Protection Measure (NEPM) is a national monitoring and reporting protocol. Its purpose is to evaluate trends in air quality with time across the general population and to guide air quality management strategies. An assessment of air quality emissions from the long term development, including the NEPM for ozone is provided in Chapter 32.

Both the 2030 base case and the 2063 'with airport' case were above the NEPM criterion on all but one day of analysis. The assessment also identified that the peak predicted 1-hour ozone concentrations between the 2030 base case and the 2063 'with airport' case were unchanged on eight of the twelve days selected for analysis. On four days, the peak predicted 1-hour ozone concentration increased by a maximum of 0.2 parts per billion (ppb).

The background ozone levels for Western Sydney regularly exceed NEPM guidelines, generally in summer months. For the long term development, changes in emissions from other sources (e.g. commercial, industrial, on-road mobile, etc.) have not been accommodated – some of which may increase and some of which may decrease. Consistent with the modelling approach adopted for the Stage 1 development, the modelling assumes worst case operations, for example, by including emissions from aircraft auxiliary power units (APUs). Fixed electrical ground power and preconditioned air are expected to be provided for aircraft at the airport gates, meaning that APUs will not generally need to be used by stationary aircraft.

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 in the long term 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 biodiversity and ecosystem function (UNESCO 2015). Greenhouse gas (GHG) emissions are identified as a contributing factor to global climate change.

In the absence of a projected GHG emissions inventory for 2063, greenhouse gas emission estimates for the long term development represent approximately 0.71 per cent of Australia's projected 2030 transport-related GHG emissions inventory. Given this small proportional contribution, the GHG emissions from the proposed airport would not represent a significant contribution to climate change.

Emissions from fuel jettisoning

Potential emissions from fuel jettisoning and their impacts on GBMWHA are assessed in Chapter 26 (Volume 2a).

The findings of the assessment indicate that fuel jettisoning is very unlikely to have a significant impact on the GBMWHA due to the rarity of such events, the inability of many aircraft to perform fuel dumps, and the strict guidelines on fuel dumping altitudes and locations. In addition, in the very unlikely event that fuel is required to be jettisoned over land, research indicates that vaporisation and dispersion of fuel occurs rapidly.

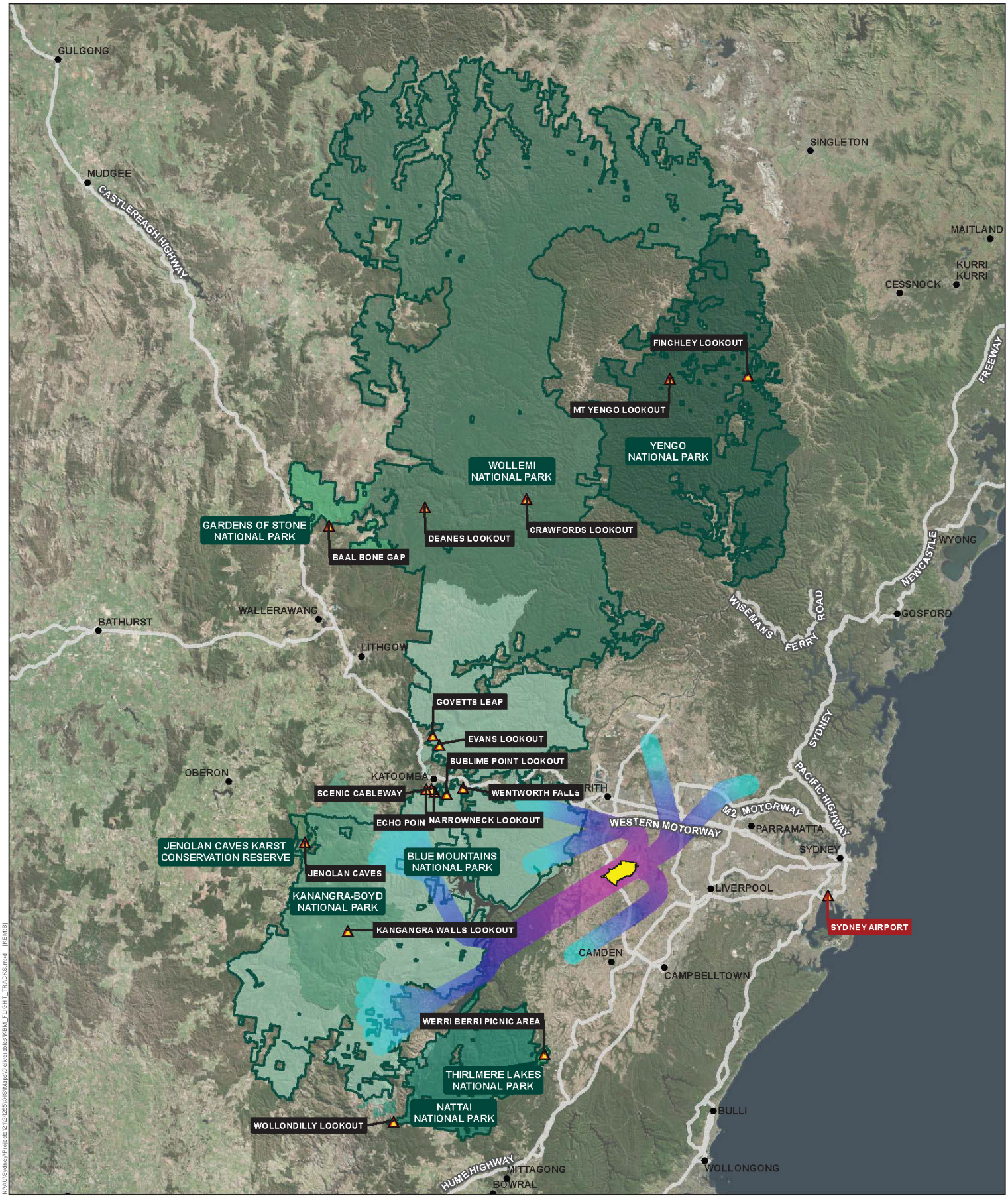
38.3.2.3 Visual amenity

Almost all aircraft departing and arriving at the airport in the long term would be at an altitude of more than 5,000 feet above sea level when passing over the GBMWHA. The predicted altitudes of arriving and departing flights in the long term are shown in Figure 38–2 and Figure 38–3.

The altitude of key sensitive areas and the average altitude of aircraft above ground level relevant to these sensitive areas are shown in Table 38–2. No flights be expected to occur below 6,000 feet (approximately 1.8 kilometres) above ground level in the vicinity of the key sensitive areas considered in this assessment.

Most sensitive areas considered in the assessment are lookout locations. These typically represent higher landforms 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 (1570 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.



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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

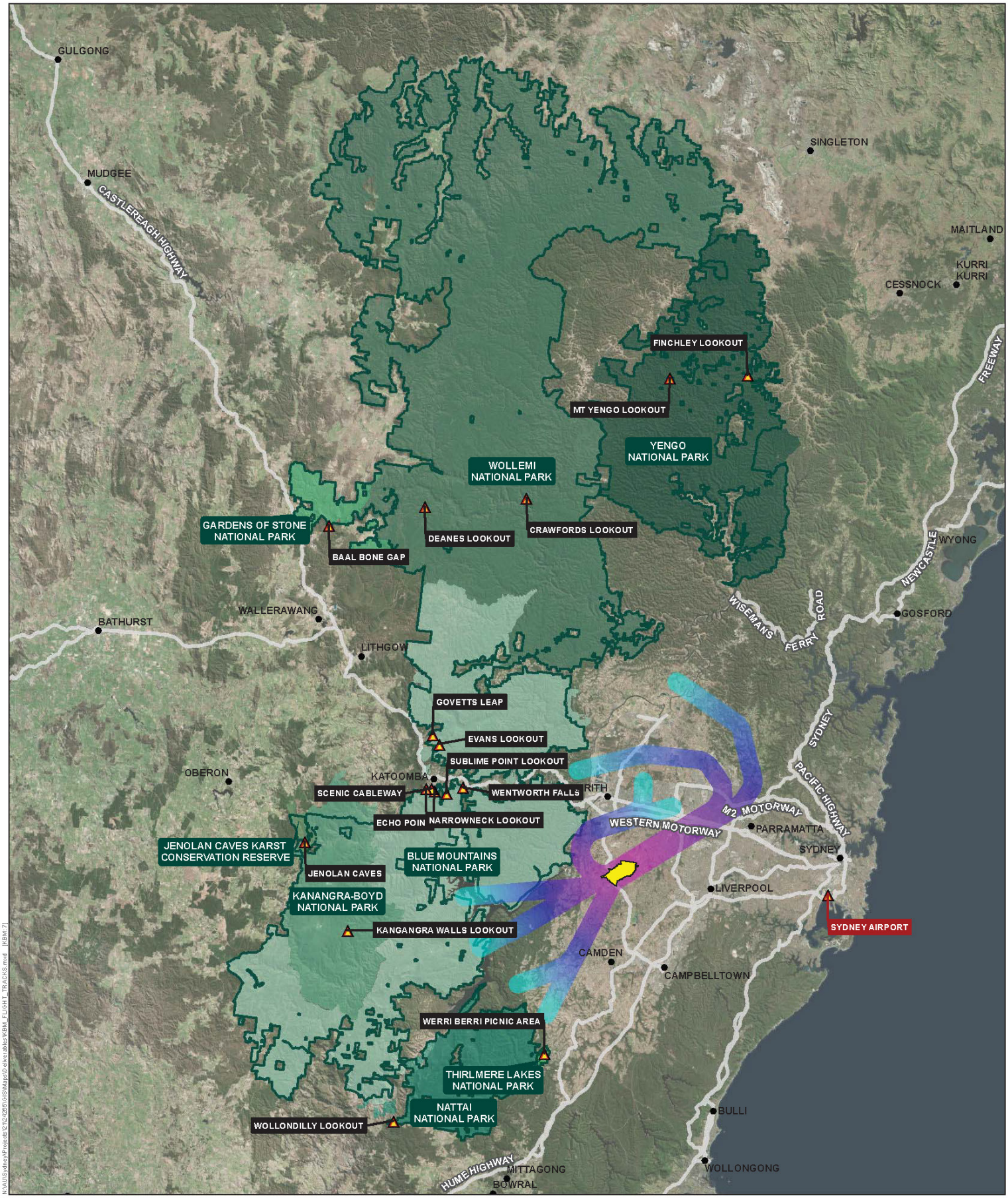
5,000 ft

0 ft

Figure 38-2 - Flight track altitude below 10,000 feet above sea level, 05 operating mode dual runways

0 5 10 20

Kilometres



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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

Figure 38-3 - Flight track altitude below 10,000 feet above sea level, 23 operating mode dual runways

0 5 10 20

Kilometres

Table 38–2 Flight levels above key sensitive areas.

Area	Site altitude (~ above sea level)	Flight altitude	Flight 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: Flight altitudes refer to Figure 38–2 and Figure 38–3.

As shown in Photograph 38–1, aircraft at 3,000 feet are not prominent visual features although they are visible from the ground. When viewed from the key sensitive areas in Table 38–2, 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.

Photograph 38-1 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 long term visual impact of the airport site is included in Chapter 36.

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. In the long term, the visual prominence of an airport at Badgerys Creek would also be reduced by substantial ongoing development in the Western Sydney Employment Area, the Western Sydney Priority Growth Area and South West Priority Land Release Area. 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 in the long term. This contribution is unlikely to impact amenity in the GBMWHA.

38.4 Outstanding universal value

Operation of the airport in the long term would have no direct impact on the outstanding universal value of the GBMWHA. Indirect impacts 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 38–3.

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 would 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.

38.4.1 Other values

Table 38–4 provides an assessment of the potential long term impacts of an 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 38–3 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; and • 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 the long term operations are not considered to represent a material contribution to global climate change which may impact on 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 to attributes under this criterion would likely occur as a result of operation of the proposed airport.	The operation of a long term development would not result in direct impacts on the attributes demonstrated within the GBMWHA relevant to evolutionary processes. The indirect impacts of a long term development would not result in a World Heritage value being lost, degraded or damaged, or notably altered, modified, obscured or diminished. Accordingly, the long term development 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 disturb species close to operations, flights to and from a long term development 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 a long term 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 39. Based on that assessment, no direct or indirect operational activities would impact on 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 a long term development.	The operation of a long term development would not result in direct impacts on the examples of biological diversity present within the GBMWHA. The indirect impacts of a long term development would not result in a World Heritage value being lost, degraded or damaged, or notably altered, modified, obscured or diminished. Accordingly a long term development 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 airport in the long term 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 airport in the long term would have no direct or indirect impact on the plant communities and habitats within the property. The operation of the airport in the long term would not directly or indirectly impact the maintenance of Aboriginal cultural practices within the GBMWHA.	A long term development would not result in the loss of any elements necessary for the property to express its outstanding universal value. A long term development 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 38.4.2, an airport would not exacerbate existing threats to the integrity of the GBMWHA in the long term.

Table 38–4 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. 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 an airport in the long term.	A long term development 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 per cent of the airport site, the majority of which is outside of the footprint of construction works required for a second runway. The proposed adoption of best-practice water quality control measures at the airport site 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. 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 a proposed airport in the long term.	A long term development would not have a significant impact on the water catchment values associated with the GBMWHA.
Indigenous heritage values	• Prominent landscape features with spiritual significance: ▪ Mount Yengo; and ▪ Coxs and Wollondilly River valleys. • Aboriginal rock art; and • Potential for uncovering further significant sites.	Operation of an airport in the long term would not directly impact sites within the GBMWHA that have Indigenous heritage values. The only forms 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. Mount 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.	An airport would not have a significant impact on the Indigenous heritage values associated with the GBMWHA in the long term.

Value	Attributes	Operational impacts	Assessment of significance
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 an airport in the long term would not directly or indirectly impact on sites of historic cultural heritage within the GBMWHA. Indirect impacts on recreation and tourism are considered below.	A long term development is not expected to have a significant impact on the historic heritage values associated with the GBMWHA.
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 a long term development. 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. Any long term impacts from airport induced traffic growth are expected to be catered for by ongoing planning and provision of road and other transport infrastructure. Some increases in tourism development and infrastructure may occur as a result of increased tourism numbers in the long term. However, potential impacts from these facilitated developments can be effectively managed through the implementation of existing management plans for the region.	A long term development 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 area and as such limit the number of people potentially affected. Some areas of Nattai National Park and Wollemi National Park would be affected by maximum noise levels associated with infrequent overflights of Boeing 747 aircraft. However, this is unlikely to eventuate in the long term as this aircraft type is gradually being phased out by airlines. A small proportion of the wilderness areas may be impacted by visual and lighting changes; however, these are considered to be insignificant for the vast majority of wilderness areas. In the long term the airport would be only one component of an expanded urban area when viewed from distant vantage points and only one of many sources of night-time light contributing to urban sky glow. A potential increase in tourism in the long term may impact the wilderness experience of some areas.	A long term development is not expected to have a significant impact on the wilderness values associated with the GBMWHA.
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 in the long term and, as such, the availability of the area for scientific investigation and research would not be limited.	A long term development would not have a significant impact on the research and education values associated with the GBMWHA.

Value	Attributes	Operational impacts	Assessment of significance
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 the key lookouts that take advantage of the unique scenic qualities of the GBMWHA 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 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 an airport in the long term.

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

38.4.2 Influence on existing threats

Table 38–5 provides a description of the influence of the long term development on existing threats identified for the GBMWHA in the Strategic Plan (DECC 2009c).

Table 38–5 Operational impacts on other important values of the GBMA – long term (2063)

Threat	Project influence
Uncontrolled and inappropriate use of fire	The only risk of fire associated with the operation of an airport in the long term 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.
Inappropriate recreation and tourism activities, including development of tourism infrastructure	The long term development 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 an 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 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 airport operations in the long term. It is very unlikely that the proposal would contribute to threats associated with weed and pest species.
Loss of biodiversity and geodiversity	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 an airport are not considered to be a contributing factor to this threat in the long term.
Impacts of human enhanced climate change	An airport is expected to make a marginal contribution to national transported-related GHG emissions. A contribution of 0.71 per cent to 2030 predicted GHG emissions is considered to be negligible. As such an airport is not considered to be a contributing factor to this threat in the long term.
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 a long term development is not considered to be a contributing factor to this threat.

38.5 Considerations for future development stages

Mitigation and management of potential noise impacts on the GBMWHA would be achieved through the planning and implementation of appropriate airspace and flight path design and airport operating procedures to support long term operations. A future design process would include consideration of noise abatement opportunities and would require extensive consultation with airlines, the community and other stakeholders as part of a separate regulatory approvals process under the *Airspace Act 2007* (see Chapter 7 (Volume 1)).

The current assessment, based on indicative long term airspace management arrangements, shows that the impacts of an airport at Badgerys Creek on the Greater Blue Mountains, including the World Heritage and other 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.

38.6 Summary of findings

At its closest point, the GBMWHA is approximately seven kilometres from the airport. As such, no direct impacts are expected on the World Heritage or National Heritage values from future construction activities or operations at the proposed airport in the long term. Potential indirect impacts on World Heritage and National Heritage values from the long term operation of an 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 a long term development would not have a significant impact on the World Heritage and other values of the GBMWHA. In particular, the indirect impacts of airport operations in the long term would not result in an attribute of the property being lost, degraded or damaged, or notably altered, modified, obscured or diminished.