Prepared for
Springfield Road Pty Ltd
ABN: 15 646 606 671

Catherine Field Planning Proposal

Land Rezoning - Acoustic Assessment

04-Apr-2022
Catherine Field Planning Proposal - Acoustic Assessment
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Client: Springfield Road Pty Ltd

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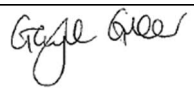
Prepared by Peter Dimou

Reviewed by Gayle Greer

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	31-Mar-2022	Draft for client review	Gayle Greer Technical Director - Acoustics	GG
B	04-Apr-2022	Final	Gayle Greer Technical Director - Acoustics	

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1.0 Introduction

1.1 Background

The Catherine Field Planning Proposal is a Proponent-led proposal that seeks to rezone approximately 104 hectares of land within the Catherine Field Precinct to enable urban development for new housing, open space and recreation, riparian protection, major roads and stormwater management. The site is located wholly within the Camden Local Government Area and is approximately 42 kilometres south-west of the Sydney CBD.

The draft Indicative Structure Plan (ISP) delivers approximately 2,080 dwellings and a population of around 5,800 people. There will be a range of housing types at varying densities throughout the site. The site is identified for low and medium density residential development with single dwellings on lots ranging in size up from 250 square metres and averaging around 350 square metres and attached and semi-attached housing, typical of recently developed urban growth areas in other parts of Sydney.

The Proposal will provide a range of social infrastructure, including open space, recreation and community facilities for the future community, and deliver road and utilities infrastructure to service the broader South West Growth Area.

AECOM Australia Pty Ltd (AECOM) was commissioned by Springfield Road Pty Ltd to undertake an acoustic assessment for the Catherine Field Precinct.

Acoustic terminology can be found in Appendix A.

1.2 Study objective

The purpose of this acoustic assessment is to support the Planning Proposal which will seek to rezone the project site to enable new residential and associated urban development. The acoustic assessment will investigate the existing and future noise environments and provide recommendations for the proposed development in accordance with Council and State Government requirements.

1.3 Study area

The proposal area for this investigation is shown in Figure 1, and is bound by Camden Valley way to the south-east, Springfield Road to the south-west, Catherine Field Road to the north-east, and the planned extension of Rickard Road to the north-west.

The land is zoned ‘RU4 – Primary Production Small Lots’ and ‘R5 – Large Lor Residential’ under the Camden Local Environmental Plan 2010 (Camden LEP 2010). The proposal area currently comprises rural land with a number of residences, rural businesses, dams and local roads. Surrounding land possesses a combination of new release residential development, and rural land with plans or applications to be developed into similar new release residential precincts.

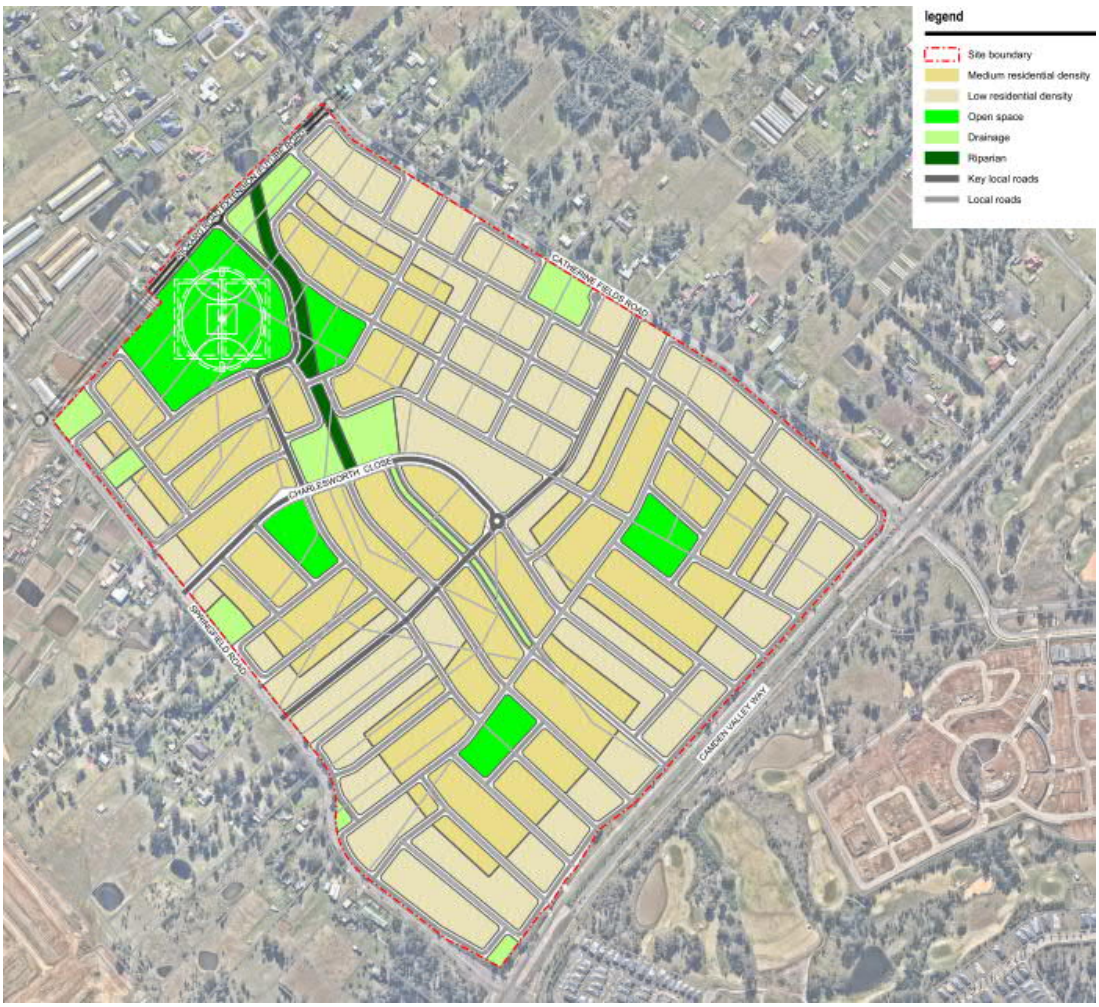


Figure 1 Catherine Field Indicative Structure Plan (source: Urbanco, 2022)

1.4 Policies and guidelines

The following policies and guidelines are relevant for this assessment:

- Camden Development Control Plan, 2019
- Camden Local Environmental Plan, 2010
- Camden Environmental Noise Policy, 2018
- State Environment Planning Policy (Transport and Infrastructure), 2021
- Development Near Rail Corridors and Busy Roads – Interim Guideline, Department of Planning, 2008
- NSW Road Noise Policy (RNP), Department of Environment, Climate Change and Water, 2011
- Noise Policy for Industry (NPfI), Environment Protection Authority, 2017
- Noise Guide for Local Government (NGLG), Environment Protection Authority, 2013
- Calculation of Road Traffic Noise, UK Department of Transport, 1988.

2.0 Noise criteria

2.1 State Environment Planning Policy (Transport and Infrastructure) 2021

Where residential development is on land adjacent to a road corridor with an annual average daily traffic volume of more than 20,000 vehicles the State Environment Planning Policy (Transport and Infrastructure) 2021 requires that appropriate measures are taken to meet the following internal L_{Aeq} noise levels:

- In any bedroom in the building – 35 dB(A) at any time between 10pm and 7am; and
- Anywhere else in the building (other than the garage, kitchen, bathroom or hallway) – 40 dB(A) at any time

In addition the *Development Near Rail Corridors and Busy Roads- Interim Guideline* states:

> *"If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and meet the Building Code of Australia (BCA) ventilation requirements."*

Assuming a conservative 10 dB reduction through a partially open window the external noise criteria is listed in Table 1.

Table 1 External noise level criteria

Type of occupancy	External noise level	Time period
Bedroom	55 dB(A)	10pm – 7am
Other habitable rooms	60 dB(A)	Any time

2.2 Camden Development Control Plan (DCP) 2019

The Camden Development Control Plan (DCP) outlines objectives and design controls for dwellings within Camden Local Government Area and zoned under Camden Local Environmental Plan 2010. Pertinent to this project, the DCP states in Section 2.12 Acoustic Amenity:

Road and Rail Noise

1. *Development applications for residential development and other noise sensitive uses such as places of public worship, hospitals, child care centres and educational establishments must be accompanied by an acoustic report where the development is:*
   a. *adjacent to existing (or proposed) railway line, arterial, sub-arterial roads, transit boulevards; or*
   b. *adjacent to a collector road that is within a 100m radius of the centre of the intersection the above roads.*
2. *Residential dwellings adjacent to an existing (or proposed) railway line, arterial road, sub-arterial road or transit boulevards, or collector roads that are within 100m of the centre of the intersection of those roads, are to be designed to minimise the impact of noise.*
   Non-residential buildings such as educational institutions, child care centres, places of worship, and hospitals are also required to be designed to minimise the impact of noise.
   Both 'residential dwellings' and 'non-residential buildings' must comply with the internal noise criteria in 'Table 3.1' from the 'Department of Planning: Interim Guideline – Development Near Rail Corridors and Busy Roads'.
   Ventilation Requirements: If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that the occupants can leave windows closed whilst also meeting the ventilation requirements of the Building Code of Australia.
3. *The principle private open space or an equivalent area of useable open space of a dwelling within a new release area is not to exceed 57dBA LAeq (15hr) from 7am to 10pm.*

4. *Note: For clarification purposes, a new release area, includes land mapped as Urban Release Area within the CLEP 2010 and includes Growth Area Precincts that have been rezoned.*
5. *For dwellings in areas outside of the new release areas, the principle private open space area is to be attenuated to 55dBA LAeq (15hr) from 7am to 10pm.*
   Council may consider an increased decibel level where it can be demonstrated that the objectives of this policy are met and the above criteria is not able to be reasonably or feasibly achieved.
6. *Note: The residential noise level criterion includes + 2.5 dBA allowance for noise reflected from the façade ('facade correction').*
7. *Residential flat building developments are to meet the objectives of Part 4J of the NSW Department of Planning and Environment (or equivalent) - Apartment Design Guide to minimise potential impacts of road and rail noise through appropriate siting and layout of buildings, noise shielding and attenuation.*
8. *Development applications for residential flat buildings are to document the noise mitigation measures that have been incorporated into the design.*
9. *An area of communal open space is to be attenuated to 57dBA LAeq (15hr) from 7am to 10pm.*

2.3 Camden Council's Environmental Noise Policy

Camden Council's Environmental Noise Policy (ENP) includes the same requirements as the DCP Section 2.12, presented above.

2.4 EPA Noise Guide for Local Government

The EPA's Noise Guide for Local Government (NGLG) outlines the techniques for assessing and managing common neighbourhood noise issues. It addresses noise emissions from outdoor sporting events involving sound amplification equipment for 200 or more people. These noise sources are to be assessed using the 'offensive noise test' outlined in the Protection of the Environment Operations Act 1997 (POEO). Management measures are also suggested in the form of noise control notices and prevention notices. It is noted that the use of these notices would not be a primary means of controlling noise in the Precinct. Noise mitigation measures would be integrated into the design and planning of any new developments. Noise control notices and prevention notices would only be used in the cases where breaches of Approval conditions occur.

3.0 Road traffic noise modelling methodology

3.1 Road traffic modelling

Road traffic noise levels were calculated using SoundPLAN v8.2 software, which implements the Calculation of Road Traffic Noise (CoRTN) algorithm. The UK Department of Transport devised the CoRTN algorithm and with suitable corrections, this method has been shown to give accurate predictions of road traffic noise under Australian conditions.

This noise model takes into account source directivity, terrain, shielding, location of buildings, air and ground absorption and distance attenuation.

The CoRTN algorithm predicts $L_{A10,1hr}$ noise levels rather than L_{Aeq} noise levels. L_{Aeq} noise levels were calculated by adopting a difference between the $L_{A10,1hr}$ and $L_{Aeq,1hr}$ noise levels in any 1 hour period would be 3 dB. This is a typical relationship that is widely used.

Noise sources heights were set at 0.5 m for cars, 1.5 m for heavy vehicle engines and 3.6 m for heavy vehicle exhausts. Corrections were applied to the noise from heavy vehicle engines and exhausts, which were 0.6 dB and 8.6 dB lower than noise from CoRTN general traffic noise sources respectively.

Camden Valley Way, Catherine Fields Road, Springfield Road and Rickard Road were modelled with a dense graded asphalt (DGA) surface. Ground absorption in the area was set to be 75% soft ground.

The noise model includes:

- Terrain elevation contours throughout the development area
- Subdivision layout
- Camden Valley Way and Springfield Road alignments
- Predicted traffic flows including compositions and traffic speeds
- Indicative internal road layouts for the Catherine Park North precinct.

Traffic speeds of 80 km/h were assumed for Camden Valley Way, with 70 km/h on Springfield Road and Catherine Fields Road and 60 km/h on Rickard Road. Heavy vehicle percentages of 7.5% were assumed for all roads. Buildings were not included in the modelling as a lot layout was not available at this stage of the project.

3.2 Road traffic volumes

Predicted (2036) road traffic data (daytime and night-time peak hour flows) for Camden Valley Way and Springfield Road were provided in the *Catherine Field (Part) Precinct – Post Exhibition Transport and Access Review* prepared by AECOM. Road traffic data for Catherine Fields Road and Rickard Road were taken from the *Rickard Road Extension Preferred Route Report* prepared by ARUP. The traffic volumes outlined in each report were verified with comparison to measured noise emissions along Camden Valley Way presented in *Catherine Fields Planning Proposal Traffic Report* prepared by Colston Budd Rogers & Kafes Pty Ltd.

A number of assumptions were used to convert the daytime peak hour flows into daytime 15 hour and night-time 9 hour volumes which are presented in Table 2.

Table 2 Road traffic volumes (2036)

Road	Direction	Daytime 15 hour[1]		Night-time 9 hour[1]	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Camden Valley Way	Southbound	27,661	2,243	3,772	306
	Northbound	28,875	2,341	3,937	319
Springfield Road	Westbound	8,244	668	1,124	91
	Eastbound	8,577	695	1,170	95
Catherine Fields Road	Westbound	6,053	491	825	67
	Eastbound	6,712	544	915	74
Rickard Road	Southbound	10,634	862	1,450	118
	Northbound	9,280	752	1,265	103

Notes:

1. Assumes the peak hour traffic flow is 11% of the daily 24 hour traffic volume and 88% of the daily 24 hr traffic volume occurs during the 15 hr day (7 am to 10 pm) whilst the remaining 12% occurs during the 9 hr night (10 pm to 7 am).

4.0 Road traffic noise impact assessment

To assess the potential impacts of road traffic noise on the proposed noise sensitive receivers, future road traffic noise levels along Camden Valley Way, Springfield Road, Catherine Fields Road, and Rickard Road in 2036 have been modelled.

4.1 Road traffic noise impacts

Noise impacts from traffic within the Catherine Field residential precinct have been predicted and the results are presented as noise contour maps in Appendix B. Dependent on lot layouts, setbacks and boundary fencing, road traffic noise levels are likely to be higher than the SEPP criteria as presented in Table 1 for residential development adjacent to Camden Valley Way. To a lesser extent, exceedances may also occur for residential development adjacent to Rickard Road, Springfield Road and Catherine Fields Road. Some noise mitigation measures which could be considered are detailed in the following sections.

4.2 Noise mitigation measures

Noise mitigation measures should be implemented in the following hierarchy:

- Treatment of noise at source: Integrated design measures such as road design and traffic management, as well as road surface treatment;
- Treatment of noise path: In-corridor barriers; and
- Treatment at receivers: At-property treatments and receiver building layouts.

Prioritising noise treatment in this order is the most efficient means of reducing impacts. Accordingly, noise mitigation measures that attenuate noise path and receivers will need to be considered as the Indicative Structure Plan for the Catherine Fields precinct is further refined.

4.2.1 Treatment of noise at source

Treatment of road traffic noise at the source includes changes to gradients, alignments, road design, administrative controls and road surface treatment.

4.2.2 Treatment of noise path

Noise path treatment involves the attenuation of noise paths between a source and receiver. This typically involves shielding of receivers with noise barriers. Residential development directly adjacent to Camden Valley Way, Rickard Road, Springfield Road and Catherine Field Road would shield subsequent rows of development.

4.2.2.1 Roadside noise walls and mounds

Acoustic barriers provide immediate reductions in road traffic noise at the shielded properties. The acoustic effectiveness of a barrier depends on its density, height, length and location. The higher the barrier (compared to the direct line-of-sight from the source to the receiver) and the closer its location to either the source or the receiver, the greater the noise attenuation provided. The barrier also needs to have a sufficient length. Roadside barriers, as distinct from barriers close to dwellings, usually have to provide shielding along an appreciable length of road to be effective.

4.2.2.2 Noise barriers close to dwellings

As noted above noise barriers are most effective when they are located either close to the road or close to the affected dwelling(s) or other noise-sensitive land uses. With the consent of owners, acoustic barriers can sometimes be located within a residential property boundary so that they provide maximum shielding of the dwelling. These barriers might also be designed to form a courtyard, providing some benefit for an outdoor area near the dwelling.

4.2.2.3 Buildings as barriers

Residential development directly adjacent to Camden Valley Way, Rickard Road, Springfield Road and Catherine Field Road would provide acoustic shielding to development set back further from these roads.

4.2.3 Treatment at receivers

Noise mitigation measures implemented at receivers include planning layouts of buildings and rooms and treatment to building façades.

4.2.3.1 Property layout

Where residential properties are located adjacent to major roads, such as Camden Valley Way, Springfield Road, Catherine Fields Road and Rickard Road, buildings should be oriented such that the buildings shield outdoor living areas such as courtyards and private open spaces.

4.2.3.2 Building layout and design

The layout of the rooms within a building is important in determining individual noise exposure. The less noise sensitive rooms such as garages, bathrooms and laundries should be located closer to the noise source to provide a buffer zone to noise sensitive areas such as bedrooms and frequently used living areas.

The number of doors and windows on the exposed façade(s) of the buildings should be minimised as these represent paths of least resistance for noise ingress.

4.2.3.3 Building construction materials and methods

Windows and doors present acoustic weaknesses which control the overall sound transmission loss of the composite wall. Buildings should be constructed so that facades most exposed to the noise source have a minimum number of windows and doors to reduce the internal noise levels.

Where road traffic noise levels exceed the external noise criteria within habitable rooms fresh air must be provided to these rooms so windows can be left closed, in order to meet the Transport and Infrastructure SEPP internal noise criteria. Suitable glazing systems should be confirmed during the subdivision development application stage.

The following building construction details are also recommended:

- A brick veneer building façade or one with an equivalent acoustic performance;
- Window detailing will have gaps between the window frames and the house frame/masonry sealed with flexible mastic;
- Hinged or casement windows are preferred over sliding windows as the former two have more effective sealing mechanisms. The overall intent is to form an air-tight construction; and
- Acoustic insulation such as polyester or rock wool/glass wool batts placed between the wall studs of brick veneer and timber framed buildings will reduce the noise entering the building.

4.2.3.4 Principal private open space

To achieve suitable noise levels in the principal private outdoor spaces it is recommended that building layouts and lot divisions are planned so that the residential buildings provide shielding from road traffic noise to the principal private outdoor spaces.

5.0 Other noise sources assessment

5.1 Existing noisy premises

There are a few existing noise sources around the Precinct which have the potential to disturb proposed noise sensitive receivers. These may include heavy machinery on rural lots. Given the transitory nature of the machinery no noise mitigation measures are considered necessary.

5.2 Sporting fields

There are a number of public open spaces throughout the Precinct. A sporting field is proposed to be located on the north western boundary, adjacent to Rickard Road. The ISP indicates that residential lots are proposed to the south west and south east of the field. These receivers may be adversely affected when large events are held at the ground.

Where possible, the distance between crowd seating and noise sensitive receivers should be maximised, using parking lots, parks and back of house areas as buffer zones between the grounds and receivers where feasible. Buildings and storage facilities should also be placed between potentially noisy areas and receivers where possible.

The Noise Guide for Local Government (NGLG) presents guidelines for the assessment of such activities as sporting events and suggests noise management procedures.

6.0 Conclusion

AECOM Australia Pty Ltd (AECOM) was commissioned by Springfield Road Pty Ltd to undertake an acoustic assessment to accompany the draft indicative structure plan for the rezoning of the new Catherine Field Precinct.

The purpose of the study is to consider and assess road traffic noise impacts on the future residents of the Precinct.

Road traffic noise levels

Road traffic noise levels in 2036 were predicted and road traffic noise contours have been presented. The road traffic noise model considered traffic from Camden Valley Way, Springfield Road, Catherine Fields Road, and Rickard Road. It was noted that road traffic noise levels are likely to exceed the criteria presented in the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP), where proposed residential areas are in close proximity to Camden Valley Way and to a lesser extent on Rickard Road, Springfield Road and Catherine Fields Road. Indicative recommendations were provided which may be required to achieve the criteria. It was noted that residential development directly adjacent to Camden Valley Way, Rickard Road, Springfield Road and Catherine Fields Road would provide acoustic shielding to development set back further from these roads. Recommendations would be confirmed at the Subdivision Development Application stage.

Other noise sources

Noise from both existing sources on proposed residential developments, and noise from proposed sporting fields on future residences have been discussed, with planning considerations and indicative mitigation measures provided.

Recommendations

The study has found that it is likely that noise mitigation measures will be required to meet the SEPP road traffic noise criteria. This study presents conceptual noise control measures and management strategies which are likely to be required to minimise adverse impacts on future residential receivers within the Precinct. Residential development areas where road traffic noise levels are likely to exceed Transport and Infrastructure SEPP noise limits have been identified, and mitigation measures may need to be implemented at these locations. Potential treatments have been identified in Section 4.2, which include noise barriers, buffer zones, building and architectural layouts and building construction materials.

Appendix A

Acoustic terminology

Appendix A Acoustic terminology

The following is a brief description of acoustic terminology used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:

0 dB(A)	Threshold of human hearing
30 dB(A)	A quiet country park
40 dB(A)	Whisper in a library
50 dB(A)	Open office space
70 dB(A)	Inside a car on a freeway
80 dB(A)	Outboard motor
90 dB(A)	Heavy truck pass-by
100 dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115 dB(A)	Limit of sound permitted in industry
120 dB(A)	747 take off at 250 metres

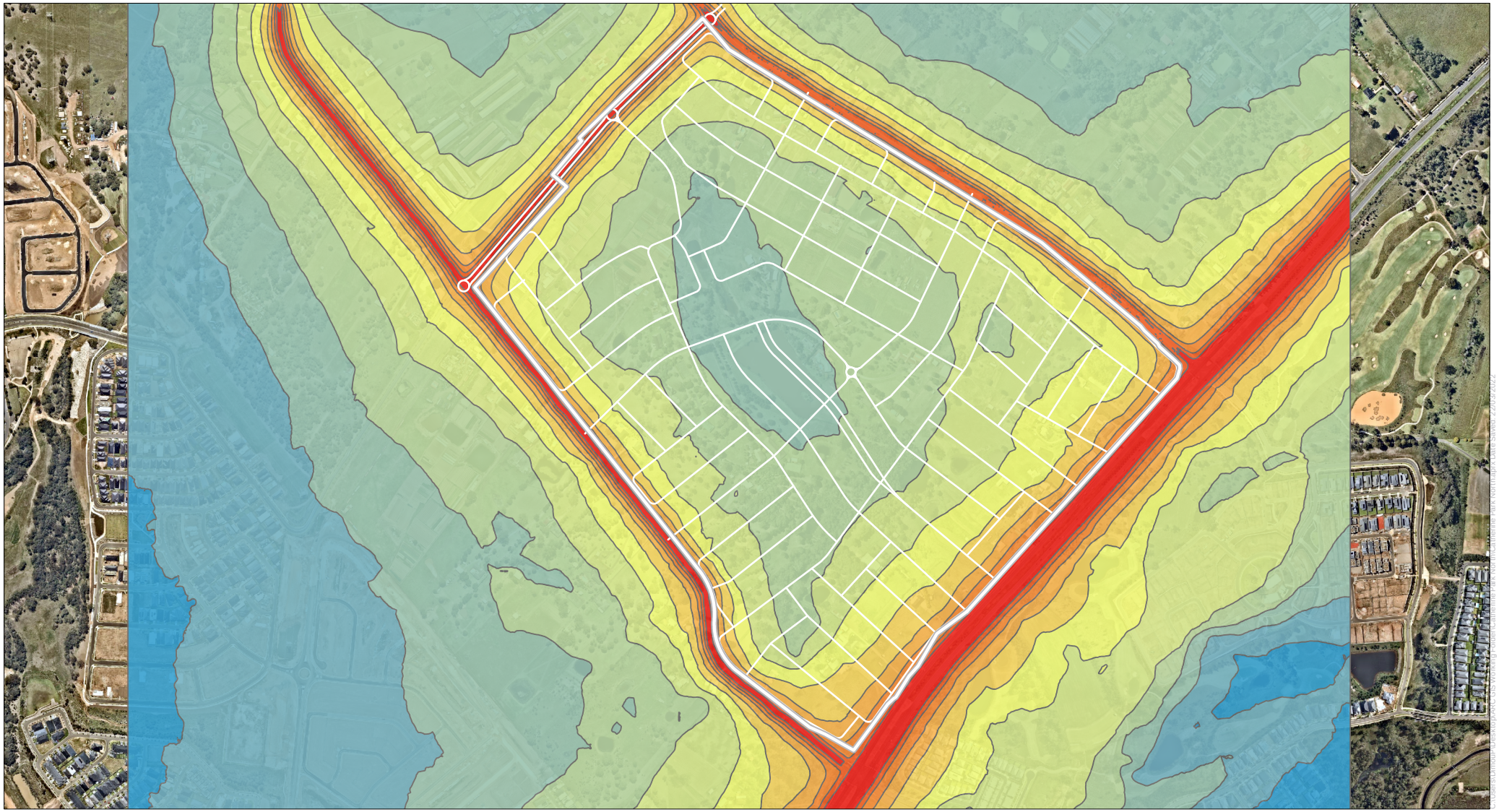
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
L_{max}	The maximum sound pressure level measured over the measurement period
L_{min}	The minimum sound pressure level measured over the measurement period
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.

L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The L_{eq} sound pressure level is used to quantify traffic noise.
Day	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
Evening	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
Night	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
Assessment background level [ABL]	The overall background level for each day, evening and night period for **each day** of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the **entire length** of noise monitoring.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*, the EPA's Noise Policy for Industry and Road Noise Policy.

Appendix B

Noise Contour Map



Catherine Field - Tra f c Noise Levels - Daytime

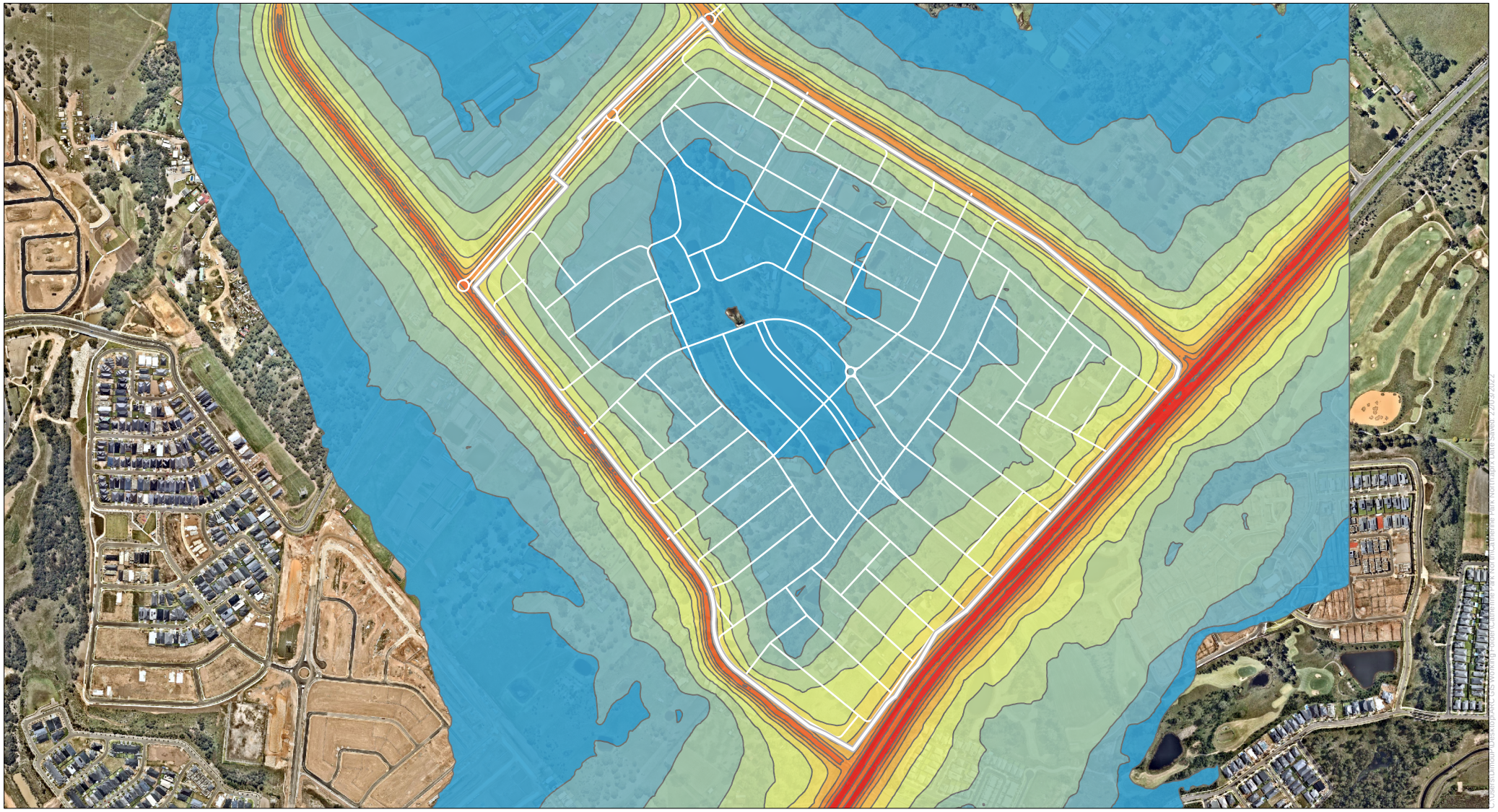
Predicted Tra f c Noise Level $L_{Aeq,15hr}$ dB

45 48 51 54 57 60 63 66 69 72 75 Site Boundary

N

0 150 300 Meters

AECOM



Catherine Field - Tra f c Noise Levels - Night-time

Predicted Tra f c Noise Level $L_{Aeq,9hr}$ dB

45 48 51 54 57 60 63 66 69 72 Site Boundary

N

0 150 300 Meters

AECOM