Chapter 15 Landscape and visual amenity

This chapter describes the existing landscape and visual conditions and the applicable legislation and policy requirements. The potential impacts of the project on the existing landscape and views in the day-time and night-time have been assessed. The full assessment of impacts to landscape and visual amenity is provided in Technical paper 7: Landscape and visual amenity (Technical paper 7).

Background and method

The assessment considered the potential impacts of the project on landscape character and visual amenity (day-time and night-time hours), using a representative viewpoint approach. It considered the landscapes and views of Western Sydney and the Blue Mountains, including impacts on the aesthetic values of the Greater Blue Mountains Area (GBMA) which is listed as a World and National Heritage place. The assessment considered a range of scenarios, including operation of the new runway in the early years (2033) and when WSI's single runway is expected to operate near capacity (2055).

A range of guidance documents were drawn upon in the assessment, including the *Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (Transport for NSW, 2020b), *Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects Queensland, 2018) and *Guidelines for Landscape and Visual Impact Assessment* (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

The study area for the assessment comprised 2 geographic areas:

- an area of about 15 kilometres (km) from WSI (centre of the runway), covering the areas of Western Sydney where the proposed flight paths are at lower altitudes and at higher frequencies
- beyond this the study area expands to about 50 km north-west, west and south-west from WSI (centre of the runway), to consider the potential landscape character and visual impacts on the Blue Mountains.

Existing environment

The study area includes several important environmental, cultural and historic places and routes, which have varying levels of sensitivity. Key receptors that have an elevated landscape character or visual sensitivity include:

- the GBMA, including the many scenic lookouts (such as Echo Point, Portal, Nepean and The Rock Lookouts)
- lookouts, including in protected areas (for example, National Parks and State Heritage or Conservation Areas)
- campgrounds and day use areas in the GBMA and other protected areas
- scenic and tourist drives
- State and Local heritage register places.

Key findings

Western Sydney

Based on similar topography, vegetation type and cover, land use and built form (existing and emerging), 12 landscape character zones were considered within Western Sydney. Generally, the landscape character of Western Sydney would be transformed by intended changes facilitated and planned for through a number of strategic planning projects. While there would be some landscape character and visual impacts to Western Sydney, these would generally be of a moderate or lower impact level. The level of landscape character impact on the Luddenham village and agricultural landscape character zone would increase from moderate in 2033 to high-moderate in 2055 due to the proximity of the runway and increase in flights arriving and departing the runway.

Eight viewpoints were also considered within Western Sydney. Viewpoints from the public domain that would experience visual impacts ranging from moderate to high-moderate include those with elevated vantage points with views to recreational areas (George Maunder Lookout at Prospect Reservoir and Warragamba Dam Lookout) and/or locations in close proximity to the airport (Kemps Creek) and Luddenham village.

Blue Mountains

Three landscape character zones within the Blue Mountains landscape were assessed. While the introduction of multiple high altitude and low frequency flights would result in a low magnitude of change to each of the landscape character zones, the variation in landscape sensitivity influences the resulting level of impact. There would be:

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

Of the 8 views assessed in the Blue Mountains, there would be:

- high-moderate visual impact in views from Walls lookout and Echo Point lookout due to the very high sensitivity of these views and the introduction of flights that would be perceptible moving across these views
- moderate visual impact in views from Burragorang Lookout, The Rock Lookout, Wynnes Rocks Lookout and Clearys Memorial Lookout, with the visual impact from Burragorang Lookout increasing to high-moderate in 2055 due to the increase in flight frequency at relatively low altitudes
- moderate-low visual impact in the view from the Hawkesbury Lookout. This view has an urban outlook and a moderate sensitivity, allowing it to absorb the aircraft activity with less of an impact.

From campgrounds and day-use areas within the Blue Mountains there would be a moderate visual impact in 2033 and 2055, as views of aircraft overhead would not be highly visible. If seen overhead, however, they would detract from the amenity of views.

There would be a moderate-low visual impact experienced in the views from scenic routes within the Blue Mountains, including the Great Western Highway and Bells Line of Road, during 2033 and 2055. These impacts would be intermittent and experienced particularly in locations where the flights pass over and across these views.

Overall, the project would not directly alter any natural landscape features on the ground. However, the contribution of the sky to landscape character and its appreciation in views make the sky (in some locations) a landscape feature. This includes locations in the Blue Mountains and also where the naturalness of the sky contributes to landscape character. There is a real chance or possibility that the project would substantially alter the appreciation of the sky in views from the following viewpoints:

- south of Katoomba (represented in the assessment by the view from Echo Point Lookout)
- from lookouts along the Grose Valley (represented by the assessment of the view from Walls Lookout).

This alteration would be intermittent, not permanent and is reversible.

Mitigation and management

The design of the flight paths aimed to minimise noise and other environmental impacts, including visual impacts, to the extent practical while still achieving safe and efficient operations. These considerations were had at various stages of the design process and included sensitive tourist, recreational and wilderness areas.

Based on the nature of the potential impacts, no other reasonable or feasible project specific mitigations are considered to be available that would reduce the potential landscape and visual impacts from the project.

15.1 Introduction

This chapter considers the landscape character and visual impacts of the project. It considers the impacts of the project on landscape character and scenic values by defined landscape character zones, and the visual impacts of the project during the day- and night-time. The full assessment is provided in Technical paper 7: Landscape and visual amenity (Technical paper 7).

The assessment does not consider aircraft within the Airport Site (e.g. aircraft manoeuvring on the runway or taxiways) or the construction and operation of physical ground infrastructure associated with the Stage 1 Development. These impacts have been addressed in the 2016 Environmental Impact Statement (EIS).

15.2 Legislative and policy context

The landscape character and visual impact assessment was undertaken to address the EIS Guidelines and with reference to the following guidelines, policies or standards:

- *Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (Transport for NSW, 2020b)
- *The Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects Queensland, 2018)
- *The Guidelines for Landscape and Visual Impact Assessment, Third Edition* (Landscape Institute and Institute of Environmental Management and Assessment, 2013)
- *The Significant Impact Guidelines 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies* (Commonwealth of Australia, 2013b)
- *Wind Energy: Visual Assessment Bulletin* (NSW DPE, 2016)
- AS/NZS4282:2019 Control of the obtrusive effects of outdoor lighting (Standards Australia, 2019).

A range of legislation, policies and planning strategies from State and local governments were also considered in the assessment of potential landscape character and visual impacts, including:

- State Environmental Planning Policy (Precincts – Western Parkland City) 2021
- *Greater Blue Mountains World Heritage Area Strategic Pla*n (NSW DECC, 2009) and *Greater Blue Mountains World Heritage Area Strategic Plan Addendum 2016* (NSW Office of Environment and Heritage, 2018)
- *The Blue Mountains National Park Plan of Management* (NSW National Parks and Wildlife Services, 2001)
- *The Greater Sydney Region Plan – A Metropolis of Three Cities* (Greater Sydney Commission, 2018b)
- *Western City District Plan* (Greater Sydney Commission, 2018a)
- *Western Sydney Aerotropolis Precinct Plan 2022* (NSW DPE, 2023a)
- Western Sydney Aerotropolis Development Control Plan (DCP) (NSW DPE, 2022c)
- *The Luddenham Village Interim Strategy* (NSW DPE, 2022b)

- Local strategic planning statements and local environment plans for the Penrith, Liverpool and Blue Mountains local government areas (LGAs)
- *Penrith Scenic and Cultural Landscapes Study* (Penrith City Council, 2019) and *Penrith Rural Lands Strategy* (Penrith City Council, 2022)
- *Western Sydney Parklands Plan of Management 2030* (Western Sydney Parklands, 2018).

15.3 Methodology

15.3.1 Study area

The landscape and visual study area (the study area) comprises 2 geographic areas:

- an area of about 15 kilometres (km) from WSI (centre of the runway), covering the areas of Western Sydney where the proposed flight paths would be at lower altitudes and at higher frequencies. In this area aircraft movements are likely to be more visually prominent and more likely to affect landscape character and visual amenity
- a broader study area up to about 50 km north-west, west and south-west from WSI (centre of the runway), in order to consider the potential landscape character and visual impacts on the wider region, in particular the Greater Blue Mountains Area (GBMA). In this broader study area, the landform rises and the landscape character and visual amenity values are more sensitive to change.

15.3.2 Approach

Landscape character and visual impacts were assessed to identify the likely impacts arising from the project.
The assessment methodology generally involved:

- identification of landscape character areas
- division of the study area into broad landscape character zones that reflect the qualities of the built, natural and cultural environment, including geology, topography, vegetation, waterways, built form, patterns and types of land use. Due to the scale of the project and study area, the identification of landscape character zones has been approached as follows:
  - in Western Sydney, the area within 15 km of WSI has been divided into landscape character zones that are based on the 2016 EIS and refined to reflect changes to the landscape and strategic planning strategies for these areas
  - for the GBMA, the landscape character zones have been described but not spatially defined. These zones reflect the landscape types that are characterised by particular geology, topography and other natural features, built form and land use types
- identification of significant viewpoints and vistas identified in the review of relevant planning instruments, strategies and from field observations
- selection of views representative of the site, including views from areas where the greatest number of viewers are likely to congregate (such as lookouts, road corridors and scenic routes) and locations in sensitive recreational and natural areas
- identification of day-time sensitivity of each landscape character area and viewpoint, and identification of night-time visual sensitivity for each environmental zone(s)
- preparation of photomontages for selected viewpoints to support the assessment of impact. The selected viewpoints represent:
  - a range of viewing locations, from a distance and orientation where the project would be most visible, and
  - views from areas with the greatest visual sensitivity and where the greatest number of viewers would be located

  For each photomontage, an image was prepared that includes a line showing the flight path and multiple aircraft in silhouette located along each flight path. The spacing of the aircraft does not represent aircraft frequency, but is intended to illustrate the effect of aircraft that may be moving across the sky.

- assessment of the likely magnitude of change expected as a result of the project, which is then combined to make an overall assessment of landscape or visual impact (refer to Table 15.1)
- providing management and mitigation measures.

The assessment has considered impacts in 2033 and 2055 alongside the planned land use change in the surrounding landscape.

Further detail on the sensitivity and magnitude of change applied in the landscape and visual impact assessment is provided in Section 15.3.2.1 to Section 15.3.2.3.

Table 15.1 Landscape and visual impact levels

		Sensitivity				
		Very high	High	Moderate	Low	Very low
Magnitude	Very high	Very high	Very high	High	High-Moderate	Moderate
	High	Very high	High	High-Moderate	Moderate	Moderate-Low
	Moderate	High	High-Moderate	Moderate	Moderate-Low	Low
	Low	High-Moderate	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

15.3.2.1 Landscape character impact assessment

The *Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (Transport for NSW, 2020b) defines landscape as 'all aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure' and defines landscape character as the 'combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place'.

Landscape sensitivity reflects the frequency and volumes of users and the valued characteristics such as scenic amenity, its contribution to sense of place and rarity. It also considers the scenic quality of the landscape. For example, areas with more distinctive terrain, greater vegetation cover, natural waterbodies, heritage or cultural landscape and built form features would have a higher landscape sensitivity and greater susceptibility to change compared to landscapes with less terrain, fewer trees, human created farmland and areas with a more dominating presence of development.

Table 15.2 sets out the landscape sensitivity levels applied in this assessment.

Table 15.2 Landscape sensitivity levels

Sensitivity	Description
Very high	• Landscape feature or place protected under national legislation or international policy. For example, World Heritage Areas and National Parks. • Typically includes distinctive, unique and landscape features which are uncommon across the nation and internationally. Comprises a high sense of tranquillity and wilderness with minimal evidence of human presence.
High	• Landscape feature or place that is iconic to NSW. Typically includes some unique and landscape features which are uncommon within NSW. • Comprises a sense of tranquillity and wilderness but may include some human presence. For example, small scale built development.

Sensitivity	Description
Moderate	• Landscape or place that is heavily used, and/or valued by residents of a major portion of a city or a non-metropolitan region, and/or places with regionally important scenic value or landscape features. • May include urban areas with a greater density of urban development where character and amenity is important, or landscape features that are uncommon within the region.
Low	• Landscape valued and experienced by concentrations of residents, and/or local recreational users, and/or places of local scenic value or local landscape features. • May include regionally common landscapes and features, and may be a landscape transitioning to urban development.
Very low	• Places without any particular scenic value or local landscape features, or which are common across the region and beyond.

The magnitude of change refers to changes to the landscape character that would occur as a result of the project. It considers both direct and indirect changes. The magnitude of change relates to the entire landscape character zone or area and is assigned a level based on the categories described in Table 15.3. Visibility is a part of landscape character and areas more widely seen would have a greater influence on landscape character.

Table 15.3 Landscape magnitude of change levels

Magnitude of change	Description
Very high	• The landscape is altered such that the project dominates and/or transforms its character, and results in an extensive and/or severe change in landscape character.
High	• The project substantially changes and/or is not compatible with the character of the landscape, and may result in considerable change in landscape character.
Moderate	• The project noticeably changes and/or is not compatible with the character of the landscape. • This may include the introduction of elements that are visible from some areas and/or contrasts somewhat with the characteristics of the existing landscape character.
Low	• The project slightly changes and/or is compatible with the landscape character. • This may include the introduction of elements that have minimal visibility, influence a small extent of the landscape character area, and/or contrasts noticeably with the characteristics of the existing landscape character.
Negligible	• The project would not change the existing landscape character.

Although the project would not result in direct impacts on the landscape (for example, the removal of trees and tree canopy), it is likely to result in indirect impacts. This could be changes to the characteristics of the landscape that form its sense of place and unique identity. The magnitude of change relates to the entire landscape character zone or area, not just changes to a small area or localised changes. Visibility is a part of landscape character and areas which are more widely seen would have a greater influence on landscape character.

15.3.2.2 Day-time visual impact assessment

The day-time visual amenity impact assessment considers visual amenity as experienced by people (referred to as receivers) and aims to identify the range of views to the site that may be impacted and where the greatest number of receivers are likely to congregate. This includes views from residential areas, lookouts, road corridors and scenic routes, as well as locations in sensitive recreational and natural areas.

Visual sensitivity refers to the nature and duration of views. Locations from which a view would potentially be seen for a longer duration, where there are higher numbers of potential viewers and where visual amenity is important to viewers can be regarded as having a higher visual sensitivity. To ensure the impacts are attributed fairly, the sensitivity of each viewpoint is considered in the broadest context of possible views, including those of national importance through to those considered to have a neighbourhood importance.

Table 15.4 sets out the day-time sensitivity levels applied in this assessment.

Table 15.4 Day-time sensitivity levels

Sensitivity	Description
Very high	• Heavily experienced view to a national icon, for example, view from lookouts within the GBMA. • Views to areas with a scenic value of national importance or to landscape features of NSW. • Views that are generally unique and uncommon nationally.
High	• Heavily experienced view to a feature or landscape that is iconic to NSW. • Views to areas with a scenic value recognised by NSW. • Views that are generally unique or uncommon within NSW.
Moderate	• Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, or an important view from an area of regional open space. • Views to areas of regionally important scenic value or to landscape features of the region. • Views that are generally unique or uncommon within the region.
Low	• High quality view experienced by concentrations of residents, local recreational users and/or large numbers of road or rail users. • Views to areas of local scenic value or to local landscape features. • Views that are somewhat common within the landscape.
Very low	• Views where visual amenity is not as important to the wider community (such as lower quality views briefly glimpsed from roads). • Views that are likely to be common within the landscape.

The magnitude of change refers to the change to the landscape that would occur as a result of the project from a given viewpoint. Magnitude of change describes the extent of change and identifies elements which are removed or in this case added, changes in remoteness and tranquillity, and compatibility of new elements with the existing landscape.

Table 15.5 sets out the magnitude of change levels applied in the assessment for day-time visual impacts. A high magnitude of change would result if a project contrasts strongly with the existing landscape. Whereas a low magnitude of change occurs if there is visual compatibility or minimal visual contrast between the project and the landscape in view. In this situation, the project may be noticeable but does not noticeably contrast with the existing modified and transitioning landscape surrounding WSI.

Table 15.5 Day-time magnitude of change levels

Magnitude of change	Description
Very high	• The view is altered such that the project visually dominates and transforms the character of the view. • The project would result in a substantial change in the amenity of the view.
High	• The project is visually prominent, and/or contrasts with the character of the view. • The project would result in a considerable change in the amenity of the view.
Moderate	• The project is somewhat prominent and/or is not compatible with the character of the view. • The project would result in a noticeable change in the amenity of the view.
Low	• The project is not visually prominent and/or is visually compatible with the character of the view. • The project would result in a slight change in the amenity of the view.
Negligible	• The project is not visible, is not visually prominent in the view and/or is compatible with the character of the view. • The project would result in no perceived change in the amenity of the view.

There are some general principles regarding the relationship between the project and the landscape which determine the magnitude of change level. These principles, or assumptions, relate to how well a flight path can be absorbed into the landscape setting and what is considered to be more or less visually harmonious. These principles have been applied generally to the viewpoint assessment (refer to Figure 15.1) and include:

- vertical and horizontal distance – the greater the distance, the less prominent the aircraft are likely to be
- area of sky occupied – for example, frequency of flights and number of flight paths visible
- visibility of the sky – for example, open and expansive skyline where the sky is a critical feature in views, versus an enclosed sky where buildings or vegetation screen and reduce visibility
- development context and character – the presence of other existing infrastructure of a similar character (for example, vehicular traffic and existing flight paths) can increase the compatibility of development within a view.

Figure 15.2 and Figure 15.3 shows the visible scale of aircraft (B777 and A320) based on distance and altitude.

Figure 15.1 Visual magnitude principles

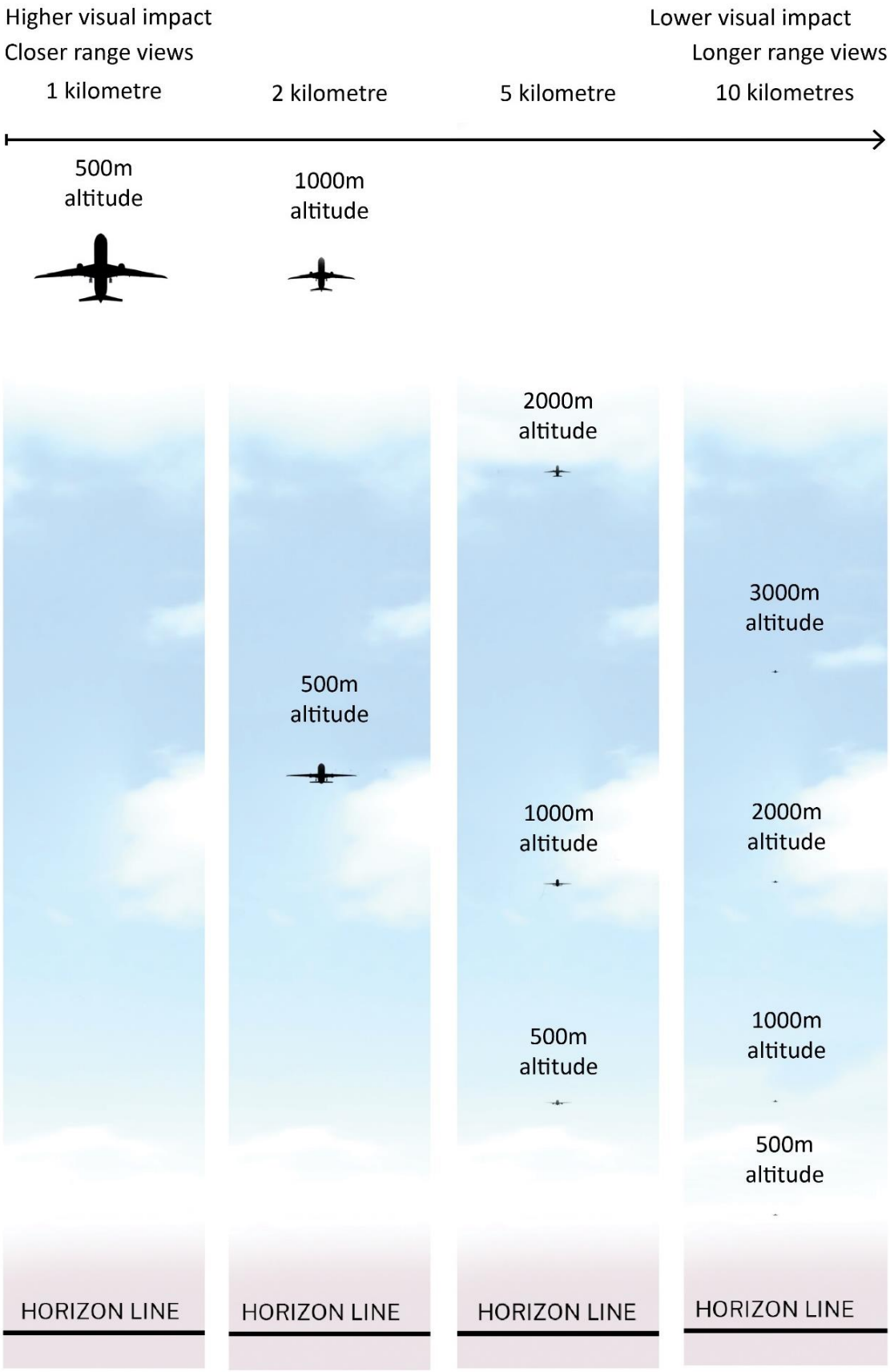

Figure 15.2 Visible scale of aircraft based on distance and altitude (B777 aircraft shown)

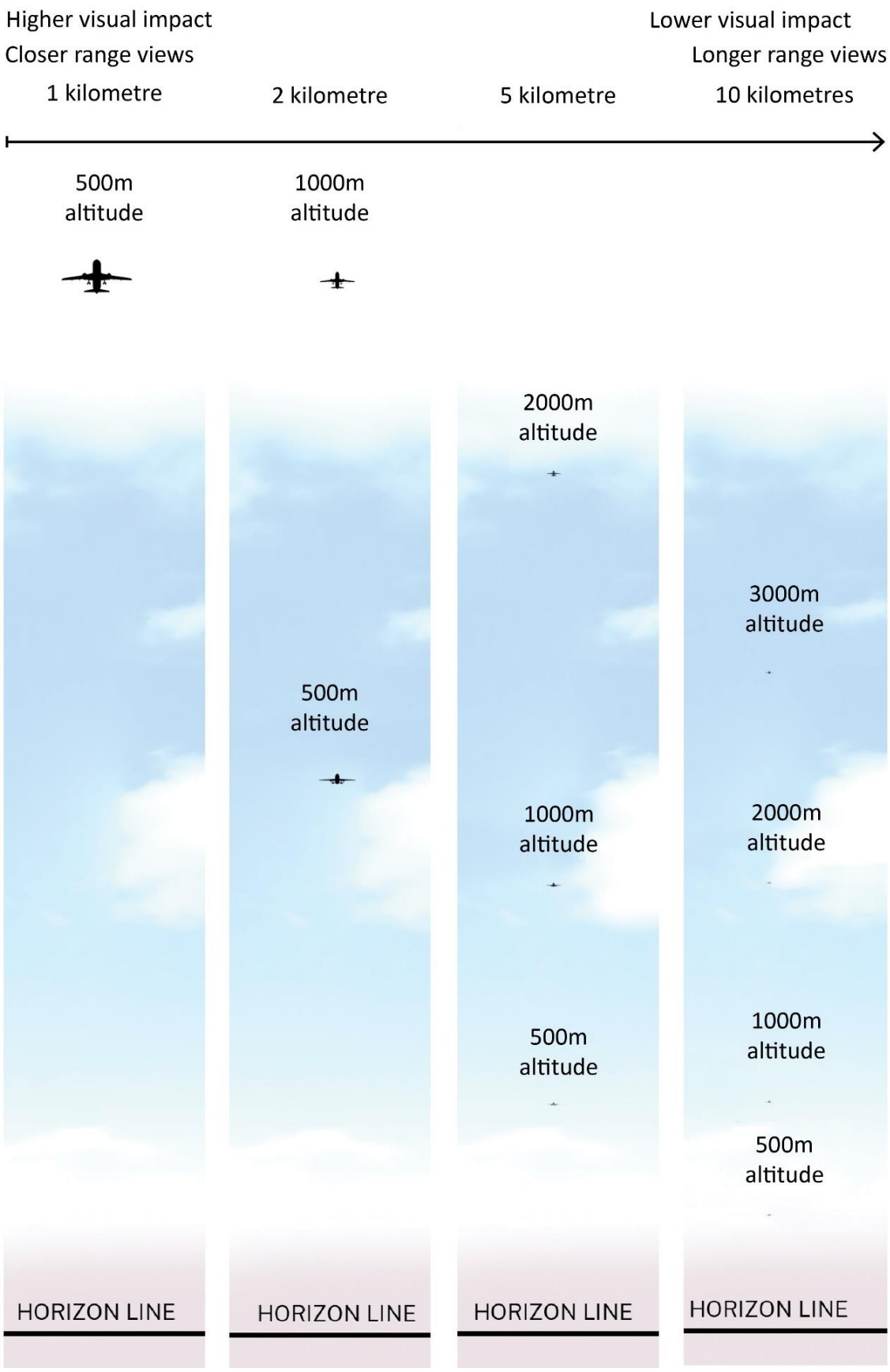

Figure 15.3 Visible scale of aircraft based on distance and altitude (A320 aircraft shown)

15.3.2.3 Night-time visual impact assessment

An assessment of the potential visual impacts of the project at night was undertaken using the broad environmental zones that occur within the study area. Night-time hours for this assessment are between 11 pm and 5:30 am.

The assessment of visual impacts at night has been undertaken based on the 'night-time' flight paths (between 11 pm and 5.30 am), as well as the 'day-time' flight paths which would be used during periods of darkness (between sunset and 11 pm).

The assessment of night-time impact was carried out with a similar methodology to the day-time assessment and also draws upon the guidance contained within AS/NZS4282:2019 Control of the obtrusive effects of outdoor lighting (Standards Australia, 2019). This assessment has considered the effects of lighting on the visual amenity of residents and transport system users and astronomical observations.

AS4282 identifies environmental zones used to categorise night-time landscape settings in the study area. These environmental zones have been used to describe the existing night-time visual condition and assign a level of sensitivity as shown in Table 15.6.

Table 15.6 Environmental zone sensitivity – night-time

	Environmental zones (AS4282:2019)	
Sensitivity level	**Description**	**Examples**
Very high	A0: Intrinsically dark	• UNESCO Starlight Reserve • IDA Dark Sky Parks • Major optical observatories • No road lighting (unless specifically required by the road controlling authority).
High	A1: Dark	• Relatively uninhabited rural areas • No road lighting (unless specifically required by the road controlling authority).
Moderate	A2: Low district brightness	• Sparsely inhabited rural and semi-rural areas.
Low	A3: Medium district brightness	• Suburban areas in towns and cities.
Very low	A4: High district brightness areas	• Town, city centres and other commercial areas • Residential areas abutting commercial areas.

The magnitude of change that would be expected within each environmental zone at night is described in Table 15.7, with reference to the following key terms (as defined in AS4282:2019 (Standards Australia, 2019)):

- skyglow – the brightening of the night sky that results from radiation (visible and non-visible), scattered from the constituents of the atmosphere (gaseous, molecules, aerosols and particulate matter), in the direction of observation, and comprises natural sky glow and artificial sky glow
- glare – condition of vision in which there is discomfort or a reduction in ability to see, or both, caused by an unsuitable distribution or range of luminance, or to extreme contrasts in the field of vision
- light spill – light emitted by a lighting installation that falls outside of the design area, and may or may not be obtrusive depending on what it affects.

Table 15.7 Magnitude of change levels – night-time

Magnitude of change	Night-time visual
Very high	• Substantial change to the level of skyglow, glare or light spill expected. • The lighting of the project would transform the character of the surrounding setting at night. • The effect of lighting would be experienced over an extensive area.
High	• Considerable change to the level of skyglow, glare or light spill. • The lighting of the project would noticeably contrast with the surrounding landscape at night. • The effect of lighting would be experienced across a large portion of the landscape.
Moderate	• Alteration to the level of skyglow, glare or light spill would be expected. • The lighting of the project would contrast with the surrounding landscape at night. • The effect of lighting would be experienced across a moderate portion of the landscape.
Low	• Alteration to the level of skyglow, glare or light spill would be expected. • The lighting of the project would not contrast substantially with the surrounding landscape at night. • The effect of lighting would be experienced across a small portion of the landscape.
Negligible	• The level of skyglow, glare and light spill is unchanged or if it is altered, the change is generally unlikely to be perceived by viewers. • Compatible with the existing or intended future use of the area.

15.3.3 Dependencies and interactions with other study areas

This assessment is associated with other Draft EIS studies as outlined in Table 15.8.

Table 15.8 Dependencies and interactions with other Technical papers

Technical paper	Relevance
Technical paper 1: Aircraft noise	This assessment considers the flight frequencies relied upon in Technical paper 1. The altitudes used in this assessment are assumed based on the mapping provided in Technical paper 1.
Technical paper 9: Heritage	There is the potential for interactive effects between Aboriginal cultural heritage and non-Aboriginal cultural heritage, where the values of these places relies on landscape character or views, particularly where these places offer views to the sky.

15.3.4 Assumptions and limitations

15.3.4.1 Limitations

This assessment has considered distances from flight paths, however for operational and safety reasons, aircraft may operate within wider flight path corridors that could bring aircraft closer than assumed in this assessment. This is more likely to affect views further from the airport, such as across the GBMA.

The scheduling and therefore the frequency of flights is not yet known. This assessment considered the flight frequencies relied upon in Technical paper 1 and has assumed these flights occur evenly across either day- or night-time operating hours. There is, however, likely to be peak hours when more flights would occur.

All altitudes vary by aircraft type, weight, destination, weather, individual pilot technique, air traffic control instructions and other factors. The altitudes used in this assessment are assumed based on the mapping provided in Technical paper 1.

The night-time assessment has utilised the AS/NZS4282:2019 Control of the obtrusive effects of outdoor lighting, which aims to manage lighting on the ground and does not contemplate aerial light sources.

15.3.4.2 General assumptions

The assumptions that have been applied in this assessment concerning the movement and type of aircraft are detailed in Table 15.9.

Table 15.9 General assumptions

Feature	Assumption
General	Views of aircraft flying overhead are transient, typically of short duration and viewed at varying distances. It is assumed that the greater the distance from WSI, the higher aircraft would be and therefore the less visually prominent these aircraft are in views toward them. Based on the orientation of Runway 05/23, aircraft would typically move on a generally north-east to south-west axis. A considerable number of aircraft would be viewed across Western Sydney, or along a corridor to the north-east and south-west. The patterns of movement would be relatively consistent but would alter day to day according to weather conditions.
Flight path corridors	There will be some variation as to where different aircraft will be on the flight path because aircraft perform slightly differently or may be affected by weather conditions. The variation of aircraft around a nominated flight path is referred to as dispersion. This broad band of dispersion is known as the flight path corridor. This caters for aircraft dispersion either side of the nominal centreline. The flight path corridor will progressively widen as the distance increases from the runway.
Hours	Day-time operations at WSI occur between 5.30 am and 11 pm, extending beyond daylight hours. Night operations are between 11 pm and 5.30 am. The assessment of visual impacts at night has been undertaken based on the 'night-time' flight paths (between 11 pm and 5.30 am), as well as the 'day-time' flight paths which would be used during periods of darkness (between sunset and 11 pm). Aircraft typically have at least 3 flashing red and white navigation lights, which are more visible at night. Actual lighting, however, can vary and include red, green and white lights on the wingtips and tail which may be steady or flashing, appearing visible at night. During final approach there are also landing lights which can be steady or pulse/strobe and can be visible at some distance. These lights may be used during low visibility conditions and not necessarily only at night.
Frequency	The frequency of flights has been based on the data used for Technical paper 1. The distribution of flights throughout the day and detailed flight scheduling is not yet known.
Altitude and existing landform	The description of flight altitude is usually an above sea level measurement. In Western Sydney, the landform varies up to 100 meters (m) above sea level, which is not a material viewing height when considering the altitude of visible flights. At the Blue Mountains, however, where there is substantial increase in the height of the landform, relative to sea level, assumptions have been made in relation to flight path altitudes. For further detail on elevation and altitude, refer to Section 6.3 in Technical paper 7.

Feature	Assumption
Aircraft type	This assessment has considered views to jet aircraft only. In particular, a typical large aircraft and a smaller aircraft representing the likely aircraft size that would most frequently operate at WSI: • B777 – typical of the wide-body type of aircraft predicted to fly from WSI (about 73 m long) • A320 – expected to be the most flown aircraft at WSI (about 37.6 m long). Whilst not the most frequently flown, the B777 was selected as it is one of the largest aircraft and would be likely to cause the greatest landscape character and visual impact.
Contrails	Contrails form when aircraft are at very high altitudes (normally above 26,000 ft or 8,000 m), the air is very cold and there is a large amount of water vapor in the air (high humidity). At the altitudes contrails are formed, they form a small part of the view to the sky and can be seen in the context of clouds (which can reduce their visibility). Contrails typically form straight lines, and can be especially noticeable in sensitive natural areas such as the GBMA because they are linear features, unlike most natural clouds. While the formation of contrails is variable, when present they can draw attention to and increase the visibility of distant aircraft, particularly when there is heavy flight traffic. Contrails can also remain for long periods of time after the aircraft has passed depending on atmospheric conditions.

15.4 Existing environment

15.4.1 Landscape character zones

Based on similar topography, vegetation type and cover, land use and built form (existing and emerging), 12 landscape character zones have been identified. The zones were also based on the landscape character zones identified in the 2016 EIS and have been updated to reflect recent changes in the landscape and planned future landscape character. The location of these landscape character zones are shown in Figure 15.4, and are described further in Section 15.4.1.1.

The Blue Mountains landscape has been considered in addition to the 12 landscape character zones, and is described in Section 15.4.1.2.

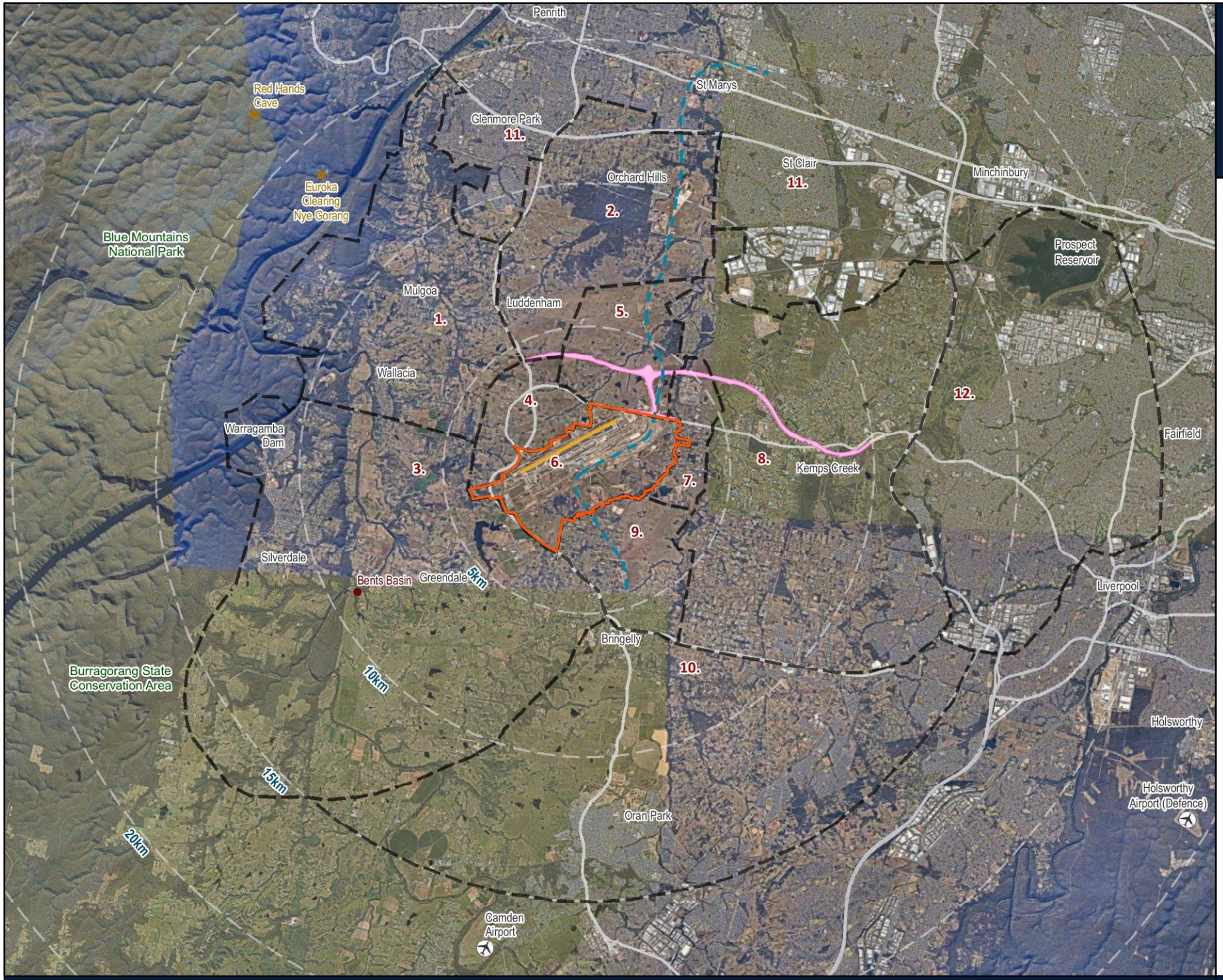

Figure 15.4

Landscape character plan - Western Sydney

Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Radial distances
- Proposed M12 Motorway
- Draft landscape character zones
- Railway
- Proposed Sydney Metro
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

The corresponding character zones

1. Penrith rural south-west landscape
2. Penrith south-east rural transition landscape
3. Greendale and Silverdale rural and residential landscape
4. Luddenham village and agricultural precinct
5. Northern Gateway precinct
6. WSI
7. Badgerys Creek landscape
8. Kemps Creek and Rossmore rural residential landscape
9. Aerotropolis core precinct
10. Leppington rural residential landscape
11. South Penrith urban area
12. Western Sydney Parklands landscape

0 2 4 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:175,000 Date: 10/08/2023

Data sources: - DITRDC, DCS, Geoscience Australia
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

15.4.1.1 Western Sydney

Penrith rural south-west landscape character zone (LCZ1)

Landscape character zone LCZ1 is broadly located along the eastern foothills of the Blue Mountains, encompassing the Nepean River valley. The landscape has significant environmental conservation lands which shape its character, including the Blue Mountains National Park and Mulgoa Nature Reserve.

This entire landscape character zone is identified in the Penrith Rural Lands Strategy as a Metropolitan Rural Area and within the rural edge of Penrith. Dwellings and villages are scattered through the landscape with modified waterways and scattered or sparsely vegetated areas (beyond the conservation lands).

Several features in the landscape character zone are recognised as having scenic and cultural landscape values, including the Nepean River, several State and local heritage sites in the Mulgoa Valley and The Northern Road corridor.

LCZ1 is overflown by flights from Sydney (Kingsford Smith) Airport, Bankstown Airport, Camden Airport and other airports in the region, as well as flying training areas. Whilst some of these overflights are high, flying training activity at lower altitudes is allowed in this area. Aircraft are likely to be seen in the airspace over this area, which influences the character of LCZ1.

The landscape character zone is presently of low sensitivity. It would remain as low sensitivity in 2033 and 2055, noting the zone is within the Metropolitan Rural Area and should remain predominantly rural.

Penrith south-east rural transition landscape character zone (LCZ2)

Landscape character zone LCZ2 consists of established and planned urban areas of Penrith as well as areas of rural-residential with local heritage places. It broadly encompasses the suburbs of Orchard Hills, Kemps Creek, Mount Vernon, Badgerys Creek and Luddenham. While currently rural land, a large part of this zone would eventually develop into urban areas with associated infrastructure, including:

- residential development emerging within the Orchard Hills Urban Investigation Area
- major infrastructure projects such as Sydney Metro Western Sydney Airport (including the Orchard Hills Metro Station), Western Sydney freight line and the Outer Sydney Orbital.

Vegetation is mostly scattered or sparsely distributed through the landscape. South Creek would provide a green break within the zone. The Defence Establishment Orchard Hills site also plays an important conservation role with much of the vegetation on the site protected.

LCZ2 is currently overflown by flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports in the region, as well as flying training areas. Whilst some of these overflights are high, there is also some flying training activity at lower altitudes. Aircraft are likely to be seen in the airspace over this area, which influences the character of LCZ2.

The landscape character zone is presently of moderate sensitivity, and would remain as moderate sensitivity in 2033 and 2055.

Greendale and Silverdale rural and residential landscape character zone (LCZ3)

Landscape character zone LCZ3 is located to the south-west of WSI, comprising the rural and suburban areas of Greendale, Warragamba and Silverdale along the Nepean River valley. The majority of this landscape is zoned for primary production and is characterised by acreage lots and small farms on gently undulating landform. The southern part of this landscape includes the University of Sydney's Camden farm. Gulguer Nature Reserve and Bents Basin State Conservation Area are located along the Nepean River comprising dense native bushland and walking trails.

LCZ3 is overflown by flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports in the region, as well as flying training areas. The suburbs of Greendale and Silverdale are located under a departure flight path from Bankstown Airport and flights arriving at Camden Airport. There would also be flying training activity of smaller aircraft at lower altitudes in the area. Combined, these aircraft would influence the character of LCZ3.

The landscape character zone is presently of low sensitivity, and would remain as low sensitivity in 2033 and 2055.

Luddenham village and agricultural precinct landscape character zone (LCZ4)

Landscape character zone LCZ4 is located to the west of WSI and includes the historic village of Luddenham, surrounded by agricultural production areas. Luddenham Village is located on a ridgeline and contains several local heritage items. Strategic planning for the village is ongoing, but is envisioned that the village would grow as a local centre to support WSI and to provide the tourist and cultural hub for the Aerotropolis.

The area surrounding the Luddenham Village Precinct is designated in strategic plans as the Agribusiness Precinct. An enterprise zone is also proposed at the northern end of the landscape character zone, adjacent to the Northern Gateway. This would include developments such as logistics, food production and processing. A network of open space and parkland is also proposed to follow existing creek lines. Duncans Creek reservoir would also be rehabilitated, providing passive recreation. The Northern Road (a 4-lane divided road) is located to the east of Luddenham village, bypassing the village.

There is air traffic across LCZ4 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports in the region. Part of this area is also overflown by flying training areas based around Bankstown Airport and Camden Airport. While some of these overflights are high, the flying training activity can occur at lower altitudes. Luddenham is located under a departure flight path from Bankstown Airport. Combined, these aircraft would influence the character of LCZ4.

The landscape character zone is presently of moderate sensitivity. While the future enterprise zone would reduce the sensitivity of this landscape character zone, it would remain as moderate sensitivity in 2033 and 2055 due to the density of residential development.

Northern Gateway precinct landscape character zone (LCZ5)

Landscape character zone LCZ5 is located to the north of WSI, between Elizabeth Drive and the Warragamba pipeline. Dwellings and villages are scattered through the landscape with modified waterways and scattered or sparsely vegetated areas. Although it is largely rural, this landscape would develop as the Northern Gateway. The Northern Gateway is a future employment precinct that would support WSI (including warehousing, distribution and manufacturing developments) with an open space network aligned with existing creek lines (referred to as the Northern Gateway). The Northern Gateway would expand from the approved Sydney Science Park and transition into an employment precinct, with supporting residential areas.

The approved Sydney Metro Luddenham Station would be located near Luddenham Road, and the M12 Motorway (under construction) is located in the centre of this landscape.

There is air traffic across LCZ5 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports in the region. Part of this area is also overflown by flying training areas based around Bankstown Airport and Camden Airport. While some of these overflights are high, the flying training activity occurs at lower altitudes. The Northern Gateway precinct is located under an arrival and departure flight path to Bankstown Airport. Combined, these aircraft would influence the character of LCZ5.

The landscape character zone is presently of low sensitivity and would be of very low sensitivity in 2033 and 2055, given the area would transition to an employment precinct.

WSI landscape character zone (LCZ6)

Landscape character zone LCZ6 is changing from a largely undulating rural area to a major international airport. Construction commenced in 2018. This landscape would include 2 Metro stations. The Airport Business Park Station precinct would become a major employment and services hub and key interchange for customers working in the local area.

There is air traffic currently operating across LCZ6 with flights from Sydney (Kingsford Smith) Airport and Bankstown Airport, as well as flying training areas. Whilst some of these overflights are high, there is some flying training activity at lower altitudes in the area influencing the character of LCZ6.

The landscape character zone is highly modified landscape and is of very low sensitivity now and in the future (2033 and 2055).

Badgerys Creek landscape character zone (LCZ7)

Landscape character zone LCZ7 is generally located to the east of WSI, between Badgerys Creek and Wianamatta-South Creek corridors. This landscape currently includes large lot rural residential and small lot agricultural uses. This zone is planned to transform to intensive technology, manufacturing and industry uses adjacent to WSI.

There is air traffic across LCZ7 with flights from Sydney (Kingsford Smith) Airport and Bankstown Airport, as well as flying training areas. Whilst some of these overflights are high, there is flying training activity at lower altitudes in the area. Badgerys Creek is also located under a departure flight path from Bankstown Airport. These flights influence the character of LCZ7.

The landscape character zone is presently of low sensitivity. As this area would transition to business and industrial uses, the area would be of very low sensitivity in 2033 and 2055.

Kemps Creek and Rossmore rural residential landscape character zone (LCZ8)

Landscape character zone LCZ8 is located to east of WSI. It includes the Wianamatta-South Creek and Kemps Creek corridors, and surrounding rural and residential areas of Kemps Creek and Rossmore. Under the Aerotropolis Precinct Plan, the Wianamatta-South Creek corridor would provide a green break between surrounding urban development and would include sporting fields, walking trails and community facilities.

The northern part of this landscape would change from rural landscape character to industrial, forming part of the Western Sydney Employment Area. The southern part of this landscape character zone would likely transition to urban development as part of the South West Growth Area.

There is air traffic across LCZ8 with flights from Sydney (Kingsford Smith) Airport and Bankstown Airport, as well as flying training areas. Whilst some of these overflights are high, there is also flying training activity at lower altitudes in the area. Kemps Creek is also located under a departure flight path from Bankstown Airport. Aircraft are operating in the airspace over this area, which influences the character of LCZ8.

The landscape character zone is presently of low sensitivity. While it would transition to industrial uses in the southern part of the landscape character zone (thereby lowering the sensitivity of some areas), there are existing and planned areas of parkland and residential uses elsewhere within the zone (thereby increasing sensitivity). Overall, the sensitivity would remain low in 2033 and 2055.

Aerotropolis core precinct landscape character zone (LCZ9)

Landscape character zone LCZ9 is generally located to the south-east of WSI, between WSI and Bringelly Road. This landscape currently includes large lot rural residential and small lot agricultural uses.

This zone would transform to a dense urban precinct planned around the future Aerotropolis Metro station (located east of Badgerys Creek Road). It would include a new regional park system along Thompsons Creek and the new Bradfield City Centre. While the land use focus is on employment and economic development, it would include residential development.

There is air traffic across LCZ9 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and Camden Airport, as well as flying training areas. Whilst some of these overflights are high, there is some flying training activity operating at lower altitudes. The Aerotropolis precinct is also located under arrival and departure flight paths from both Bankstown Airport and Camden Airport. Aircraft are visible in the airspace over this area, influencing the character of LCZ9.

The landscape character zone is presently of low sensitivity. As this area would transition to urban land uses, it would be of moderate sensitivity in 2033 and 2055.

Leppington rural residential landscape character zone (LCZ10)

Landscape character zone LCZ10 is located to the south of Bringelly Road. It is characterised by large, rural residential lots and farms on undulating topography. This landscape forms part of the South West Growth Area and would include major urban development in the future, such as a town centre, rail connections, low and medium density residential areas and major community facilities.

There is air traffic across LCZ10 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and Camden Airport, as well as flying training areas. Part of this zone is also within the Camden airspace. Whilst some of the overflights are high, there are also some flying training activity at lower altitudes. The Leppington area is also located under arrival and departure flight paths from both Bankstown Airport and Camden Airport. Aircraft are visible in the sky above this area, which influences the character of LCZ10.

The landscape character zone is currently of low sensitivity. As it would transition to urban land uses over time (including a town centre), it would be of moderate sensitivity in 2033 and 2055.

South Penrith urban area landscape character zone (LCZ11)

Landscape character zone LCZ11 is located to the north of WSI, south of Penrith. It is characterised by an undulating topography with mixture of urban uses (low density residential, industrial areas and parkland). This landscape forms part of the urban area of Penrith. Sydney Metro will extend through this landscape between Orchard Hills and St Marys.

There is air traffic across LCZ11 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports in the region, as well as flying training areas. This may include low altitude emergency services helicopter activity. The South Penrith precinct is also located under the arrival flight path to Bankstown Airport. Aircraft and helicopters would be seen in the airspace over this area, influencing the character of LCZ11.

The landscape character zone is of moderate sensitivity now and in the future (2033 and 2055).

Western Sydney Parklands landscape character zone (LCZ12)

Landscape character zone LCZ12 is located to the east of WSI, forming part of the Western Sydney Parklands. The parklands provide open space for the growing population in Western Sydney. It is characterised by large areas of open space, including park and bushland along Eastern Creek and the Prospect Reservoir.

There is air traffic across LCZ12 with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and Camden Airport, as well as flying training areas. Whilst some of these overflights are high, there would also be flying training activity at lower altitudes. The Western Sydney Parklands are located under several arrival and departure flight paths to and from Bankstown Airport. There would be flights seen over this area and have some influence over the character of LCZ12.

The landscape character zone is of moderate sensitivity now and in the future (2033 and 2055).

15.4.1.2 Blue Mountains landscape

The Blue Mountains is located to the west of WSI and includes both natural and urban areas. The Blue Mountains landscape that has been considered in this assessment includes part of the GBMA and adjacent conservation lands as well as the towns, villages and bushland areas alongside the Great Western Highway. While there is a diverse mosaic of landscapes within the study area of the Blue Mountains, 3 broad landscape character zones have been identified for this assessment.

As outlined in Chapter 4 (Project setting), the GBMA is listed for its natural values. The *Greater Blue Mountains World Heritage Area Strategic Plan* (NSW DECC, 2009) does identify a number of other values and attributes which contribute to the GBMA. This is discussed further in Section 15.5.1.3.

Blue Mountains iconic features landscape character zone (LCZ13)

Landscape character zone LCZ13 includes the striking landscape formations that are unique to the GBMA, such as the dramatic landform (vertical cliffs, sandstone canyons, pedestals and pagoda rock formations) and native vegetation. It comprises a high level of tranquillity and wilderness with minimal evidence of human presence. Images of this landscape character zone is provided in Figure 15.5.

Aircraft presently pass over this landscape character zone. Generally, the larger aircraft are travelling at higher altitudes and some smaller aircraft and helicopters are seen generally at a lower altitude. Aircraft are visible but do not strongly influence the character of the zone. The landscape character zone is of very high sensitivity now and in the future (2033 and 2055).

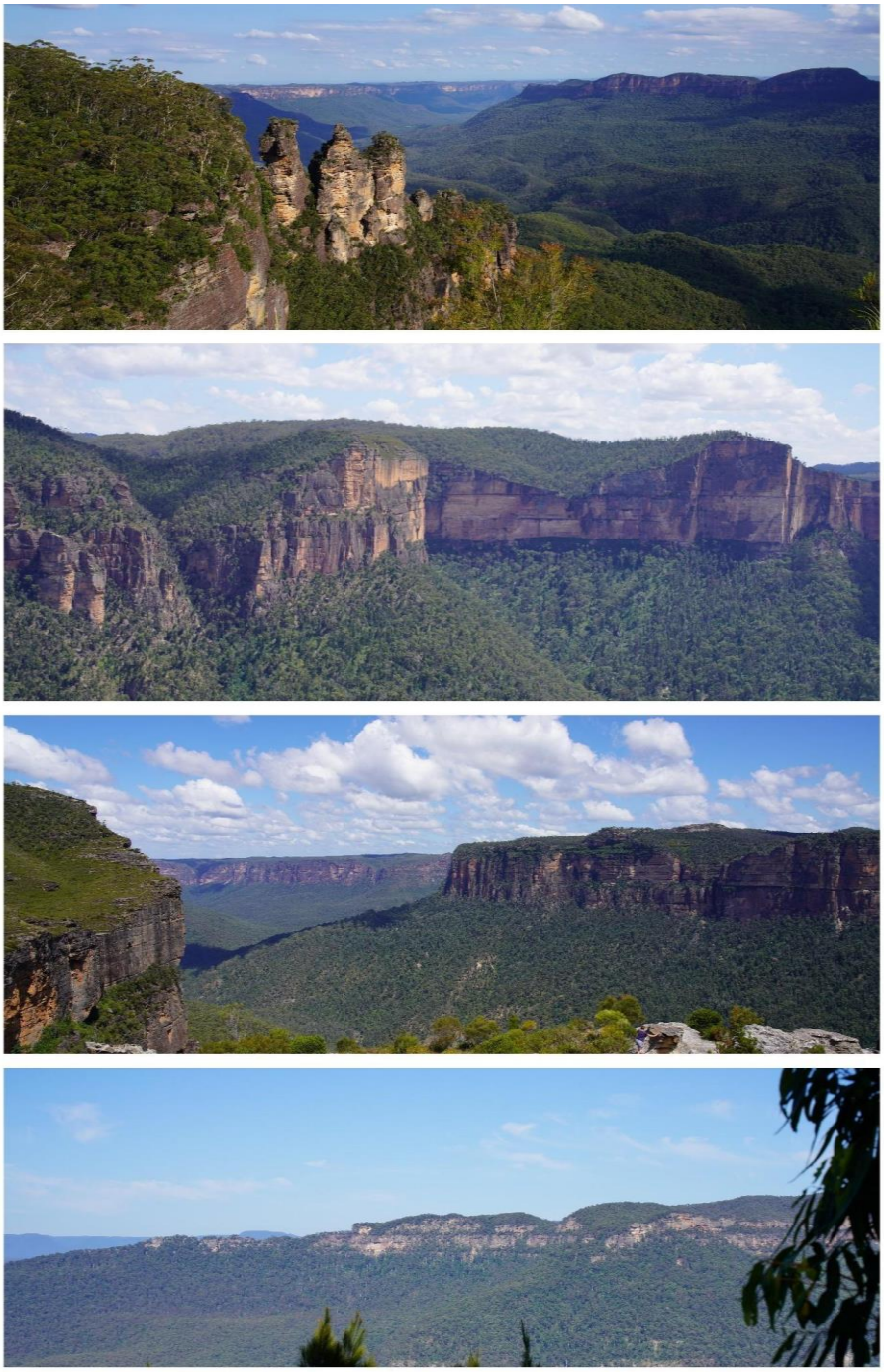

Figure 15.5 Examples of the Blue Mountains iconic features landscape character zone

Blue Mountains forested hills and valleys landscape character zone (LCZ14)

Landscape character zone LCZ14 includes the undulating forested hills and valleys located between and alongside the striking landscape formations. This zone includes landscape features such as steep hillsides, valleys, canyons and lakes. This area is dominated by eucalyptus species unique to the GBMA. The wide expanse of the forest and minimal built features also creates a strong sense of remoteness and tranquillity. It has some human presence, such as camp grounds, access roads and picnic areas. Images of this landscape character zone is provided in Figure 15.6.

There is air traffic visible across this landscape character zone, with flights from Sydney (Kingsford Smith) Airport, Bankstown Airport and other airports across the region. These overflights are high and do not strongly influence the character of this zone. The landscape character zone is of high sensitivity now and in the future (2033 and 2055).

Figure 15.6 Examples of the Blue Mountains forested hills and valleys landscape character zone

Blue Mountains township spine landscape character zone (LCZ15)

Landscape character zone LCZ15 includes the towns and villages within the Blue Mountains local government area either side of the Great Western Highway (such as Blaxland, Woodford and Katoomba). These towns and villages each contain a unique built form, character and sense of place, and are valued locally and regionally (Blue Mountains City Council, 2020). The residential areas accommodate most of the population of the Blue Mountains and are typically low density.

This zone also includes the land between the towns, outside of the GBMA, alongside the Great Western Highway. These vegetated areas are considered to be of high amenity and landscape value. Local strategic planning strategies and plans aims to retain the character of this zone.

Aircraft presently pass over this landscape character zone, which influence the character of the zone, particularly near Katoomba.

The landscape character zone is of moderate sensitivity now and in the future (2033 and 2055).

15.4.2 Viewpoints – Western Sydney

The viewpoints within Western Sydney for the assessment are described in Table 15.10 and identified in Figure 15.7. Figures showing the view from each of the viewpoints are included in Section 15.5.2.1 and further figures can be found in Section 8.1.1 of Technical paper 7.

Table 15.10 Viewpoints – Western Sydney

Viewpoint	Description	Sensitivity
1 – View from Orchard Hills	An elevated view to a varied landscape comprising small lot farms and suburban development in Orchard Hills, low-lying rural areas along Blaxland and South creeks, and industrial development at Erskine Park. The vegetated ridgeline of Prospect Reservoir and vegetation within the Western Sydney Parkland is a scenic landscape feature. This view would be experienced by concentrations of residents and is of local scenic value. The area is planned to transition to urban uses.	Low (2022 baseline, 2033 and 2055)
2 – View from George Maunder Lookout, Prospect Reservoir	An elevated view at the eastern side of Prospect Reservoir (a heritage item). The reservoir and surrounding parkland have aesthetic and recreational values. The vegetated hills in the GBMA are a scenic landscape feature, providing a backdrop to the view. This view is a view from a regionally important recreational area and includes a regionally important area of open space in the view.	Moderate (2022 baseline, 2033 and 2055)
3 – View from Walworth Road, Horsley Park	An elevated view across rural areas of Horsley Park including small lot farms with scattered dwellings, rural structures and transmission lines. The partly vegetated ridgeline conceals views to low lying industrial areas of Kemps Creek and construction of WSI and beyond. The vegetated hills in GBMA are a scenic landscape feature, providing a backdrop to the view. This is a view experienced by a concentration of residents and includes some areas of local and regional scenic value. In future years, planned urban development would be seen in this view.	Low (2022 baseline, 2033 and 2055)

Viewpoint	Description	Sensitivity
4 – View from Mamre Road, Kemps Creek	View across rural areas in Kemps Creek and Mount Vernon, including small lot farms with scattered rural dwellings and sheds as well as transmission line structures. The vegetated valleys of Kemps and South creeks conceal the areas under construction at WSI. The vegetated hills in GBMA are a scenic landscape feature. This view is experienced by some residents and passing traffic and includes some glimpses to areas of local and regional scenic value. In future years, planned urban development would be seen in this view.	Low (2022 baseline, 2033 and 2055)
5 – View from Luddenham Village	View from the southern edge of the Luddenham village centre, a heritage place with attractive scenic qualities. The Northern Road separates the undulating rural area surrounding Luddenham from WSI. The vegetated valley of Badgerys Creek is a scenic landscape feature, providing a backdrop to the view. This view would be experienced by a dense concentration of residents and includes some glimpses to areas of local scenic value.	Moderate (2022 baseline, 2033 and 2055)
6 – View from Orangeville	An elevated view across rural lands from Silverdale Road, which includes the low-lying rural areas along the Nepean River valley. The undulating terrain and mature vegetation along Bushrangers Creek is a landscape feature with local scenic value. This view would be experienced by a small number of residents and includes landscape areas of local scenic value.	Low (2022 baseline, 2033 and 2055)
7 – View from Silverdale	An elevated view from the top of Kalangara Road, which includes the low density residential areas of Silverdale and low-lying rural areas along the Nepean River valley. The mature vegetation along the Nepean River is a landscape feature in this view, with local scenic value. This view would be experienced by a concentration of residents and includes landscape areas of local scenic value.	Low (2022 baseline, 2033 and 2055)
8 – View from Warragamba Dam Lookout	An elevated view from Warragamba Dam Lookout, with views to the water body, the dam wall and spillway, surrounded by dense bushland. The vegetation to the west of the dam forms part of GBMA and is a scenic landscape feature in the background of view. This view would be experienced by a concentration of recreational users and includes landscape areas of regional scenic value.	Moderate (2022 baseline, 2033 and 2055)

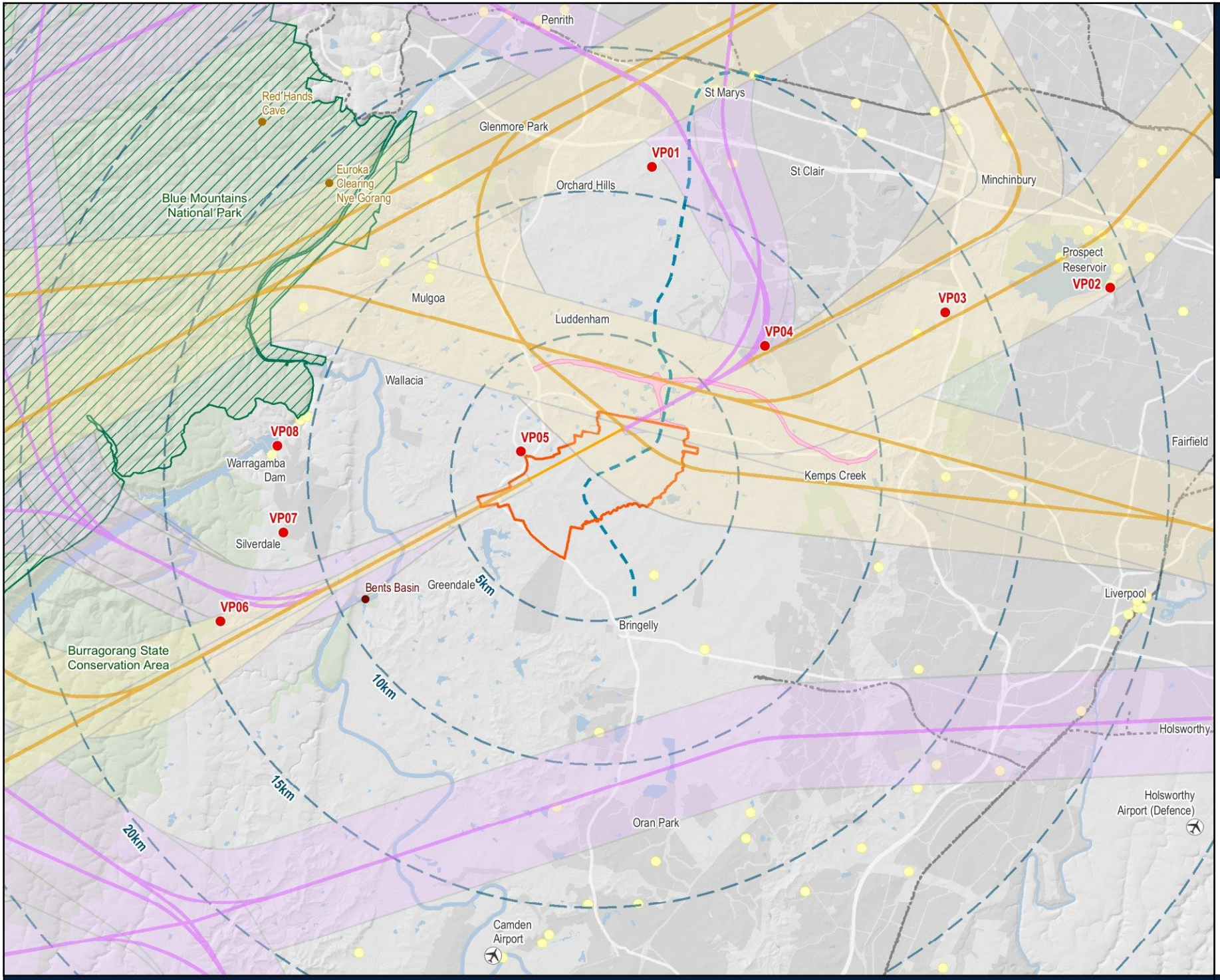

Figure 15.7

Viewpoints - Western Sydney

Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Proposed M12 Motorway
- Greater Blue Mountains World Heritage Area
- Railway
- Proposed Sydney Metro
- Viewpoint locations
- State Heritage Register location
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

Day time flight paths and swathes

- Arrivals
- Departures

VP01 - Homestead Rd, Orchard Hills
VP02 - George Maunder Lookout, Prospect Reservoir
VP03 - Walworth Road, Horsley Park
VP04 - Mamre Road, Kemps Creek
VP05 - St James Anglican Church, Luddenham Village
VP06 - Silverdale Road, Orangeville
VP07 - Kalangara Road Silverdale
VP08 - Warragamba Dam Lookout

0 2 4 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:175,000 Date: 10/08/2023

15.4.3 Viewpoints – Blue Mountains

The Blue Mountains region is a popular destination that offers highly scenic views to the GBMA from lookouts and other vantage points as well as when travelling along the major routes in the region (such as the Great Western Highway and Bells Line of Road). Within the bushland areas, there are scattered facilities for hiking, swimming and picnicking as well as camp grounds.

The viewpoints within the Blue Mountains region for the assessment are described in Table 15.11 and identified in Figure 15.8. Figures showing the views are included in Section 15.5.2.2 and further figures can be found in Technical paper 7 (Section 8.1.2).

Views from campground and day-use areas (Figure 15.9) and scenic routes (Figure 15.10) are also included in Table 15.11.

Table 15.11 Viewpoints – Blue Mountains

Viewpoint	Description	Sensitivity
Lookouts		
9 – View from the Burragorang Lookout, The Bluff	An elevated view that overlooks the deep waters of the Burragorang Valley and the Warragamba Dam. Surrounded by rocky escarpments and dense bushland, the lookout provides expansive views containing landscapes of high scenic value. It includes forested wilderness covered by natural vegetation but does not include the iconic landforms of the Blue Mountains (being the striking vertical cliffs, waterfalls, ridges and escarpments, narrow sandstone canyons and pagoda rock formations). This is a unique view to an area with scenic values recognised by the State.	High (2022 baseline, 2033 and 2055)
10 – View from The Rock Lookout	An elevated view that includes views of the Nepean River valley and surrounding dense bushland. The lookout provides views of areas containing high scenic value within an area of national importance. It includes forested wilderness covered by natural vegetation but does not include the iconic landforms of the Blue Mountains. This is a unique view to an area with scenic values recognised by the State.	High (2022 baseline, 2033 and 2055)
11 – View from Portal Lookout	An elevated view overlooking the junction between Glenbrook Gorge and the Nepean River. The lookout provides expansive views containing very high scenic value of national importance. While this view includes forested wilderness covered by natural vegetation, it does not include the iconic landforms of the Blue Mountains. This is a unique view to an area with scenic values important to the region and State.	High (2022 baseline, 2033 and 2055)
12 – View from Hawkesbury Lookout	A roadside lookout that provides an elevated view to the south-west across the Cumberland Plain (including the Nepean River, Wianamatta Park and Penrith). It is a popular rest-stop enroute to the Blue Mountains and is of regional importance. This is a unique view to an area with scenic values important to the region.	Moderate (2022 baseline, 2033 and 2055)

Viewpoint	Description	Sensitivity
13 – View from Wynnes Rocks Lookout	An elevated view that provides an expansive views south-east across Bowen's Creek to the Blue Mountains and Mounts Tomah, Hay and Banks. This view includes forested wilderness covered by natural vegetation but does not include the iconic landforms of the Blue Mountains. This is a unique view to an area with scenic values important to the State.	High (2022 baseline, 2033 and 2055)
14 – View from Walls Lookout	An elevated view overlooking the Grose Valley. Surrounded by rocky escarpments and bushland defining the Little Blue Gum canyon, the lookout is representative of several other lookouts in the immediate area. These lookouts provide expansive views containing very high scenic value of national importance. This view includes iconic landforms of the Blue Mountains including striking vertical cliffs, sandstone canyons. This is a unique and heavily experienced view to an area with scenic values of national and international importance.	Very high (2022 baseline, 2033 and 2055)
15 – View from Echo Point Lookout	An elevated view that offers panoramic views across the GBMA, including the Three Sisters, Jamison Valley, Mount Solitary and Narrow Neck. The lookout provides views of areas containing very high scenic value of national importance. This view includes iconic landforms of the Blue Mountains including striking vertical cliffs, sandstone canyons and pagoda rock formations. This is a unique and heavily experienced view to an area with scenic values of national and international importance.	Very high (2022 baseline, 2033 and 2055)
16 – View from Cleary Memorial Lookout, Kedumba Pass	An elevated view offering limited views across GBMA. The lookout offers glimpsed views of areas containing high scenic value including views to Mount Solitary. This viewpoint is not formalised and would attract a relatively small number of visitors compared to more accessible viewing locations. Aircraft flying over Katoomba and this part of the Blue Mountains are visible from this location. This is an infrequently experienced view to an area with scenic values of importance to the Nation.	High (2022 baseline and 2033) Moderate (2055)
Campgrounds and day-use areas		
Views from campgrounds and day use areas	There are many camp sites and day use areas within the Blue Mountains offering a variety of activities and experiences, including overnight stays, picnicking, hiking and swimming. Some of the remote wilderness areas do not have designated camp grounds. These sites vary in what they have to offer, but are generally scenic landscapes. Examples of these types of sites include Murphys Glen campground, Euroka campground, Wentworth Falls and Katoomba Falls, Mount Banks Picnic Area and lookout.	High (2022 baseline, 2033 and 2055)
Scenic routes		
Views from scenic routes	The winding, undulating roads of the Great Western Highway and Bells Line of Road offer opportunities for open or semi-enclosed views to the Blue Mountains landforms. Views from these routes are experienced by large numbers of people and are used with the intention of appreciating views.	Moderate (2022 baseline, 2033 and 2055)

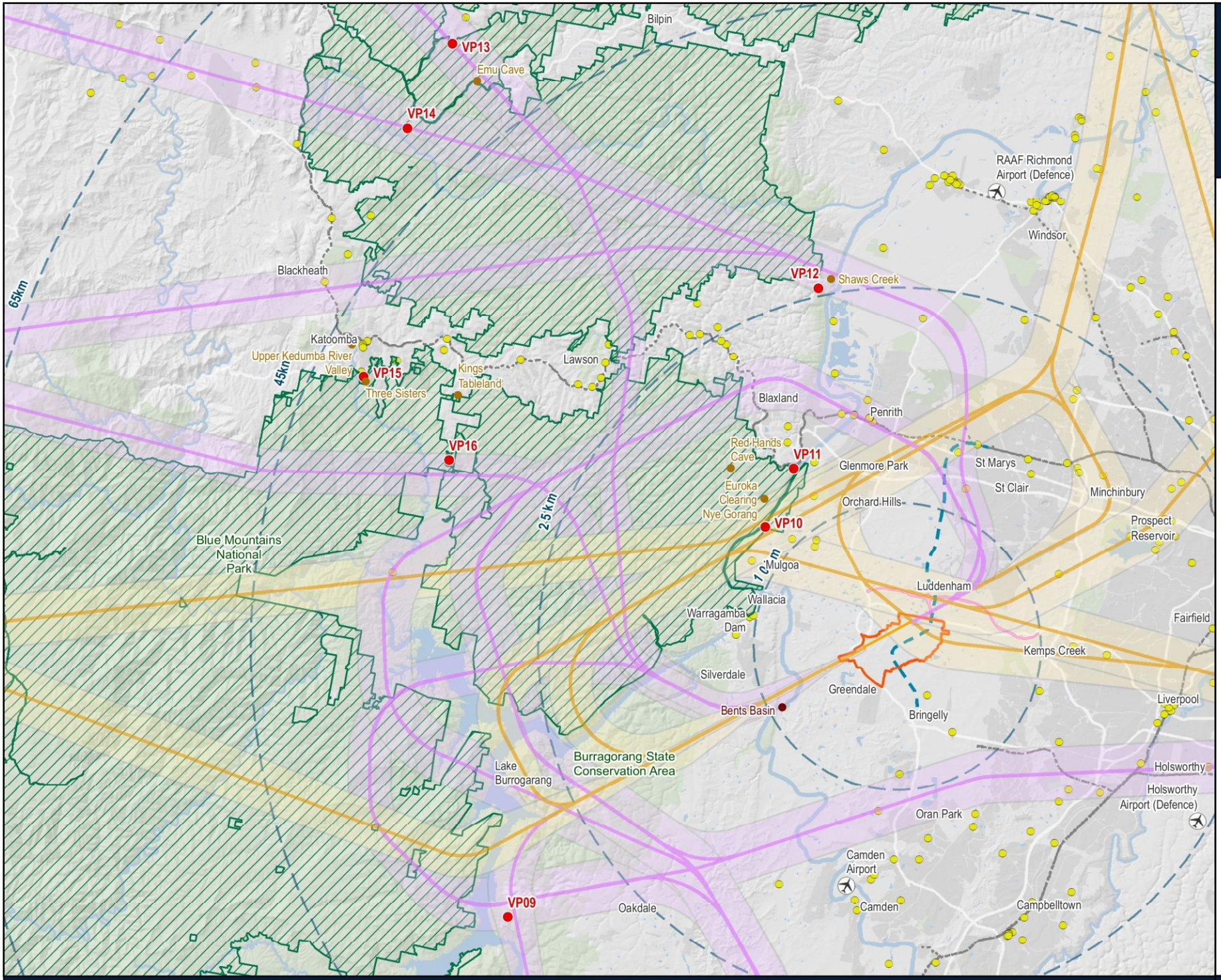

Figure 15.8

Viewpoints - Blue Mountains

Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Radial distances
- Proposed M12 Motorway
- Greater Blue Mountains World Heritage Area
- Railway
- Proposed Sydney Metro
- Viewpoint locations
- State Heritage Register location
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

Day time flight paths and swathes

- *Arrivals*
- Departures

VP09 - Burragorang Lookout, The Bluff
VP10 - The Rock lookout
VP11 - Portal lookout
VP12 - Hawkesbury Lookout
VP13 - Wynnes Rocks Lookout
VP14 - Walls Lookout
VP15 - Echo Point Lookout
VP16 - Cleary memorial lookout, Kedumba Pass

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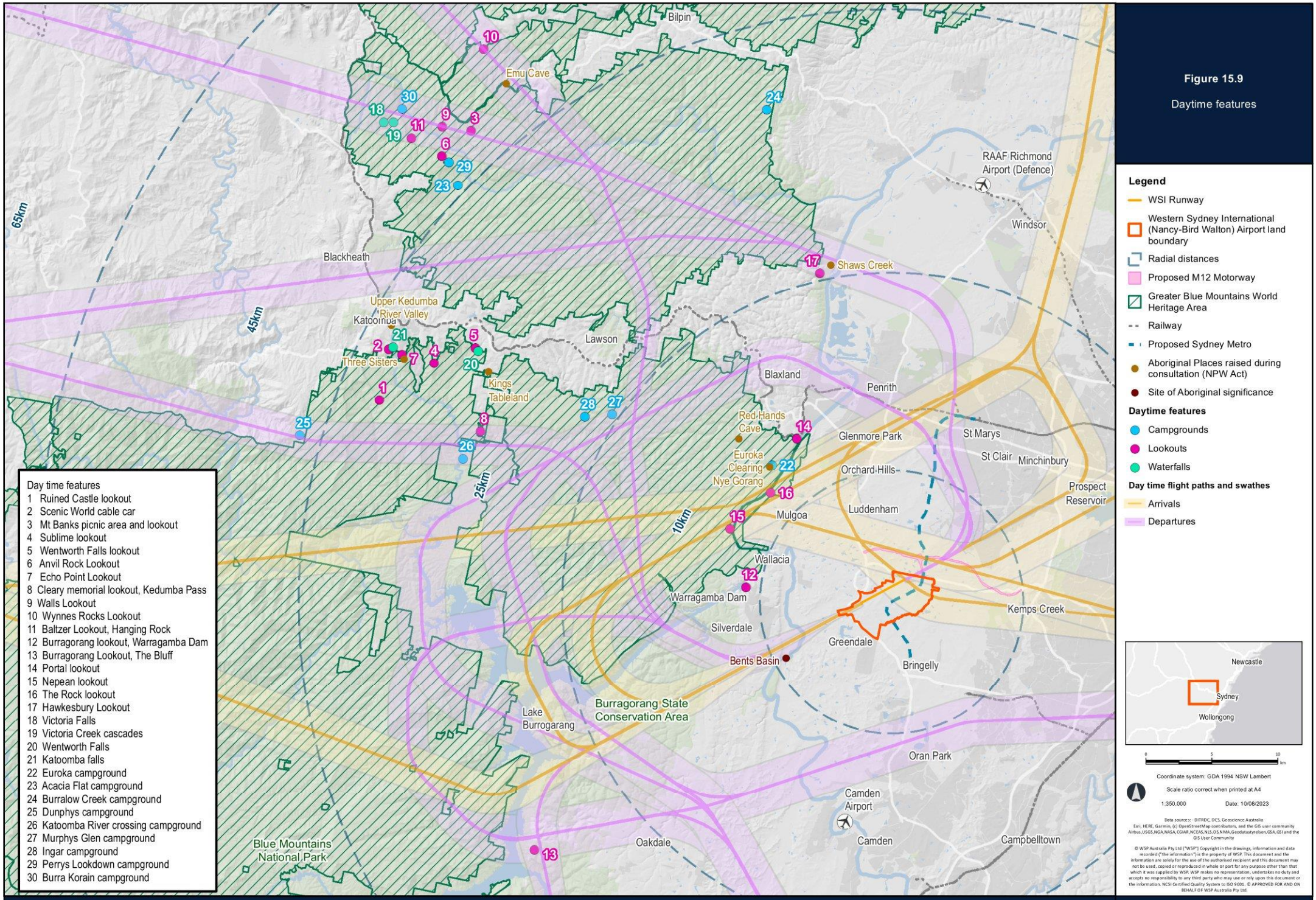
Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

1:350,000 Date: 10/08/2023


Bilpin
Emu Cave
RAAF Richmond Airport (Defence)
Windsor
Blackheath
Shaws Creek
Upper Kedumba River Valley
Katoomba
Three Sisters
Lawson
Kings Tableland
Blaxland
Penrith
Red Hands Cave
Glenmore Park
St Marys
St Clair
Minchinbury
Euroka Clearing
Nye Gorang
Orchard Hills
Prospect Reservoir
Luddenham
Mulgoa
Wallacia
Warragamba Dam
Kemps Creek
Silverdale
Greendale
Bents Basin
Bringelly
Lake Burrogarang
Burragorang State Conservation Area
Oran Park
Camden Airport
Camden
Campbelltown
Oakdale
Blue Mountains National Park
65km
45km
25km
10km
Day time features
1 Ruined Castle lookout
2 Scenic World cable car
3 Mt Banks picnic area and lookout
4 Sublime lookout
5 Wentworth Falls lookout
6 Anvil Rock Lookout
7 Echo Point Lookout
8 Cleary memorial lookout, Kedumba Pass
9 Walls Lookout
10 Wynnes Rocks Lookout
11 Baltzer Lookout, Hanging Rock
12 Burragorang lookout, Warragamba Dam
13 Burragorang Lookout, The Bluff
14 Portal lookout
15 Nepean lookout
16 The Rock lookout
17 Hawkesbury Lookout
18 Victoria Falls
19 Victoria Creek cascades
20 Wentworth Falls
21 Katoomba falls
22 Euroka campground
23 Acacia Flat campground
24 Burralow Creek campground
25 Dunphys campground
26 Katoomba River crossing campground
27 Murphys Glen campground
28 Ingar campground
29 Perrys Lookdown campground
30 Burra Korain campground
Figure 15.9
Daytime features
Legend
WSI Runway
Western Sydney International (Nancy-Bird Walton) Airport land boundary
Radial distances
Proposed M12 Motorway
Greater Blue Mountains World Heritage Area
Railway
Proposed Sydney Metro
Aboriginal Places raised during consultation (NPW Act)
Site of Aboriginal significance
Daytime features
Campgrounds
Lookouts
Waterfalls
Day time flight paths and swathes
Arrivals
Departures
Newcastle
Sydney
Wollongong
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Date: 10/08/2023
Data sources: - DITRDC, DCS, Geoscience Australia
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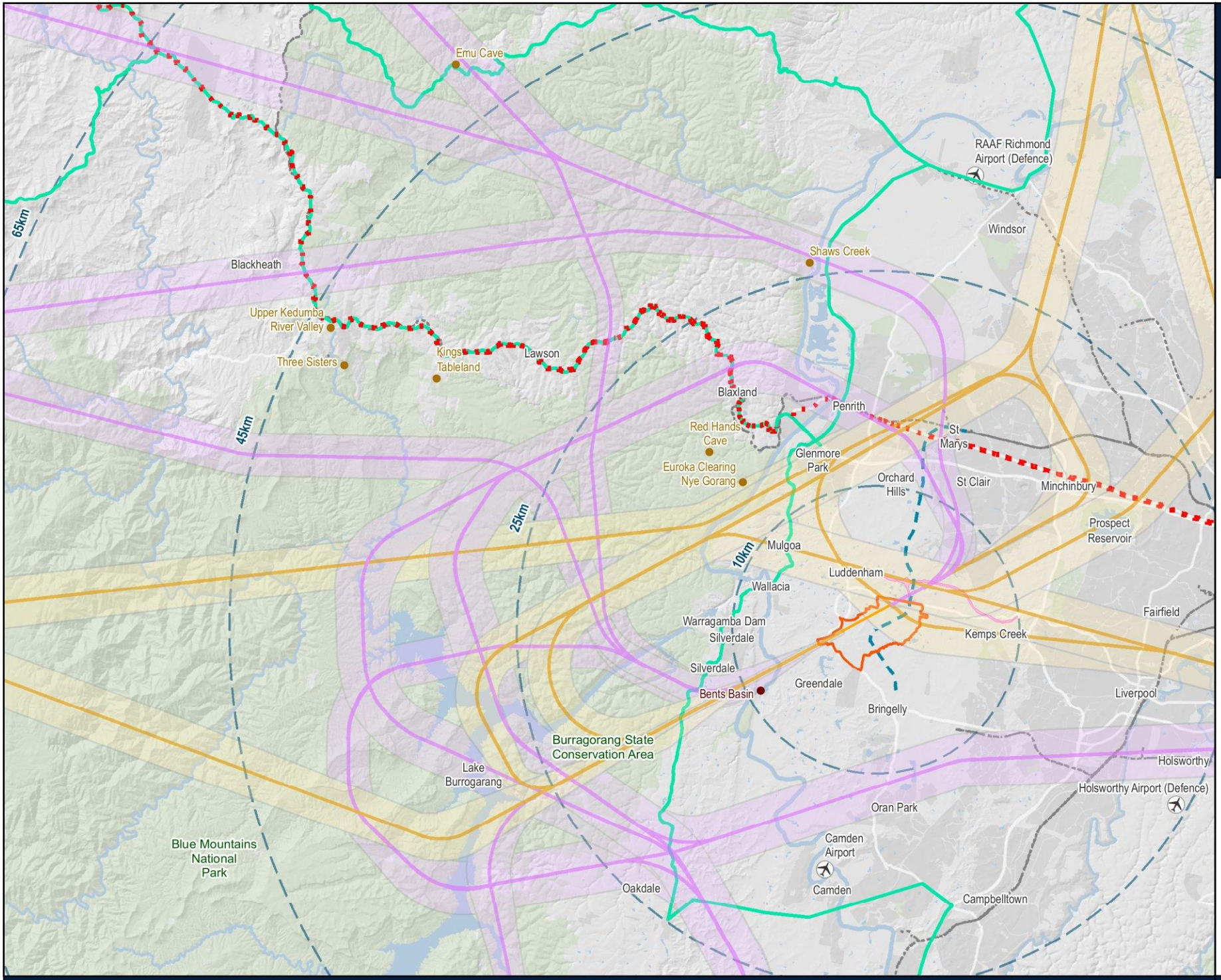


Figure 15.10

Scenic routes

Legend

- WSI Runway
- Western Sydney International (Nancy-Bird Walton) Airport land boundary
- Radial distances
- Proposed M12 Motorway
- Railway
- The Great Western Highway
- Proposed Sydney Metro
- Aboriginal Places raised during consultation (NPW Act)
- Site of Aboriginal significance

Scenic Routes

- Greater Blue Mountains Drive

Day time flight paths and swathes

- Arrivals
- Departures

0 5 10 km

Coordinate system: GDA 1994 NSW Lambert

Scale ratio correct when printed at A4

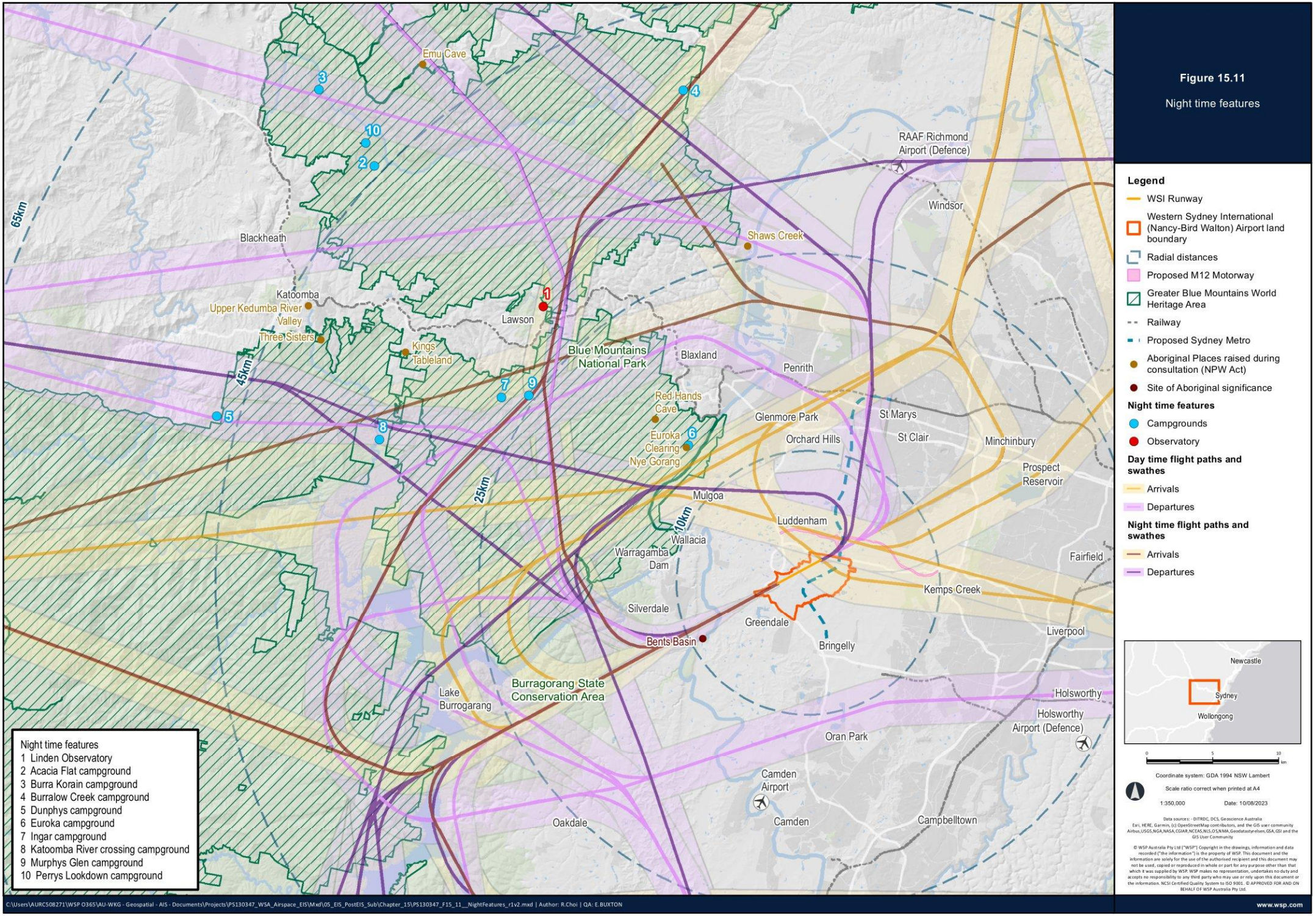
1:350,000 Date: 10/08/2023

15.4.4 Night-time visual environment

The night-time visual environment within the study area is described in Table 15.12 and night-time features are shown in Figure 15.11.

Table 15.12 Night-time sensitivity

Environmental zone	Areas	Sensitivity
Intrinsically dark landscape (A0)	National parks and reserves near WSI (Blue Mountains and Nattai National Park, Burragorang State Conservation Area). These areas generally do not contain light sources such as dwellings, with only lights from vehicles travelling along local roads or access tracks, and very low lighting from camp grounds. Occasional aircraft at night may be visible but are generally flying at higher altitudes.	Very high (2022 baseline, 2033 and 2055)
Medium district brightness (A3)	*Western Sydney:* The urban and semi-urban areas in the Western Sydney study area, with areas of general sky glow associated with concentrations of lighting within urban areas. This area also includes towns along the semi-rural and rural residential areas near WSI such as Silverdale, Warragamba and Greendale.	Low (2022 baseline, 2033 and 2055)
	Blue Mountains: Urban and semi-urban areas, such as towns along the Great Western Highway. This includes the Katoomba Falls Night-lit Walk and around Echo Point which provides night-time viewing of several natural features (lit until 11 pm).	Low (2022 baseline, 2033 and 2055)
	Linden Observatory: The Linden Observatory is a dark site used by the Western Sydney Amateur Astronomy Group. It is a State heritage listed place and offers members and the public to explore the night sky using their own telescopes.	High (2022 baseline, 2033 and 2055)
High district brightness (A4)	The brightly lit urban areas such as Penrith and St Marys, as well as the future Aerotropolis surrounding WSI which would be brightly lit once developed (including the Bradfield city centre).	Very low (2022 baseline, 2033 and 2055)


Emu Cave
RAAF Richmond Airport (Defence)
Windsor
Shaws Creek
Blackheath
65km
Katoomba
Upper Kedumba River Valley
Three Sisters
Kings Tableland
Lawson
Blue Mountains National Park
Blaxland
Penrith
45km
Red Hands Cave
Euroka Clearing
Nye Gorang
Glenmore Park
St Marys
St Clair
Orchard Hills
Minchinbury
Prospect Reservoir
25km
Mulgoa
10km
Luddenham
Wallacia
Warragamba Dam
Fairfield
Kemps Creek
Silverdale
Greendale
Bringelly
Liverpool
Bents Basin
Burragorang State Conservation Area
Lake Burrogarang
Holsworthy
Holsworthy Airport (Defence)
Oran Park
Camden Airport
Camden
Campbelltown
Oakdale
Night time features
1 Linden Observatory
2 Acacia Flat campground
3 Burra Korain campground
4 Burralow Creek campground
5 Dunphys campground
6 Euroka campground
7 Ingar campground
8 Katoomba River crossing campground
9 Murphys Glen campground
10 Perrys Lookdown campground
Figure 15.11
Night time features
Legend
WSI Runway
Western Sydney International (Nancy-Bird Walton) Airport land boundary
Radial distances
Proposed M12 Motorway
Greater Blue Mountains World Heritage Area
Railway
Proposed Sydney Metro
Aboriginal Places raised during consultation (NPW Act)
Site of Aboriginal significance
Night time features
Campgrounds
Observatory
Day time flight paths and swathes
Arrivals
Departures
Night time flight paths and swathes
Arrivals
Departures
Newcastle
Sydney
Wollongong
0 5 10 km
Coordinate system: GDA 1994 NSW Lambert
Scale ratio correct when printed at A4
1:350,000
Date: 10/08/2023
Data sources: - DITRDC, DCS, Geoscience Australia
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15.5 Assessment of impacts

15.5.1 Landscape character impacts

15.5.1.1 Western Sydney

Penrith rural south-west landscape character zone (LCZ1)

The landscape character impact for LCZ1 is detailed in Table 15.13.

In 2033, there would be several arrival flight paths over this landscape character zone. There would be up to a maximum of 55 and 68 flights per day for Runway 05 and Runway 23, respectively. Aircraft would be at an altitude of about 5,000 to 8,000 ft (1.5 to 2.4 km). No departure flights would pass over this landscape character zone.

In 2055, the number of flights would increase up to a maximum of around 138 and 184 flights per day for Runway 05 and Runway 23, respectively. The height of aircraft would reduce the influence on the landscape character zone, but there would be a steady stream of flights as multiple arrival flight paths converge upon approach to the airport.

Overall, there would be a slight change to the character of this zone in 2033 and a noticeable change in 2055.

Table 15.13 Landscape character impact – LCZ1

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Low	Low	Low
2055	Low	Moderate	Moderate-low

Penrith south-east rural transition landscape character zone (LCZ2)

The landscape character impact for LCZ2 is detailed in Table 15.14.

The majority of this landscape character zone would not be overflown by WSI aircraft. In 2033, the south-west and north-eastern corner of this character zone would be overflown by several flight paths (up to a maximum of 55 and 37 flights arriving and departing per day on Runway 05, respectively, and up to a maximum of 17 flights per day arriving on Runway 23). Aircraft in the north-east would be relatively low in the sky and have a greater influence over the character of the zone. This would result in a slight change to the landscape character.

In 2055, aircraft would follow the same flight paths at the same altitudes, with the frequency of flights increasing (up to a maximum of 138 and 104 flights arriving and departing per day on Runway 05, respectively, and up to a maximum of 48 flights per day arriving on Runway 23). The presence of aircraft would increase and would result in a noticeable change to the landscape character.

Table 15.14 Landscape character impact - LCZ2

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Low	Moderate-low
2055	Moderate	Moderate	Moderate

Greendale and Silverdale rural and residential landscape character zone (LCZ3)

In 2033, the central part of this landscape character zone would be overflown by arriving aircraft (up to a maximum of about 87 flights per day on Runway 05) and departing aircraft (up to a maximum of about 95 flights per day on Runway 23). The aircraft along these flight paths would likely be at lower altitudes (less than about 2,500 ft or 760 m). The frequency and lower altitudes of aircraft would result in a noticeable change to the character of this zone.

In 2055, the frequency of flights would increase in the central part of this zone (up to a maximum of about 274 flights arriving per day on Runway 05 and up to a maximum of about 267 flights departing per day on Runway 23). The increase in flight numbers would result in a substantial change to the character of this zone.

The landscape character impact for LCZ3 is detailed in Table 15.15.

Table 15.15 Landscape character impact – LCZ3

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Low	Moderate	Moderate-low
2055	Low	High	Moderate

Luddenham village and agricultural precinct landscape character zone (LCZ4)

This area is in close proximity to WSI but would only be overflown in the north-east of Luddenham village, including up to a maximum of about 17 flights arriving per day on Runway 23 in 2033. Aircraft are likely to be at an altitude of about 5,000 to 8,000 ft (1.5 to 2.4 km). While there are few overflights, there would be views to low flying aircraft from some areas of this character zone. This would result in a noticeable change to the character of this zone.

Aircraft would follow the same flight paths in 2055. The frequency of flights would increase, including up to a maximum of about 48 flights arriving per day on Runway 23. While this landscape character area is not overflown by many flight paths, due to the proximity of the runway and increase in flights, there would be a substantial change to the landscape character.

The landscape character impact for LCZ4 is detailed in Table 15.16.

Table 15.16 Landscape character impact – LCZ4

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Moderate	Moderate
2055	Moderate	High	High-moderate

Northern Gateway precinct landscape character zone (LCZ5)

This landscape character zone would be overflown by several flight paths, including:

- Runway 05 arrivals – up to a maximum of about 36 and 93 flights per day in 2033 and 2055, respectively
- Runway 05 departures – up to a maximum of about 92 and 262 flights per day in 2033 and 2055, respectively
- Runway 23 arrivals – up to a maximum of about 105 and 273 flights per day in 2033 and 2055, respectively.

Aircraft in the southern part of this zone would be at lower altitudes (less than about 2,500 ft or 760 m), whereas flights in the central part of this zone would be at higher altitudes (8,000 to 10,500 ft or 2.4 to 3.2 km). This would result in a noticeable change to the character of this area in 2033 and 2055.

The landscape character impact for LCZ5 is detailed in Table 15.17.

Table 15.17 Landscape character impact – LCZ5

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Very Low	Moderate	Low
2055	Very Low	Moderate	Low

WSI landscape character zone (LCZ6)

Aircraft arriving and departing from WSI would be consistent with the character of the airport and would have a negligible impact on the landscape character.

The landscape character impact for LCZ6 is detailed in Table 15.18.

Table 15.18 Landscape character impact – LCZ6

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Very low	Negligible	Negligible
2055	Very low	Negligible	Negligible

Badgerys Creek landscape character zone (LCZ7)

The northern part of this zone would be overflown by:

- Runway 05 arrivals – up to a maximum of about 36 and 93 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 10,500 to 13,300 ft (3.2 to 4 km)
- Runway 05 departures – up to a maximum of about 92 and 262 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 750 to 2,500 ft (230 to 760 m)
- Runway 23 arrivals – up to a maximum of about 105 and 273 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 750 to 2,500 ft (230 to 760 m).

The central part of this zone would be overflown by:

- Runway 23 arrivals – up to a maximum of about 17 and 48 flights per day in 2033 and 2055, respectively, with aircraft likely to be at altitudes of 8,000 to 10,500 ft (2.4 to 3.2 km).

While the project would introduce lower flying aircraft, there would be a slight change to the character of this zone in 2033 and 2055 as this activity would be consistent with the character of airport associated development.

The landscape character impact for LCZ7 is detailed in Table 15.19.

Table 15.19 Landscape character impact – LCZ7

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Very low	Low	Negligible
2055	Very low	Low	Negligible

Kemps Creek and Rossmore rural residential landscape character zone (LCZ8)

The northern part of this zone would be overflown by:

- Runway 05 arrivals – up to a maximum of about 19 and 45 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 10,500 to 13,300 ft (3.2 to 4 km)
- Runway 05 departures – up to a maximum of about 92 and 262 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of about 2,500 ft (or 750 m)
- Runway 23 arrivals – up to a maximum of about 105 and 273 flights per day in 2033 and 2055, respectively, with aircraft at an altitude of 750 to 2,500 ft (230 to 760 m).

The central part of this zone would be overflown by:

- Runway 05 arrivals – up to a maximum of about 17 and 48 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 13,300 ft (about 4 km)
- Runway 23 arrivals – up to a maximum of about 17 and 48 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of 8,000 to 10,500 ft (about 2 km to 3.2 km).

This would result in a noticeable change to the character of this zone in 2033 and 2055.

The landscape character impact for LCZ8 is detailed in Table 15.20.

Table 15.20 Landscape character impact – LCZ8

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Low	Moderate	Moderate-low
2055	Low	Moderate	Moderate-low

Aerotropolis core precinct landscape character zone (LCZ9)

This landscape character zone would not be overflown by WSI aircraft but would have views to arriving and departing aircraft in the distance, around 2 km to Runway 05/23. Overall this would result in a slight change to the landscape character of the zone in 2033 and 2055.

The landscape character impact for LCZ9 is detailed in Table 15.21.

Table 15.21 Landscape character impact – LCZ9

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Low	Moderate-low
2055	Moderate	Low	Moderate-low

Leppington rural residential landscape character zone (LCZ10)

This landscape character zone would be overflown by

- Runway 05 departures – up to a maximum of about 17 and 57 flights per day in 2033 and 2055, respectively, with aircraft likely to be at a height of 20,000 ft (6 km)
- Runway 23 departures – up to a maximum of about 17 and 57 flights per day in 2033 and 2055, respectively, with aircraft likely to be at a height of 20,000 ft (6 km).

No arrival flights would pass over this zone.

This would not appreciably change the character of this zone in 2033 and 2055.

The landscape character impact for LCZ10 is detailed in Table 15.22.

Table 15.22 Landscape character impact – LCZ10

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Negligible	Negligible
2055	Moderate	Negligible	Negligible

South Penrith urban area landscape character zone (LCZ11)

This landscape character zone would be overflown by several flight paths, including:

- Runway 05 arrivals – up to a maximum of about 19 and 45 flights per day in 2033 and 2055, respectively, with aircraft likely to be at a height of 8,000 to 10,500 ft (about 2.4 to 3.2 km)
- Runway 05 departures – up to a maximum of about 92 and 262 flights per day in 2033 and 2055, respectively, with aircraft likely to be at a height of 5,000 to 8,000 ft (1.5 to 2.4 km)
- Runway 23 arrivals – up to a maximum of about 105 and 273 flights per day in 2033 and 2055, respectively, with aircraft likely to be at a height of 2,500 to 5,000 ft (760 to 1,524 m).

This would result in a noticeable change to the character of this area in 2033 and 2055.

The landscape character impact for LCZ11 is detailed in Table 15.23.

Table 15.23 Landscape character impact – LCZ11

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Moderate	Moderate
2055	Moderate	Moderate	Moderate

Western Sydney Parklands landscape character zone (LCZ12)

This landscape character zone would be overflown by several arrival and departure flight paths, including:

- Runway 05 arrivals – up to a maximum of about 36 and 93 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of about 13,300 ft (4 km)
- Runway 23 arrivals – up to a maximum of about 17 and 48 flights per day in 2033 and 2055, respectively, with aircraft likely to be at an altitude of about 13,300 ft (4 km).

One Runway 05 arrival flight path crosses directly over Prospect Reservoir. No departure flights would pass over this zone.

This would result in a slight change to the character of this zone in 2033 and a noticeable change in 2055.

The landscape character impact for LCZ12 is detailed in Table 15.24.

Table 15.24 Landscape character impact – LCZ12

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Low	Moderate-low
2055	Moderate	Moderate	Moderate

15.5.1.2 Blue Mountains landscape

Blue Mountains iconic features landscape character zone (LCZ13)

Some of the landscape features in this landscape character zone would be overflown or in close proximity to the proposed flight paths. For example:

- Mount Solitary (927 m above sea level) would be overflown by one Runway 23 departure flight path with up to a maximum of about 19 flights per day in 2033 and 62 flights per day in 2055. Aircraft would be at an altitude of about 10,500 to 13,300 ft (about 3.2 to 4 km) above sea level and about 7,500 ft (2.2 km) above Mount Solitary.
- Kings Tableland (about 700 m above sea level) would be overflown by:
  - Runway 05 departures – up to a maximum of about 20 flights per day in 2033 increasing to 47 flights per day in 2055, with aircraft at an altitude between 13,300 to 17,500 ft (4 to 5.3 km) above sea level and about 10,900 to 15,400 ft (3.3 to 4.3 km) above the tableland
  - Runway 23 arrivals – up to a maximum of about 51 flights per day in 2033 increasing to 136 flights per day in 2055, with aircraft at an altitude of about 8,000 to 10,500 ft (2.5 to 3.2 km) above sea level and about 5,900 ft (1.8 km) above the tableland.
- The Grose valley and surrounding escarpments (about 920 m above sea level) would be overflown by Runway 05 departure flight paths with up to a maximum of about 8 and 42 flights per day in 2033 and 2055, respectively. Aircraft would be at an altitude of about 13,300 to 17,500 ft (about 4 to 5.3 km) above sea level and about 10,000 to 14,500 ft (3 to 4.5 km) above the escarpments.

The character of aircraft, and at times contrails, would contrast with the natural forms of clouds in the sky and natural features of the land. Overall, there would be several flight paths over this landscape character zone. Aircraft would be relatively high and passing over at a relatively low frequency. This would slightly alter the character of this zone in 2033 and 2055.

The landscape character impact for LCZ13 is detailed in Table 15.25.

Table 15.25 Landscape character impact – LCZ13

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Very high	Low	High-moderate
2055	Very high	Low	High-moderate

Blue Mountains forested hills and valleys landscape character zone (LCZ14)

Areas north of the Great Western Highway would be overflown by 4 departure flight paths. Areas south of the Great Western Highway would be overflown by several departure and arrival flight paths.

Aircraft would vary in altitude, with lower altitudes in eastern and central parts of the landscape character zone (up to about 2,500 to 8,000 ft or 0.75 to 2.5 km above sea level), including over Burragorang State Conservation Area, Lake Burragorang and the Erskine Range. Aircraft would be at higher altitudes in the western and northern parts of this zone (up to about 8,000 to 17,500 ft or 2.5 to 5 km above sea level), including over Kanangra-Boyd National Park.

The character of aircraft, and at times contrails, would contrast with the natural forms of clouds in the sky and natural features of the land. Overall, there would be multiple flight paths over this zone. Aircraft would be relatively high across the majority of this zone. This would slightly alter the character of this zone in 2033. In 2055, the project would result in a moderate magnitude of change to the character of this zone due to the increase in frequency.

The landscape character impact for LCZ14 is detailed in Table 15.26.

Table 15.26 Landscape character impact – LCZ14

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	High	Low	Moderate
2055	High	Moderate	High-moderate

Blue Mountains township spine landscape character zone (LCZ15)

LCZ15 would be overflown by several departure flight paths:

- Runway 05 departures crossing over the Great Western Highway between Blaxland and Warrimoo, at a height of about 8,000 to 15,000 ft (2.4 to 3.2 km) – up to a maximum of about 37 flights per day in 2033 increasing to 104 flights per day in 2055
- Runway 05 departures crossing over Medlow Bath, at a height of about 17,500 ft – up to a maximum of about 11 flights per day in 2033 increasing to 19 flights per day in 2055
- Runway 23 departures crossing over the Great Western Highway east of Linden, at a height of about 10,500 to 13,300 ft (3.2 to 4 km) – up to a maximum of about 36 flights per day in 2033 increasing to 97 flights per day in 2055.

No arrival flights would pass over this landscape character zone during the day.

The character of aircraft, and at times contrails, would contrast with the natural forms of clouds in the sky and natural features of the land. Overall, there would be several flight paths over this zone. Aircraft would be relatively high and pass over at low frequencies. This would slightly alter the character of this zone in 2033. There would be a noticeable change to the character of this zone in 2055 due to the increase in frequency of aircraft movements.

The landscape character impact for LCZ15 is detailed in Table 15.27.

Table 15.27 Landscape character impact – LCZ15

Scenario	Sensitivity	Magnitude of change	Landscape impact
2033	Moderate	Low	Moderate-low
2055	Moderate	Low	Moderate-low

15.5.1.3 Greater Blue Mountains Area landscape values

The landscape character related values of the GBMA as described in the *Greater Blue Mountains World Heritage Area Strategic Plan* (NSW DECC, 2009) and the assessment of the potential impacts of the project against these values is provided in Table 15.28.

Table 15.28 Potential impact on the GBMA Strategic Plan values

Landscape related value	Potential impact
Scenic and aesthetic values	
Striking vertical cliffs and waterfalls, ridges and escarpments	Views to vertical cliffs and waterfalls, ridges and escarpments may include distant aircraft where they are overflown by air traffic.
Extensive caves in the Jenolan Karst Conservation Reserve	No direct or indirect impact as views to caves do not rely on views of the sky.

Landscape related value	Potential impact
Spectacular complex of narrow sandstone canyons and pagoda rock formations	Aircraft would be at least 5,000 ft (1.5 km) above the Blue Mountains in the vicinity of key views and would not obstruct views to the sandstone canyons and pagoda rock formations. There are currently aircraft visible intermittently over the Blue Mountains, however there would be more frequent flights and flights seen in key viewpoints and campgrounds across the GBMA. Views to narrow sandstone canyons and pagoda rock formations (such as in views to the Three Sisters lookout at Echo Point, Katoomba) would include distant aircraft (and potentially their contrails) crossing views at a high altitude in the background. The scenic value of these views would be altered slightly. Due to the very high sensitivity of these views, a low magnitude of change would result in a high-moderate adverse visual impact.
Recreation and tourism values	
Vantage points on ridges and escarpments, offering outstanding vistas, from uninterrupted views of forested wilderness covered by natural vegetation to the contrasts of steep forested slopes surrounding cleared valleys	There are numerous vantage points on ridges and escarpments. While the line of sight between these vantage points to the forested wilderness would not be interrupted due to the height of the aircraft, there would be views where additional aircraft would be seen flying overhead and across these views. The aircraft would range in height and distance from these locations. They would be at least 5,500 ft (1.5 km) high and therefore of a relatively small scale. There may be locations where multiple aircraft would be seen together, as the flight numbers increase over time, and where multiple flight paths intersect or overlap.
Historic lookouts and walking tracks along the central Blue Mountains ridgeline	There are numerous historic lookouts and walking tracks along the central Blue Mountains ridgeline. This includes many lookouts between Wentworth Falls and Katoomba which are oriented to the south and towards WSI.
Canyoning, bushwalking, rock climbing, nature observation, scenic driving and photography are popular activities	The visual amenity and wilderness experience of recreational activities may be reduced by increased visual intrusion by aircraft movements. Aircraft would be at an altitude of over one km (5,000 ft) and the assumed typical aircraft (most frequently flown being the A320) would be of a small scale in the sky.
Wilderness values	
Extensive natural areas	No direct or indirect impact
Opportunities for solitude and self-reliant recreation	No direct or indirect impact
Unroaded except for management trails and largely free of exotic species	No direct or indirect impact

15.5.2 Day-time visual impacts

15.5.2.1 Western Sydney viewpoints

Viewpoint 1: View from Orchard Hills

This view (refer to Figure 15.12) is oriented towards several arrival and departure flight paths. Some aircraft would be visible travelling across the view at lower elevations. Aircraft would also be visible in the background of the view.

Due to the proximity of this view to the runway, there would be a greater concentration of flights around the runway and then dispersing across the surrounding sky. The aircraft would be viewed above the valley within a predominantly open sky increasing the prominence in the view. The increase in flight frequency from 2033 to 2055 would not alter the magnitude of impact.

This would result in a moderate magnitude of change in 2033 and 2055, resulting in a moderate-low visual impact.

Figure 15.12 View south-east from Homestead Road, Orchard Hills

Viewpoint 2: View from George Maunder Lookout, Prospect Reservoir

Due to the proximity of this view to the runway, there would be a greater number of aircraft seen across this view (refer to Figure 15.13 and Figure 15.14). This would include a large number of arriving aircraft which may be visible overhead or passing across the middle ground (about 5 km away) and relatively low in the sky. These aircraft, together with aircraft visible in the background, would be viewed within an open and expansive skyline against the distant backdrop of the Blue Mountains. The increase in flight frequency from 2033 to 2055 would not alter the magnitude of impact.

As this view also contains natural and aesthetic features of heritage significance, there would be a moderate magnitude of change in 2033 and 2055. This would result in a moderate visual impact.

Figure 15.13 View from George Maunder Lookout, Prospect Reservoir, Runway 05 photomontage (top) with flight paths shown (bottom)

Figure 15.14 View from George Maunder Lookout, Prospect Reservoir, Runway 23 photomontage (top) with flight paths shown (bottom)

Viewpoint 3: View from Walworth Road, Horsley Park

This view would include some arrival flights high overhead and crossing the view (refer to Figure 15.15). There would also be aircraft visible in the background of the view. The aircraft would be viewed in a predominantly open sky, however future urban development and infrastructure may enclose the open sky somewhat. The increase in flight frequency from 2033 to 2055 would not alter the magnitude of impact.

The project would result in a moderate magnitude of change in 2033 and 2055, resulting in a moderate-low visual impact.

Figure 15.15 View south-west from Walworth Road, Horsley Park

Viewpoint 4: Views from residential areas in Kemps Creek

This view includes several arrival and departure flight paths and is located at close range to WSI (refer to Figure 15.16), with some flights at low altitude. These aircraft movements would be prominent in the view. There would also be some aircraft visible in the background as they depart from or arrive at WSI.

In 2033, this would result in a considerable change to the amenity of this view, representing a high magnitude of change. In 2055, the prominence of aircraft in this viewpoint, along with the low altitude and considerable increase in flight frequency, would result in a very high magnitude of change.

This would result in a moderate visual impact in 2033 and a high-moderate impact in 2055.

Figure 15.16 View south-west from Mamre Road, Kemps Creek

Viewpoint 5: View from Luddenham Village

This view is located in close proximity to WSI and would capture views of arriving and departing aircraft to the south and south-west (refer to Figure 15.17 and Figure 15.18). 2 to 3 additional flight paths for departing flights would be seen at varying altitudes in the mid to background views in the south-west. The aircraft would be seen in an open and expansive sky increasing their prominence in the view.

Due to the close proximity to WSI and frequency of flights at low altitudes, there would be a moderate magnitude of change in 2033 and increasing to a high magnitude of change in 2055 as the frequency of flights increase.

This would result in a moderate visual impact in 2033 and high-moderate impact in 2055.

Figure 15.17 View south from St James Anglican Church, Luddenham Village, Runway 05 photomontage (top) with flight paths shown (bottom)

Figure 15.18 View south from St James Anglican Church, Luddenham Village, Runway 23 photomontage (top) with flight paths shown (bottom)

Viewpoint 6: View from Orangeville

This view (refer to Figure 15.19) would capture aircraft arriving and departing WSI. Aircraft may be seen overhead or passing across the middle ground at lower altitudes. Aircraft would be seen in an open and expansive sky increasing their prominence in the view.

Due to the close proximity to WSI and frequency of flights at low altitudes, there would be a moderate magnitude of change in 2033 and increasing to a high magnitude of change in 2055 as the frequency of flights increase.

This would result in moderate-low visual impact in 2033 and moderate impact in 2055.

Figure 15.19 View south-east from Silverdale Road, Orangeville

Viewpoint 7: View from Silverdale

This view is oriented towards WSI and overlooks several arrival flight paths approaching both Runway 05 and Runway 23 (refer to Figure 15.20 and Figure 15.21). The closest flight paths would be seen approaching and departing the runway from the south-west. Aircraft would be viewed at lower altitudes and within 2 km. The frequency of flights would increase in 2055.

There would also be flights visible in the background, approaching and departing from the north-east. This elevated position and orientation of the view increases the potential for multiple aircraft being visible during peak periods and seen within a predominantly open sky.

Due to the frequency and proximity of the aircraft in this view, there would be a moderate magnitude of change in 2033 and 2055. This would result in a moderate-low visual impact.

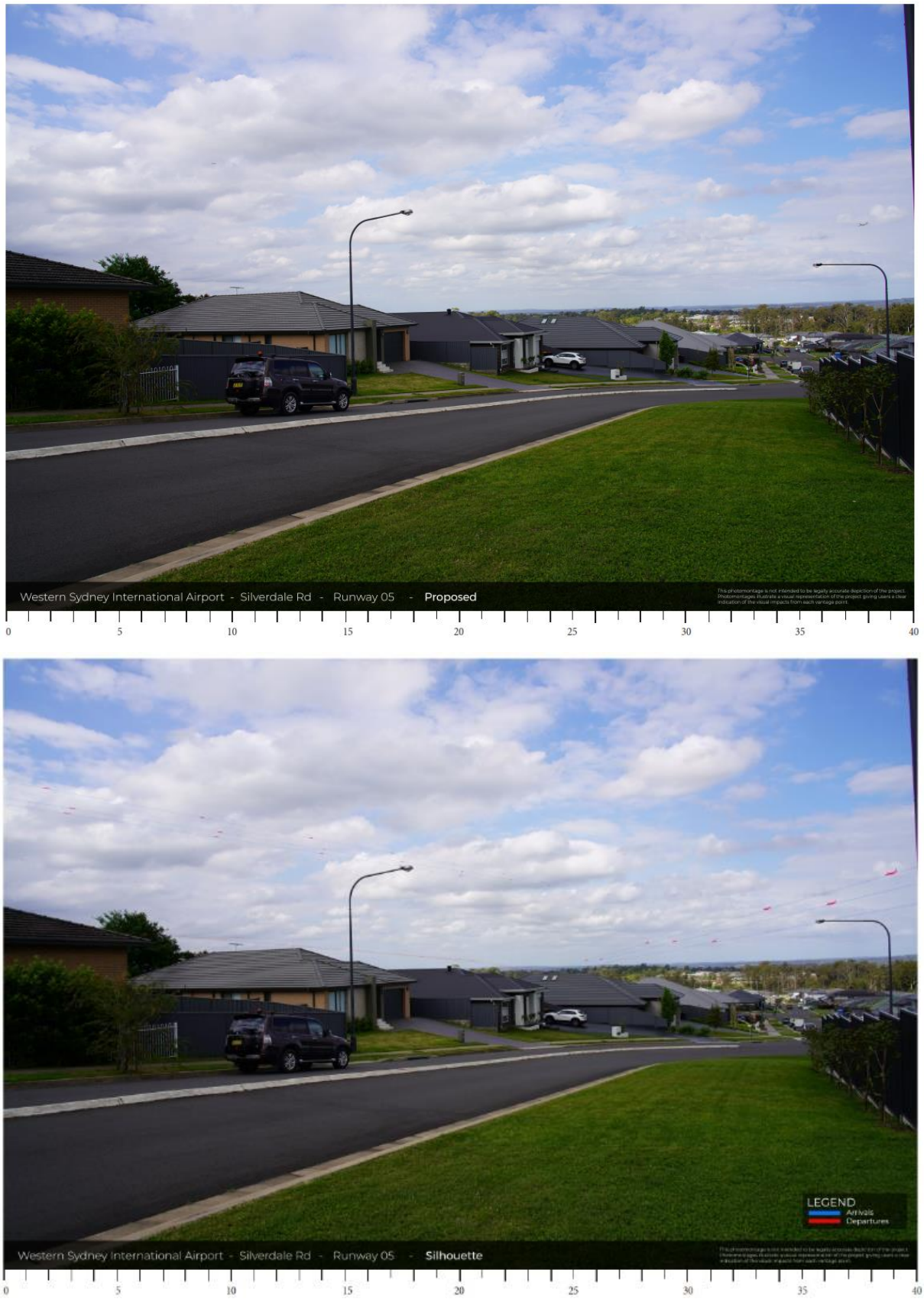

Figure 15.20 View east from Kalangara Road, Silverdale, Runway 05 photomontage (top) with flight paths shown (bottom)

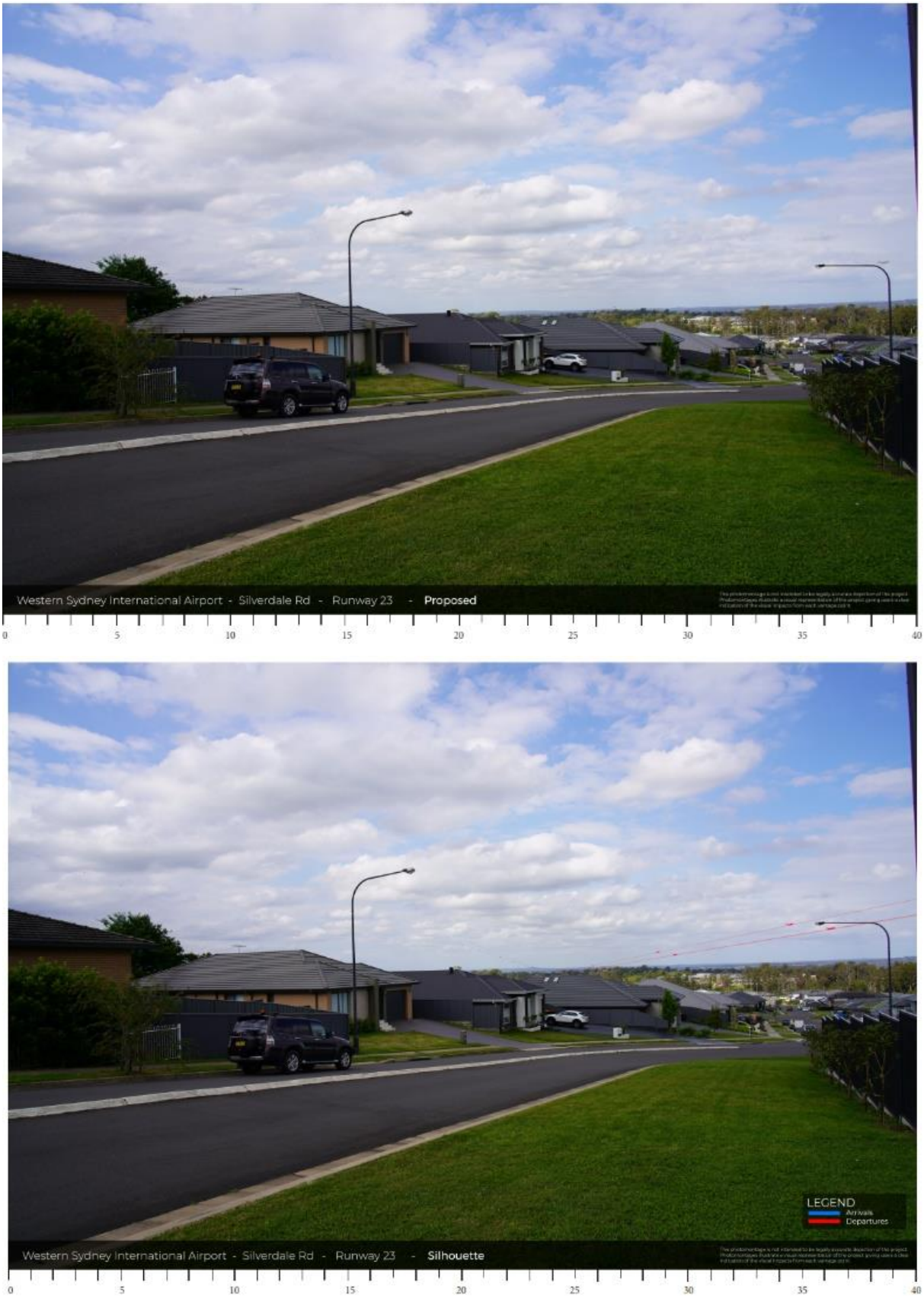

Figure 15.21 View east from Kalangara Road, Silverdale, Runway 23 photomontage (top) with flight paths shown (bottom)

Viewpoint 8: View from Warragamba Dam lookout

This viewpoint (refer to Figure 15.22) would capture views of aircraft arriving and departing Runway 05/23.

This view would include:

- Runway 05 arrivals – up to a maximum of 55 flights per day in 2033 increasing to 138 flights per day in 2055, and may be seen at a distance of about 11 km
- Runway 05 departures – up to a maximum of 37 flights per day in 2033 increasing to 104 flights per day in 2055, and may be seen at a distance of about 5.5 km
- Runway 23 departures – up to a maximum of 92 flights per day in 2033 increasing to 263 flights per day in 2055, and may be seen at a distance of about 4 km. 4 flight paths branch out over the downstream waters of the dam and will be seen in the background of the view, about 6 km away.

While these flights would be seen in an open and expansive sky (increasing the prominence of the aircraft), the high altitude and distance would reduce the magnitude of change so that they would not noticeably reduce the amenity of the view. As a result, the project would result in a low magnitude of change in 2033 and a moderate magnitude of change in 2055 due to the increase in flight frequency. This would result in moderate-low visual impact in 2033 and moderate impact in 2055.

Figure 15.22 View south-west from Warragamba Dam lookout

15.5.2.2 Blue Mountains viewpoints

Table 15.29 provides a summary of the day-time visual impacts for the selected representative views of the Blue Mountains, including lookouts, campground and day-use areas, and scenic routes.

Table 15.29 Summary of day-time visual impacts – Blue Mountains viewpoints

Viewpoint	Sensitivity	Magnitude of change	Visual impact
Lookouts			
9 – View from the Burragorang Lookout, The Bluff	High	Low (2033) Moderate (2055)	Moderate (2033) High-moderate (2055)
10 – View from The Rock Lookout	High	Low	Moderate
11 – View from Portal Lookout	High	Negligible	Negligible
12 – View from Hawkesbury Lookout	Moderate	Low	Moderate-low
13 – View from Wynnes Rocks Lookout	High	Low	Moderate
14 – View from Walls Lookout	Very high	Negligible (2033) Low (2055)	Negligible (2033) High-moderate (2055)
15 – View from Echo Point Lookout	Very high	Low	High-moderate
16 – View from Cleary Memorial Lookout, Kedumba Pass	High (2033) Moderate (2055)	Low	Moderate
Campgrounds and day-use areas			
Views from campgrounds and day use areas	High	Low	Moderate
Scenic routes			
Views from scenic routes	Moderate	Low	Moderate-low

Lookouts

The project would result in negligible impacts at viewpoints 11 (all years) and 14 (2033) as aircraft would be viewed at high altitudes in an open and expansive sky or viewed in the backdrop of a rural and urban fringe (in the case of Viewpoint 11). This would reduce the prominence of the aircraft and would not noticeably intrude on the character or amenity of the view.

At Viewpoint 9, the project would result in a moderate visual impact in 2033 and high-moderate visual impact in 2055. This view would include Runway 23 departures at an altitude of about 6,200 ft (1.9 km) above the surrounding hills, and Runway 05 arrivals at a distance of about 3.5 km and altitude of about 3,200 ft (1 km) above the surrounding hills. The frequency of flights would increase from 2033 to 2055. Due to the proximity of flights to the surrounding hills and frequency of flights there would be a noticeable change to the amenity of this view.

At Viewpoint 10 (refer to Figure 15.23 and Figure 15.24), the lookout is located under several arrival flight paths and there may also be some departure flights visible in the background of this view. The project would result in a moderate visual impact in 2033 and 2055. Aircraft would be seen crossing the Nepean River valley. However the aircraft would be at higher altitudes (over 7,000 ft or 2.3 km) and would be less visually prominent. The addition of aircraft would somewhat intrude upon the wilderness character of the view and result in a low magnitude of change in 2033 and 2055.

Figure 15.23 View north from The Rock lookout, Blue Mountains National Park

Figure 15.24 View south from The Rock lookout, Blue Mountains National Park

At Viewpoint 12 (refer to Figure 15.25), the project would result in a moderate-low visual impact in 2033 and 2055. The view would include aircraft departing Runway 05 at a height of about 10,500 ft (about 3.2 km). In 2033, there would be up to a maximum of around 55 flights per day and would increase to 158 flights per day by 2055. Aircraft would be seen intermittently, crossing over the Cumberland Plain as they ascend steeply towards a cruising altitude. Aircraft would be somewhat prominent in the view due to distance and altitude. There would also be aircraft visible in the background, as they come into land on several flight paths from the north and east. This would result in a noticeable reduction in the amenity of the view.

Figure 15.25 View to the north-west from Hawkesbury lookout, Yellomundee Regional Park

At Viewpoint 13 (refer to Figure 15.26) the project would result in a moderate visual impact in 2033 and 2055. The view would include aircraft departing Runway 05 and Runway 23 at a height of about 13,300 to 17,500 ft (4 to 5 km) above sea level and about 10,100 ft (3 km) above Mount Tomah. In 2033 there would be up to a maximum of around 72 flights per day and this would increase to 194 flights per day by 2055. Aircraft would be seen intermittently overhead at relatively high altitudes in 2033. While this lookout would be frequently overflown by aircraft in 2055, due to the altitude these aircraft would not be prominent in this view. Aircraft would not noticeably intrude upon the wilderness character of this view in 2033. In 2055 aircraft would slightly intrude upon the wilderness character of this view.

Figure 15.26 View south-east from Wynnes Rocks Lookout

At Viewpoint 14 (refer to Figure 15.27) the project would result in a high-moderate visual impact in 2055. The view would include aircraft departing Runway 05 at a height of about 17,500 ft (5.3 km) above sea level, and about 15,100 ft (4.6 km) above the escarpments. In 2033 there would be up to a maximum of around 8 flights per day and this would increase to 42 flights per day by 2055. Aircraft would be seen at a relatively high altitude and be viewed in an open and expansive sky. Aircraft would not noticeably intrude upon the wilderness character of this view in 2033. In 2055, due to the increased frequency, there would be a noticeable reduction in the amenity of this view.

Figure 15.27 View from Walls Lookout

At Viewpoint 15 (refer to Figure 15.28 and Figure 15.29), aircraft would be seen intermittently crossing this view, over and beyond Mount Solitary (about 927 m above sea level). Aircraft would be viewed in an open and expansive sky, from an elevated vantage point, increasing their prominence in the view. Whilst aircraft would be visible moving across the view, the scale of the aircraft at this distance and their infrequency in 2033 reduces the potential for them to noticeably intrude upon the wilderness character of this view. By 2055, the frequency of aircraft visible would more than double and their prominence in this view would increase. These flights have the potential to intrude upon the wilderness character of this view. Overall, there would be a low magnitude of change in 2033 and 2055. However, as this view is of very high sensitivity, this would result in a high-moderate visual impact in 2033 and 2055.

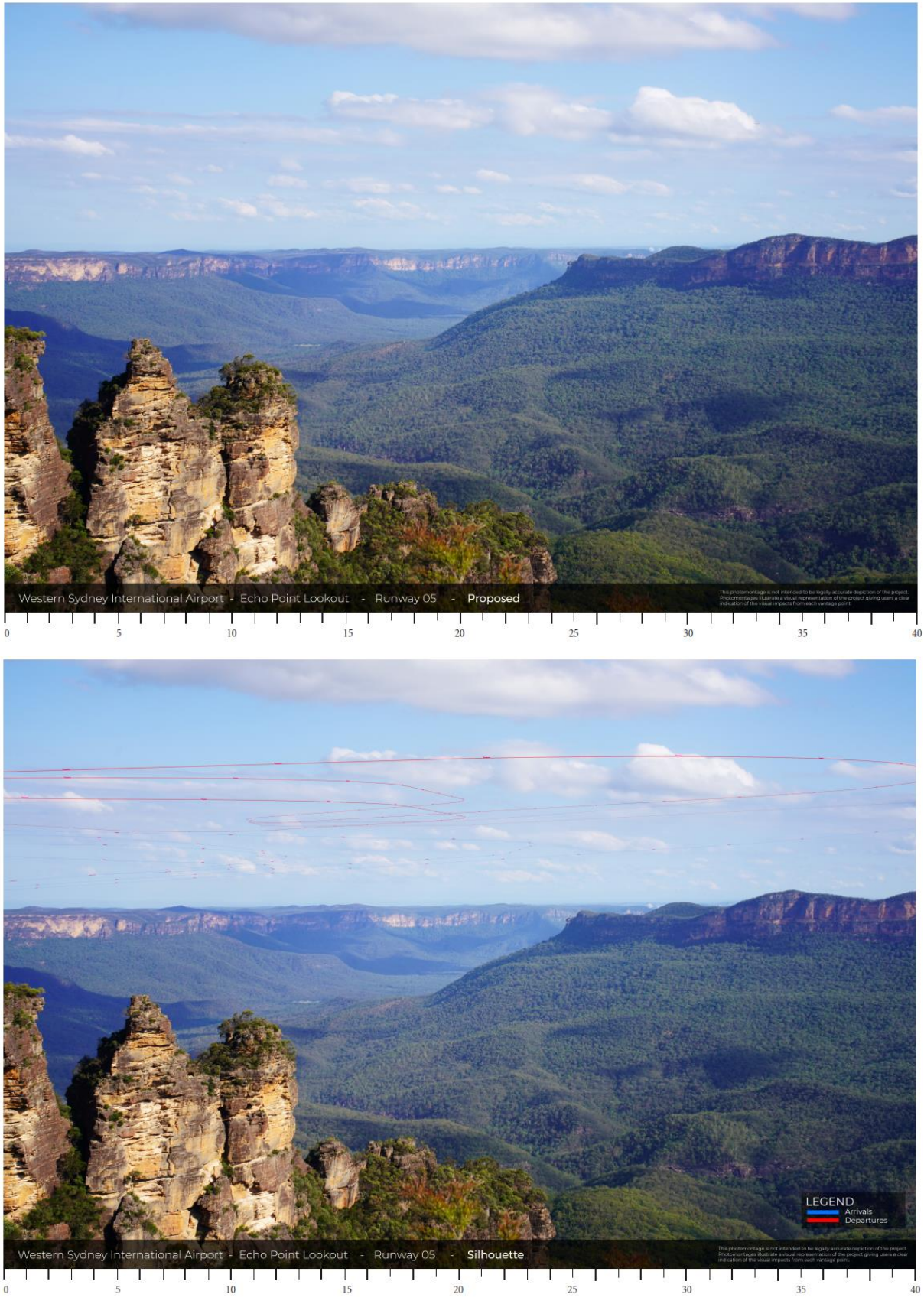

Figure 15.28 View south-east from Echo Point Lookout to The Three Sisters and Mount Solitary, Runway 05 photomontage (top) with flight paths shown (bottom)

Figure 15.29 View south-east from Echo Point Lookout to The Three Sisters and Mount Solitary, Runway 23 photomontage (top) with flight paths shown (bottom)

At Viewpoint 16 (refer to Figure 15.30), aircraft would be seen departing or arriving WSI. Aircraft on the departing flight path from Runway 23 would be visible overhead or passing across the middle ground of views from this lookout. However, aircraft would be at a high altitude and relatively infrequent. These flights would be seen in between overgrown vegetation, which currently partly encloses the lookout, restricting views out. Due to the close proximity and contrast with the wilderness view, the project would result in a low magnitude of change in 2033 and 2055. However, as this view is of high sensitivity, this would result in a moderate visual impact in 2033 and 2055.

Figure 15.30 View from Cleary Memorial Lookout, Kedumba Pass

Campgrounds and day-use areas

From most of the campground locations, views are enclosed by trees so that the opportunity to view aircraft would be restricted to those directly overhead and within the area of visible sky. Aircraft are more likely to be visible from the Murphys Glen campground, Euroka campground, Wentworth Falls and Katoomba Falls. Some areas in the north-eastern parts of the Blue Mountains would be overflown by aircraft (for example the Mount Banks Picnic Area and lookout), but aircraft would be less frequent and at high altitudes (about 17,500 ft or 5.3 km).

There would be a slight reduction in the amenity of views in 2033. Due to the increase in the frequency of flights in 2055, there would potentially be more flights seen from campgrounds and day use areas that are open and/or elevated. Overall, the project would result in a low magnitude of change in 2033 and 2055. Due to the high sensitivity, there would be a moderate visual impact in 2033 and 2055.

Scenic routes

The winding, undulating roads of the Great Western Highway and Bells Line of Road offer opportunities for open or semi enclosed views to the Blue Mountains landforms. At the Great Western Highway, there are some flight paths which will fly over sections of the highway at Warrimoo, Linden and Hartley. At Bells Line of Road, aircraft may be visible at Mount Tomah and near Grose Valley.

Overall, aircraft flying over sections of the feature routes may be visible passing overhead (assuming there is no intervening vegetation), however they would generally be seen at high or very high altitudes between 8,000 to 20,000 ft (2.5 to 6 km) by few people, resulting in a low magnitude of change in 2033 and 2055. Due to the moderate sensitivity, there would be a moderate-low visual impact in 2033 and 2055.

15.5.3 Night-time visual impacts

15.5.3.1 Intrinsically dark landscapes (A0)

The scenic and aesthetic values of the nature reserve landscapes are generally experienced during the day-time from lookouts, picnic areas and walking trails. Recreational activities in the GBMA, such as canyoning and rock climbing, would also occur during the day-time. Apart from designated campgrounds, there would not be much activity in these areas at night.

There are a number of camp sites within this landscape that the proposed flight paths may be seen at night, including:

- Euroka campground south of Glenbrook
- Katoomba River crossing campground in the Jamison Valley
- Ingar and Murphys Glen campgrounds south of Woodford
- Burralow Creek campground in the Lower Grose Valley area west of Kurrajong.

Aircraft may be viewed occasionally from these locations as a series of small moving lights in the sky. Murphys Glen campground would have the greatest number of overflights and is in closer proximity to WSI than the other campgrounds that are overflown. Aircraft along this flight path are likely to be at higher altitudes.

Eastern parts of these reserves would experience views to flight paths, with aircraft at lower altitudes (due to the closer proximity to WSI). Such areas include the north-eastern parts of Burragorang National Park near Silverdale Road and the GBMA west of Mulgoa. These areas, however, do not have any designated camp sites and would not be experienced by many people at night-time.

In 2055 there would be an increase in the frequency of early evening and night flights where they pass over the intrinsically dark landscapes.

Overall, the effect of the project lighting would be experienced across a small portion of the landscape by few people, resulting in a negligible magnitude of change and a negligible visual impact in 2033 and 2055.

15.5.3.2 Areas of medium district brightness (A3)

Western Sydney

Semi-rural and rural residential areas that would experience views of aircraft at low altitude (less than 5,000 ft) due to take-off and landing include Mulgoa, Wallacia, Silverdale and Greendale.

In the early evening, areas south of Silverdale are overflown by arrival and departure flight paths in 2033, with aircraft at low altitude (less than 5,000 ft). Aircraft would follow the same paths and at the same altitude in 2055, with the frequency of flights increasing.

At night, areas of medium distinct brightness would experience views to aircraft at low altitudes (less than 5,000 ft) including:

- Runway 05 arrivals over areas south of Silverdale, up to a maximum of 23 and 57 flights per night in 2033 and 2055, respectively
- Runway 05 departures over Mulgoa and Wallacia, up to a maximum of 14 and 28 flights per night in 2033 and 2055, respectively
- Runway 23 departures, up to a maximum of 22 and 57 flights per night in 2033 and 2055, respectively.

Overall, the lighting of the project would contrast with the surrounding landscape at night, resulting in a moderate magnitude of change in 2033 and 2055. Due to the low visual sensitivity, there would be a moderate-low visual impact in 2033 and 2055.

Blue Mountains

Urban and semi-urban areas include towns along the Great Western Highway such as Woodford and Katoomba.

These residential areas generally include street lighting, and lighting from vehicles and dwellings. There is lighting associated with the night trails and lit features of the Katoomba Falls Night-lit Walk and around Echo Point and the Three Sisters. There would also be occasional night-time flight paths contributing to the light level.

In the early evening, areas of medium district brightness would experience views to aircraft at higher altitudes (between 8,000 to 17,500 ft) including Runway 05 departures over Blackheath and Runway 23 departures over Lawson.

At night, areas of medium distinct brightness would experience views to aircraft at higher altitudes including:

- Runway 05 arrivals over Lawson, up to a maximum of 8 and 14 flights per night in 2033 and 2055, respectively
- Runway 23 departures over Lawson, up to a maximum of 6 and 25 flights per night in 2033 and 2055, respectively.

There would be a low magnitude of change at night in 2033 due to the low frequency and high altitude of aircraft. While there would be a slight increase in flight frequency in 2055, there would continue to be a low magnitude of change at night due to the relatively high altitude of aircraft. Due to the low visual sensitivity, there would be a low visual impact in 2033 and 2055.

Linden Observatory

In the late evening, the Linden Observatory may be overflown by arrival flights on Runway 05, up to a maximum of 8 and 14 flights per night in 2033 and 2055, respectively.

Aircraft may also be viewed in the night sky to the east of the Linden Observatory departing on Runway 23, up to a maximum of 14 and 25 flights per night in 2033 and 2055, respectively. Aircraft along these flight paths are likely to be at relatively high altitudes of 8,000 to 10,500 ft (2.4 to 3.2 km).

Overall, the effect of the project lighting would be experienced across a small portion of the sky and seen as distant flashing lights at high altitudes, resulting in a low magnitude of change (noting this is an assessment of night-time visual amenity). Any obstruction to astronomical observations would be brief and intermittent. Due to the high sensitivity, there would be a moderate-low visual impact in 2033 and 2055.

The Linden Observatory is a State heritage item and is considered further in the heritage assessment, including the impact on cultural values and amateur astronomy (refer to Technical paper 9: Heritage and Chapter 17 (Heritage)).

15.5.3.3 Areas of high district brightness (A4)

All areas of high district brightness within the study area have the potential to be overflown or have a view to flights at night, either by aircraft on a night-time or day-time scheduled flight path in the early evening (before 11 pm).

In the early evening in 2033, areas of high district brightness that would experience views to aircraft at low altitudes (less than 5,000 ft) include:

- Runway 05 departures from St Marys, Penrith and Orchard Hills
- Runway 23 arrivals from Minchinbury, Glenmore and Penrith.

During the early evening in 2055, aircraft would follow the same flight paths and at the same altitude, with the frequency of flights increasing.

At night, areas that would experience views of aircraft at low altitude (less than 5,000 ft) include:

- Runway 05 departures – up to a maximum of 6 and 25 flights per night in 2033 and 2055, respectively, over Orchard Hills, St Marys and Penrith
- Runway 23 arrivals – up to a maximum of 23 and 57 flights per night in 2033 and 2055, respectively, over Orchard Hills, St Marys, Eastern Creek and suburban areas on the western outskirts of Blacktown.

Overall, the lighting of the project would not contrast substantially with the surrounding landscape at night due to the existing brightly lit setting. Generally, this would result in a low magnitude of change in 2033 and 2055. Due to the very low visual sensitivity, there would be a negligible visual impact in 2033 and 2055.

15.6 Mitigation and management

15.6.1 Mitigation measures already incorporated into the project

The design of the flight paths aimed to minimise noise and other environmental impacts, including visual impacts, to the extent practical while still achieving safe and efficient operations. These considerations were had at various stages of the design process and included sensitive tourist, recreational and wilderness areas.

In addition to airspace design constraints (such as technical and flight constraints (which includes safety) and other aircraft activity in the Sydney Basin), the airspace design considered the following areas as constraints as far as practicably and reasonably possible:

- residential built-up areas within the Sydney Basin and Blue Mountains region
- sensitive tourist and recreation areas associated with the GBMA.

Many of these locations are areas of higher landscape character and visual sensitivity.

15.6.2 Additional proposed mitigation measures

Based on the nature of the potential impacts, no reasonable or feasible project specific mitigations are considered to be available that would reduce the potential landscape and visual impacts from the project.