NEIGHBOURHOODS 3-5, GOOGONG TOWNSHIP

Consideration of Road Traffic Noise

Prepared for:

Googong Township Pty Ltd
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Googong Township Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
670.11047-R01-v3.0	7 September 2021	Matthew Bryce	Antony Williams	Matthew Bryce
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EXECUTIVE SUMMARY

SLR Consulting Australia Pty Ltd (SLR) has undertaken a road traffic noise assessment for the Googong Township Neighbourhoods 3 - 5 (“the Project”) at Googong in New South Wales (NSW).

The assessment involved predicting noise from vehicles on Old Cooma Road and comparing the traffic noise levels with external noise threshold levels based on internal noise criteria described in Regulation Clause 102 of the *State Environment Planning Policy (Infrastructure) 2007*.

Predictions of traffic noise were made using traffic volumes for the year 2031.

The assessment found that some allotments next to Old Cooma Road are likely to be “noise affected” due to road traffic noise intrusion.

Noise barriers between Old Cooma Road and the nearest allotments were considered and it was found that barriers would only marginally reduce noise intrusion into the development site and are therefore not considered feasible or reasonable.

In relation to achieving the internal traffic noise criteria, specific acoustic treatments would not be required for any conventionally-constructed dwelling on most allotments, other than closed windows to habitable rooms for a relatively small number of allotments, which subsequently impacts on ventilation requirements to those rooms.

Dwellings on a small number of allotments facing Old Cooma Road may require acoustic facade treatments, such as upgraded glazing, however this should be confirmed when the design, size and location of the proposed dwelling(s) is known.

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1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has undertaken a road traffic noise assessment for the Googong Township Neighbourhoods 3 - 5 ("the Project") at Googong in New South Wales (NSW).

This assessment addresses noise from the nearby road network with regard to NSW acoustic amenity criteria for future occupants of yet-to-be designed dwellings, and forms part of the Structure Plan for the Project.

A glossary of the acoustical terminology used throughout this report is contained within **Appendix A**.

2 Project Site Description and Surrounds

2.1 Project Overview

Googong Township is a 25 year project being developed in partnership by Peet and Mirvac, operating as Googong Township Pty Ltd (GTPL). The emerging township is located in Southern NSW, 8 km from Queanbeyan and 15 km from Canberra.

The Googong master plan is embedded in Queanbeyan-Palerang Regional Council's (QPRC) Googong Development Control Plan and provides the overarching structure for the township. It has been planned and is being developed as a freestanding township with five neighbourhoods, around 6,600 dwellings and a population of over 18,000 people over 25 years.

Neighbourhood's 1 and 2 (also known as Googong North and Googong Central) have completed Structure plans and DAs. Neighbourhood 2 is currently under staged construction.

The next three Neighbourhoods to be developed, under the next Development Application, are

- Neighbourhood 3 (including the Hamson land) – also known as Googong West
- Neighbourhood 4 – also known as Googong South
- Neighbourhood 5 – also known as Googong East

Neighbourhood's 3, 4 and 5 (NH345) is 235Ha in size and is bounded by Old Cooma Road to the west, Neighbourhood 2 and Neighbourhood 1B to the north, the Googong Dam foreshore and PinkTail Worm-Lizard Conservation Area to the east and rural land to the south.

The area around Googong is characterised by rural uses, while NH345 itself is characterised as former agricultural land.

2.2 Project Objective

GTPL are seeking to submit a Development Application (DA) with QPRC for the subdivision of the land within NH345.

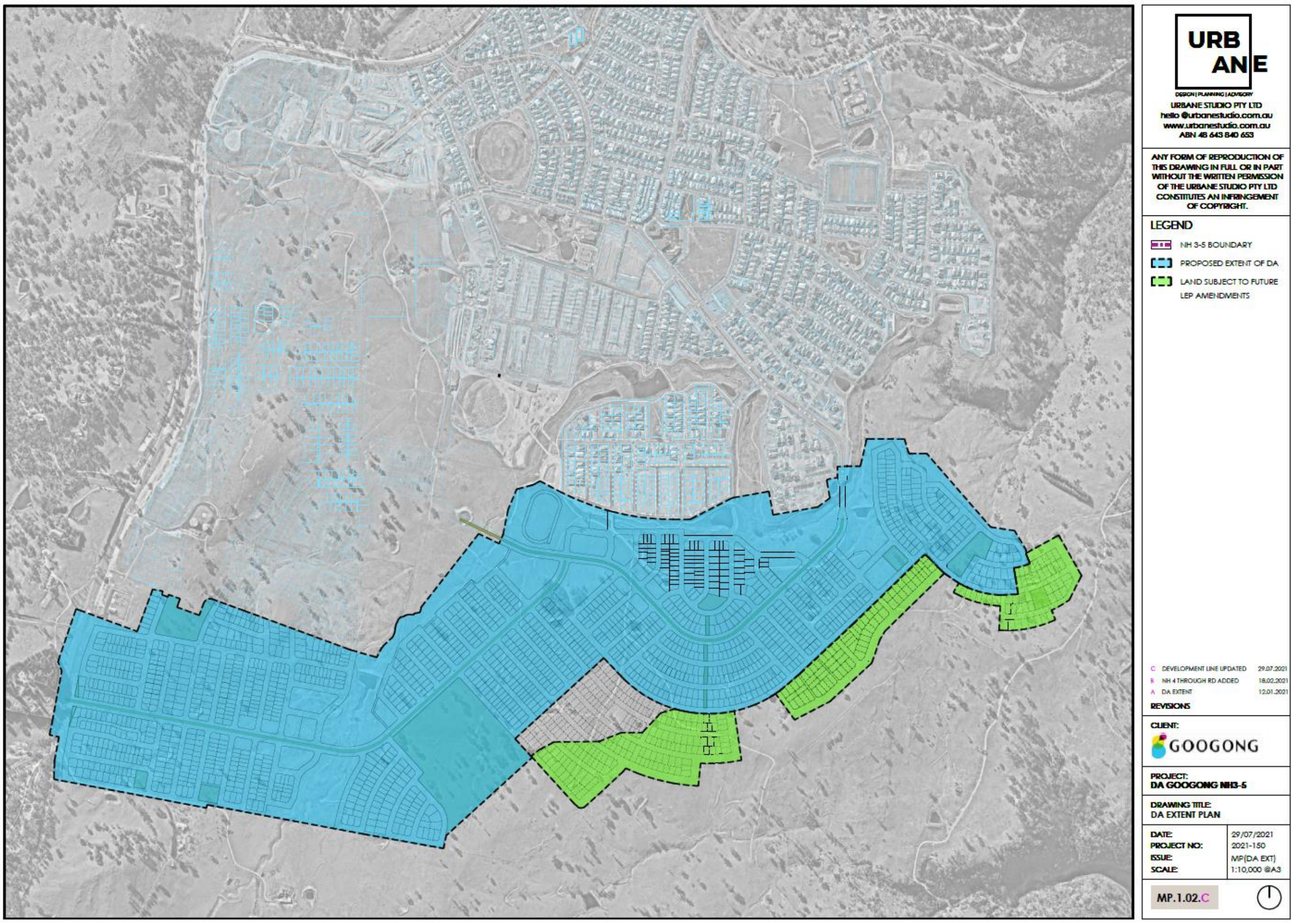
The DA proposal seeks approval for:

- Torrens title subdivision of Neighbourhoods 3, 4 and 5 to create:
    - 1476 residential lots

    - 20 lots for future subdivision of higher density housing and other uses including the Neighbourhood Centre sites, to accommodate approximately 320 dwellings
    - public reserves including, local parks, a sports fields and Googong Common
    - public roads and drainage reserves.
- All subdivision works to prepare the land for the future development comprising site preparation and grading, stormwater and drainage works, road construction, tree removal, public domain landscaping and structures and utilities provision. The subdivision of the higher density super lots and the construction of all buildings (housing and schools) as well as the Neighbourhood Centre sites will be subject of future applications.

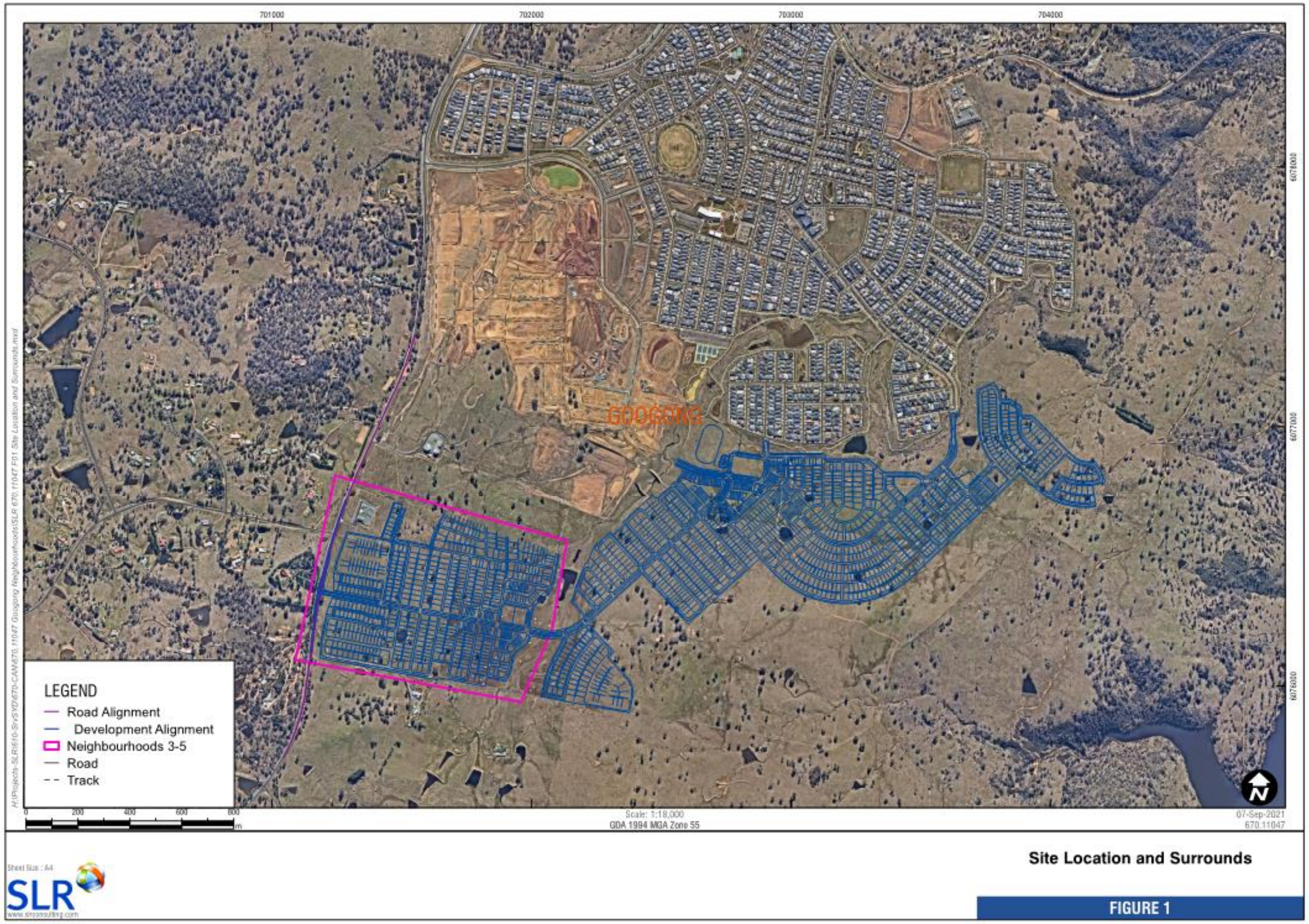
The DA proposal will apply to the area shown in blue on .

Figure 1 Googong Neighbourhoods 3-5



An aerial view of the project site and surrounds, together with the proposed allotment layout is shown in **Figure 2**.

Figure 2 Site Location and Surrounds



3 Road Traffic Noise Criteria

3.1 Internal Traffic Noise Criteria

The proximity of the site to Old Cooma Road, and the number and type of vehicles expected on Old Cooma Road in the future, warrants consideration of the NSW Department of Planning (DoP) *Development near Rail Corridors and Busy Roads – Interim Guideline* ("the Guideline") document issued in 2008.

The Guideline relies upon internal noise criteria provided in Regulation Clause 102 of the *State Environment Planning Policy (Infrastructure) 2007* (SEPP 102), which stipulates:

> *(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
>
> *(a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7 am,*
>
> *(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time.*

It should be noted that SEPP 102 generally applies to "a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles", however it is common and often appropriate to apply the criteria to roads with a lower traffic volume.

3.2 External Traffic Noise Thresholds

Conventional external wall and roof/ceiling constructions and standard proprietary window glazing (4 mm thick or greater) will commonly attenuate noise ingress by approximately 20 dBA when in the closed position and by approximately 10 dBA when opened (sufficient to allow for natural ventilation).

Therefore, based on the internal traffic noise criteria, the corresponding external noise thresholds are shown in **Table 1**.

Table 1 External Noise Thresholds – Residences

Position of Facade Openings	External Noise Level, dBA L_{Aeq}		
	Daytime – 15 hour (7:00 am – 10:00 pm)	Night-time – 9 hour (10:00 pm – 7:00 am)	
	Habitable[1] Areas	Bedrooms	Other Habitable[1] Areas
Windows open	50	45	50
Windows closed	60	55	60

1. Habitable rooms/areas consist of bedrooms, living rooms, family/rumpus rooms and the like. Non-habitable rooms/areas include wet areas (kitchens, laundries, bathrooms, toilets and the like), workshops, studios and garages and do not require consideration.

Where road traffic noise exceeds the "windows open" criteria, dwellings will require windows and doors to be closed and alternative ventilation arrangements must therefore be provided.

Where road traffic noise exceeds the "windows closed" criteria, an upgraded building construction may be required, along with the alternative ventilation. The weakest acoustic element of a residential facade is usually the weather sealed windows. It is generally necessary to upgrade only the glazing and/or door components of building facades.

4 Noise Assessment and Recommendations

4.1 Road Traffic Noise Modelling

SLR developed a SoundPLAN noise model of the study area to predict for the year 2031 (ie 10 year horizon) noise levels at the Project site.

The model includes a digitised ground map (containing 3D ground elevations and buildings), the location and acoustic power levels of significant noise sources, and sensitive receptor locations.

The Calculation of Road Traffic Noise 1988 (CoRTN) methodology within SoundPLAN was utilised to predict future road traffic noise levels. CoRTN incorporates the road design, the topography between the subject road and receptors, significant structures (eg buildings and noise barriers/fences) and traffic characteristics for the subject road (ie volume, composition, speed, and road surface type).

Road and traffic information for Old Cooma Road was obtained from the *Googong NH2 Structure Plan Network Assessment* report prepared by TDG for the Queanbeyan-Palerang Regional Council (QPRC) in October 2016. Road and traffic information for the main internal road from Old Cooma Road into NH3-5 was obtained from the "NH3/4/5 Structure Plan – Traffic Analysis, November 2018 Opportunities and Constraints" document prepared by Calibre Consulting.

Table 2 summarises the information incorporated into the noise prediction model.

Table 2 Traffic and Road Information

Road Name	2031 Volume (AADT)[1]	Heavy Vehicles	Speed
Old Cooma Road	9500	9 %	80 km/h

1. AADT – Annual Average Daily Traffic, two-way

Traffic volumes and speeds on internal roads within the development will be low relative to Old Cooma Road and well below the threshold described in SEPP 102, which would not usually be applied to internal roads within a residential development. Therefore, the internal roads have not been included in the model.

The road pavement surface of Old Cooma Road was modelled as Dense Graded Asphalt (DGA) which requires no correction factor in the CoRTN methodology.

An Australian Road Research Board correction factor of -1.7 dBA, to account for the applicability of CoRTN to Australian conditions, was applied to all building facade predictions.

Separate predictions for two building heights were undertaken (1.5 m and 4 m for single and two-storey dwellings respectively). The predicted results include a +2.5 dBA reflection facade adjustment.

Future single-storey dwellings have been incorporated into the noise model to account for the potential screening effects provided by intervening buildings to the allotments behind, ie those allotments not directly exposed to road traffic noise. Allotment boundary fencing between properties, which may provide some noise screening in some instances, has not been considered.

4.2 Road Traffic Noise Modelling Results

The predicted external road traffic noise levels in contour form across the site are shown in **Figure 3** to **Figure 6**, to allow identification of "affected allotments", ie where the external road traffic noise level would likely exceed the thresholds shown in **Table 1**.

The road traffic noise levels have been predicted for the daytime (habitable rooms) and night-time periods (bedrooms) for both single and two storey dwellings.

The two lines (green and red) on each of the figures identify which allotments would be considered "noise affected". There are three outcomes:

1. Dwellings built on allotments to the east of the green line (windows open threshold level) do not require acoustic considerations (ie internal criteria are predicted to be achieved even with windows open).
2. Dwellings built on allotments between the green and red lines do not require specific acoustic constructions (eg glazing thicker than 4 mm) **but** require windows closed to meet internal criteria. Such dwellings would require ventilation by means other than open windows. "Category 1" construction (refer to **Section 5**), would be appropriate for dwellings on these allotments.
3. Dwellings built on allotments west of the red line (windows closed threshold level) would also require windows to be closed (and assisted ventilation) in order to meet the internal criteria, and **may** require specific acoustic constructions (eg thicker glazing). "Category 1" construction (refer to **Section 5**), would be appropriate for dwellings on these allotments.

The majority of the affected allotments will fall into the second outcome, which would not be considered onerous given the propensity for the provision of mechanical ventilation in modern dwellings.

It can be seen in **Figure 3** to **Figure 6** that the red line impacts on a small number of allotments nearest the Old Comma Road alignment, however the need for acoustic treatments would be dependent on the location and size of any dwelling on those allotments.

It can also be seen that it is the predicted daytime noise levels that would control the extent of the noise intrusion into the Project and therefore the number of "noise-affected allotments".

It is expected that prospective purchasers of allotments in the estate would be shown the noise contour maps of the affected allotments. This will enable informed decisions regarding building heights and construction requirements.

Precise building constructions can be determined by way of a road traffic noise intrusion assessment or it would also be acceptable to use the "deemed-to-satisfy" standard constructions, as discussed in **Section 5**.

It is noted that the noise modelling shows that noise levels are predicted to be highest immediately adjacent to Old Cooma Road and the design of the site layout already provides noise mitigation in the form of setback zones for internal site roads between Old Cooma Road and the nearest receivers.

Figure 3 Predicted Daytime Road Traffic Noise – Single storey dwellings, habitable areas

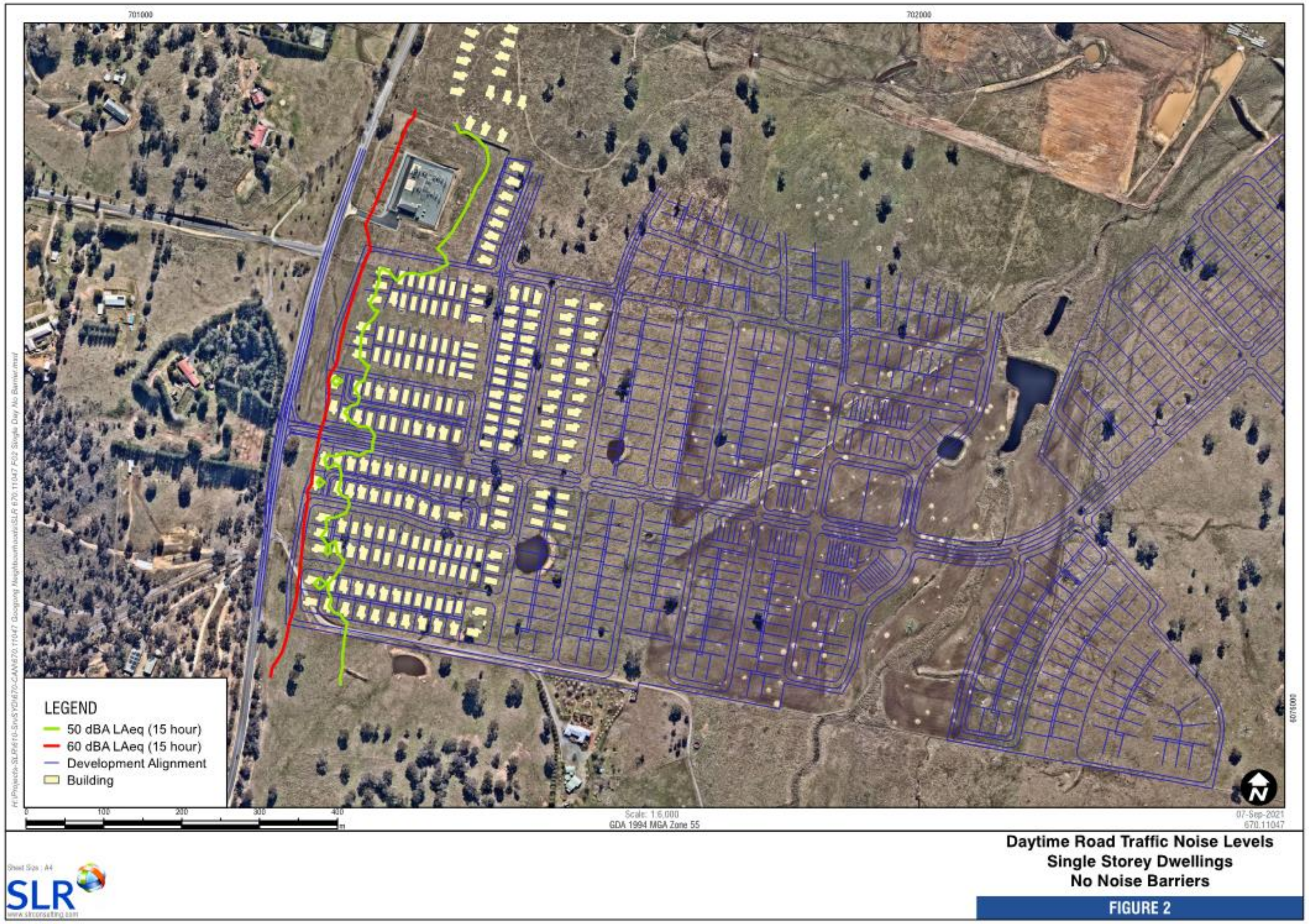


Figure 4 Predicted Night-time Road Traffic Noise – Single storey dwellings, Bedrooms

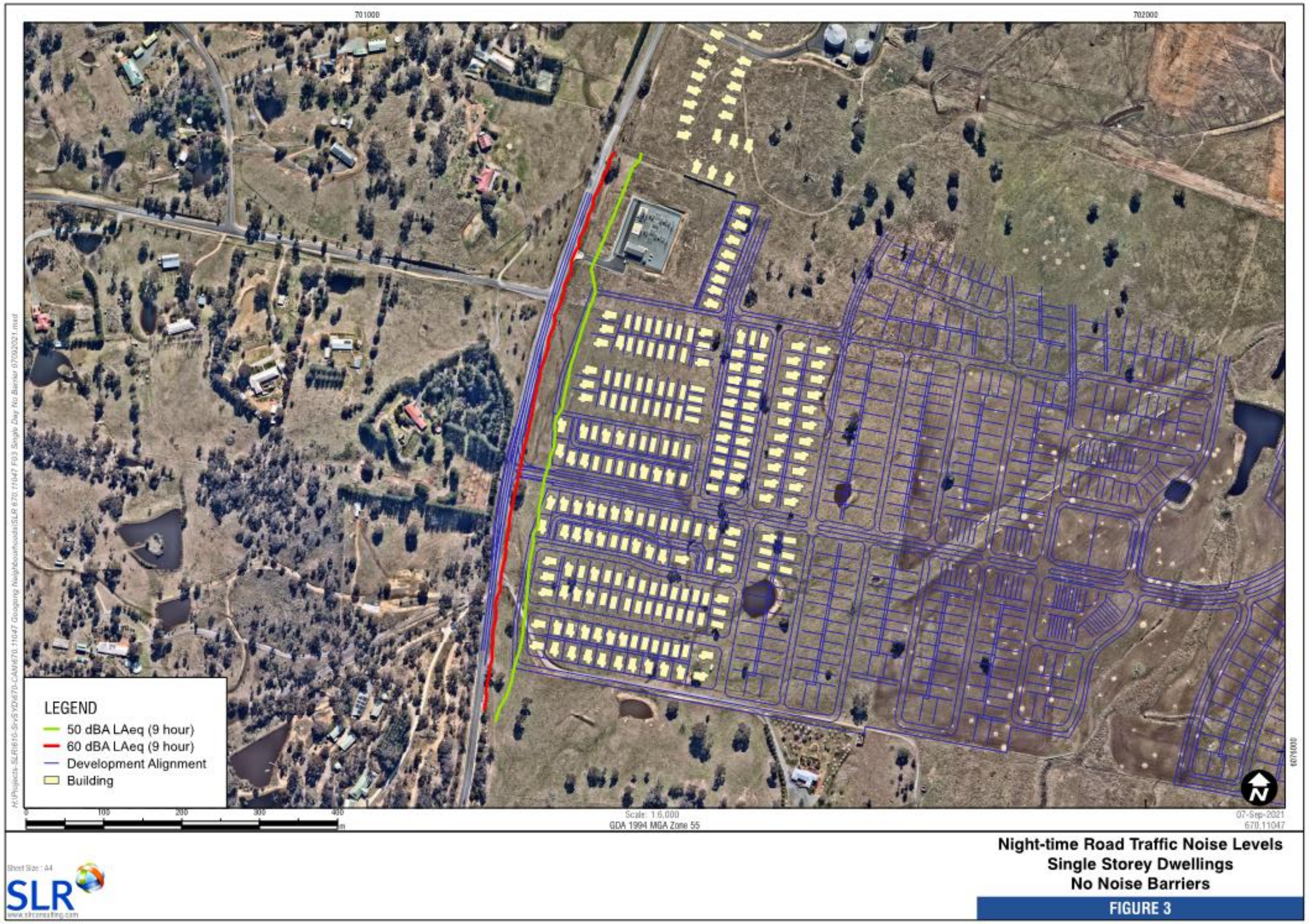


Figure 5 Predicted Daytime Road Traffic Noise – Two storey dwellings, habitable areas

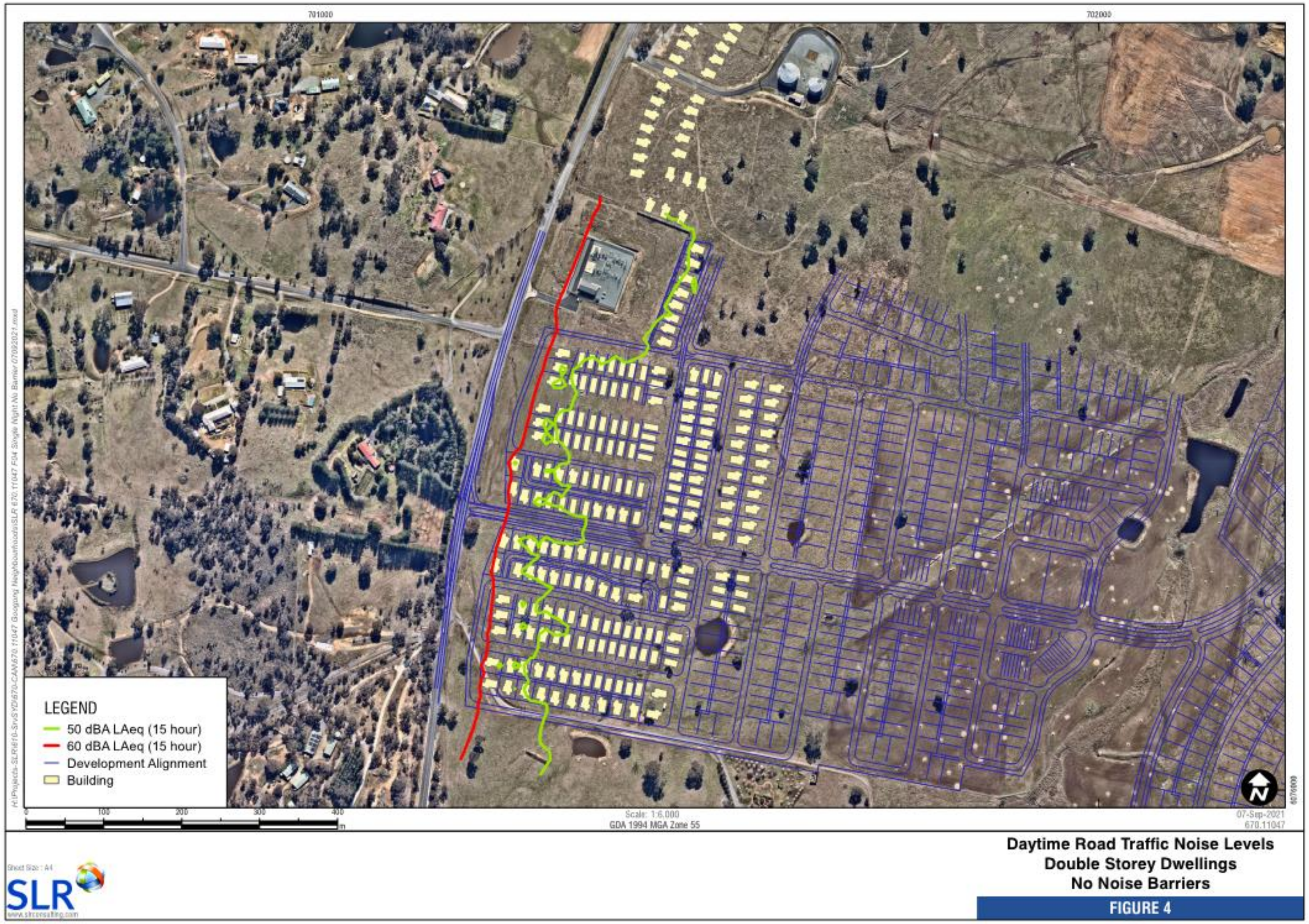
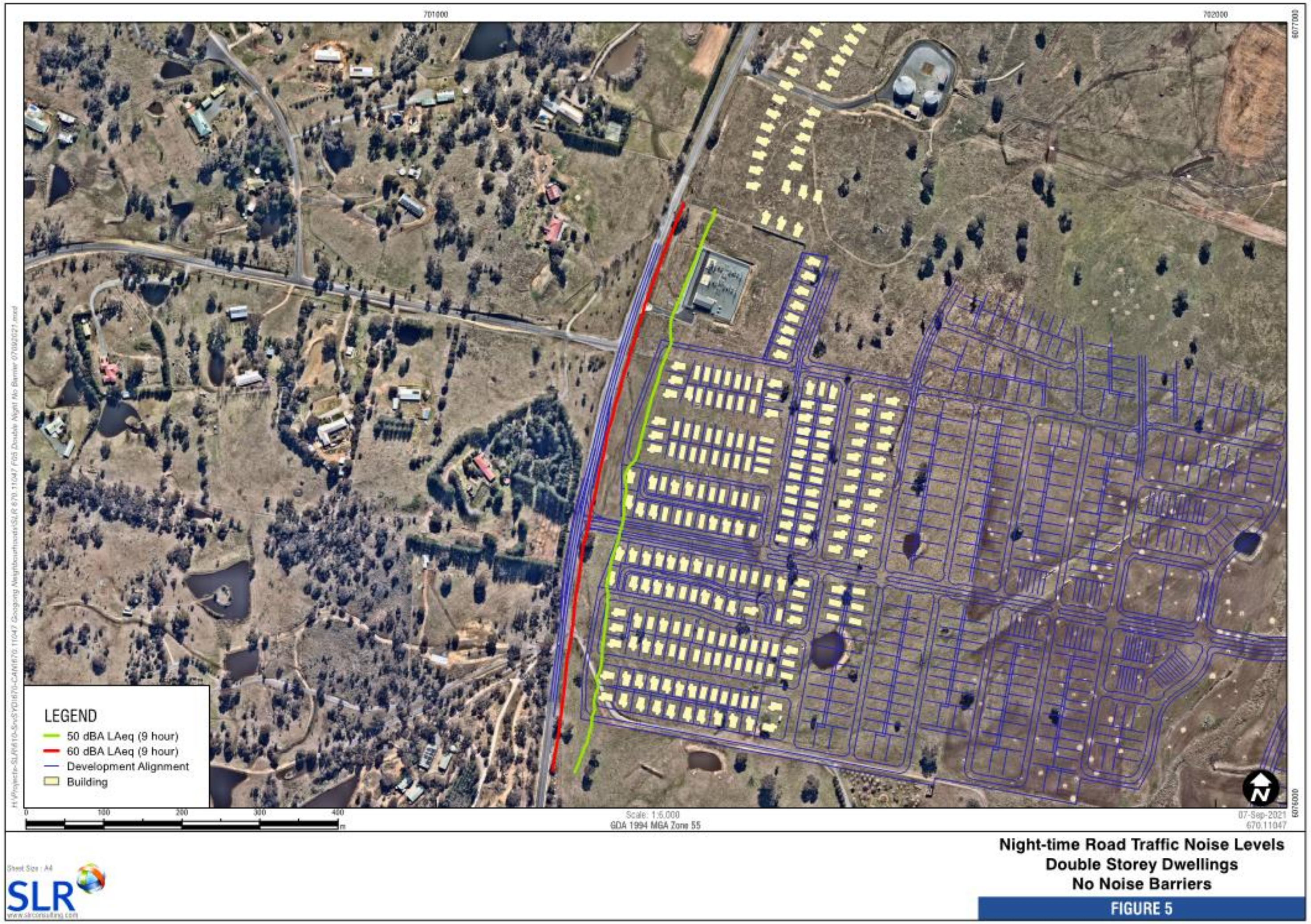


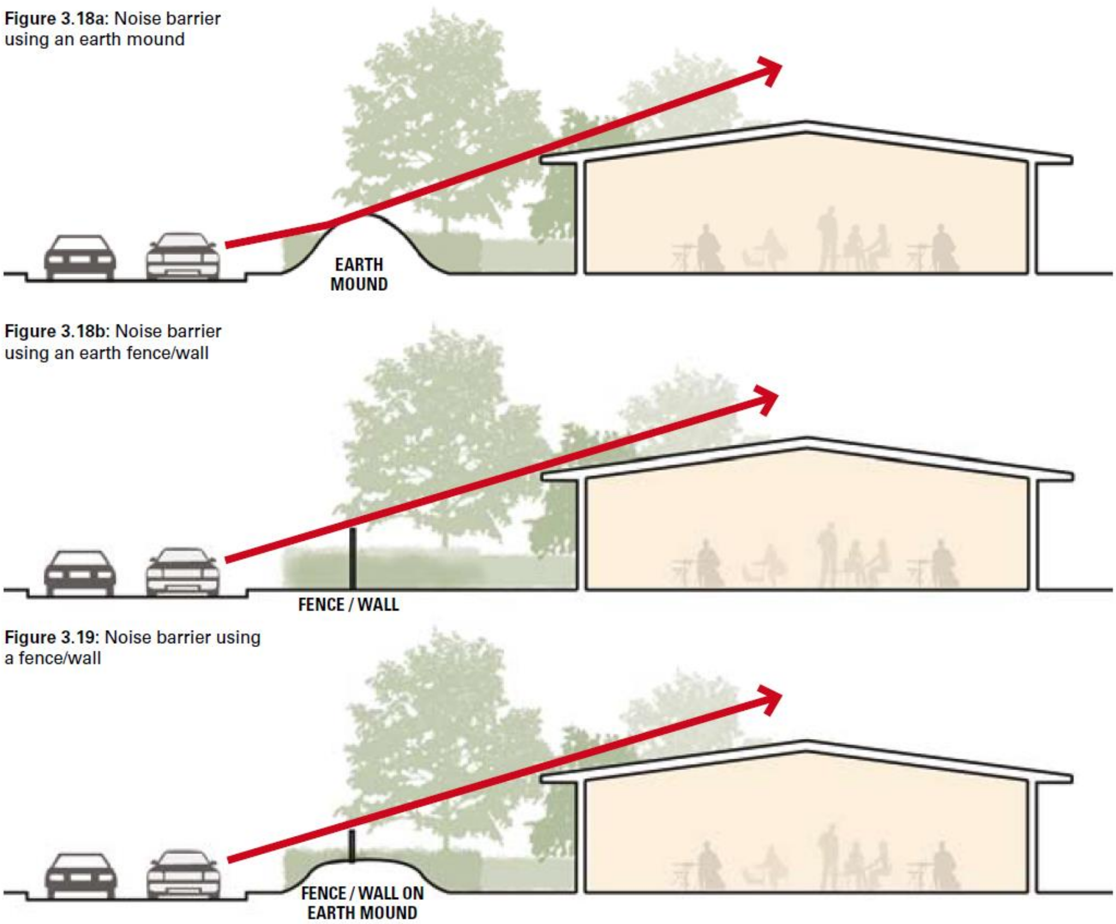
Figure 6 Predicted Night-time Road Traffic Noise – Two storey dwellings, Bedrooms



4.3 Noise Barriers

Noise barriers or earth mounds can be an effective way to reduce road noise impacts. Where space allows, raised earth mounds can also be used as noise barriers and can be enhanced by placing a low wall on top. These methods are shown in **Figure 7**.

Figure 7 Noise Barrier and Mounds



Note: Taken from the DoP "*Development near Rail Corridors and Busy Roads – Interim Guideline*.

Whilst noise barriers can provide significant noise benefit they can also introduce a number of negative aspects, including access to property, aesthetic impacts, daylight access, overshadowing, drainage, graffiti, restriction of line-of-sight, maintenance access and safety concerns.

Noise barriers are most commonly used next to major motorways and are less common on arterial roads or on roads where access is required to be maintained.

Noise Barriers for Googong Township

The layout of the allotments is not ideal for using noise barriers to reduce noise intrusion on the site. Access to the allotments would be from an internal road adjacent to Old Cooma Road and west of the allotments. That means that many allotments would 'face' Old Cooma Road and therefore no opportunity exists to use noise barriers on the property boundaries due to driveway access requirements.

Nonetheless, the effects of noise barriers located between the allotments and the Old Cooma Road have been investigated, ie on the west side of the internal road. Barriers in that position are considered more suitable as it allows for a continuous noise barrier and positions the barrier closer to Old Cooma Road.

Noise barriers of 2 m in height were incorporated into the model. The predicted daytime noise levels for single and two-storey dwellings are shown in **Figure 8** and **Figure 9** respectively, together with the locations of the considered noise barriers.

It can be seen by comparing the noise contours shown in the "no noise barrier" figures, that a 2 m high noise barrier would have negligible noise reduction effect. This is due to the topography of the project site which is generally lower than the height of Old Cooma Road at the southern end of the site and higher than Old Cooma Road at the northern end.

An investigation into higher noise barriers indicated that a barrier height of 4 m in that same location had only a moderate improvement in noise reduction, resulting in approximately six additional allotments no longer being 'noise affected'. The predicted noise level contours are shown in **Figure 10**.

As would be expected, neither barrier height influences the noise levels for the two-storey prediction height.

Therefore, the use of noise barriers does not provide significant noise reductions and it is reasonable to conclude that noise barriers would not be feasible.

Figure 8 Predicted Daytime Road Traffic Noise – Single storey dwellings, habitable areas (2 m high noise barrier to western site boundary)

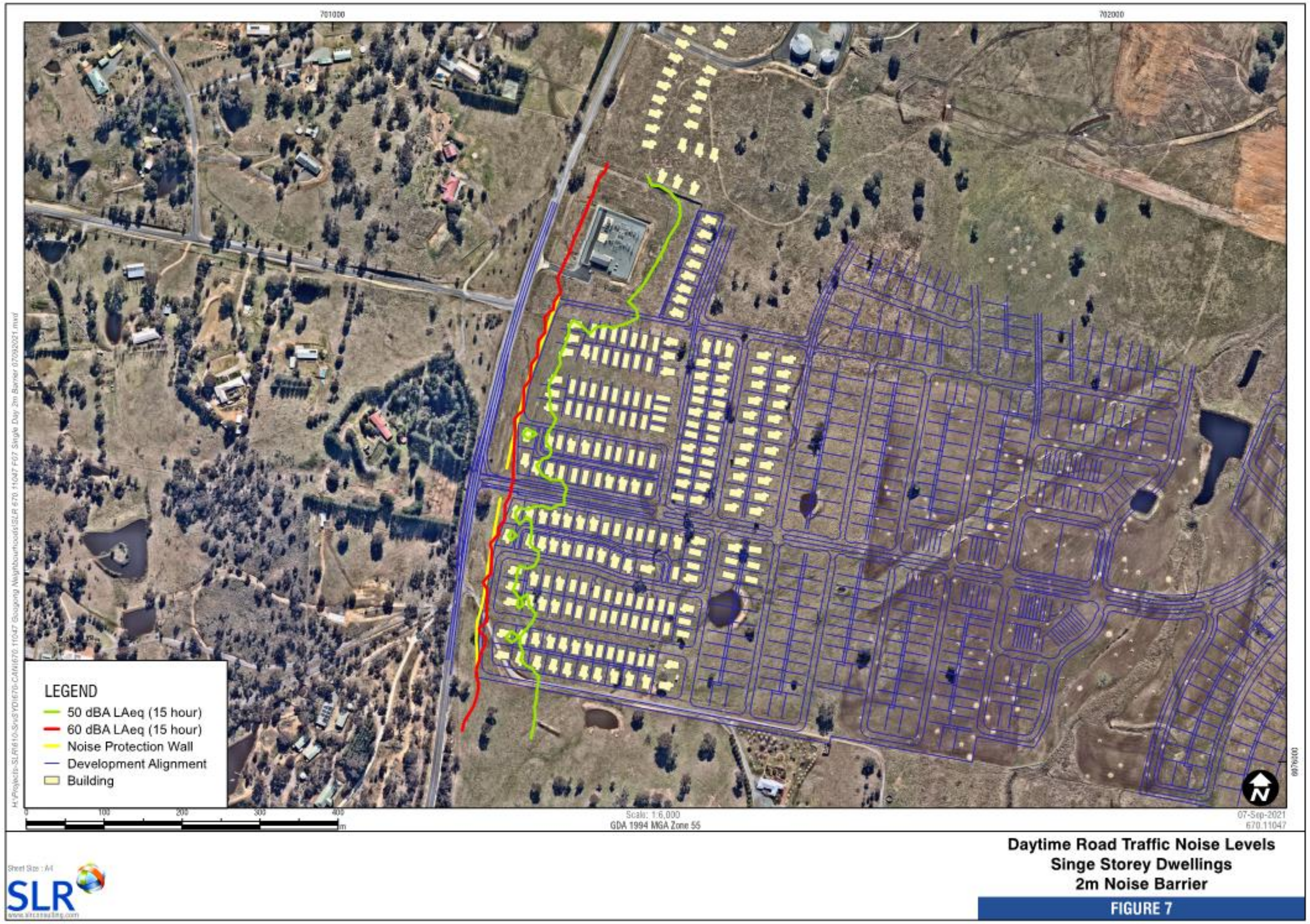


Figure 9 Predicted Daytime Road Traffic Noise – Two storey dwellings, habitable areas (2 m high noise barrier to western site boundary)

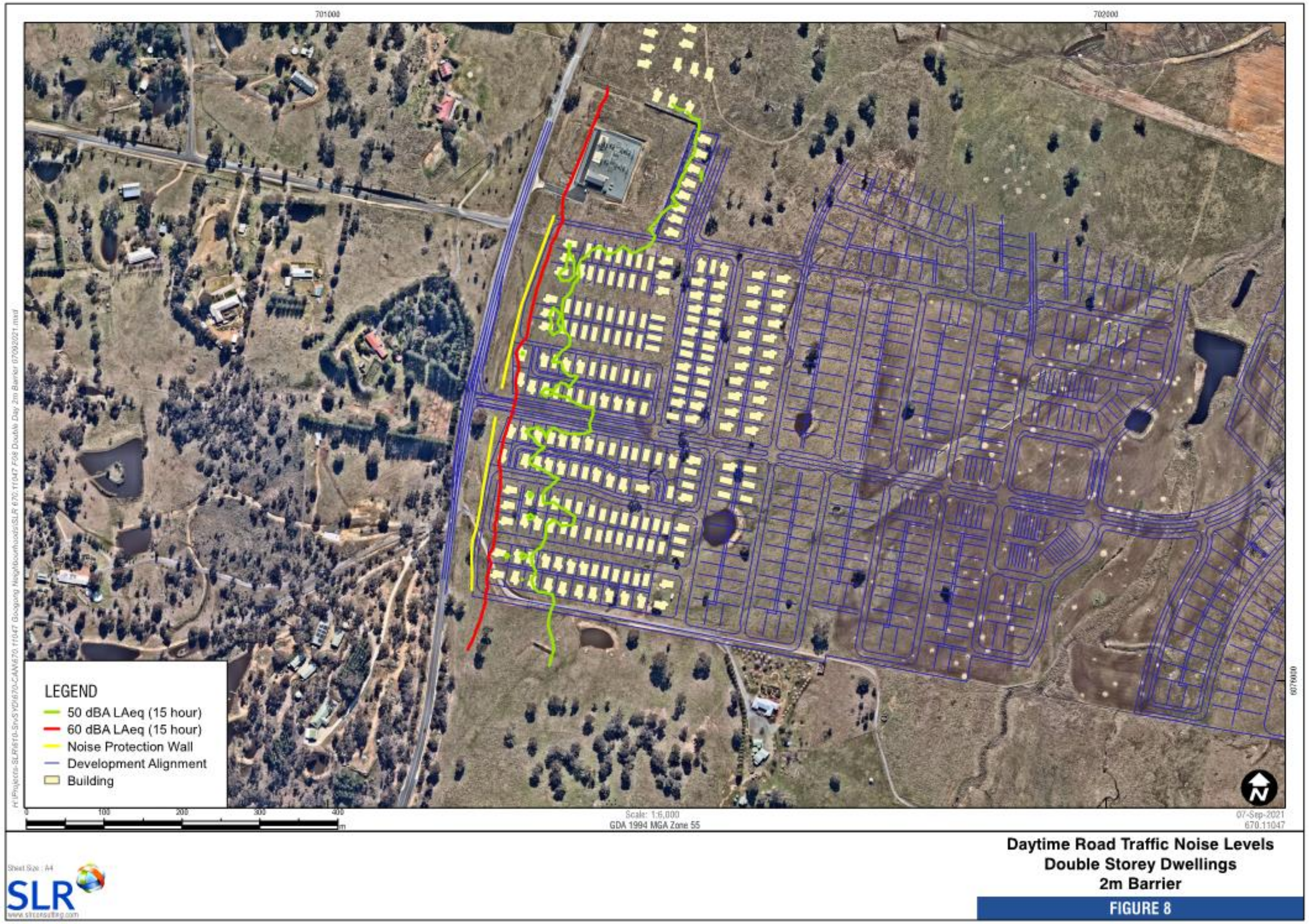
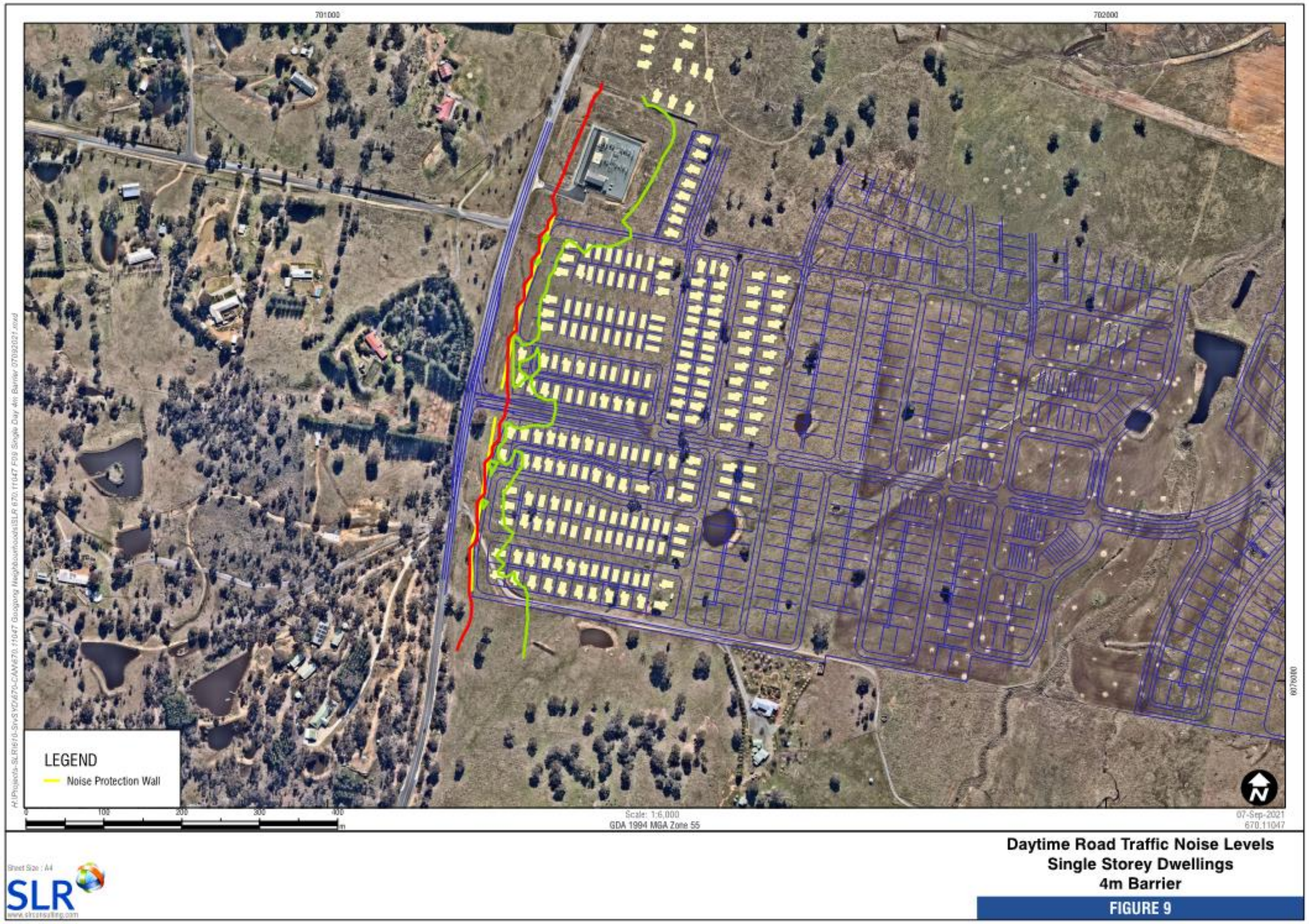


Figure 10 Predicted Daytime Road Traffic Noise – Single storey dwellings, habitable areas (4 m high noise barrier to western site boundary)



5 Building Constructions – Facade Insulation

The precise acoustic treatments required to achieve the internal SEPP criteria would be determined when the design of the dwelling becomes known. There are several factors that influence the extent of the acoustic treatments, including:

- The road traffic noise level adjacent to the facade. This may be affected by:
  - Screening from other dwellings or other significant structures
  - The distance between the facade and the noise source
  - The orientation of the dwelling relative to the noise source.
- The internal layout of the dwelling, ie noise-sensitive occupancies may be located away from the side of the dwelling most exposed to the noise source.
- The construction of the dwelling.
- The size/area of glazed elements relative to the acoustically 'stronger' elements.

However, based on the predicted noise levels at the Project site, up to approximately 60 dBA $L_{Aeq(15hour)}$, a dwelling facade on any allotment would need a maximum noise reduction of up to 20 dBA to achieve compliance with the internal criteria.

That level of reduction would not be considered onerous and, assuming a typical residential dwelling design, would be achieved using standard constructions with proprietary glazing including those described as Category 1 "deemed-to-satisfy" constructions within the DoP Guideline.

The building constructions for those categories are described in **Table 3**.

Table 3 Category 1: 'Deemed-to-Comply' Constructions

Facade Element	Minimum Sound Insulation, R_w	Construction
Windows/Sliding Doors	24	Openable with minimum 4 mm monolithic glass and standard weather seals
External Walls	38	Timber frame or cladding: 6 mm fibre cement sheeting or weatherboards or plank cladding externally, 90 mm deep timber stud or 92 mm metal stud, 13 mm standard plasterboard internally. Brick veneer: 110 mm brick, 90 mm timber stud or 92 mm metal stud, minimum 50 mm clearance between masonry and stud frame, 10 mm standard plasterboard internally. Double brick cavity: Two leaves of 110 mm brickwork separated by 50 mm gap.
Roof/Ceiling	40	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.
Entry Door[1]	28	35 mm solid core timber door fitted with full perimeter acoustic seals.
Floor	29	One layer of 19 mm structural floor boards, timber joist on piers. OR Concrete slab floor on ground.

1. For dwellings at the Project site, acoustic seals would only be required where the entry door directly faces the Old Cooma Road.

These constructions are a 'deemed to comply' design and no further assessment is required where they are used, however, confirmation of equivalent sound insulation performance of the alternative treatments must be obtained from the supplier/manufacturer or suitably qualified person.

The constructions apply to the entire building and not just the exposed facade/s. A detailed assessment, provided by a suitably qualified acoustic engineer, having consideration for the factors described above may result in less acoustic treatment than would the 'deemed-to-comply' constructions.

Mechanical ventilation that is compliant with Australian Standard 1668.2-2012 "*The use of ventilation and airconditioning in buildings - Mechanical ventilation in buildings*" (AS 1668) would be required to enable occupants to maintain closed windows/doors.

Although glazing must be closed to achieve the indoor noise objectives, this does not preclude the use of natural ventilation., Where natural ventilation is to be provided, the ventilation opening must however be selected such that the overall composite sound insulation of the facade is not compromised.

6 Conclusion

SLR has undertaken a road traffic noise assessment for the proposed Googong Township Neighbourhoods 3-5 Precinct.

The assessment involved predicting noise from vehicles on Old Cooma Road and comparing the traffic noise levels with external noise threshold levels based on internal noise criteria described in the *Development near Rail Corridors and Busy Roads – Interim Guideline* and its referral policy, Regulation Clause 102 of the *State Environment Planning Policy (Infrastructure) 2007*.

Predictions of traffic noise were made using traffic volumes for the year 2031.

The assessment found that some allotments next to Old Cooma Road are likely to be "noise affected" due to road traffic noise intrusion.

Noise barriers between Old Cooma Road and the nearest receivers have been considered and the investigation indicated that they would only marginally reduce noise intrusion into the development site and are therefore not considered feasible or reasonable.

In relation to achieving the internal traffic noise criteria, specific acoustic treatments would not be required for any conventionally-constructed dwelling on most allotments, other than closed windows to habitable rooms for a relatively small number of allotments, which subsequently impacts on ventilation requirements to those rooms.

Dwellings on a small number of allotments facing Old Cooma Road may require acoustic facade treatments, such as upgraded glazing, however this should be confirmed when the design, size and location of the proposed dwelling(s) is known.

APPENDIX A

Acoustic Terminology

1 Sound Level or Noise Level

The terms “sound” and “noise” are almost interchangeable, except that in common usage “noise” often refers to unwanted sound.

Sound/noise consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio logarithmically to a more manageable size.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 “A” Weighted Sound Pressure Level

Sound pressure is not sensed equally by the human ear at all frequencies. The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an “A-weighting” filter. This is an electronic filter having a frequency response corresponding to that of human hearing.

People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels:

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

3 Free Field and Facade Reflections

“Free field” describes a microphone position where there are no reflecting surfaces, other than the ground, close enough to influence the sound pressure level. A position at least 4 m from the closest vertical surface, eg a building facade, is considered free field.

A microphone position closer than 4 m to a reflective surface may be affected by reflected noise. It is common to consider reflected noise by adjusting a predicted noise level by +2.5 dBA to account for the facade that will be there in the future, particularly in the context of a road traffic noise assessment.

4 Steady State and Time-varying Noise

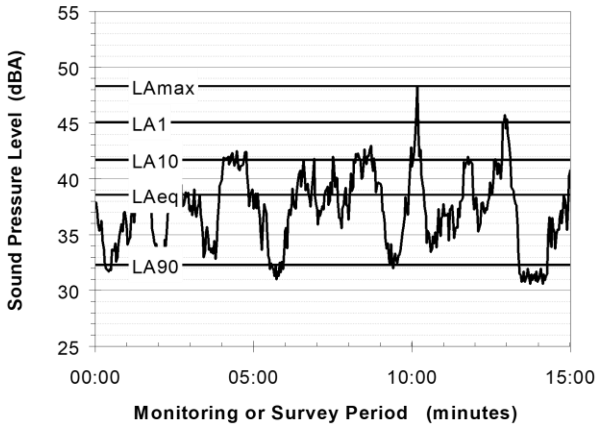
Noise whose average characteristics remain relatively constant or do not vary over time is referred to as steady-state noise, eg airconditioner noise.

Time-varying noise describes noise that fluctuates in level over time, eg road traffic noise.

5 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the period, L_{A10} the noise exceeded for 10% of the period, etc.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval, commonly used for the assessment of short-term noise events. It is often similar in value to the L_{Amax} level.

L_{A10} The noise level exceeded for 10% of the 15 minute interval. This may be referred to as the average maximum noise level and is often used in the context of road traffic noise.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

$L_{Aeq(T)}$ The L_{Aeq} evaluated over a time period, T.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Amax} The “maximum noise level” for an event, commonly used in the assessment of potential sleep disturbance during night-time periods.

$L_{Ax,adj,T}$ The average of the L_{Ax} noise levels (eg L_{A90}, L_{A1}) during time period T adjusted for tonality and impulsiveness.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the “repeatable minimum” L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or “average” levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

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