31 Noise

31.1 Introduction

This chapter provides a review of the predicted aircraft overflight and ground-based operations noise associated with the potential long term development of the proposed airport. The chapter draws on comprehensive assessments of these factors which are included in Appendices E1 and E2 (Volume 4).

The assessment addresses two operational scenarios:

- 37 million annual passengers – this represents a stage of development, which could be reached about 2050, at which time the single runway would likely be approaching its maximum capacity and further demand growth would require construction of a second runway; and
- 82 million annual passengers – this represents a stage of development, assumed to be reached about 2063, when the airport comprises two operating runways and both runways are operating close to capacity.

These key stages, along with any incremental expansion of airport infrastructure between them would be subject to separate approvals under the Airports Act 1996.

Consideration of the findings of the assessment in relation to social amenity, world heritage and National heritage values, and human health have been addressed in Chapters 37, 38 and 39 respectively.

31.2 Approach to aircraft noise assessment

31.2.1 Methodology

The methodology for the assessment of aircraft overflight noise is described in detail in Chapter 10 (Volume 2a). The Integrated Noise Model was used to calculate noise exposure levels. Inputs to the modelling included the predicted numbers of aircraft operations by different aircraft types, airport operating modes, indicative aircraft flight paths and schedules, topography and meteorology.

For each aircraft type, flight path and possible stage length (a measure of distance to destination for departing aircraft), specialist software was used to calculate noise levels at each point on a 185 x 185 metre grid, covering the assessment area. This was used to develop noise contours for each of the airport operating strategies.

31.2.1.1 Flight paths and operating modes

The flight paths and procedures used for this noise assessment are indicative, which introduces uncertainty in regards to predicting the extent of aircraft overflight noise impacts. A future airspace design process would be undertaken closer to the commencement of operations and would be expected to evolve in time throughout the life of the proposed airport.

Three primary operating modes were considered for the single runway 2050 scenario including:

- Mode 05 – aircraft arrive from the south-west and depart to the north-east;

- Mode 23 – aircraft arrive from the north-east and depart to the south-west; and
- Head-to-head – all landings and take off movements occur in opposing directions, to and from the south-west.

The availability of each operating mode (described in greater detail in Chapter 7 (Volume 1)) at any given time would depend on meteorological conditions, particularly wind direction and speed, the number of presenting aircraft and the time of day. Due to the relatively low and consistent wind speeds at the airport site, it is likely that either the 05 operating mode or 23 operating mode could be used over 80 per cent of the time based solely on these factors. However, the selection of a preferred or priority operating mode, or a preferred combination of operating modes (i.e. preferred operating strategy), for noise management or other operational purposes has a notable effect on the overall noise impact from the airport. In this context, the preferred operating strategies that were considered as part of the noise impact assessment are as follows:

- Prefer 05 – all aircraft would be directed to approach and land from the south-west and directed to take-off to the north-east. If this is not possible for meteorological or operating policy reasons, then second priority would be given to operations in the opposite direction (i.e. the 23 direction). This strategy gives priority to operations in the 05 direction;
- Prefer 23 – all aircraft would be directed to approach and land from the north-east and take-off to the south-west. If this is not possible for meteorological or operating policy reasons, then second priority would be given to operations in the opposite direction (i.e. the 05 direction). This strategy gives priority to operations in the 23 direction;
- Prefer 05 with head-to-head – as per Prefer 05, except that during the night time period between 10.00 pm and 7.00 am, the head-to-head operating mode to the south-west would be used when:
  - there are no more than a total of 20 aircraft movements expected in the hour following the relevant time; and
  - wind conditions allow the use of both runway directions;
- Prefer 23 with head-to-head – as per Prefer 05 with head-to-head, except that when the head-to-head operating mode is not in use, Prefer 23 applies rather than Prefer 05.

If Prefer 05 or Prefer 23 is in use during the night-time period, the operating mode would revert to head-to-head under the following conditions:

- the use of head-to-head has been allowed for at least two hours before the change time; and
- the use of head-to-head would be allowed for at least two hours after the change time.

For the long term development, a number of alternative airport operating modes are also possible. However, it is difficult to determine accurately the likely availability, capacity and usage of such alternative modes at this point in time and therefore only the Prefer 05 and Prefer 23 strategies have been considered.

31.2.1.2 Predicted future aircraft movements

Predicted future numbers of aircraft movements (one movement consists of an aircraft either taking off or landing) were developed in the form of 'synthetic schedules'. The synthetic schedule identifies the aircraft family, operation type (arrival or departure), time of operation and port of origin or destination for each aircraft movement.

Predicted total aircraft movements for the indicative assessment scenarios are summarised in Table 31–1.

Table 31–1 Predicted daily aircraft movements in 2050 and 2063 by aircraft family

Aircraft	Daily movements 2050	Daily movements 2063
Passenger Movements		
Airbus A320	176	378
Airbus A330	128	286
Airbus A380	4	8
Boeing 737	104	196
Boeing wide-body general	20	40
Boeing 777	26	78
DeHaviland DHC8	12	10
Saab 340	10	10
Freight Movements		
Airbus A330	2	2
Boeing 737	6	6
Boeing 747	28	38
Boeing 767 – 400	8	10
Boeing 767-300	4	6
Boeing 777-300	2	4
Boeing 777-200	4	6
Small Freight	20	32
Total	554	1,110

31.2.2 Understanding noise

31.2.2.1 Sources of aircraft noise

Operation of the proposed airport would result in changes to the pattern of aircraft movements in the airspace above Western Sydney due to the introduction of new aircraft flight paths.

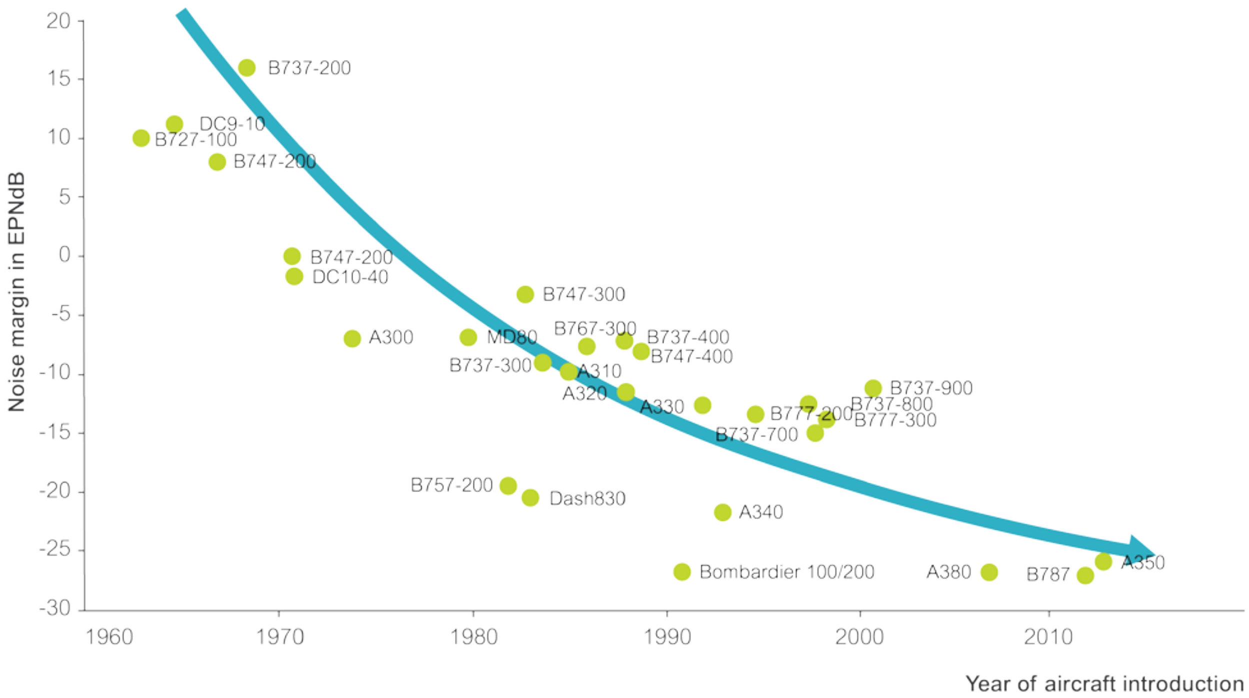
The characteristics of sound from aircraft can vary depending on a range of factors, including the type of engine, the stage of flight, the height of the aircraft and the prevailing meteorological conditions. While there are many sources of noise from an aircraft, including noise generated by the airframe, engines are the dominant source of noise for the majority of the flight cycle.

Engine noise can be particularly pronounced when aircraft are operating on the ground as a result of elevated thrust during take-off and reverse thrust during landing. Reverse thrust noise levels are typically higher than take-off noise levels as a result of the diversion of the engine exhaust to assist with deceleration, which results in a characteristic noise contour bulge surrounding a runway.

The pattern of noise exposure that would result from operation of the proposed Western Sydney Airport is complex, and depends on final flight paths and airport operating procedures, time of day, season, weather conditions and other factors. Generally speaking, aircraft noise levels would decrease with distance from the proposed airport primarily as a result of the higher altitude of aircraft operations.

Advances in aviation technology are resulting in a reduction in noise generated by aircraft. Figure 31–1 shows how aircraft have become progressively quieter over the past several decades through the incorporation of new airframe technologies and engine innovations. In 2013, ICAO agreed that more stringent noise standards would apply to all new aircraft types over 55 tonnes in weight submitted for certification on or after 31 December 2017. The amendments include a new noise standard for jet and turboprop aircraft, which represents a reduction of 7 EPNdB[1] relative to the current ICAO ‘Chapter 4’ cumulative noise standard.

[1] EPNdB, or Effective Perceived Noise level in decibels, is used for the certification of aircraft according to ICAO procedures. It is a measure of human annoyance to aircraft noise that takes into account the special spectral characteristics, intensity, tonal content and duration of noise from an aircraft pass-by event. EPNdB values cannot be directly measured. They are calculated using noise monitoring data recorded at certification points that account for different phases of an aircraft movement (e.g. approach and flyover on departure) and the lateral spread of noise.



Source: Brisbane New Parallel Runway EIS, 2007, CANSO and ACI 2015. Composited by GHD 2016.

Note: Noise levels are relative to ICAO 'Chapter 3' noise standards which took effect in 1978.

Figure 31–1 Reduction in aircraft noise over time

Despite the likely introduction of these next-generation aircraft in the future, the assessment of aircraft noise in this EIS has been based on aircraft types that are commonplace today, including the louder Boeing 747 and the Airbus A320. The Boeing 747 is the loudest aircraft anticipated to operate at the proposed airport and airlines are already beginning to retire it from regular passenger services.

31.2.2.2 Land use planning

For land use planning around airports, Australia has adopted the Australian Noise Exposure Forecast (ANEF) system, which describes cumulative aircraft noise for an 'annual average day'. As a cumulative or averaged measure of noise exposure, the system does not illustrate the day to day variation in noise exposure that is associated with airport operations. The ANEF system was developed on the basis of social survey data which aimed to correlate aircraft noise exposure with community reaction in residential areas. While the ANEF system is useful for informing land use planning, including controlling new noise sensitive developments near airports, it has not proven effective for assessing the potential impact of aircraft noise on individuals and communities.

An Australian Noise Exposure Concept (ANEC) is a noise exposure chart produced for a hypothetical future airport usage pattern, and is useful for considering the land use planning consequences of alternative operating strategies. ANEC noise exposure contours are calculated using the same methods as the ANEF. However, they use indicative data on aircraft types, aircraft operations and flight paths. They are generally used in environmental assessments to depict and compare noise exposure levels for different flight path options.

*Australian Standard 2021:2015 Acoustics—Aircraft noise intrusion—Building siting and construction (*AS 2021) contains advice on the acceptability of building sites based on ANEF zones. The acceptability criteria vary depending on the type of land use, with an aircraft noise exposure level of less than 20 ANEF considered acceptable for the building of new residential dwellings.

A series of ANECs[2] was developed for the 1985 *Second Sydney Airport Site Selection Programme: Draft Environmental Impact Statement* (1985 Draft EIS) (Kinhill Stearns 1985). These contours were adopted as an "ANEF" for land use planning purposes and have guided subsequent planning controls implemented by the NSW Government and relevant local councils in the vicinity of the airport site.

Planning controls that are implemented based on an ANEF typically serve to limit the types of development permitted to occur within particular noise exposure zones.

The key planning decision made subsequent to the 1985 EIS is the ministerial direction under section 117(20) of the *Environmental Planning and Assessment Act 1979* (NSW). The direction applies to all land within the 20 ANEF contour in the local government areas of Fairfield, Liverpool, Penrith and Wollondilly and requires that planning proposals not contain provisions enabling development that could hinder the potential for development of a Second Sydney Airport. The direction has subsequently been enforced through the *Penrith Local Environmental Plan 2010* and *Liverpool Local Environmental Plan 2008,* with the inclusion of provisions aimed at preserving noise related buffers around the airport site (see Chapter 21 (Volume 2a)). This has resulted in limited noise sensitive development around the airport site.

31.2.2.3 Measuring noise

Consistent with the assessment of the proposed Stage 1 development, the following noise measures were used for assessment of the 2050 and 2063 scenarios:

- ANEC – a measure of aircraft noise exposure levels for an 'annual average day' that uses indicative data on aircraft types, aircraft operations and flight paths using the same methods as the ANEF;
- N70 – the average number of aircraft noise events per day (i.e. over a 24-hour period) with maximum noise levels exceeding 70 dBA. A noise level of 70 dBA outside a building would generally result in an internal noise level of approximately 60 dBA, if windows are partially open. An internal 60 dBA noise level is sufficient to disturb conversation, in that a speaker would generally need to raise their voice to be understood, or some words may be missed from a television or radio. If windows are closed, an external noise of 70 dBA would result in an internal noise level of approximately 50 dBA;
- N60 – the average number of aircraft noise events per day with maximum noise levels exceeding 60 dBA during the night-time period of 10.00 pm to 7.00 am. An external noise level of 60 dBA approximates an internal level of 50 dBA if windows are partly open. An internal noise level of 50 dBA is commonly used as a design criterion for noise in a bedroom to protect against sleep disturbance. A criterion of 60 dBA is also considered appropriate for recreation areas, both passive and active, on the basis that at this level a person may need to raise their voice to be properly heard in conversation;

[2] The 1985 EIS included a scenario-based noise exposure chart in the form of an "ANEF", which we would today term an "ANEC".

- 90th percentile – a statistical category representing noise values that would be exceeded on only 10 per cent of days. The 90th percentile N70 and N60 values represent days where there would be a particularly high number of aircraft movements and may therefore be likened to a near worst case scenario compared to the standard 'average' N60 or N70; and
- L_{Amax} – the maximum A-weighted noise level predicted or recorded over a period. In this assessment, L_{Amax} denotes the maximum level of noise predicted at a location during a single overflight of a particular aircraft occurring at any time.

31.3 Aircraft noise in 2050

This section considers aircraft noise impacts for a 2050 scenario where the single runway is at or near its predicted maximum capacity servicing around 37 million annual passengers or approximately 185,000 aircraft movements per year.

31.3.1 ANEC contours

ANEC contours have been developed based on indicative flight paths and operating strategies to provide an indication of the likely acceptability of building types at locations around the airport site based on AS 2021. Operating procedures for the proposed airport are yet to be determined and Figure 31–2 presents combined ANEC contours for the Prefer 05 and Prefer 23 operating strategies. Because these ANEC contours combine noise exposure levels for the two assumed operating strategies, they are a conservative or 'worst case' representation of noise exposure levels. ANEC contours for the individual Prefer 05 and Prefer 23 operating strategies are shown in Appendix E1 (Volume 4).

The 20 ANEC contour represents the area where new residential development is described as conditionally acceptable and the 25 ANEC contour represents the area within which new residential development becomes unacceptable under AS 2021. The area enclosed by the 20 ANEC is largely rural residential in nature and the estimated population within these contours in 2050 is shown in Table 31–2.

Table 31–2 Estimated population within ANEC contours (2050)

ANEC	Operating strategy			
	Prefer 05	Prefer 23	Prefer 05 with head-to-head	Prefer 23 with head-to-head
20–25	1,173	1,255	1,014	1,293
25–30	261	313	315	302
30–35	34	72	38	72
>35	0	4	0	4
Total	1,468	1,645	1,367	1,672

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

LEGEND

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

0 1 2 4
Kilometres

Figure 31-2 ANEC contours for Prefer 05 and Prefer 23 operating strategy (2050)

The total population within the 20 ANEC contour is similar for both the Prefer 05 and Prefer 23 operating strategies; however, certain areas surrounding the airport site may be exposed to different noise levels depending upon the selected strategy. The increased usage of the single runway under the 2050 scenario also extends the boundaries of the ANEC contours to new areas compared to Stage 1 operations.

While there are differences between the Prefer 05 and Prefer 23 operating strategies, the introduction of head-to-head operations at night does not greatly influence the contours (see Section 4.5 of Appendix E1 (Volume 4)). This is because even with the additional 6 dBA weighting for night-time noise events included in the ANEF formula, overall noise exposure is still dominated by daytime events.

Figure 31–3 shows the combined year 2050 ANEC 20 contour compared to the ANEC 20 contour presented in the 1985 Draft EIS (Kinhill Stearns 1985). The 1985 ANEC was prepared for a dual runway airport and have been used for land use planning purposes to date.

The 2050 ANEC contours for the single runway are generally comparable to the northern half of the 1985 ANEC with slight extensions to the north and the south-west. These differences reflect revised modelling assumptions including updated forecasts for the number of aircraft movements, the inclusion of new quieter aircraft types, new indicative flight paths and changes in the assignment of aircraft to particular flight paths. The 2050 ANEC contours cover considerably less land to the east and south of the airport site than the 1985 ANEC contours.

The existing planning controls arising from the 1985 ANEC contours have restricted development for the majority of the land area captured within the modelled 2050 ANEC contours.

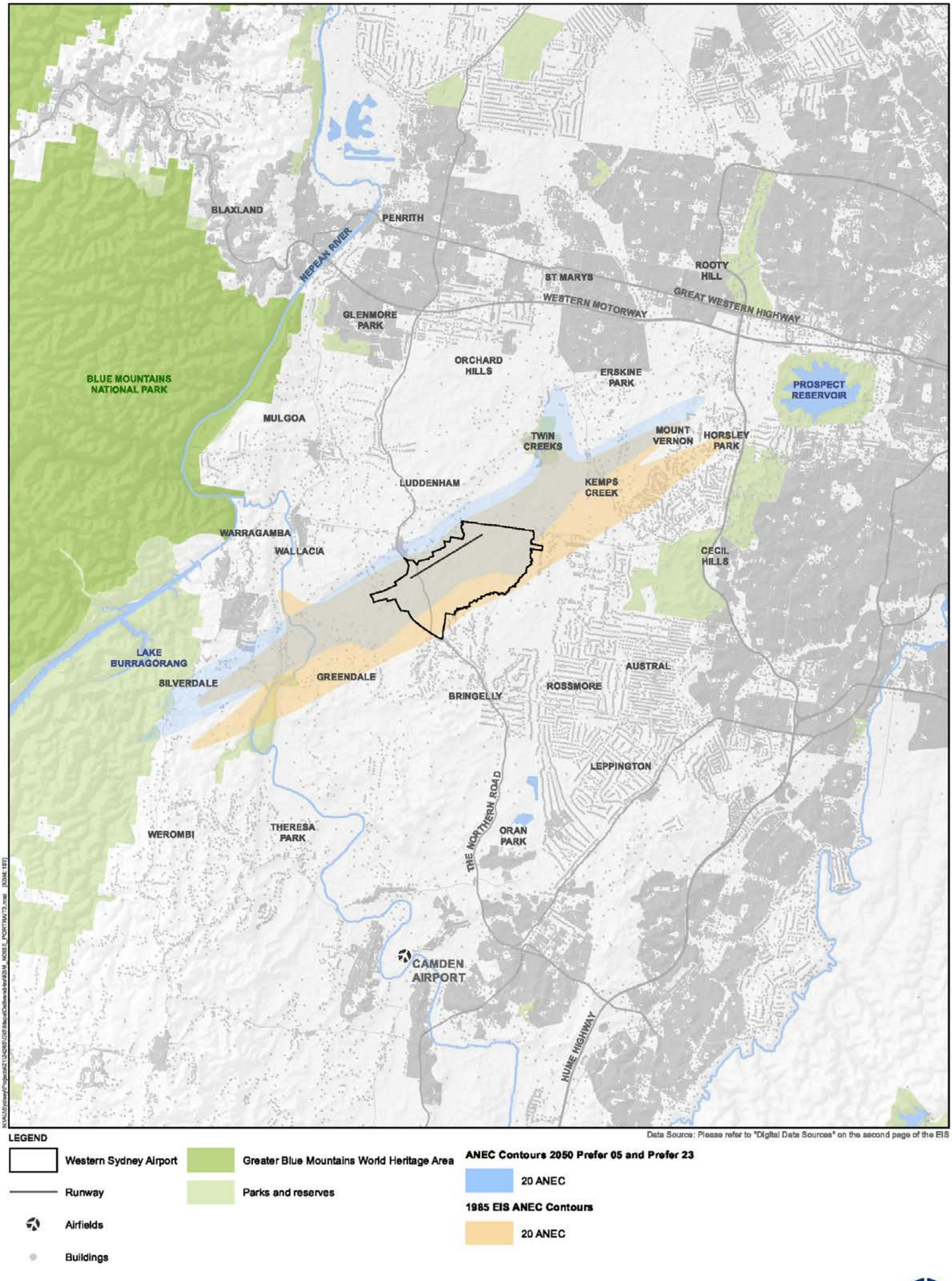


Figure 31-3 1985 Draft EIS combined ANEC contours compared to 2050 Prefer 05 and Prefer 23

31.3.2 Single event maximum noise levels

Single-event noise contours depict the maximum (L_{Amax}) noise levels resulting from a single operation of a specific aircraft type on all applicable arrival or departure flight paths. The aircraft types used in modelling for the 2050 scenario are generally the same as those used for Stage 1 operations and therefore the single event contours would typically remain unchanged.

One exception is that the predicted schedule for the Stage 1 operations included assessment of the Boeing 747 (or equivalent) as the noisiest aircraft with a maximum stage length (or destination distance category) of 5, corresponding to a departure for Singapore—whereas the 2050 scenario includes stage 9 departures corresponding to departures for Los Angeles. As noted in Chapter 10 (Volume 2a), the Boeing 747 is being phased out of passenger services by airlines and it is unlikely that any operations by this aircraft type would occur at the proposed airport in 2050.

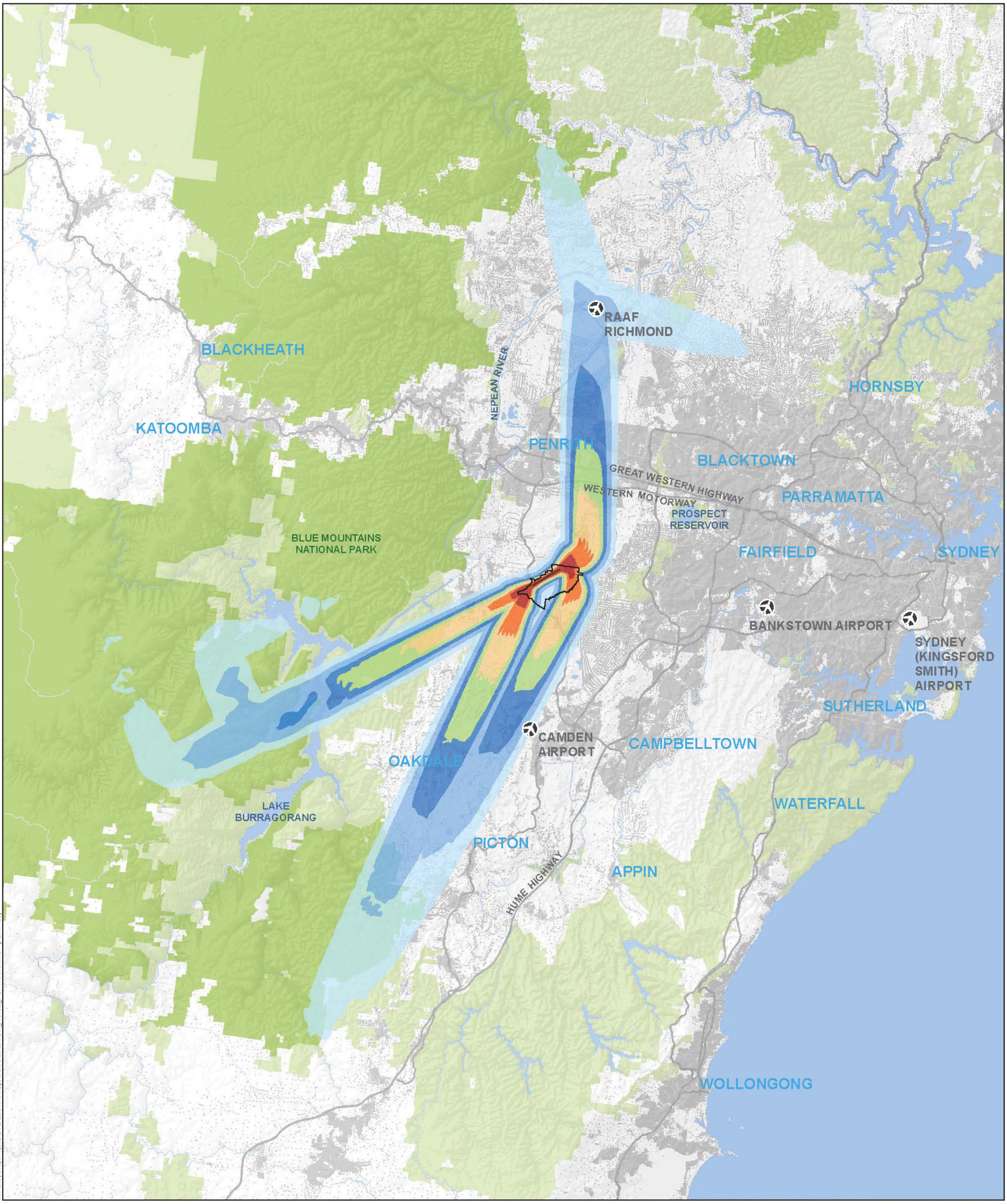
According to the predicted schedule, stage 9 departures by Boeing 747 aircraft could occur on average once every two days by 2050 and may occur on any of a number of flight paths. Although contours are shown for these events on paths heading south from the airport, it is very unlikely that a stage 9 departure would occur on these paths as there are no destinations for which this would be a preferred departure direction.

The additional fuel load required to reach stage 9 destinations results in an elevated engine noise level to achieve take-off. Maximum noise level contours for this additional departure event type are shown in Figure 31–4 and Figure 31–5. At the most-affected residences, close to the airport, L_{Amax} noise levels from these events would be in the range 85 – 95 dBA. There are less than ten existing residences within the 90 dBA L_{Amax} contour for these departures, located to the south-west of the airport site.

When these events occur on the flight path leading north in the 05 direction (i.e. departures to the north-east), L_{Amax} noise levels exceeding 75 dBA are predicted over more densely-populated areas around St Marys, with levels above 80 dBA predicted in some parts of Erskine Park.

Figure 31–6 and Figure 31–7 show L_{Amax} noise levels from a B747 arrival on any flight path. In this case, noise levels are identical to those experienced from the proposed Stage 1 operations. Noise levels of 60 to 70 dBA are predicted over sections of Erskine Park and St Marys, extending to parts of Blacktown. Based on the indicative flight paths, noise levels from this event would reach 60 dBA in parts of the lower Blue Mountains.

Maximum noise levels from other more common aircraft operations would be as described for the Stage 1 operations (see Chapter 10 (Volume 2a)) as the aircraft type and stage length would remain the same for the 2050 scenario.



LEGEND

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

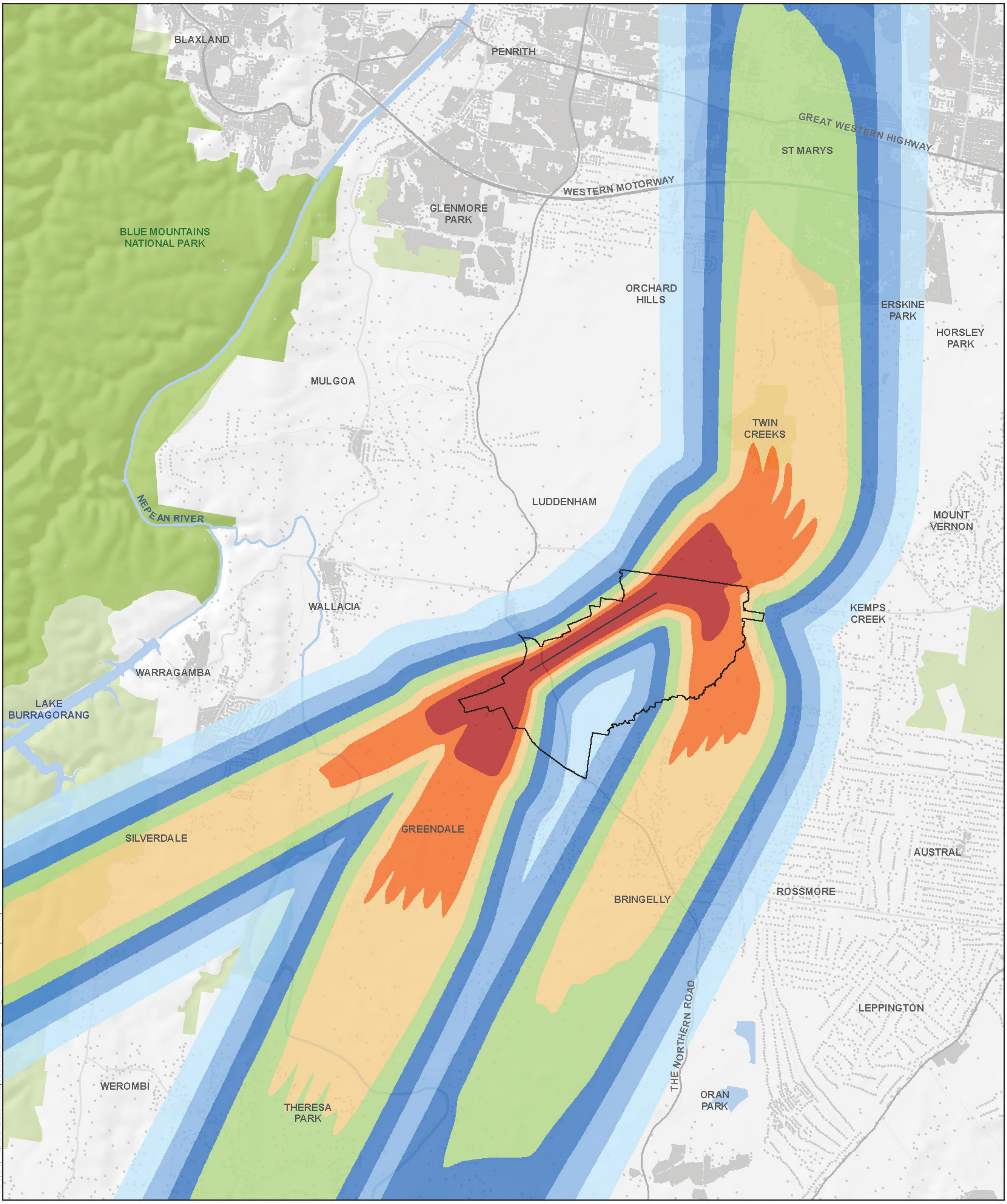
- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves

LAmax

- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- >90 dBA

0 3.5 7 14
Kilometres

Figure 31-4 Combined single event Boeing 747 departure Stage Length 9 2050 Scenario



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

LEGEND

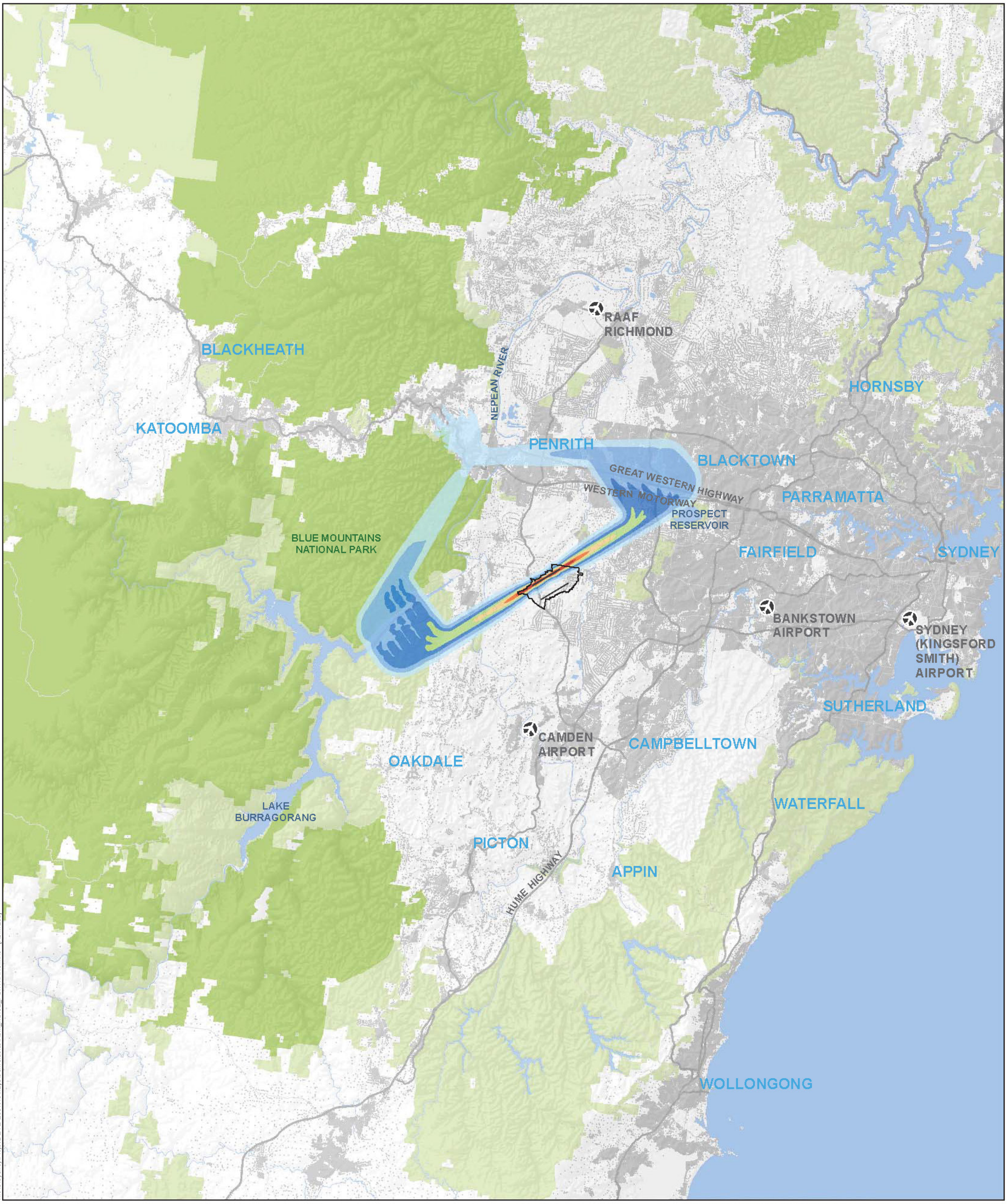
- Western Sydney Airport
- Runway
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves

LAmax

- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- >90 dBA

0 0.75 1.5 3
Kilometres

Figure 31-5 Combined single event Boeing 747 departure Stage Length 9 2050 Scenario (meso scale)



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

LEGEND

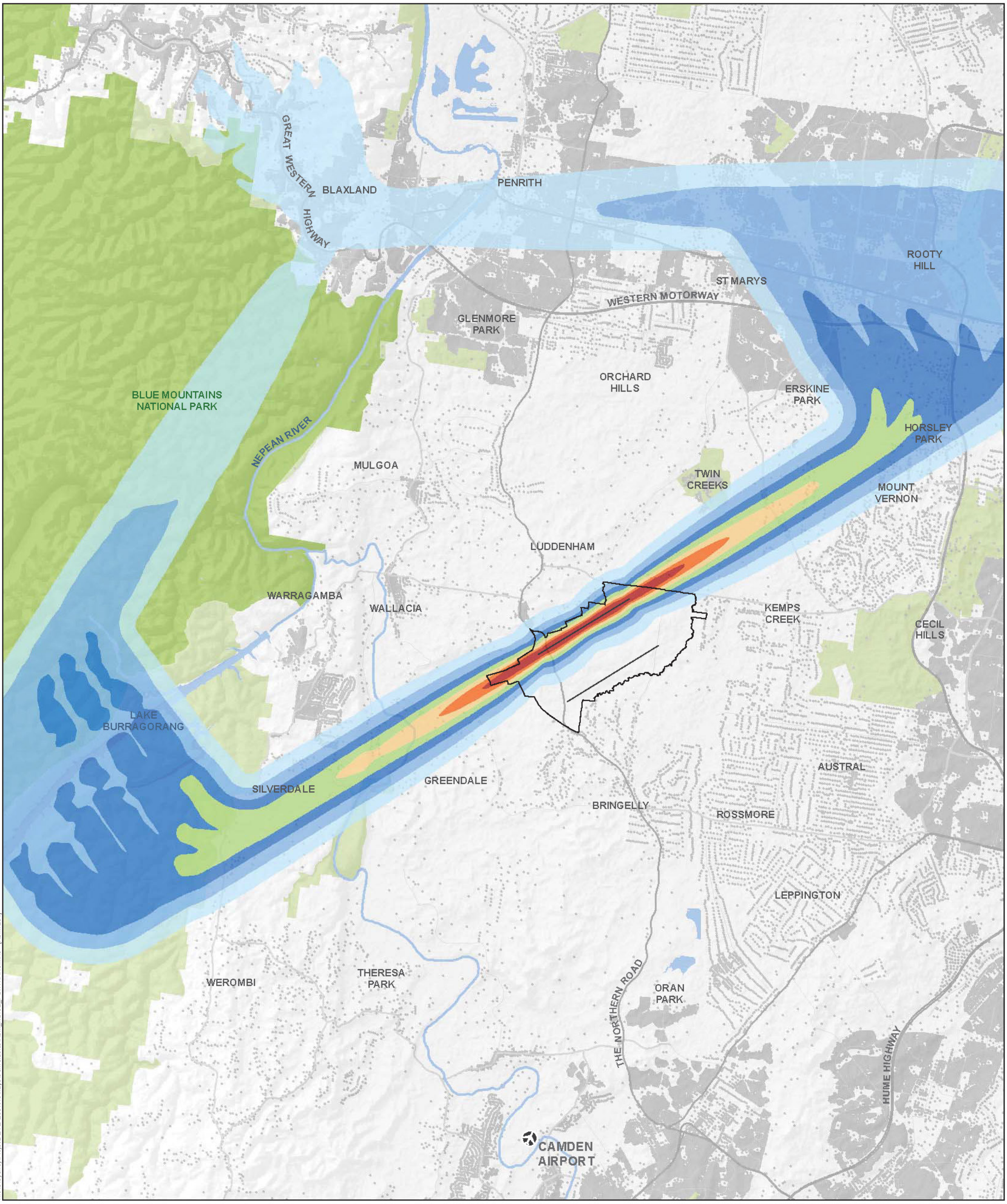
- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves

LAmax

- 60-65 dBA
- 65-70 dBA
- 70-75 dBA
- 75-80 dBA
- 80-85 dBA
- 85-90 dBA
- >90 dBA

0 3.5 7 14
Kilometres

Figure 31-6 Single event B747 arrival on all flight paths



LEGEND

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

LAmax
60-65 dBA
65-70 dBA
70-75 dBA
75-80 dBA
80-85 dBA
85-90 dBA
>90 dBA

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

0 1 2 4
Kilometres

Figure 31-7 Single event B747 arrival on all flight paths (meso scale)

31.3.3 Noise over 24 hours

31.3.3.1 N70 contours – 2050 scenario

As the volume of air traffic increases beyond 10 million annual passengers, the extent of predicted noise impact would also gradually increase. Based on current forecasts, aircraft movements at the proposed airport would approach capacity for the single runway configuration by about 2050. Calculated N70 noise contours for each of the four airport operating strategies are shown on Figure 31–8 to Figure 31–11. These represent the predicted annual average number of movements per day with L_{Amax} noise levels exceeding 70 dBA.

The Prefer 05 operating strategy results in greater impact on residents in densely-populated areas to the north-east of the airport site, with a predicted 5 to 10 events per day above 70 dBA over more densely-populated areas around St Marys.

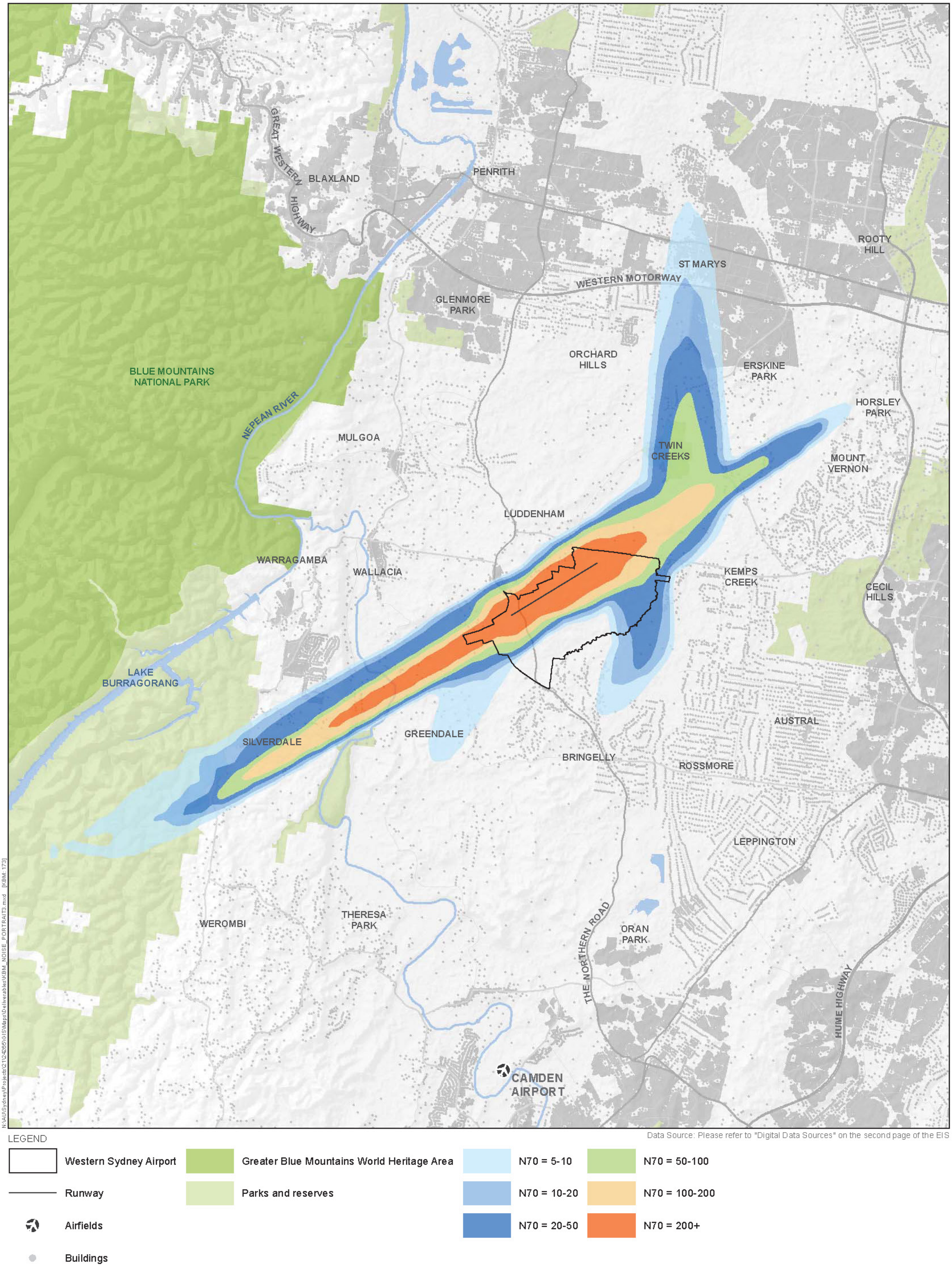
In comparison, the Prefer 23 operating strategy is predicted to result in an impact of less than five events per day in these areas. The predicted impact would be greater in less densely-populated areas to the north of Horsley Park, and also in rural-residential areas around Greendale. Compared to the Prefer 05 operating strategy, the Prefer 23 operating strategy also results in higher predicted impacts in the Burragorang State Conservation Area to the south-west of the airport site.

Table 31–3 shows the population estimated to be affected by aircraft noise above 70 dBA in 2050. Larger areas of existing built-up residential development would be exposed to aircraft noise compared to the proposed Stage 1 operations. A Prefer 05 operating strategy would result in an estimated 30,000 people experiencing more than five events per day above 70 dBA. Under the Prefer 23 operating strategy, this number is substantially lower at approximately 5,000 people. However, it is notable that a Prefer 23 strategy still results in rural residential areas to the south-west of the airport site experiencing a higher number of noise events above 70 dBA.

Head-to-head operations at night would reduce the population exposed to between five and 20 noise events per day above 70 dBA under a Prefer 05 operating strategy. The use of a head-to-head mode under a Prefer 23 operating strategy would result in little change to overall N70 values.

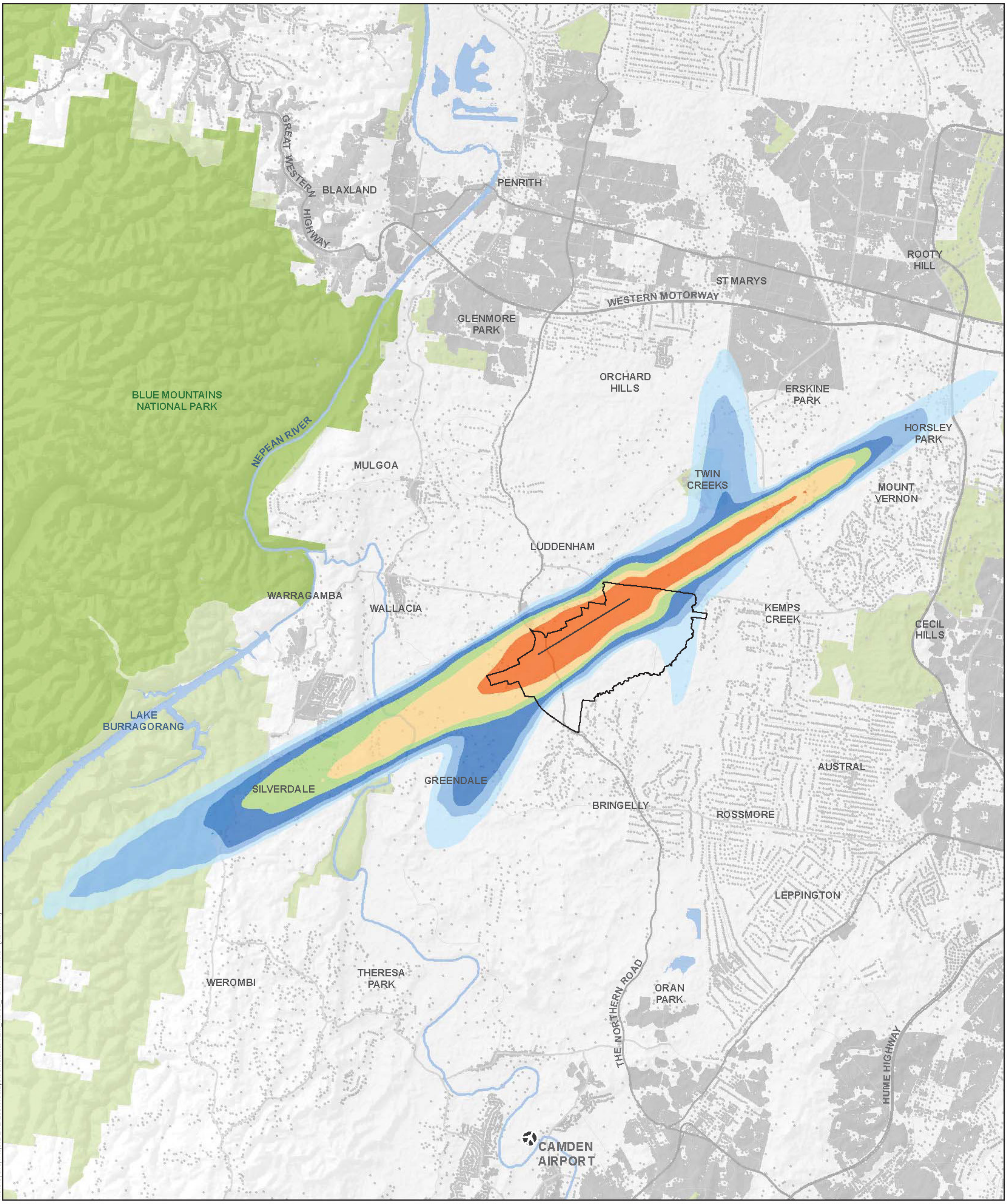
Table 31–3 Estimated population within N70 contours – 2050

N70	Operating strategy			
	Prefer 05	Prefer 23	Prefer 05 with head-to-head	Prefer 23 with head-to-head
5–10	20,193	2,232	17,358	2,262
10–20	7,101	1,024	5,425	992
20–50	1,448	636	1,392	649
50–100	767	590	685	594
100–200	265	662	228	665
>200	139	145	180	141
Total	29,912	5,288	25,268	5,303



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

Figure 31-8 - N70 contours for Prefer 05 operating strategy (2050)



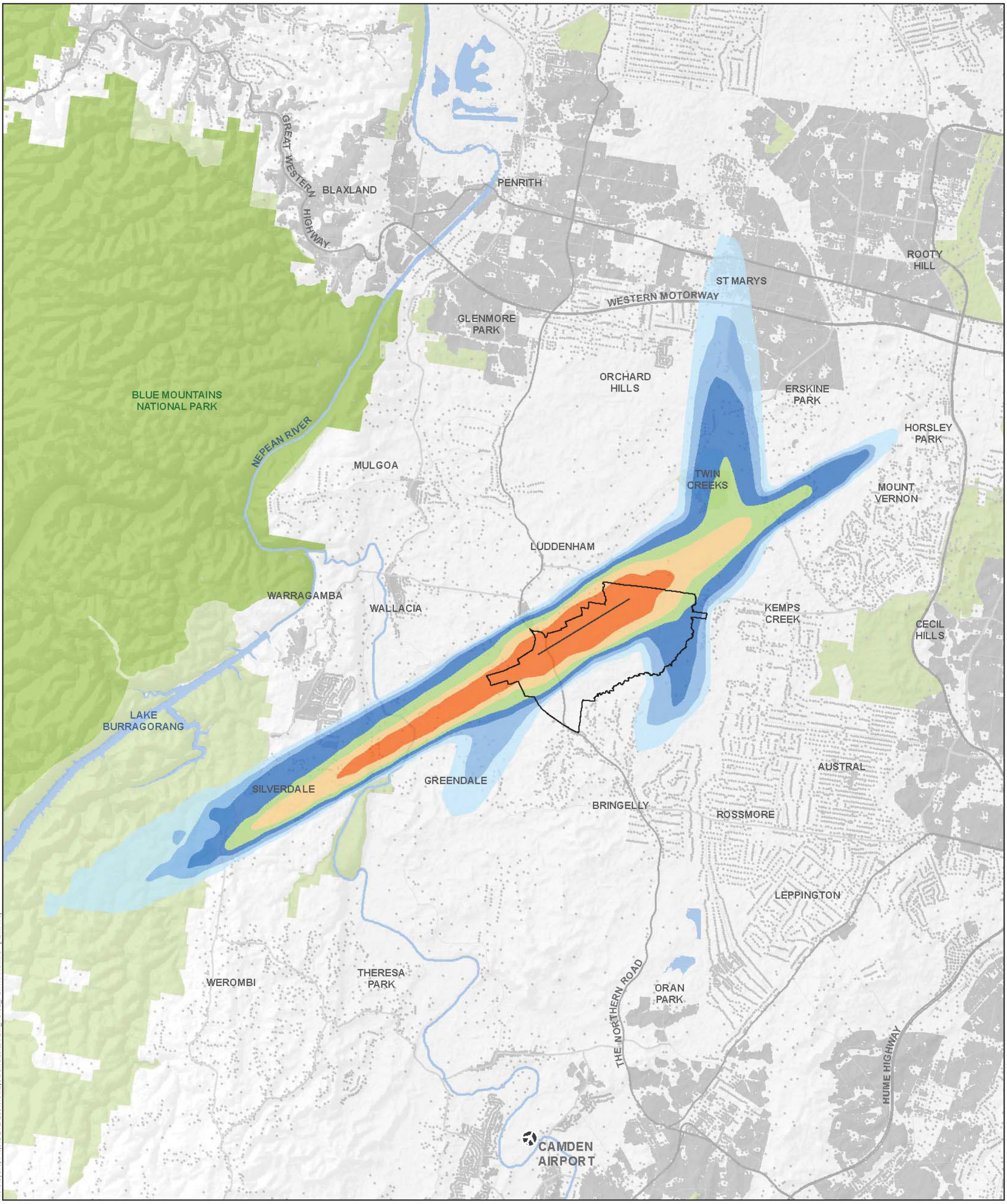
Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves
- N70 = 5-10
- N70 = 10-20
- N70 = 20-50
- N70 = 50-100
- N70 = 100-200
- N70 = 200+

0 1 2 4
Kilometres

Figure 31-9 - N70 contours for Prefer 23 operating strategy (2050)



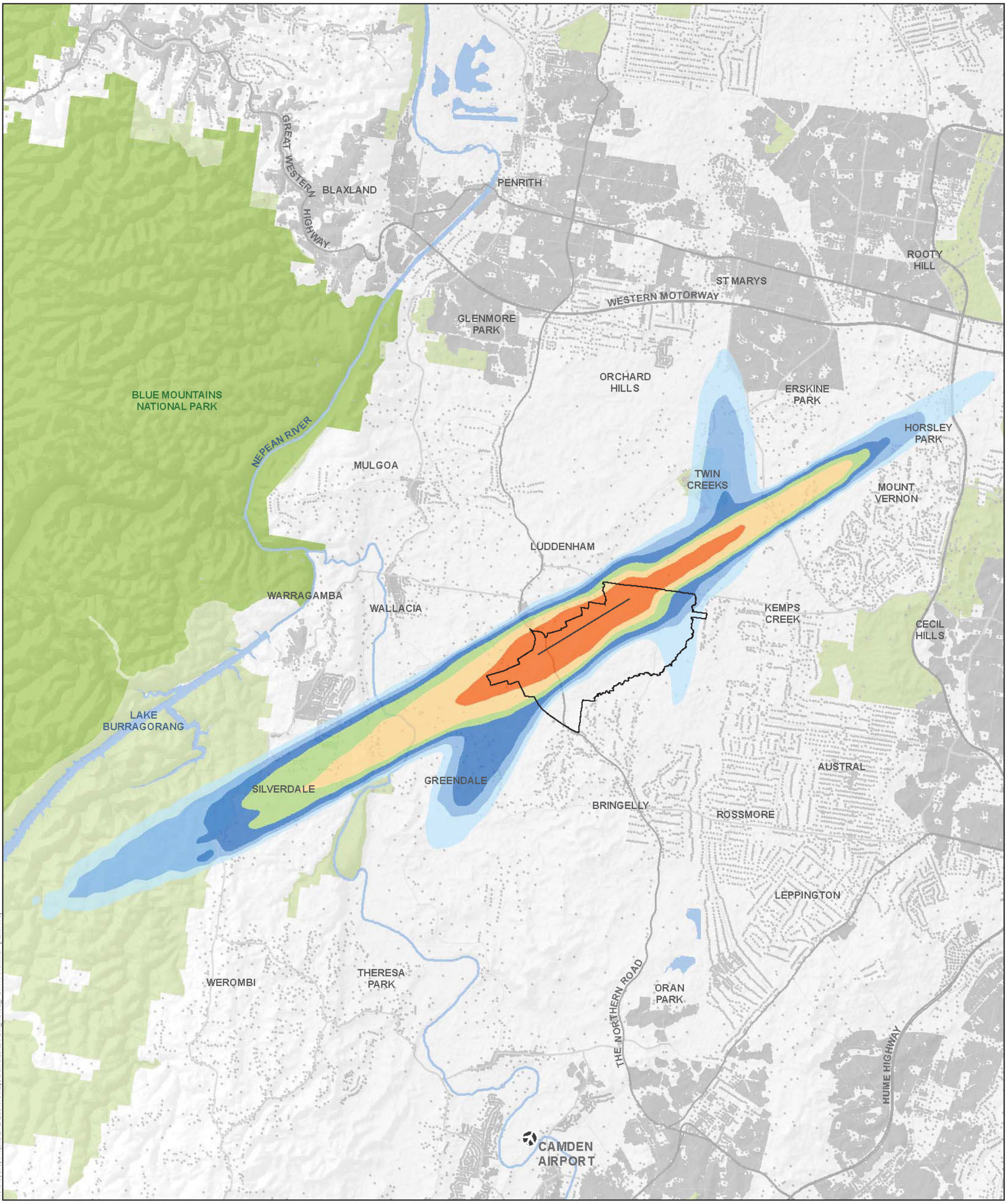
LEGEND

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

Western Sydney Airport	Greater Blue Mountains World Heritage Area	N70 = 5-10
Runway	Parks and reserves	N70 = 10-20
Airfields		N70 = 20-50
Buildings		N70 = 50-100
		N70 = 100-200
		N70 = 200+

0 1 2 4
Kilometres

Figure 31-10 - N70 contours for Prefer 05 with head-to-head operating strategy (2050)



LEGEND

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

Western Sydney Airport	Greater Blue Mountains World Heritage Area	N70 = 5-10
Runway	Parks and reserves	N70 = 10-20
Airfields		N70 = 20-50
Buildings		N70 = 50-100
		N70 = 100-200
		N70 = 200+

0 1 2 4
Kilometres

Figure 31-11 - N70 contours for Prefer 23 with head-to-head operating strategy (2050)

31.3.3.2 90th percentile N70 contours – 2050 scenario

The 90th percentile values of N70 calculated over all days for the 2050 scenario are shown on Figure 31–12 and Figure 31–13. The values represent the number of daily aircraft noise events over 70 dBA that would be exceeded on only 10 per cent of days. This can be thought of as a typical worst case day for airport operations in each operating strategy. The figures also show the average day N70 values for comparison. Head-to-head operations are not shown as this strategy makes very little difference to the results for the 90th percentile N70 values.

The most noticeable feature of these figures is that generally the predicted difference between noise impact on average and typical worst case days is not large. This is due to the relatively low and consistent wind speeds at the airport site, which mean that the proposed airport's 'preferred' mode of operation could be selected over 80 per cent of the time for either strategy.

Although for the Prefer 23 operating strategy established built-up areas are not predicted to experience more than five events per day over 70 dBA on an average day, there are areas of St Marys and St Clair that would do so on a typical worst case day. In fact, in these areas a typical worst case day for the Prefer 23 operating strategy would be similar to an average day for the Prefer 05 operating strategy.

The number of noise events exceeding 60 dBA (N60) has been used to describe the impact of noise at night.

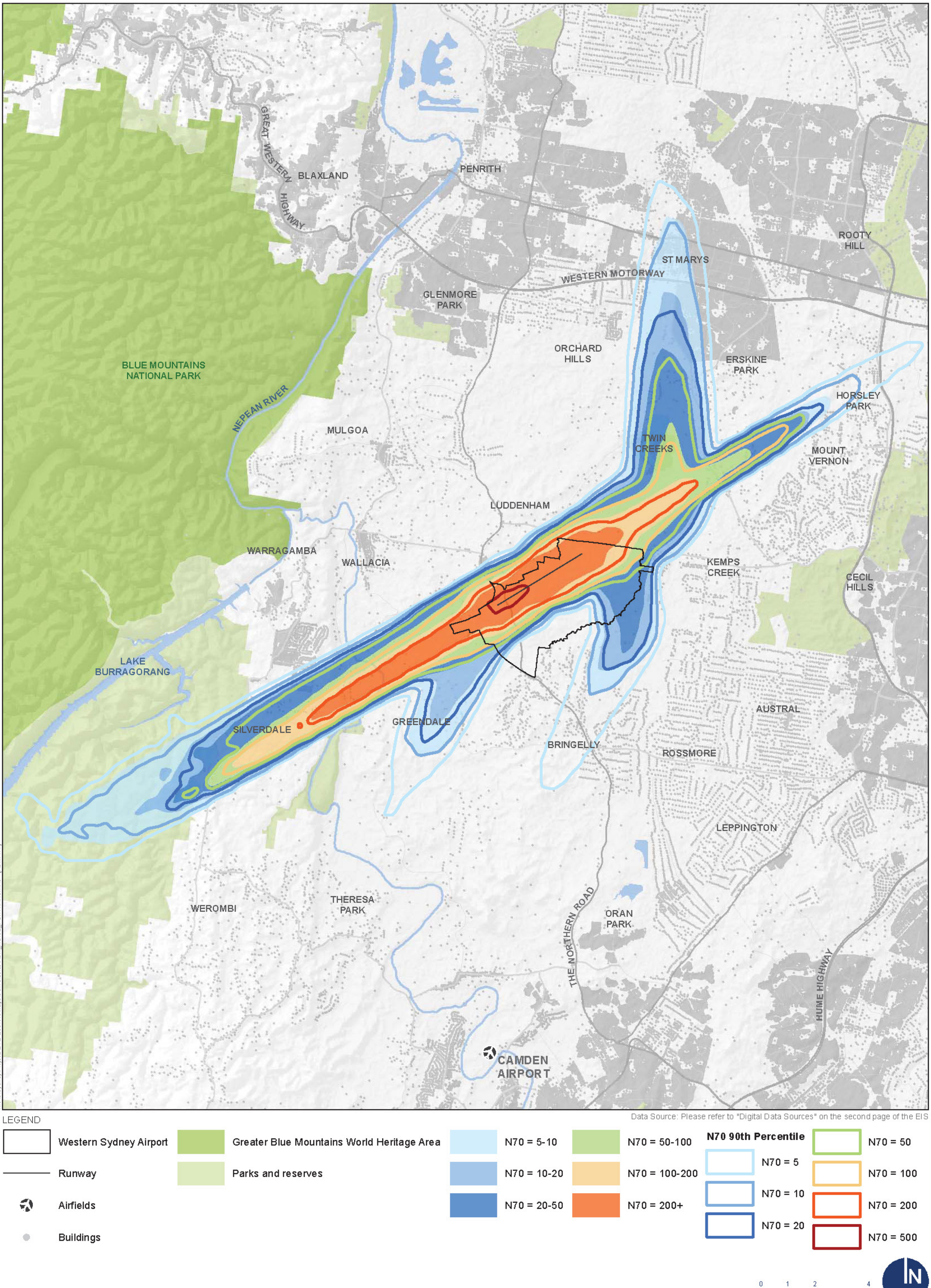


Figure 31-12 - 90th percentile N70 contours for Prefer 05 operating strategy (2050)

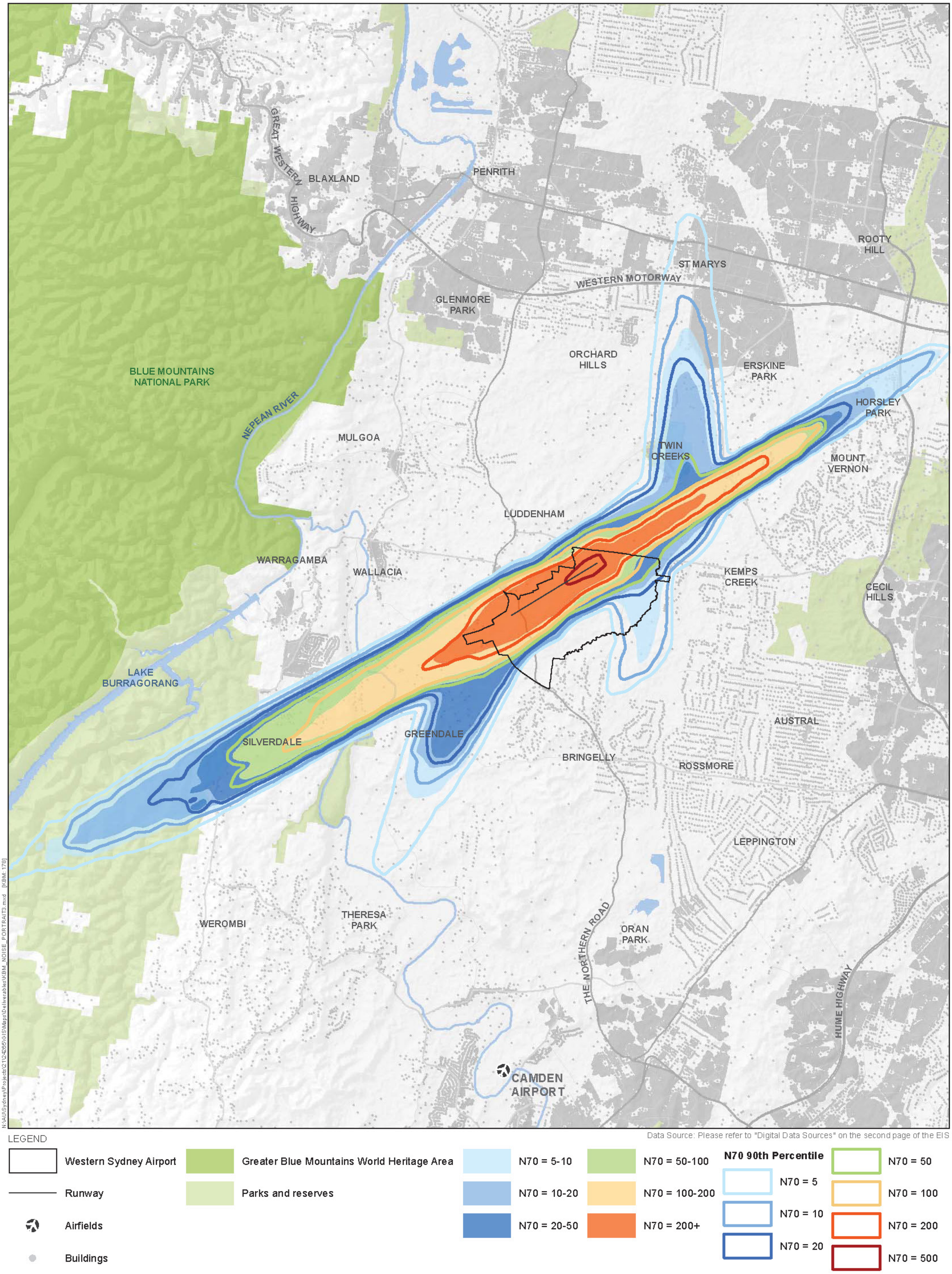


Figure 31-13 - 90th percentile N70 contours for Prefer 23 operating strategy (2050)

31.3.4 Night time noise

31.3.4.1 N60 contours – 2050

The number of noise events exceeding 60 dBA (N60) has been used to describe the impact of noise at night.

N60 values have been calculated for the standard night-time period 10.00 pm – 7.00 am. Figure 31–14 to Figure 31–17 show 2050 N60 contours for the four operating strategies considered.

Under the 2050 assessment scenario, large areas with high population densities are predicted to experience over 20 noise events per night exceeding 60 dBA under the Prefer 05 operating strategy, particularly to the north of the airport site around St Marys, St Clair and Erskine Park. Large areas of residential development to the north-east are also predicted to experience night-time noise impacts under the Prefer 23 operating strategy, but at a lower frequency of five to 10 events per night.

Areas near the airport site including Luddenham and rural residential areas south-west of the site are predicted to experience a high number of noise events per night under all operating modes.

Night-time noise impact towards the north-east could be reduced by the use of head-to-head operations where available. As demonstrated in Figure 31–18 and Figure 31–19, this would result in almost no built-up residential areas being exposed on average to more than five events per night above 60 dBA. The use of a head-to-head operating mode would have minimal effect on the level of disturbance to residents close to the airport site.

Table 31–4 shows the population estimated to be affected by night-time noise above 60 dBA in 2050. By this time, the population experiencing night-time noise impacts events at some level is predicted to increase substantially compared to the Stage 1 operations. At 2050 levels of aircraft traffic, the use of a Prefer 23 operating strategy with head-to-head operations offers clear benefits in terms of the number of residents experiencing night-time noise.

Table 31–4 Estimated population within N60 contours – 2050

N60	Operating strategy			
	Prefer 05	Prefer 23	Prefer 05 with head-to-head	Prefer 23 with head-to-head
5–10	29,128	143,827	81,187	30,560
10–20	34,552	18,211	15,513	1,987
20–50	72,138	4,953	3558	4,111
50–100	1,600	3,395	2,664	3,440
>100	13	5	1,44	0
Total	137,431	170,390	103,067	40,099

The 90th percentile night-time N60 values, representing the predicted number of events per night exceeding 60 dBA on a ‘worst case’ night, are presented in Appendix E1 (Volume 4). Differences between average and worst case days are generally not large; however, more extensive residential areas would be exposed to more than five events per night on a worst case night than on an average night, particularly with head-to-head operations.

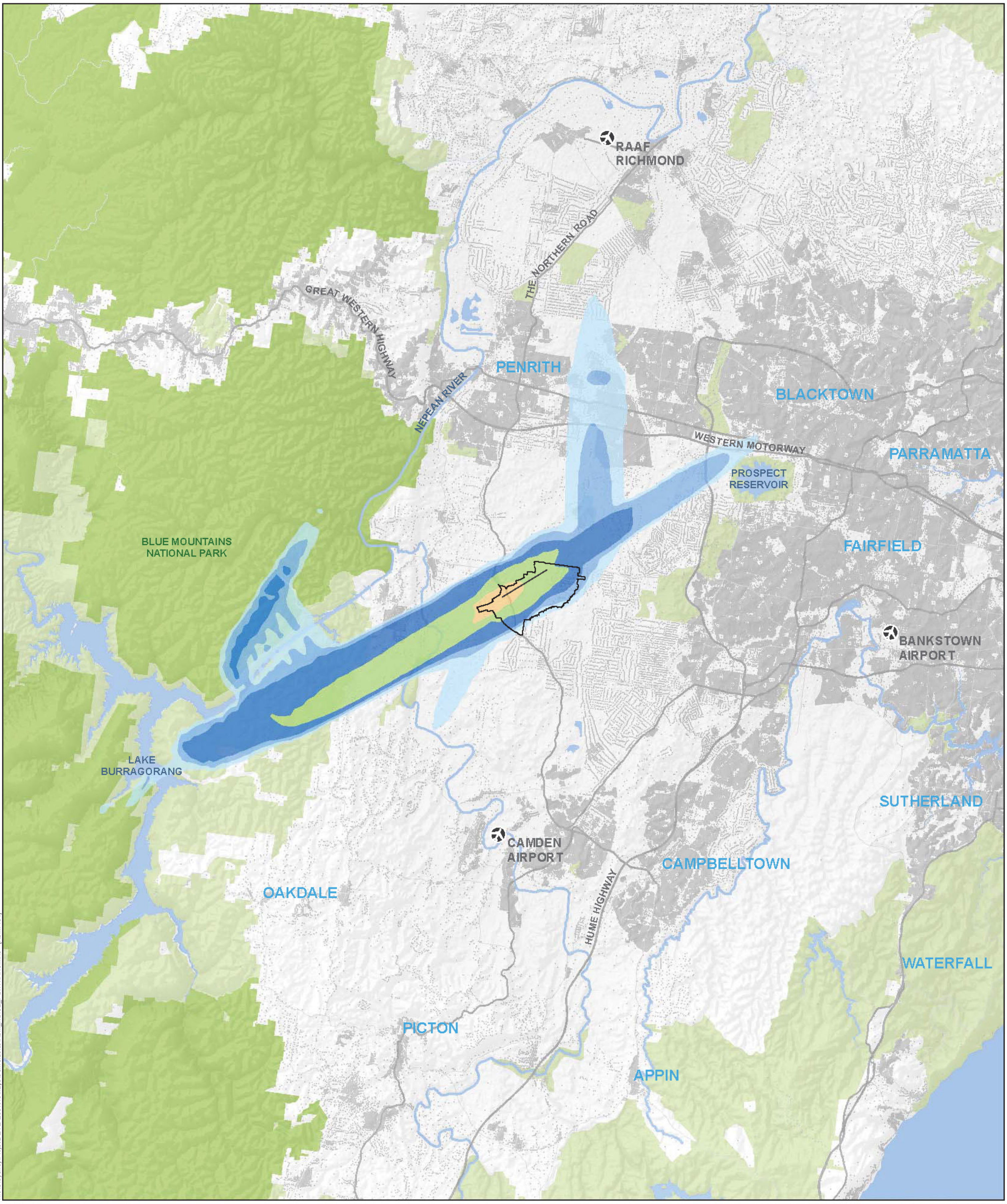
Figure 31-14 - N60 contours for Prefer 05 operating strategy (2050)

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

LEGEND

- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves
- N60 = 5-10
- N60 = 10-20
- N60 = 20-50
- N60 = 50-100
- N60 = 100+

Figure 31-15 - N60 contours for Prefer 23 operating strategy (2050)



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

LEGEND

- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves
- N60 = 5-10
- N60 = 10-20
- N60 = 20-50
- N60 = 50-100
- N60 = 100+

0 2.25 4.5 9
Kilometres

Figure 31-16 - N60 contours for Prefer 05 operating strategy with head-to-head (2050)

Figure 31-17 - N60 contours for Prefer 23 operating strategy with head-to-head (2050)

31.3.5 Recreational areas

A number of recreational areas near to the airport site have been identified within the area predicted to be affected by the threshold levels of aircraft overflight noise exposure used in this assessment. These range from sports areas used for active pursuits (such as horse riding, bowling or golf) to nature reserves which may be used for more passive activities.

The impact of aircraft noise in recreational areas can be quantified by calculating the number of events per day exceeding maximum noise levels of 60 and 70 dBA. Where an outside noise level exceeds 60 dBA, a person may need to raise their voice to be properly heard in conversation, but this level would be unlikely to cause disruption to active sporting pursuits; however, noise events of this level would be noticeable and could impact on the acoustic amenity of areas used for passive recreation for the duration of the aircraft overflight. Noise levels above 70 dBA would require increased voice effort (although not shouting) for conversation to be understood and would likely be considered to be acoustically intrusive in passive recreation areas for the duration of the overflight.

Table 31–5 and Table 31–6 show the identified recreation areas and the predicted values of N60 and N70 for the Prefer 05 and Prefer 23 operating strategies. The values shown are for the period 7.00 am – 6.00 pm, representing the times when these areas would most likely be used.

Table 31–5 Average number of daily noise events with L_{Amax} exceeding 60 dBA (N60) at recreational areas (2050)

Recreational area	2050 N60 noise events	
	Prefer 05	Prefer 23
Bents Basin State Conservation Area & Gulguer Nature Reserve	24	49
Kemps Creek Nature Reserve	0	0
Rossmore Grange	11	2
Horsley Park Reserve	0	0
Twin Creeks Golf & Country Club	78	27
Sydney International Equestrian Centre	0	0
Whalan Reserve, St Marys	4	10

Table 31–6 Average number of daily noise events with L_{Amax} exceeding 60 dBA (N60) at recreational areas (2050)

Recreational area	2050 N70 noise events	
	Prefer 05	Prefer 23
Bents Basin State Conservation Area & Gulguer Nature Reserve	0	0
Kemps Creek Nature Reserve	0	0
Rossmore Grange	0	0
Horsley Park Reserve	0	0
Twin Creeks Golf & Country Club	28	11
Sydney International Equestrian Centre	0	0
Whalan Reserve, St Marys	0	0

The results indicate that most of the identified recreational receivers would not be subject to aircraft overflight noise events with maximum levels exceeding 70 dBA.

Aircraft noise levels at Twin Creeks Golf and Country Club would be noticeable and at times a raised voice effort would be required for effective communication outdoors. At this location, predicted noise exposure would be significantly reduced under a Prefer 23 operating strategy.

Bents Basin State Conservation Area and Gulguer Nature Reserve, Rossmore Grange and Whalan Reserve would be subject to a number of flyovers with noise levels exceeding 60 dBA, which would be noticeable to passive users of these areas. Bents Basin State Conservation Area and Gulguer Nature Reserve, and Whalan Reserve noise levels would be lower under a Prefer 05 operating strategy. At Rossmore Grange, they would be lower under a Prefer 23 strategy.

31.4 Aircraft noise in 2063

This section considers aircraft noise impacts for a 2063 scenario where the airport is servicing around 82 million annual passengers and around 370,000 annual aircraft movements. This scenario represents an assessment of noise exposure at a point in time when the airport has two runways, which are both operating close to their theoretical capacity.

As for the single runway assessment scenarios, the flight paths and operating procedures for parallel runway operations are indicative and would be subject to further detailed consideration before being finalised. There is also considerable uncertainty regarding noise emission levels from future aircraft operating in 2063, although generally they can be anticipated to be lower than the current aircraft types used in this assessment.

A number of alternative airport operating modes may be available under conditions of low traffic volume that may potentially result in reduced noise impacts. However, it is not possible to accurately ascertain which modes would be possible at a time so far into the future and therefore only the Prefer 05 and Prefer 23 operating strategies have been considered for the assessment of parallel runway operations.

31.4.1 ANEC contours

ANEC contours have been developed based on indicative flight paths and operating modes to provide an indication of the likely acceptability of building types based upon ANEF zones specified in AS 2021. Figure 31–18 presents combined ANEC contours for the Prefer 05 and Prefer 23 operating strategies. Because these ANEC contours combine noise exposure levels for the two assumed operating strategies, they are a conservative or ‘worst case’ representation of noise exposure levels. ANEC contours for the individual Prefer 05 and Prefer 23 operating strategies are shown in Appendix E1 (Volume 4).

The area between the 20 and 25 ANEC contours represents the area within which new residential development is described as conditionally acceptable. New residential development is considered unacceptable within the area defined by the 25 ANEC contour under AS 2021.

The contours cover a larger area compared to the 2050 scenario, extending to the south and east of the airport site following commissioning of the second runway.

The estimated population within the ANEC contours in 2063 is shown in Table 31–7.

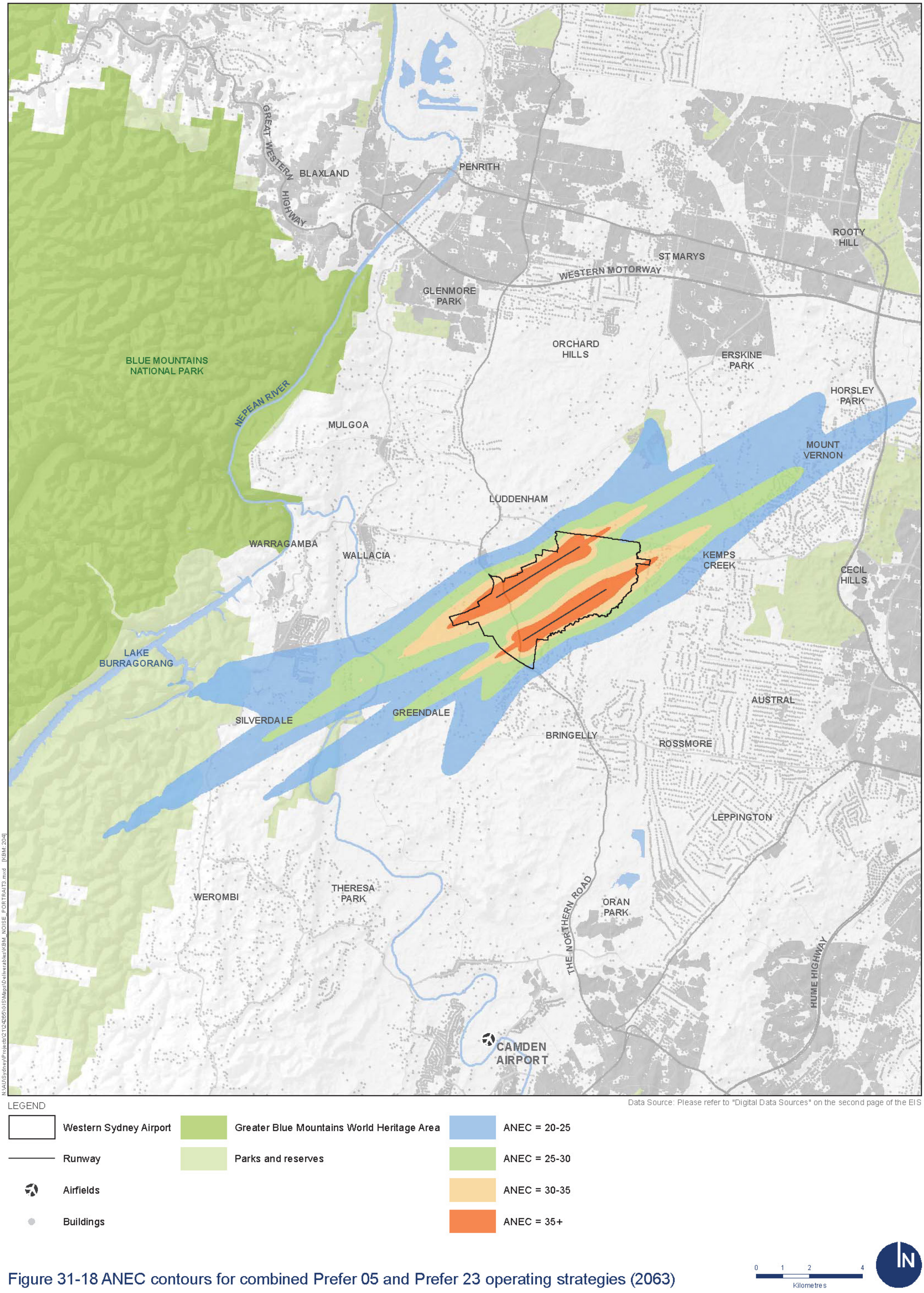
Table 31–7 Estimated population within ANEC contours (2063)

ANEC	Operating strategy	
	Prefer 05	Prefer 23
20-25	5,803	7,832
25-30	1,486	1,934
30-35	570	527
>35	0	26
Total	7,858	10,319

Figure 31–19 shows the year 2063 ANEC 20 contour for the combined operating strategies compared to the ANEC 20 contour presented in the 1985 Draft EIS (Kinhill Stearns 1985). The 1985 ANEC was prepared for a dual runway airport and has been used for land use planning purposes to date.

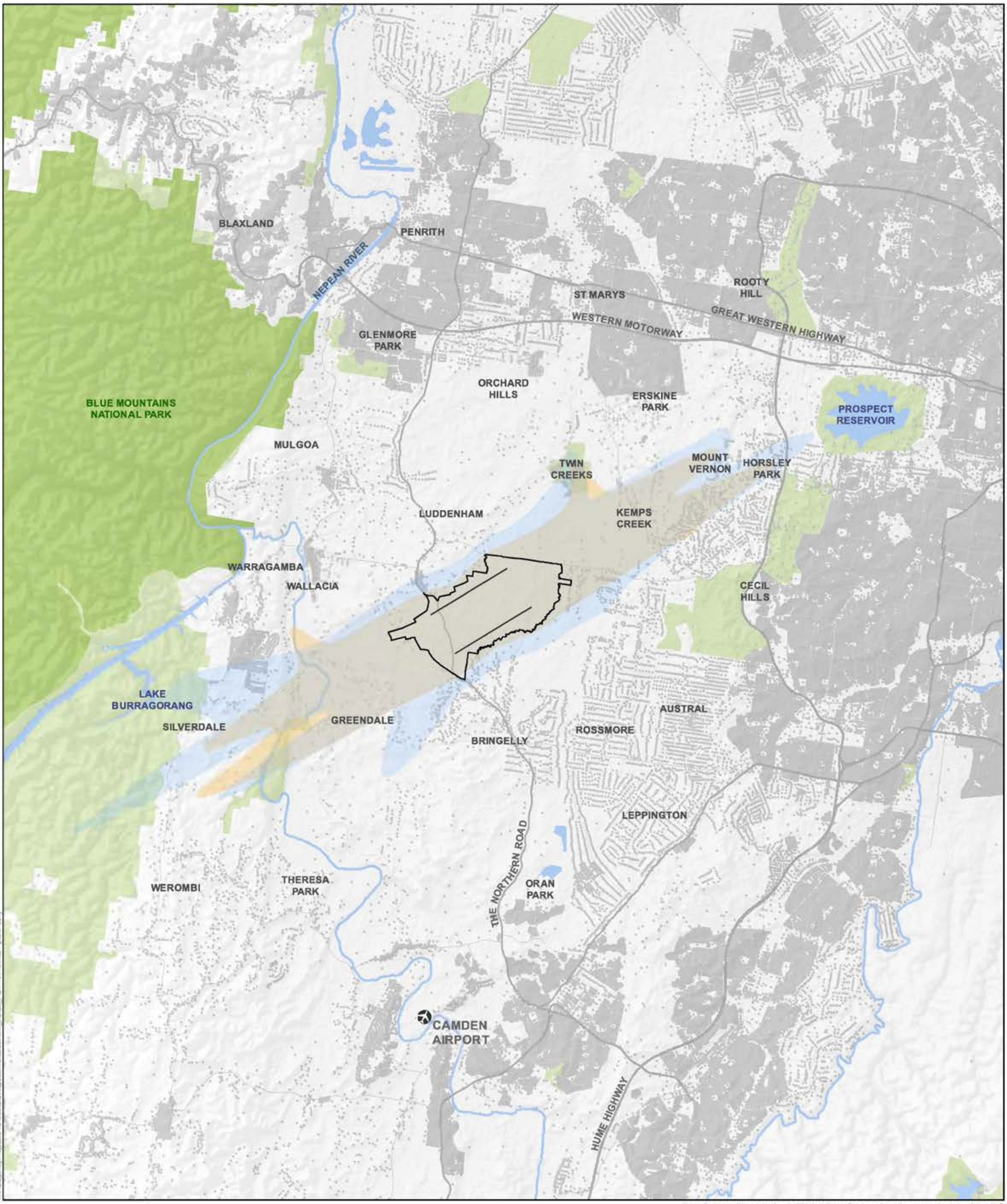
The combined 2063 ANEC contours for the long term development are generally comparable to the 1985 ANEC with slight extensions to the north and the south-west, including into the Burragorang Conservation Area. These differences reflect revised modelling assumptions including updated forecasts for the number of aircraft movements, new indicative flight paths and changes in the assignment of aircraft to particular flight paths.

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



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

Figure 31-18 ANEC contours for combined Prefer 05 and Prefer 23 operating strategies (2063)



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

LEGEND

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

ANEC Contours 2063 Prefer 05 and Prefer 23

20 ANEC

1985 EIS ANEC Contours

20 ANEC

Figure 31-19 1985 Draft EIS ANEC contours compared to combined 2063 Prefer 05 and Prefer 23 ANEC contours

0 1. 2 5 5

Kilometres

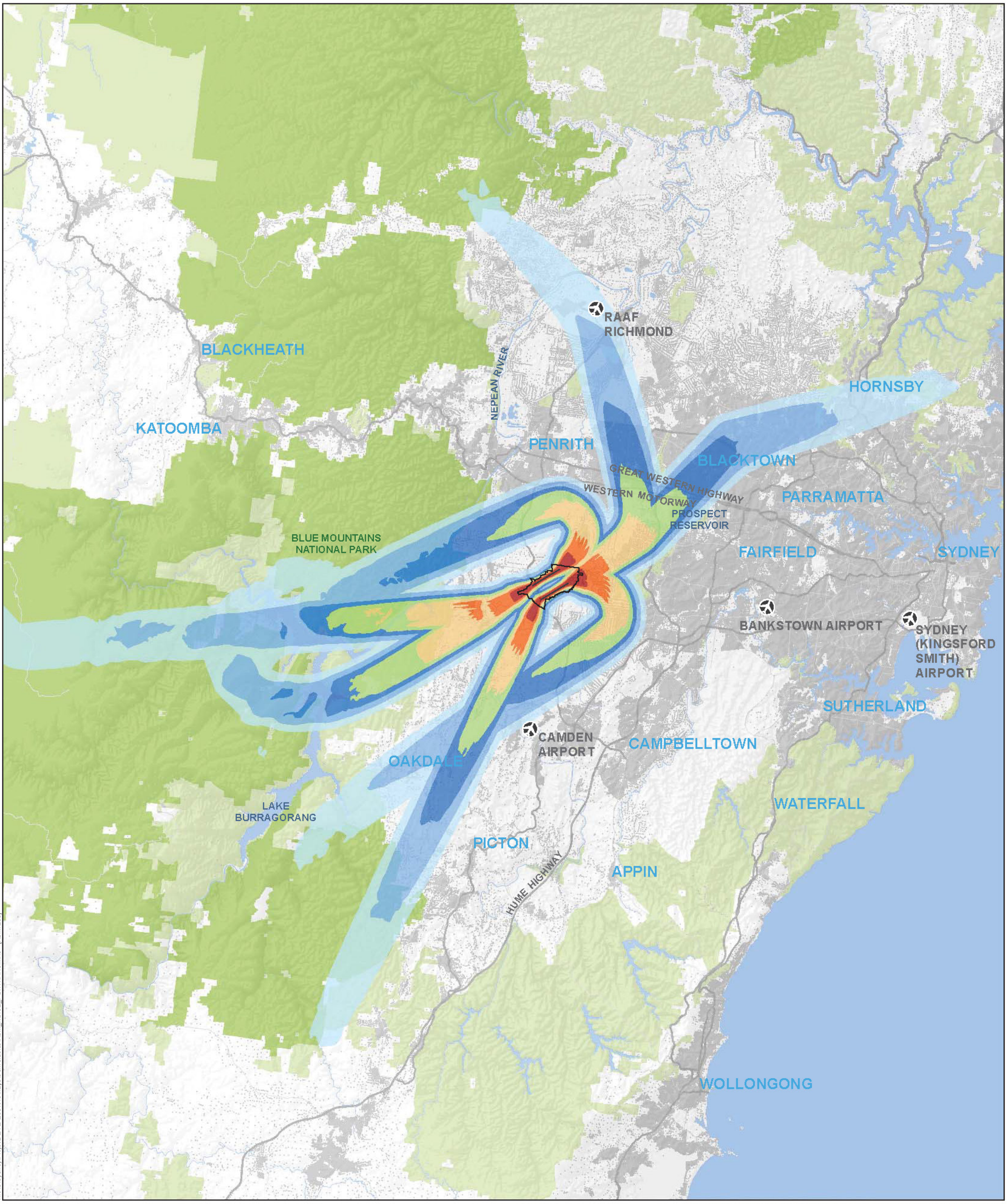
31.4.2 Single event or maximum noise levels

Single-event noise contours depict the maximum (L_{Amax}) noise levels resulting from a single operation of a specific aircraft type on all applicable arrival or departure flight paths.

Figure 31–20 to Figure 31–25 show combined, single event L_{Amax} noise level contours for departures and approaches by a Boeing 747 (the loudest noise event predicted to occur at the airport) and Airbus A320 aircraft (a more common aircraft type), based on indicative flight paths for the long term development. These figures show that noise events above 60 dBA would be experienced over a wider area, compared to operations on a single runway, due to the additional flight paths associated with the operation of the second runway.

In particular, a Boeing 747 (or a future type with equivalent noise emissions) operating on certain departure paths would result in noise levels exceeding 60 dBA over more areas of the Greater Blue Mountains World Heritage Area, and in some areas the maximum noise level would exceed 70 dBA. As previously noted, the Boeing 747 is being phased out of passenger services by airlines and it is unlikely that any operations by this aircraft type would occur at the proposed airport in 2063.

Maximum noise levels from other operations would affect similar numbers of residents to the proposed Stage 1 operations, but the pattern of exposure is predicted be extended with additional residential areas, such as Mount Vernon and Horsley Park exposed to noise levels exceeding 60 dBA. Some residential areas, notably in Silverdale, are predicted to experience noise events over 70 dBA from A320 departures.



LEGEND

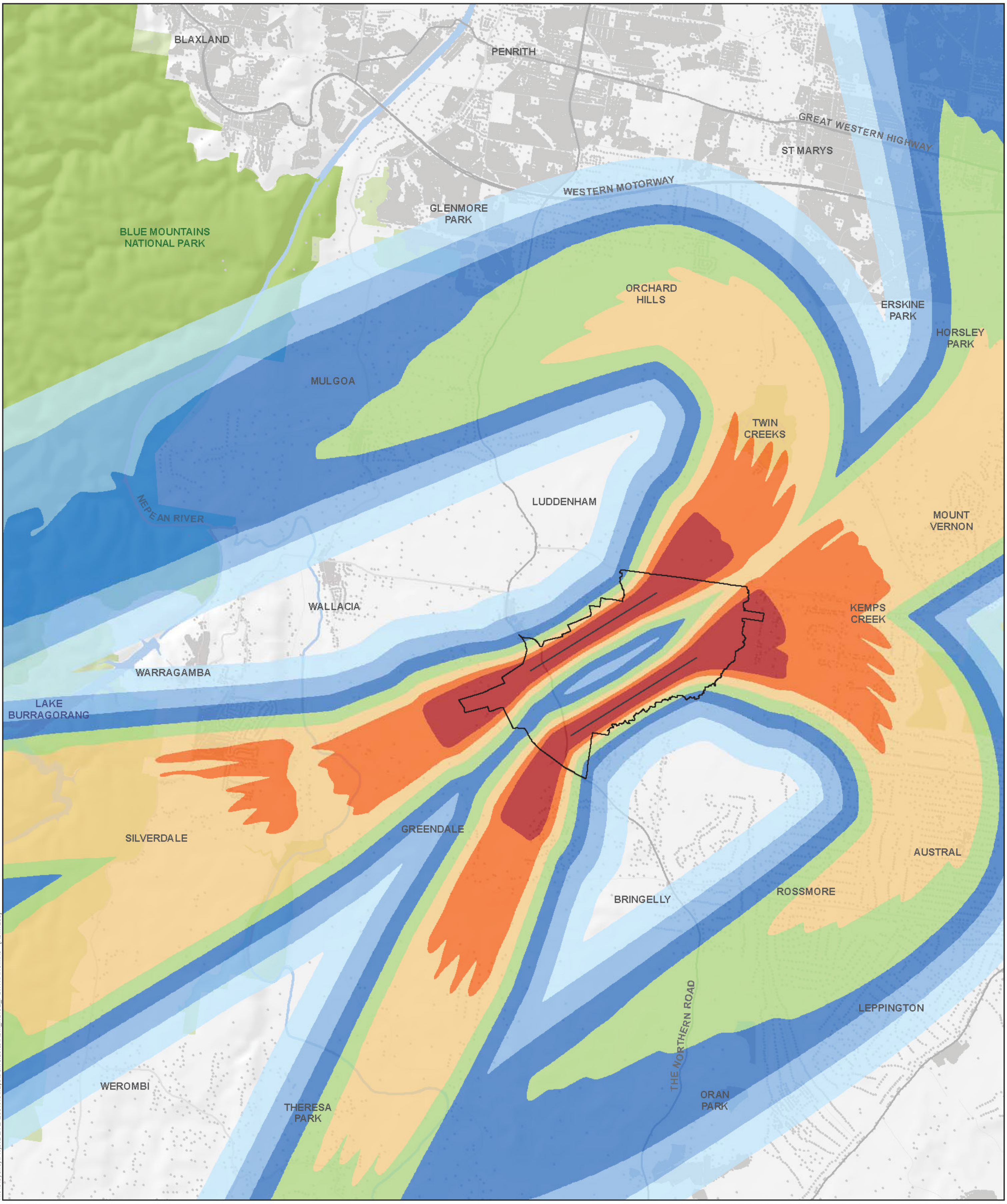
Western Sydney Airport
Runway
Airfields
Buildings
Greater Blue Mountains World Heritage Area
Parks and reserves

LAmax
60-65 dBA
65-70 dBA
70-75 dBA
75-80 dBA
80-85 dBA
85-90 dBA
>90 dBA

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

0 3.5 7 14
Kilometres

Figure 31-20 Combined single event Boeing 747 departure (stage length 9) 2063



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

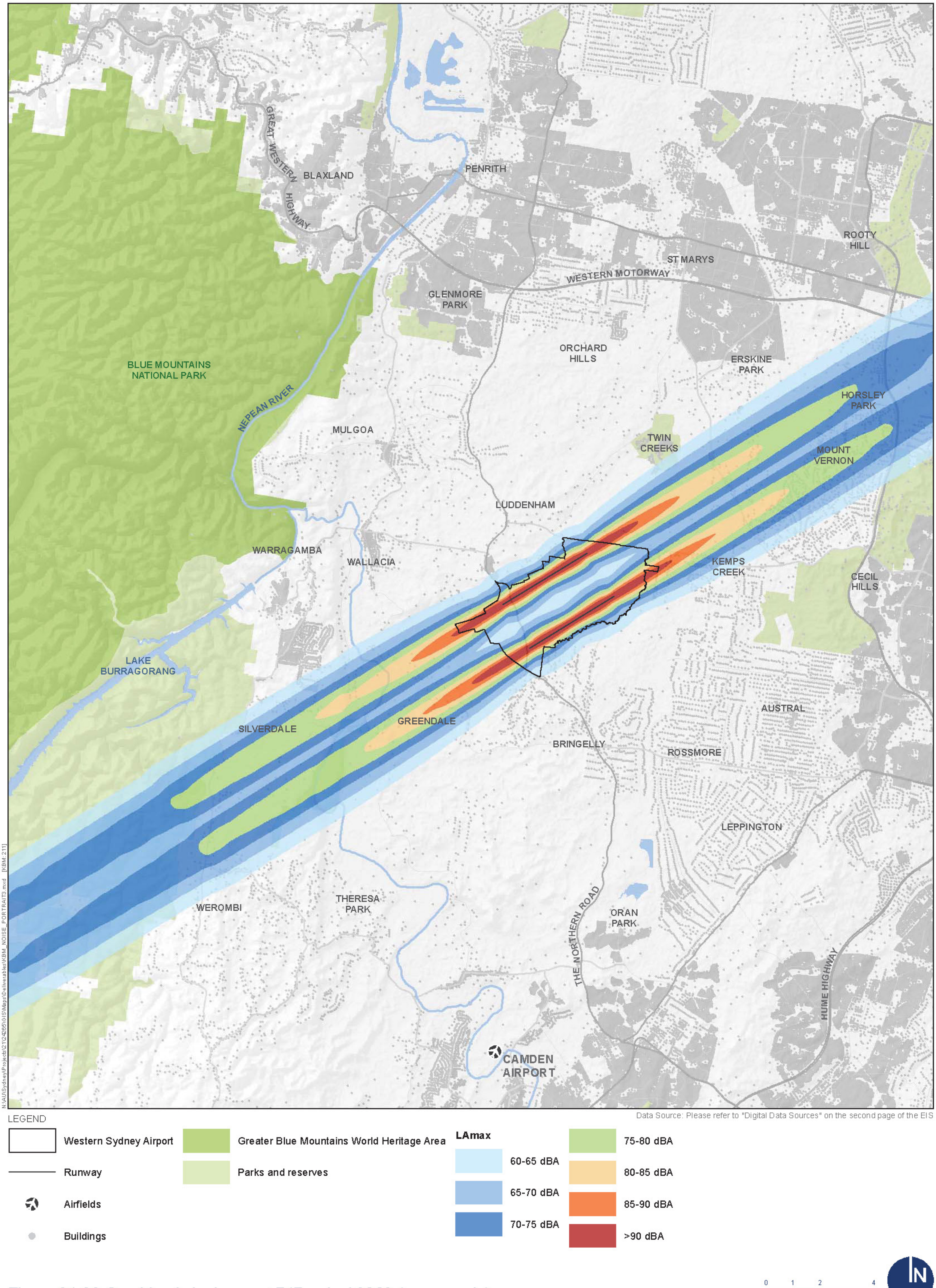
LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	**LAmax**			
Runway	Parks and reserves	60-65 dBA	75-80 dBA		
Buildings		65-70 dBA	80-85 dBA		
		70-75 dBA	85-90 dBA		
			>90 dBA		

Figure 31-21 Combined single event Boeing 747 departure (stage length 9) 2063 (meso scale)

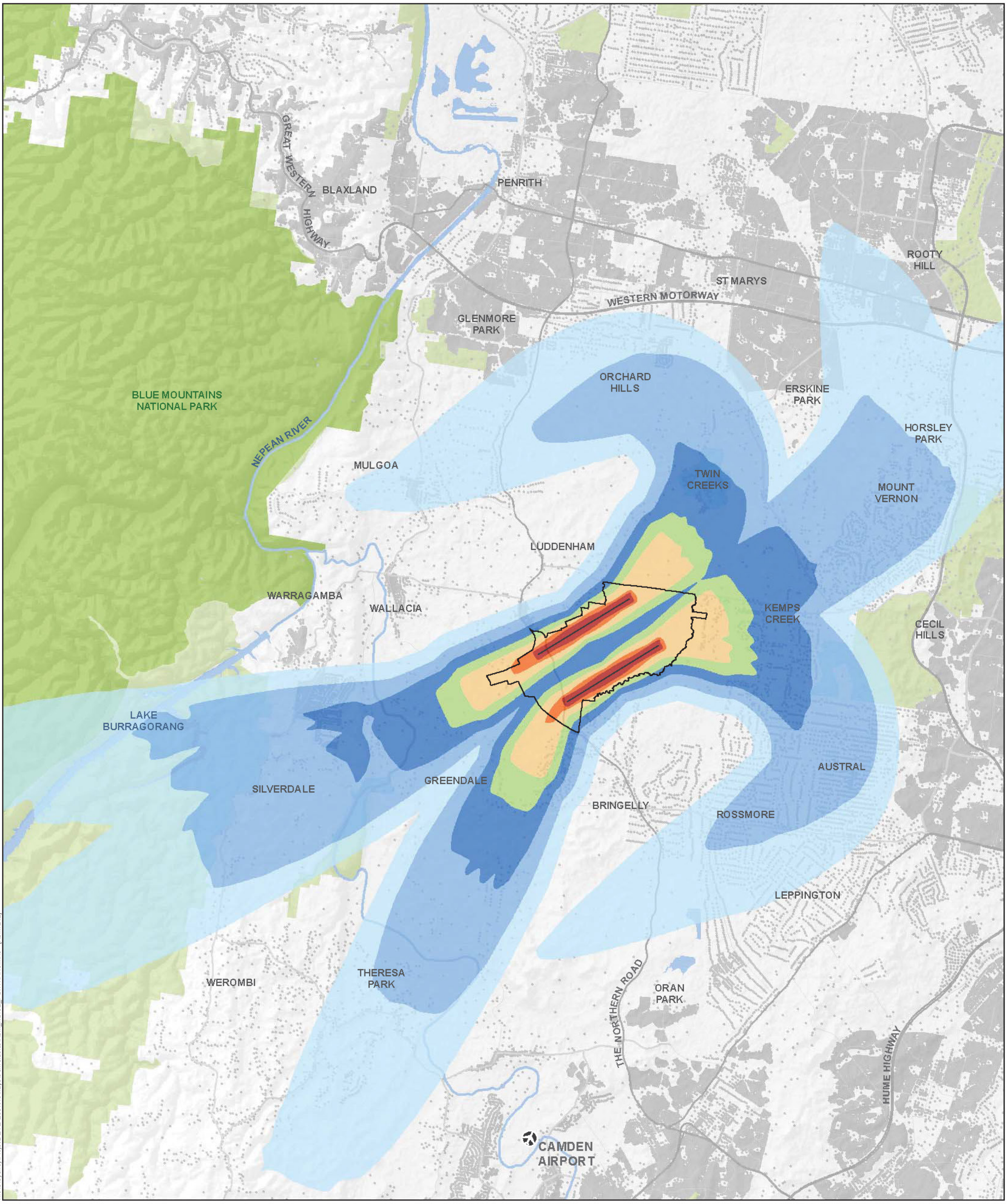
0 0.75 1.5 3
Kilometres

Figure 31-22 Combined single event 747 arrival 2063



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

Figure 31-23 Combined single event 747 arrival 2063 (meso scale)



LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	LAmax	
Runway	Parks and reserves	60-65 dBA	75-80 dBA
Airfields		65-70 dBA	80-85 dBA
Buildings		70-75 dBA	85-90 dBA
			>90 dBA

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

0 1 2 4 Kilometres

Figure 31-24 Combined single event Airbus A320 departure (stage length 4) 2063

N:\AU\Sydney\Projects\21\24265\GIS\Maps\Deliverables\KBM_NOISE_PORTRAIT3.mxd [KBM:213]

LEGEND

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

Western Sydney Airport	Greater Blue Mountains World Heritage Area	**LAmax**	
Runway	Parks and reserves	60-65 dBA	75-80 dBA
Airfields		65-70 dBA	80-85 dBA
Buildings		70-75 dBA	85-90 dBA
			>90 dBA

0 2.25 4.5 9
Kilometres

Figure 31-25 Combined single event Airbus A320 arrival 2063

31.4.3 Noise over 24 hours

31.4.3.1 N70 contours – 2063 scenario

N70 contours for the Prefer 05 and Prefer 23 operating strategies in 2063 are shown in Figure 31–26 and Figure 31–27. Compared with the results for 2050, there are fewer densely-populated areas within the N70—5–10 contour, despite a predicted doubling in the number of aircraft movements at the proposed airport between 2050 and 2063. This is particularly true for the Prefer 05 operating strategy, where movements can be spread across two runways and the locations of flight paths are less constrained. Additional residential areas in Horsley Park, Kemps Creek and Mount Vernon would experience an increased frequency of noise events. Parts of Kemps Creek are predicted to experience more than 200 events per day above 70 dBA for both operating strategies, while Mount Vernon would experience between 100 and 200 events per day above 70 dBA under the Prefer 05 strategy and more than 200 events per day above this noise level under the Prefer 23 strategy.

Table 31–8 shows the population estimated to be affected by aircraft noise above 70 dBA in 2063. Comparing the two operating strategies, there is little difference between the total number of people estimated to experience five or more noise events above 70 dBA; similarly, there are only small differences in the size of the exposed population within each respective N70 contour.

Table 31–8 Estimated population within N70 contours (2063)

N70	Operating strategy	
	Prefer 05	Prefer 23
5–10	3,493	3,738
10–20	3,926	2,988
20–50	4,454	3,807
50–100	2,542	3,106
100–200	1,920	2,511
>200	1,083	1,321
Total	17,417	17,472

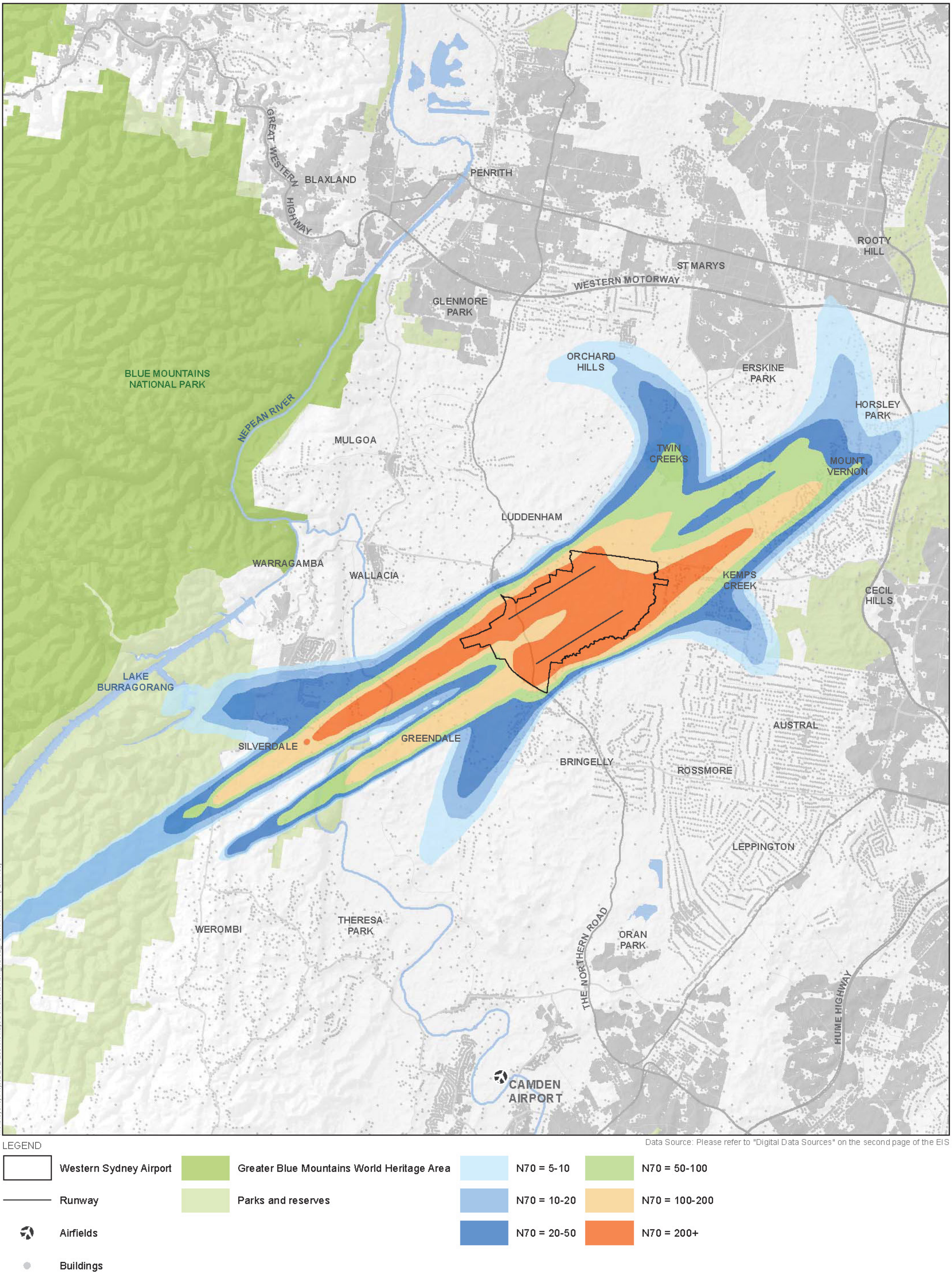
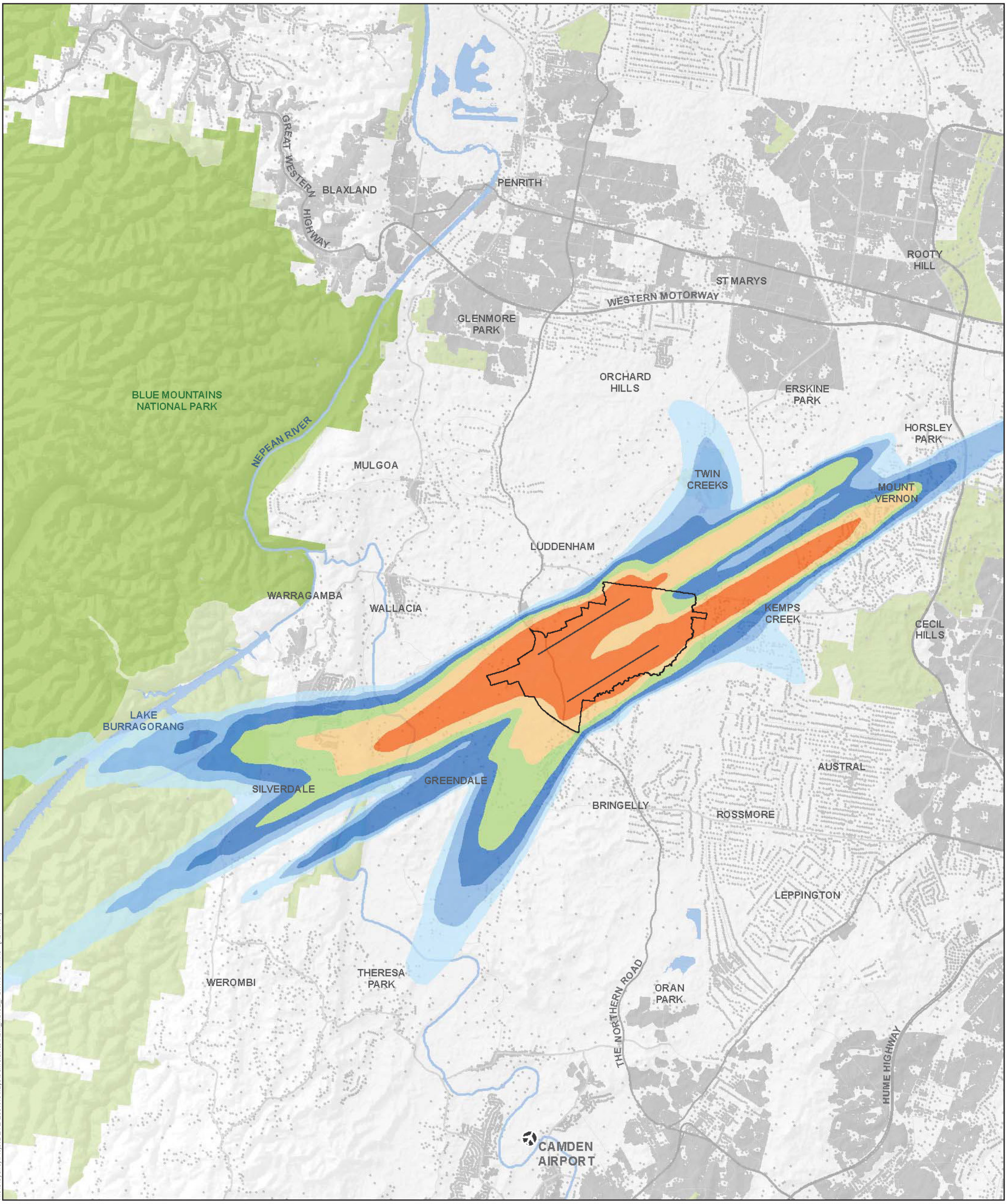


Figure 31-26 - N70 contours for Prefer 05 operating strategy (2063)



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

LEGEND

Western Sydney Airport	Greater Blue Mountains World Heritage Area	N70 = 5-10
Runway	Parks and reserves	N70 = 10-20
Airfields		N70 = 20-50
Buildings		N70 = 50-100
		N70 = 100-200
		N70 = 200+

0 1 2 4 Kilometres

Figure 31-27 - N70 contours for Prefer 23 operating strategy (2063)

31.4.3.2 90th percentile N70 contours – 2063 scenario

Figure 31–28 and Figure 31–29 show calculated 90th percentile N70 contours for the Prefer 05 and Prefer 23 operating strategies in 2063. The difference between the two modes is much less significant than when comparing average days, and also less significant when compared to the results for the 2050 scenario.

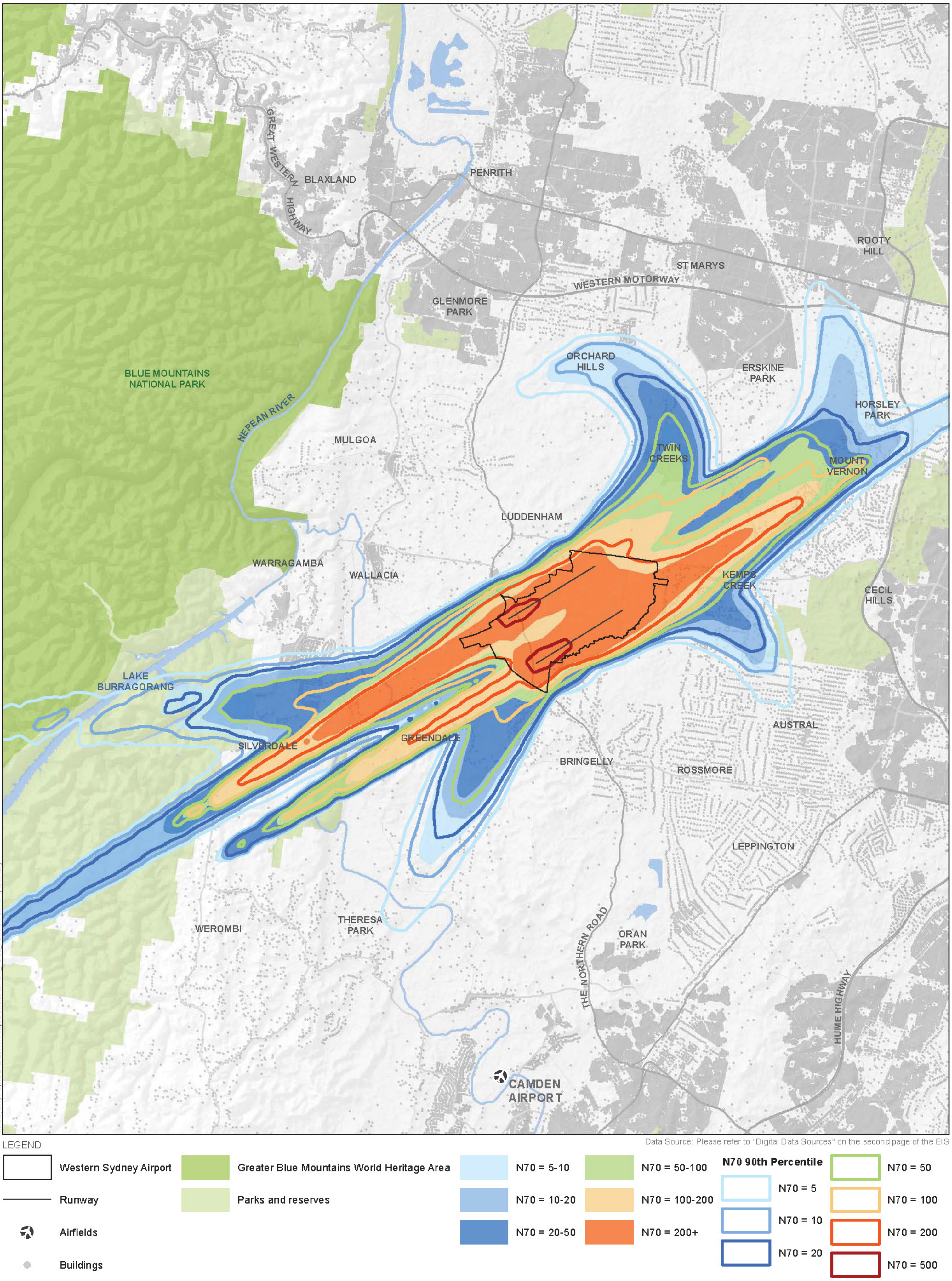
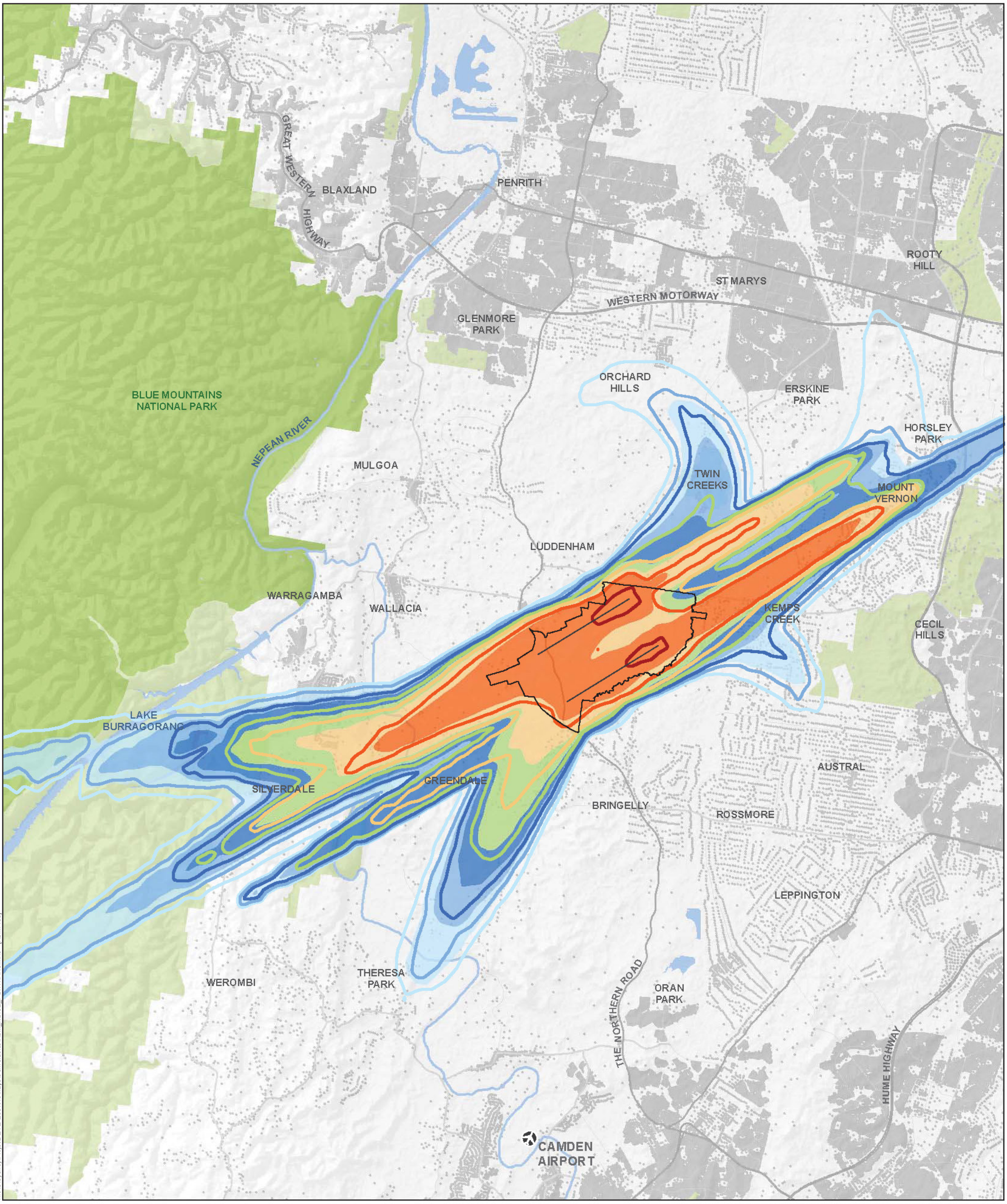


Figure 31-28 - 90th percentile N70 contours for Prefer 05 operating strategy (2063)



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

LEGEND

Western Sydney Airport
Runway
Airfields
Buildings
Greater Blue Mountains World Heritage Area
Parks and reserves
N70 = 5-10
N70 = 10-20
N70 = 20-50
N70 = 50-100
N70 = 100-200
N70 = 200+

N70 90th Percentile

N70 = 5
N70 = 10
N70 = 20
N70 = 50
N70 = 100
N70 = 200
N70 = 500

0 1 2 4
Kilometres

Figure 31-29 - 90th percentile N70 contours for Prefer 23 operating strategy (2063)

31.4.4 Night time noise

31.4.4.1 N60 contours – 2063

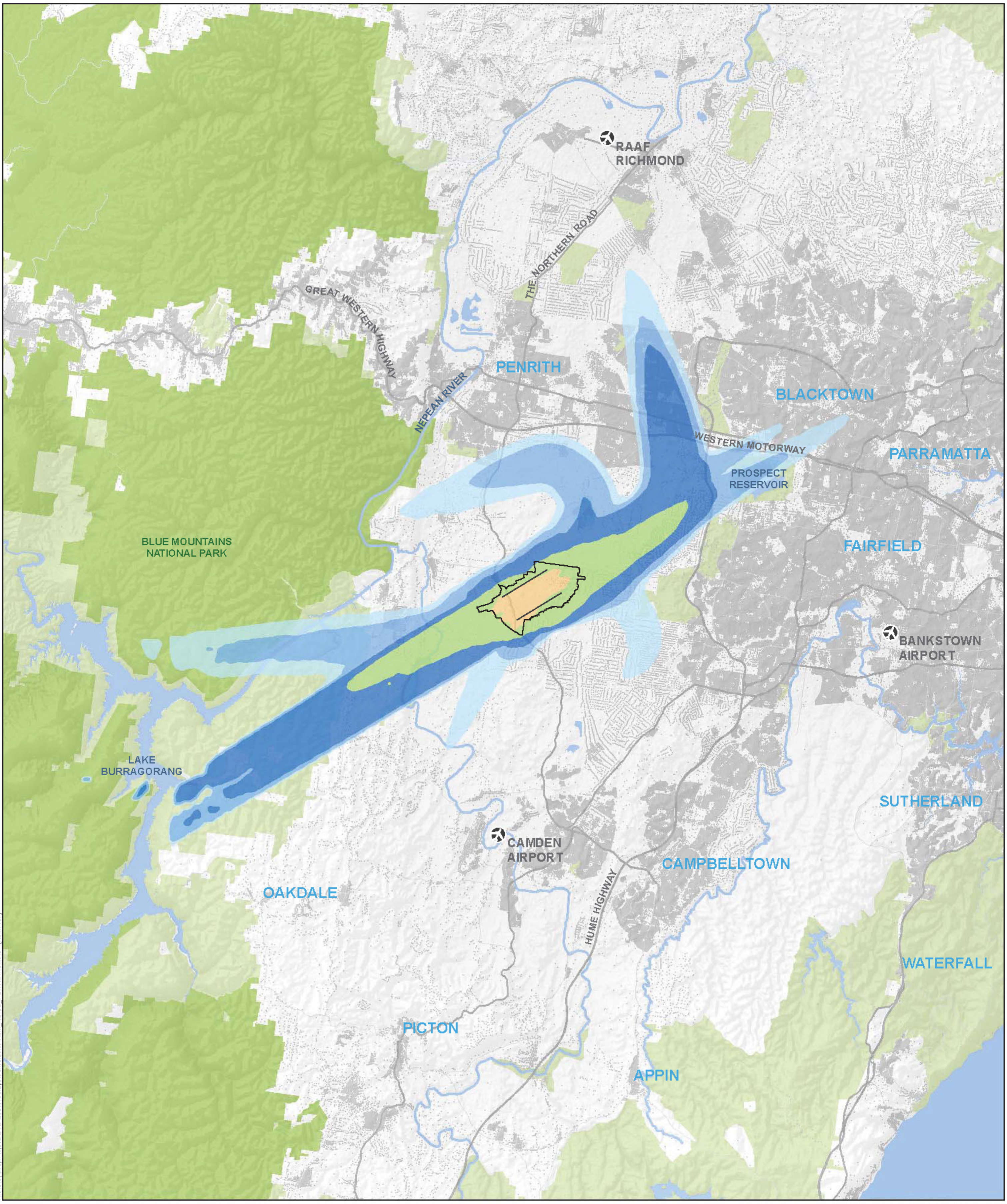
The average 2063 night time N60 contours for operating strategies Prefer 05 and Prefer 23 respectively are shown in Figure 31–30 and Figure 31–31. In either operating strategy, built-up residential areas would be affected by more than 10 events per night exceeding 60 dBA, but the extent of impact is greater in the Prefer 05 case. Additional areas to the north of the airport site including Mount Vernon and Kemps Creek are included within the N60 = 50 – 100 contour under the Prefer 05 operating strategy. Conversely, rural-residential areas to the south-west of the airport site such as Silverdale would be more affected under the Prefer 23 operating strategy. Areas in close proximity to the airport site including Luddenham and Greendale remain affected to a similar extent as the 2050 scenario.

Table 31–9 shows the population estimated to be affected by night-time noise above 60 dBA in 2063. More residents are predicted to be affected by noise events above 60 dBA under the Prefer 05 operating strategy. Analysis for 2063 does not consider the use of alternative night time operating modes for noise mitigation purposes. As noted in Section 31.2, the use of alternative operating modes, such as head-to-head operations may result in a lower number of residents experiencing night time noise above 60 dBA.

Table 31–9 Estimated population within N60 contours – 2063

N60	Operating strategy	
	Prefer 05	Prefer 23
5–10	81,333	10,509
10–20	45,372	43,963
20–50	68,963	42,097
50–100	5,313	8,236
>100	0	0
Total	200,981	104,805

The 90th percentile night time N60 values, representing the predicted number of events per night exceeding 60 dBA on a ‘worst case’ night, are presented in Appendix E1 (Volume 4). For the Prefer 05 operating strategy, the worst case noise contours cover substantially more area than the average contours, while in the Prefer 23 operating strategy, the impacted areas are almost the same.



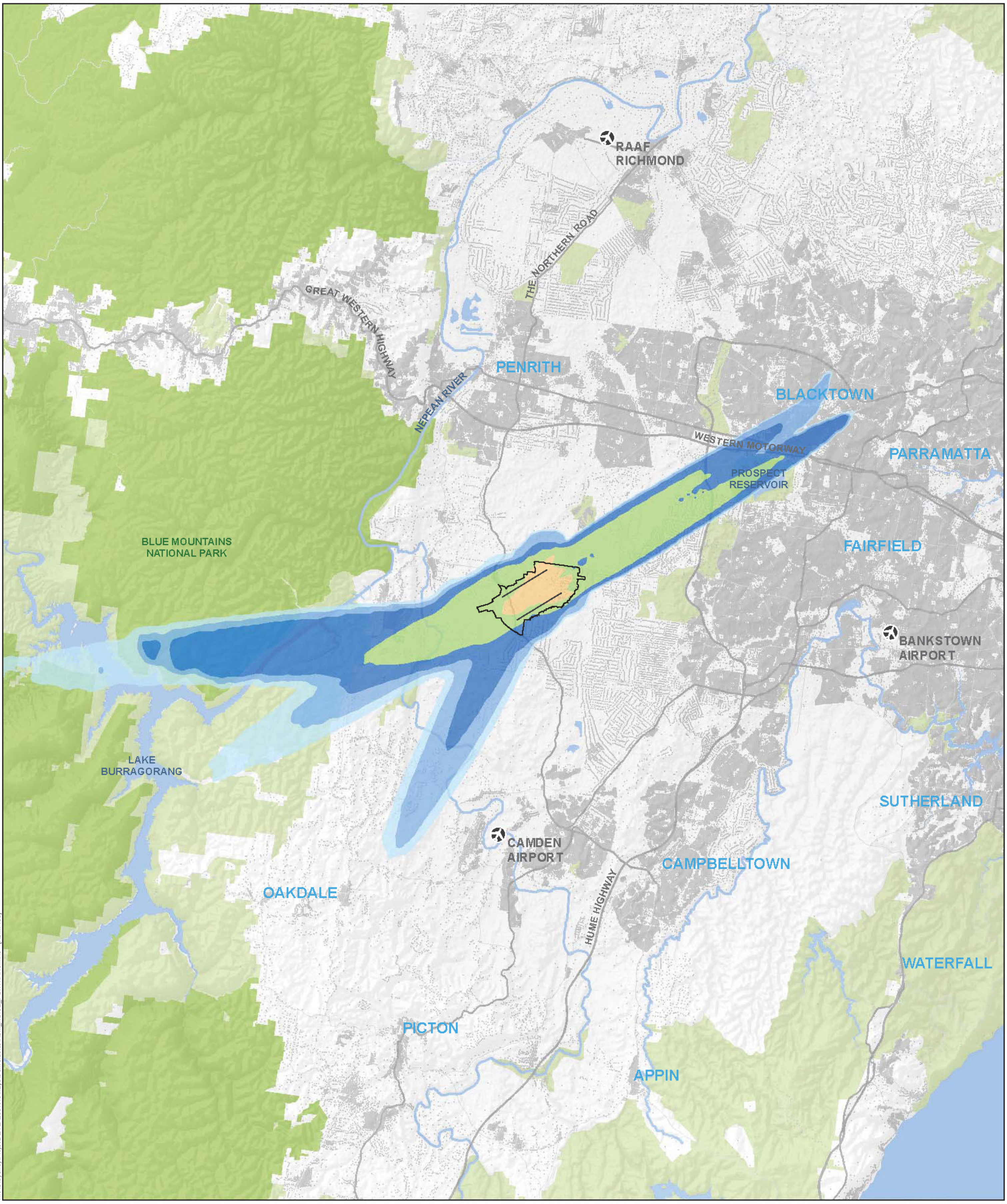
Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

LEGEND

- Western Sydney Airport
- Runway
- Airfields
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves
- N60 = 5-10
- N60 = 10-20
- N60 = 20-50
- N60 = 50-100
- N60 = 100+

0 2.25 4.5 9
Kilometres

Figure 31-30 - N60 contours for Prefer 05 operating strategy (2063)



LEGEND

	Western Sydney Airport		Greater Blue Mountains World Heritage Area		N60 = 5-10		N60 = 50-100
	Runway		Parks and reserves		N60 = 10-20		N60 = 100+
	Airfields				N60 = 20-50		
	Buildings						

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

0 2.25 4.5 9
Kilometres

Figure 31-31 - N60 contours for Prefer 23 operating strategy (2063)

31.4.5 Noise-induced vibration

At high noise levels, the low frequency components of aircraft noise can cause vibration in loosely fixed building elements, such as windows.

Even at the highest expected noise levels, the levels of vibration due to low frequency noise would be well below those which may cause structural damage to buildings. With typical light building structures, noise induced vibration may begin to occur where the maximum external noise level reaches approximately 90 dBA. The effect is more common on take-offs than for landings because the noise spectrum for a take-off near the airport has stronger low frequency components.

Figure 31–32 shows 85 dBA and 90 dBA noise level contours for a Boeing 747 aircraft departure (stage length 9). Only areas within the 90 dBA contour could expect to experience any noise-induced vibration of building structures, and even then only during the departure of a Boeing 747 aircraft with maximum stage length. Although modelled for assessment purposes, this aircraft type is not expected to be operating at the proposed airport in 2063.

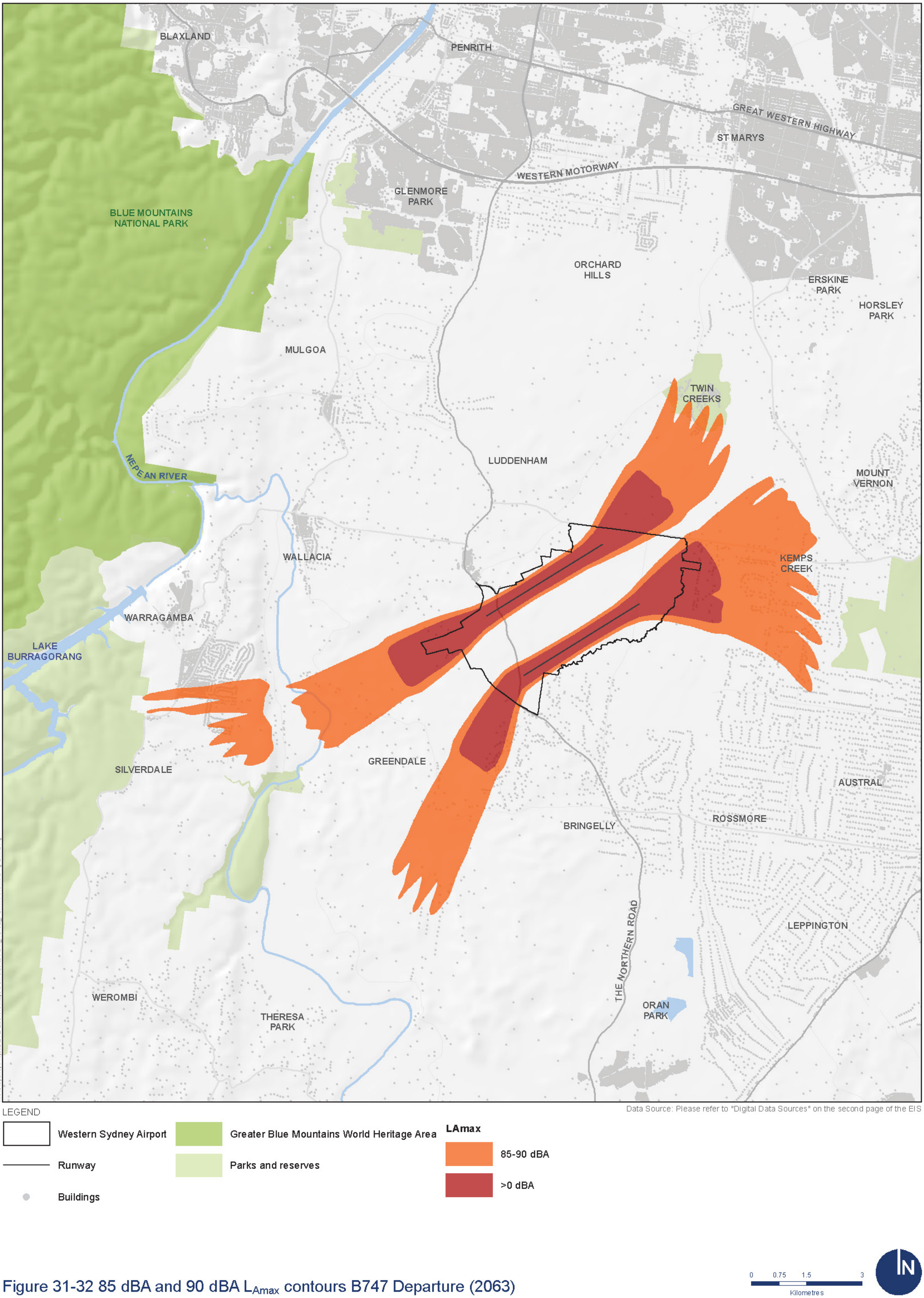


Figure 31-32 85 dBA and 90 dBA L_{Amax} contours B747 Departure (2063)

31.5 Ground-based noise

31.5.1 Approach

Ground- based operational noise emissions from the long term development would be primarily associated with aircraft engine ground running, which is required for maintenance purposes, and aircraft taxiing between the terminal building and the departure or arrival runway. Other sources of noise from within the airport are not considered to contribute significantly to potential noise impacts at nearby receivers.

Ground-based noise levels are not expected to change significantly between the proposed Stage 1 operations and the maximum single runway capacity scenario expected around 2050. It is not anticipated that taxiing and engine run-up noise levels would increase, but these types of noise would be expected to be more frequent in the 2050 scenario. The assessment of ground-based noise for the proposed Stage 1 operations (see Chapter 11 (Volume 2a)) is also considered generally appropriate for the 2050 scenario.

The long term development anticipates the commissioning of a second runway sometime around the early 2050s. A second runway would be accompanied by increased aircraft activity and additional noise sources in the south-eastern portion of the site as shown in Figure 31–33. The long term assessment of ground-based noise therefore focuses on this scenario.

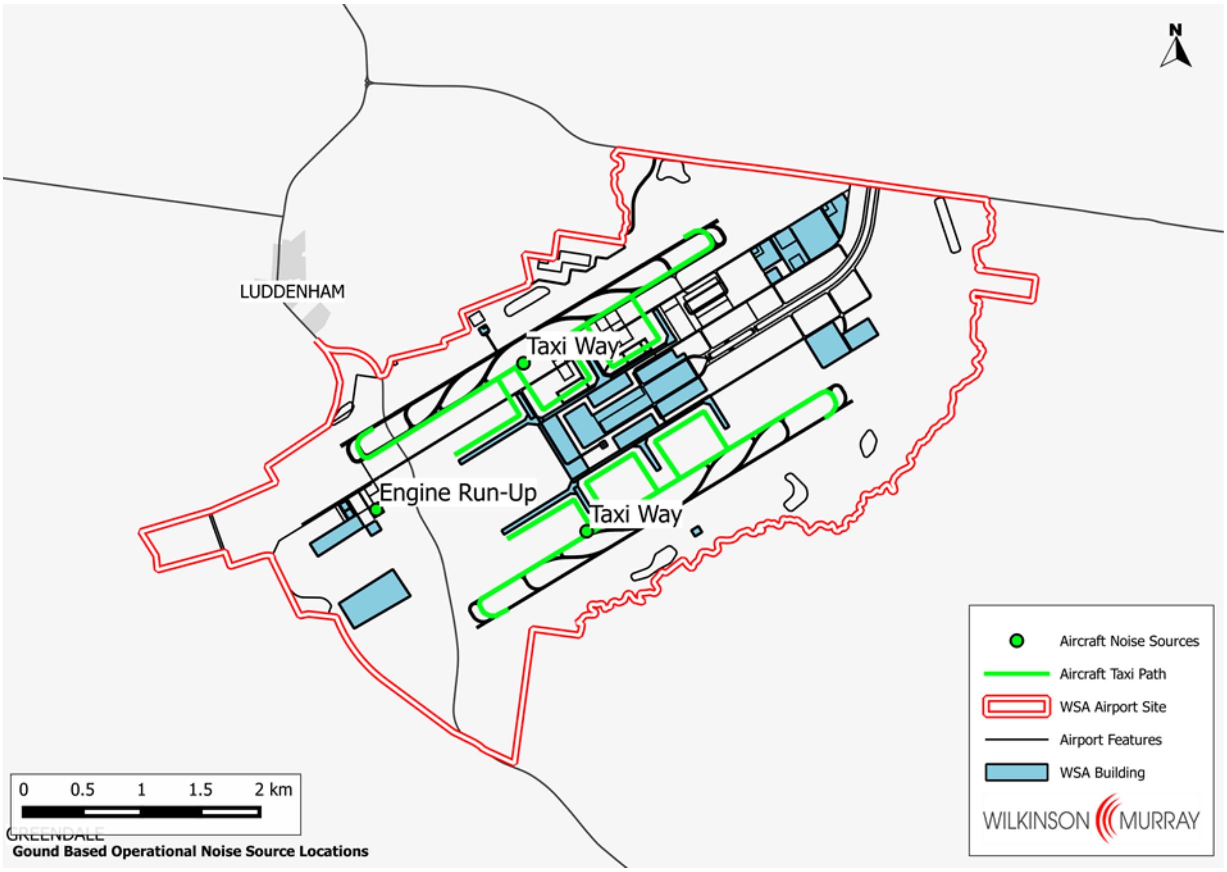


Figure 31–33 Ground-based noise sources

The approach to the assessment of ground-based noise involves consideration of typical worst case conditions, including a ground-based temperature inversion. It should also be noted that no allowance has been made for any potential reduction in aircraft noise levels over time—the predictions discussed are based on noise levels of aircraft currently used in Australia. New generation quieter aircraft would be introduced well before 2063 and the use of existing aircraft types in the assessment can therefore be considered conservative. The methodology for the assessment of airport operational noise presented in Chapter 11 (Volume 2a) is also applicable to the long term development.

Potential construction noise and vibration impacts associated the expansion of the airport beyond the proposed Stage 1 development have not been assessed. Construction beyond the Stage 1 development would be incremental. Noise would be assessed as part of the approval process for any future major airport development under the Airports Act. It is, however, noted that construction beyond the Stage 1 development would occur in the context of an operating airport and that the background noise environment would be substantially different compared to today.

The noise generated by road traffic has also been assessed as part of the ground-based operations noise assessment. This assessment included predictions of noise level increases during the day and night time using the CoRTN procedure (see Chapter 11 (Volume 2a)).

31.5.2 Assessment

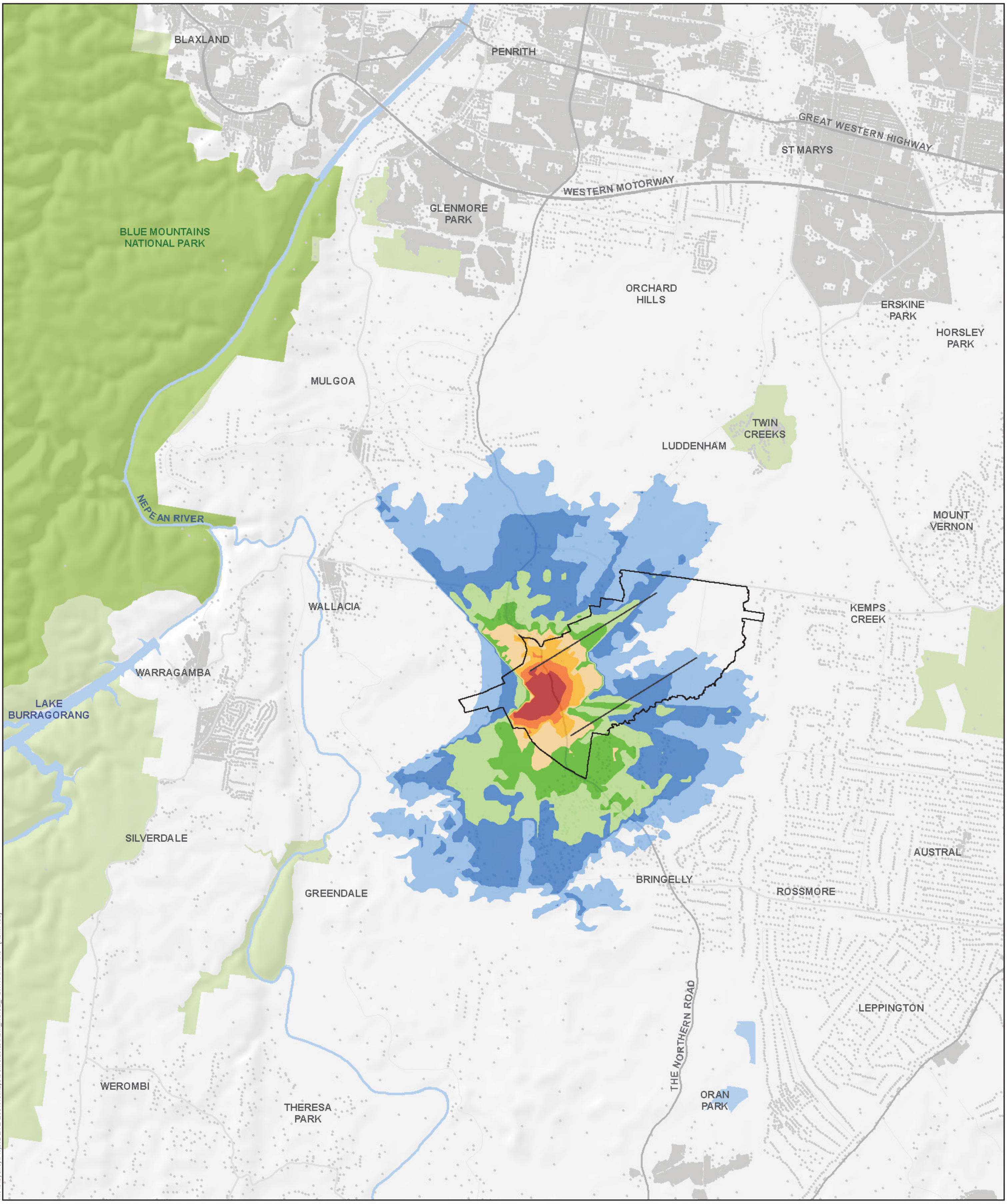
The indicative long term development of the proposed airport would involve the construction of a second parallel runway, most likely around 2050 when annual passenger movements reach approximately 37 million. Availability of a second runway would facilitate the adoption of different airport operating modes as well as a larger number of aircraft movements, resulting in more ground-based activity at the airport. Noise levels have been calculated for aircraft engine ground running and aircraft taxiing. The resulting contours are shown in Figure 31–34 and Figure 31–35 respectively.

Engine ground running noise is not predicted to change substantially over time and may be shielded by additional buildings that would be constructed for the long term development. Figure 31–34 shows the effect of shielding by aircraft maintenance buildings, the size and location of which are taken from the revised draft Airport Plan. If these buildings are not ultimately constructed or the location of the engine run-up bay relative to these assumed facilities changes through detailed design, then the noise exposure pattern from ground run-up operations would also change. Ground run-up events would also likely occur more frequently in the long term.

The 2063 aircraft taxiing noise contours reflect the increased number of aircraft movements and would extend further south as a result of the commissioning of the second runway.

Figure 31–34 and Figure 31–35 show that elevated noise levels would be experienced in the immediate vicinity of the proposed airport, particularly around Luddenham.

The assessment of traffic noise indicates that noise emissions would exceed the adopted noise criteria at two locations on Elizabeth Drive and the M12 Motorway, and on a section of Adams Road. Prior to the long term development of the airport, the area surrounding the airport site will be dramatically altered by several decades of development, including new and enhanced road and rail infrastructure. It is expected that the background noise levels in many areas will also increase as a result of the urbanisation process more generally. Therefore, the predicted increases in traffic noise levels would not likely represent substantial change against background conditions. In addition, the planning and approvals for any new infrastructure would consider traffic noise impacts as a result of predicted use, and appropriate noise controls would be implemented into its design.



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

LEGEND

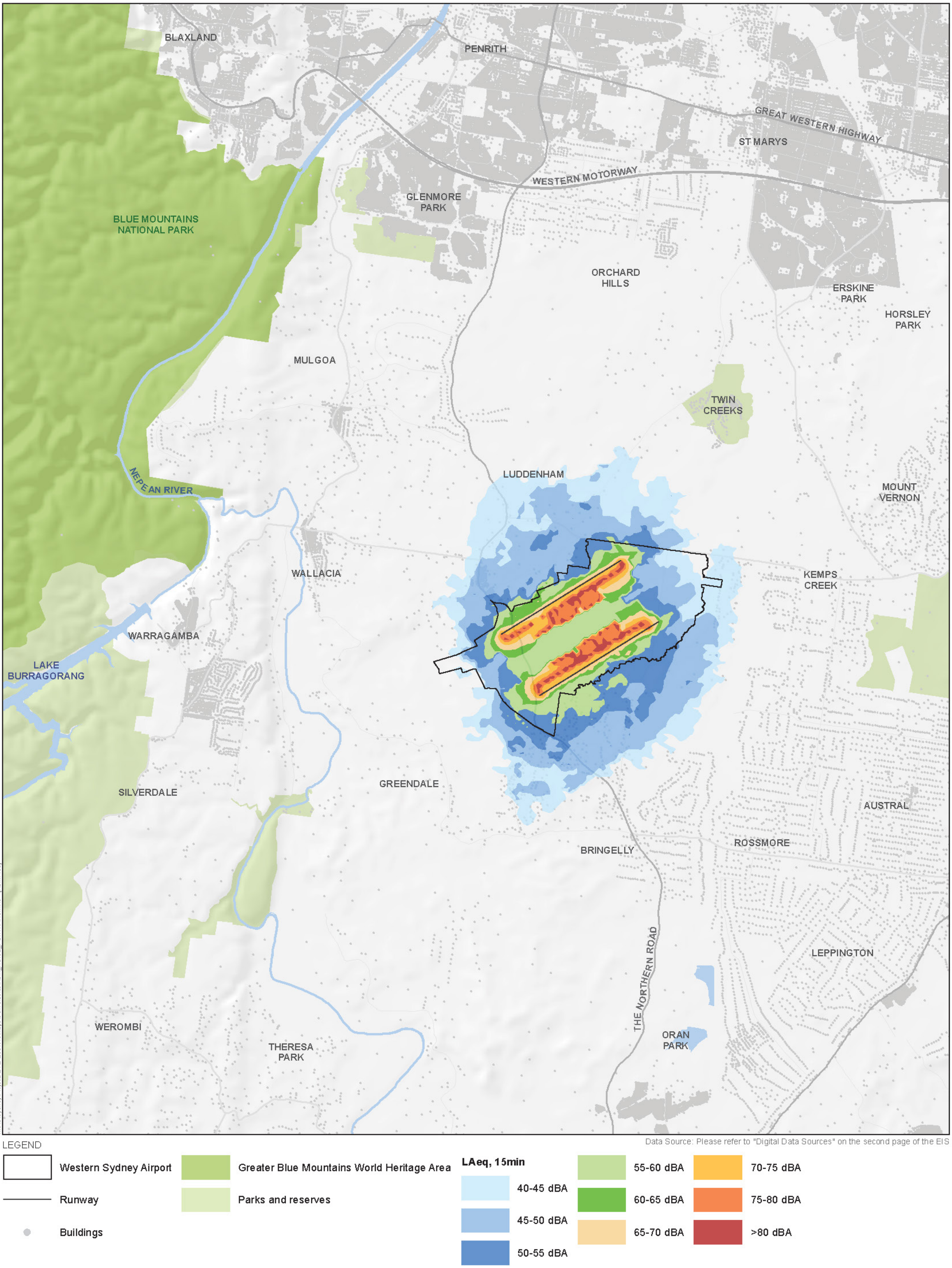
- Western Sydney Airport
- Runway
- Buildings
- Greater Blue Mountains World Heritage Area
- Parks and reserves

LAeq, 15min

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

0 0.75 1.5 3
Kilometres

Figure 31-34 - Worst case L_{Aeq} noise level for engine run-up (2063)



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

Figure 31-35 - Worst-case L_{Aeq} noise level for taxiing (2063)

31.6 Considerations for future development stages

As discussed in Chapter 10 (Volume 2a), the identification of potential airport operating modes, including noise abatement opportunities, would be an important consideration in future formal airspace design processes for both single and parallel runway operations. Other approaches to mitigating aircraft overflight noise generally focus on reducing noise emissions from the aircraft themselves, planning flight paths in a way that minimises potential noise impacts and provides respite periods, and implementing land use controls and other operating practices (e.g. use of continuous descent approaches, restrictions on use of reverse thrust at night, etc.).

The ALC will be required to include an environment strategy in its first airport master plan which must detail the sources of environmental impact associated with civil aviation operations at the airport; the monitoring to be carried out in connection with the environmental impact; and the measures to be carried out to prevent, control or reduce this impact. The environment strategy is required to include the proposed systems of testing, measuring and sampling to be carried out for possible or suspected excessive noise. Procedures on how, where and when engine run-ups would be permitted would be established under the environment strategy for the proposed airport. Each master plan including the environment strategy is subject to a public consultation process and requires approval from the Infrastructure Minister.

Land use and planning around the proposed airport would be influenced by the development of an official ANEF chart as part of the future airspace design process. It is envisaged that planning controls based on a long term development scenario would be implemented prior to the introduction of dual runway operations in order to promote appropriate development in the vicinity of the proposed airport.

The National Airports Safeguarding Framework (NASF) provides land use planning guidance and principles and guidelines in order to:

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

31.7 Summary of findings

The assessment of airport noise impacts has considered both aircraft overflight and ground-based noise sources for a 37 million passengers per year airport development and an 82 million passengers per year development. These assessment scenarios are currently anticipated to occur in about 2050 and 2063 respectively.

The flight paths and procedures to be used by aircraft using the proposed airport are indicative and would require further detailed consideration before being finalised. Other sources of uncertainty, such as noise emission levels from future aircraft types, and the role and pattern of movements at a dual runway airport, also reduce the certainty in predicting future impacts. The assessment does, however, broadly indicate the areas that may be affected by aircraft noise beyond the proposed Stage 1 operations.

For the 2050 assessment scenario, maximum noise levels of over 85 dBA from the loudest aircraft operations (long-range departures by a Boeing 747 aircraft or equivalent), would be experienced at residential locations near the airport site. Maximum noise levels of 75–80 dBA are predicted within built-up areas in St Marys, St Clair and Erskine Park. Maximum noise levels from more common aircraft types such as Airbus A320 or equivalent are predicted to be 60–70 dBA in built-up areas around St Marys and Erskine Park, and over 70 dBA in some areas to the south-west of the airport such as around Greendale.

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

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

The selection of one operating strategy over another would have less influence on the number of people exposed to various levels of aircraft noise following the commencement of operations on the second runway. Despite the forecast number of movements at the airport approximately doubling between 2050 and 2063, there are fewer densely populated areas currently located within the noise affected areas for the 2063 scenario, particularly for the Prefer 05 operating strategy. The reason is that movements can be spread between two runways and the locations of flight paths are less constrained in the two runway scenario. The total population affected may increase in the future as a result of population growth and ongoing housing development over the next 50 years. The continuation of existing planning controls will limit the potential for new residential development to be affected by increased airport traffic.

ANEC contours for the indicative long term development are similar to those for the single runway airport in 2050, although they extend over a somewhat larger area to the south as a result of operation of the second runway. For the 2063 scenario, the 20 ANEC contour does not enclose any existing built-up residential areas, such as the townships of Warragamba and Wallacia. Areas such as Kemps Creek, Mount Vernon and parts of Horsley Park and Silverdale are predicted to be within the 20 ANEC contour due to operation of the second runway.

The identification of potential noise abatement operating strategies would be an important consideration in the future formal airspace design process to be undertaken closer to the proposed commencement of operations. Within five years of an airport lease being granted, the ALC will be required to submit for approval a draft master plan including an ANEF and an environment strategy to manage noise emissions from the operation of the proposed airport. The master plan is required to be updated on a five yearly basis and will involve ongoing consideration of strategies to manage noise emissions from the site.

Other approaches to mitigating aircraft overflight noise generally focus on reducing noise emissions from the aircraft themselves, planning flight paths in a way that minimises potential noise and environmental impacts and provides respite periods, together with implementing land use planning controls and other relevant operating practices.

Ground-based noise levels are not expected to change significantly between the proposed Stage 1 operations and the maximum single runway capacity scenario expected around 2050. It is not anticipated that taxiing and engine run-up noise levels would increase, but these types of noise would be expected to be more frequent in the 2050 scenario.

A second runway (anticipated to be required around 2050) would be accompanied by increased aircraft activity and additional noise sources. Engine ground running noise is not predicted to change substantially over time and may be shielded by additional buildings that would be constructed for the long term development. However, ground run-up events would likely occur more frequently in the long term. An increase in the extent of the 2063 aircraft taxiing noise contours reflect the increased number of aircraft movements, particularly in the southern portion of the site and therefore extend further south as a result of the commissioning of the second runway.

Noise associated with aircraft operations at the proposed airport would be monitored using the noise and flight path monitoring system operated by Airservices Australia.