Hackham Code Amendment

Main South Road

Environmental Noise Assessment

S6228C5

September 2021

sonus.

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INTRODUCTION

An environmental noise assessment has been made of the proposed Planning and Design Code Amendment (***Code Amendment***) at Hackham.

The subject land is proposed to be rezoned for residential development as part of the Code Amendment. The extent is shown in Appendix A. The land is generally located between the Onkaparinga River National Park to the southeast and Main South Road to the northwest.

There are a number of noise sources in the vicinity of the proposal with the potential to impact on the amenity of any future residences, should the Code Amendment proceed. These include traffic on Main South Road to the northwest, a quarry and a shooting range to the east in the Hills Face Zone and Mick O'Shea's Hotel to the north in the Local Activity Centre Zone.

The environmental noise assessment considers the existing provisions of the South Australian Planning and Design Code (***the Code***) and demonstrates that reasonable levels of amenity can be achieved through implementing the existing provisions and assessment pathways.

Road traffic is assessed against the provisions within the Code and referenced standards. Examples of the likely acoustic treatments to achieve the Code provisions have been provided to demonstrate that through practical building techniques and material selections, adequate levels of residential amenity can be achieved at the subject site.

Indicative noise measurements and predictions have also been made at the subject site for activity within the nearby quarry and shooting range. The measurements and predictions are used as the basis for determining the need for any construction upgrades to ensure the encroaching residences do not impact on the existing lawful land uses.

Consideration has also been given to the potential activity at the nearby Mick O'Shea's hotel and the adequacy of the provisions of the Code has been considered.

The assessment ensures that each of the noise sources is adequately accounted for within the Code Amendment and that adequate levels of residential amenity can be achieved.

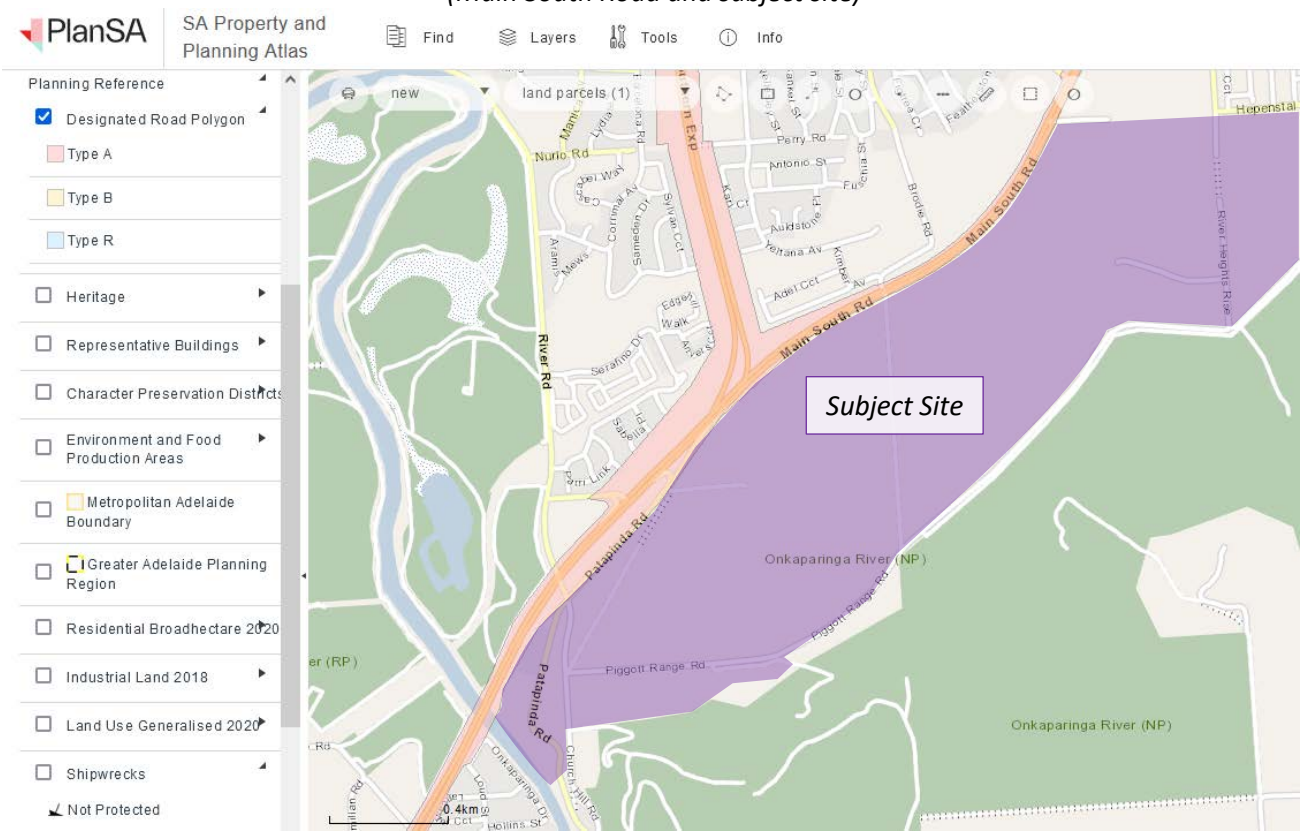
ROAD TRAFFIC

The Ministerial Building Standard MBS 010 *Construction requirements for the control of external sound* (**MBS 010**) "contains provisions for reducing the intrusion of unacceptable levels of sound into habitable rooms of residential buildings".

It is predominantly applied to residential development adjacent to transport corridors, such as major roads, however can also apply to residential development in a mixed use environment where there is the potential for other activity to impact on amenity. The Noise and Air Emissions Overlay (**the Overlay**) within the Planning and Design Code mandates MBS 010 as part of Building Rules Consent, where the subject land is designated.

MBS 010 requires treatment of residential building facades which are exposed to traffic noise from designated roads in the Code. Main South Road is a Type A designated road in the Code, as shown in the Figure below.

Figure: *Designated Roads*
(Main South Road and subject site)



Recommendations

To adequately address the noise from road traffic (on Main South Road) it is recommended that as part of the Code Amendment, the portion of the subject land closest to Main South Road be designated under the Overlay. The area (within 150m of Main South Road) which would need to be included is shown in detail below.

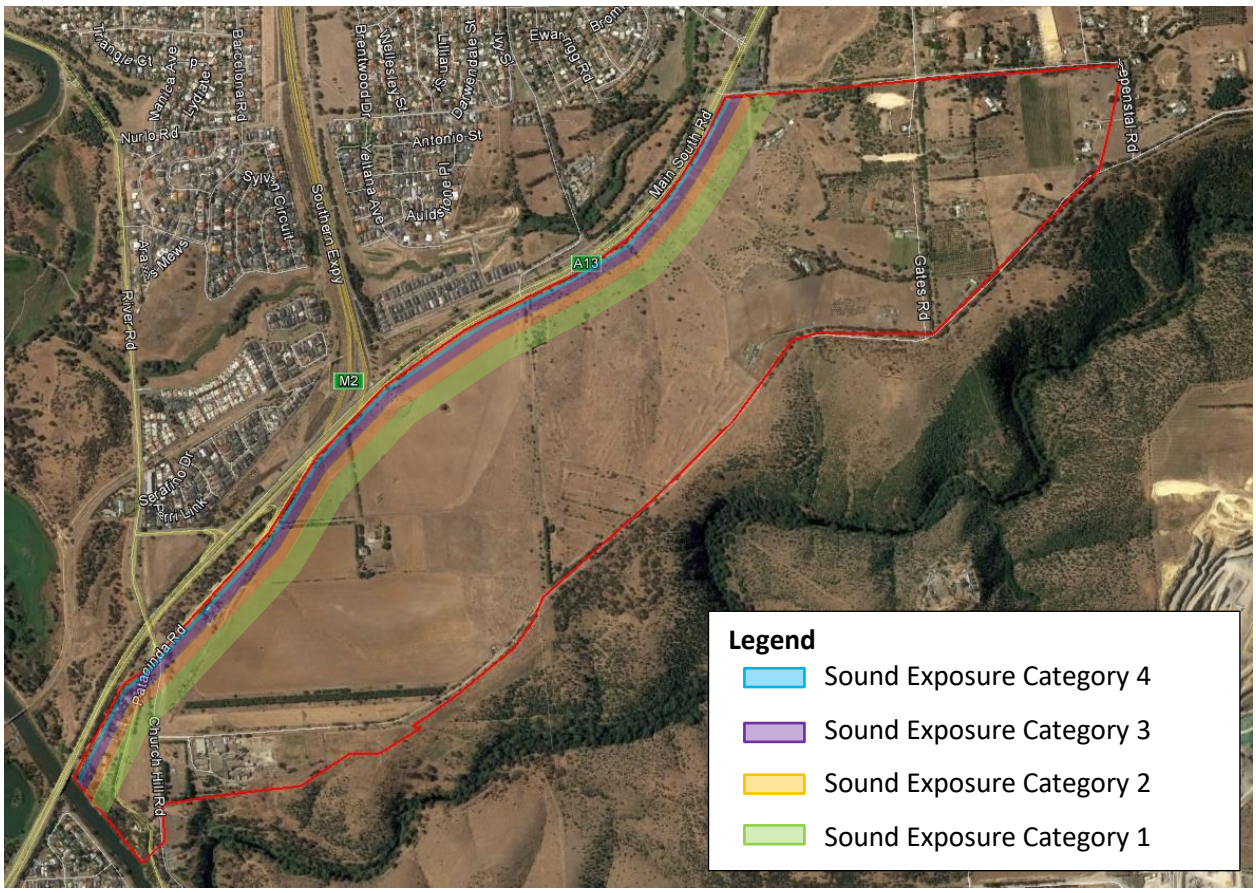
Being within a designated area will require building facades to be designed to reduce traffic noise in accordance with MBS 010. One assessment method under MBS 010 specifies acoustic treatment to dwellings based on the "Sound Exposure Category" (SEC) of specific facades. The SECs range from 1 to 5, with SEC 1 requiring a base level of acoustic treatment and SEC 5 requiring specific extensive treatment. The treatments are based on achieving a level of no more than 35 dB(A) inside a bedroom at night and therefore the SEC's account for varying levels of noise outside.

The SEC will vary according to the distance from the corridor, shielding from the corridor, the speed limit and the Type A designation of the road. It is noted that for any site designated within the Overlay, a minimum of SEC1 acoustic treatment applies. The following table provides the SEC's which would apply for various setback distances and the corresponding outdoor design sound level.

Distance Within site boundary	Applicable Sound Exposure Category	Outside Noise Level
10-25m	4	71-75dB(A)
25-45m	3	67-71dB(A)
45-95m	2	63-67dB(A)
95-150m	1	59-63 dB(A)

Once assigned an SEC, the extent of treatment for each building element varies according to design factors such as the size of glazing relative to the floor area of the room. For example, for a given SEC, the larger the glazing system into a room, the thicker the glazing must be. That is, for a future development application, the actual acoustic treatments will depend on the final design, adjusted according to the methodology provided by MBS 010.

The following mark-up shows the areas of the site which would require SEC 1 to 4 treatments if the Code Amendment progresses and incorporates a minimum 10m setback distance between the closest residence to Main South Road (in accordance with the SEC4 approach).



Appendix B of this report provides indicative treatments for each of the SEC's. The treatments demonstrate that the provisions of MSB 010 can be achieved with practical building upgrades. The final extent of treatment will be determined at the Building Rules Consent stage for the residences.

INTERFACE WITH QUARRY & SHOOTING RANGE

An assessment has been made of the noise from the quarry and shooting range in the Hills Face Zone. The assessment is designed to ensure:

- a suitable level of amenity for future residents; and
- that the ongoing lawful operation of the quarry and shooting range are not constrained.

The *Environment Protection (Noise) Policy 2007* (the **Policy**) under the *Environment Protection Act 1993* provides an objective tool to achieve both outcomes. The Policy is based on the *World Health Organisation Guidelines* (the WHO Guidelines) to prevent annoyance, sleep disturbance and unreasonable interference on the amenity of an area and is therefore suitable for assessing the level of amenity for future residents. Further, achievement of the goal noise levels of the Policy protects the quarry and shooting range[1] from future action under the *Environment Protection Act 1993*.

The Policy allows for the goal noise levels to be achieved outside of the residence or, where acoustic treatment is incorporated into the construction, the assessment location becomes inside (with an internal goal noise level).

Generally the Policy goal noise levels are based on the principally promoted land uses within both the zones of the noise source (quarry and shooting range) and the noise receiver (future residences). In this instance however, given there is an "intervening zone" (the Conservation Zone) of greater than 100m, the goal noise levels are based only on the zone of the noise receiver.

Given the proposed Code Amendment is to promote "residential" land use, the goal noise levels under the Policy will be as follows:

- Daytime (7am to 10pm) noise levels directly outside residences of no greater than 52 dB(A), or within habitable rooms of the residences of 32 dB(A); and,
- Night-time (10pm to 7am) noise levels directly outside residences of no greater than 45 dB(A), or within habitable rooms of the residences of 30 dB(A).

Under the Policy, noise levels are effectively "adjusted" for each characteristic of tone, impulse, low frequency and modulation that the noise source exhibits. The application of penalties is discussed further in the following sections.

[1] Although the Policy does not apply to some shooting ranges, this shooting range is greater than 200m from a residence and therefore the Policy applies.

Quarry

Measurements of the noise from activity within the quarry were conducted at a variety of locations along Piggott Range Road, adjacent the subject site, on 3 and 7 September 2021.

The short term measurements were conducted to isolate the noise from the quarry in the presence of distant traffic, birds and wind in trees. The highest noise levels measured were from activity at the closest point of the quarry. The highest contribution of noise from the quarry was 42 dB(A).

In addition to measuring the noise level from activity at the quarry, predictions have been made based on previous measurements of activity at other similar facilities. The measurements have been used to determine the noise level during "worst case" levels of activity at the site, which may not have occurred during the measurements. The noise model also enables the worst case location within the subject site to be determined. The previous measurements include:

- Crushing and screening plant;
- Concrete batching activities;
- Truck movements; and,
- Dozer operation.

A model of the quarry and the surrounding area has been developed using the SoundPlan noise modelling software. The model has been used to predict the noise level at the subject site from activity which may not have been operating at the time of the noise measurements. The noise model takes into account the sound power levels generated by each noise source, the separation distance to the proposed subdivision, the local topography and worst case meteorological conditions with respect to noise propagation (resulting in the highest noise level at residences).

Contours of the predicted noise levels across the sub division are provided in Appendix C of this report.

A noise level of 43 dB(A) was predicted at the closest point of the subject site. The noise from large equipment such as dozers, trucks and loaders would often incur a penalty for the noise character of modulation. With an adjustment made for the noise character penalty (+5 dB(A)), the highest noise level from the quarry is 48 dB(A). The noise contours in Appendix C are inclusive of the penalty.

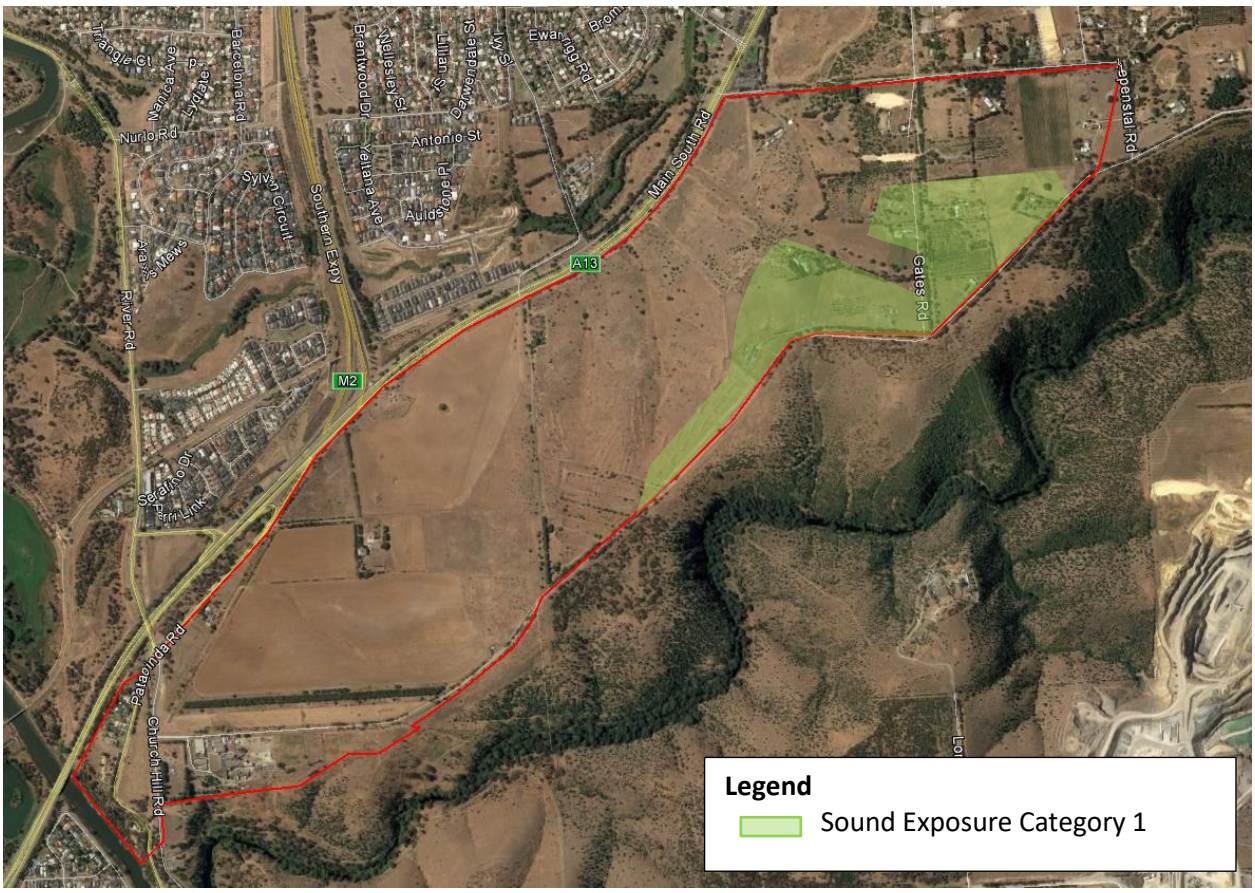
It has been assumed that there is the potential for the quarry to operate during the night period of the Policy. Without acoustic treatment measures, the noise from the quarry would Therefore exceed the night time goal noise level of 45 dB(A), which would apply outside a new residence on the subject site.

Recommendation

Although the goal noise level is not predicted to be achieved outside, a minimum noise reduction of 18 dB(A) across the facade of a residence would result in the internal goal noise level being achieved.

It is therefore recommended that the portion of the site where the predicted level is greater than 45 dB(A) be designated in the Overlay. As noted in previous sections, being within the Overlay will result in the need to incorporate a minimum of SEC 1 treatments under MBS 010, which is designed to achieve a noise reduction of 28 dB(A). Based on the above, where SEC 1 treatments are incorporated, a noise level of no greater than 20 dB(A) would be achieved inside residences, easily satisfying the Policy criterion of 30 dB(A).

The area of the subject site which should be included in the Overlay as a “designated area” is shown below, corresponding to a predicted noise contour of 45 dB(A) outside (with a penalty included).



Shooting Range

Measurements of the noise from activity at the shooting range have been conducted at a variety of locations along Piggott Range Road on 3 September 2021. The noise level was also continuously measured across a weekend (when most shooting occurs) from 3 to 7 September in the location shown in Appendix A.

During the short term measurements, activity at the shooting range was intermittent, but clearly audible when it occurred. The continuous monitoring is used to provide an indication of the highest level of activity over a typical weekend.

The short term measurements resulted in noise levels of up to 48 dB(A) at the closest parts of the subject site. For the continuous noise measurements, audio recordings have been used to identify times when the shooting range activity could be measured. During these periods, the contribution of noise from shooting was up to 52 dB(A).

When audible, the noise from a shooting range would incur a penalty for the impulsive noise character. With an adjustment made for the noise character (+5 dB(A)), the highest noise level from the shooting range is 57 dB(A).

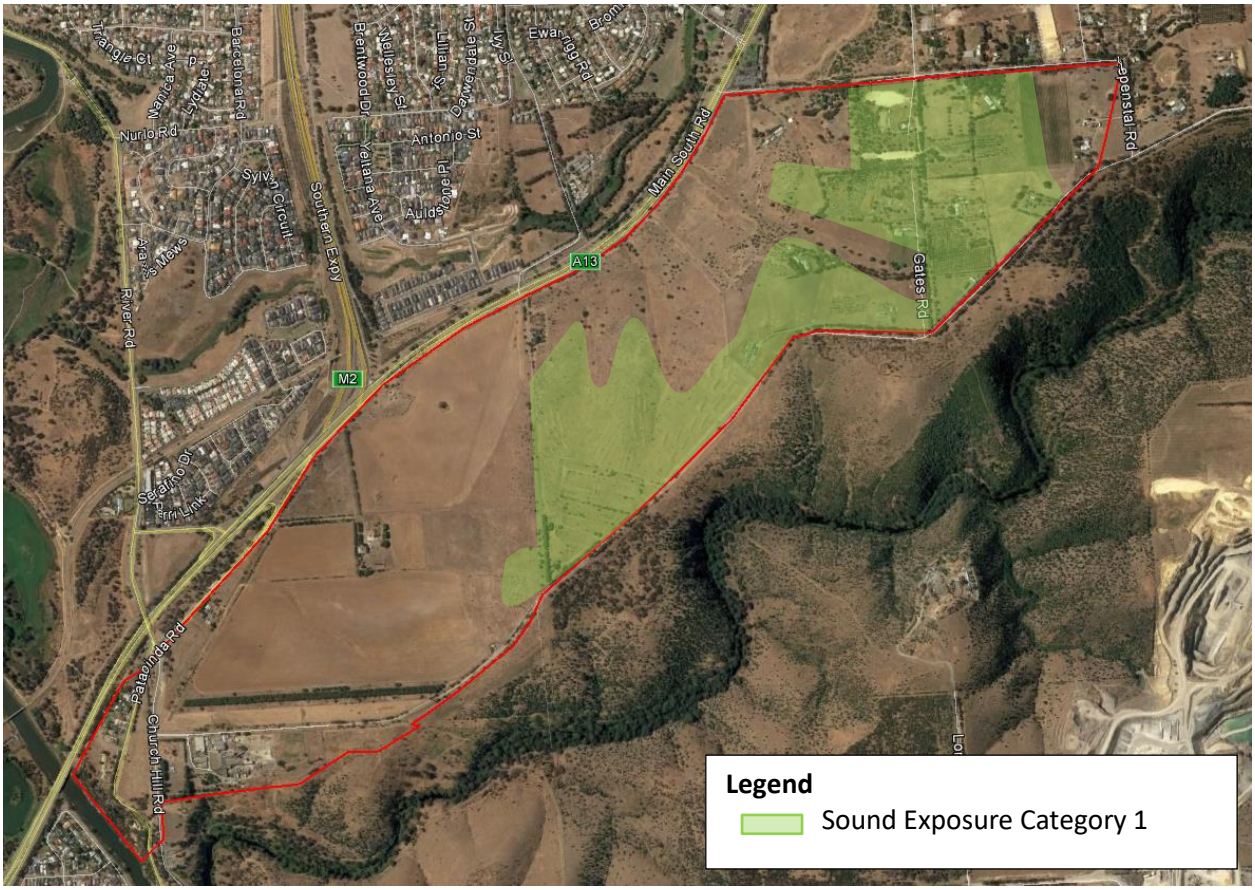
It is understood that the shooting range operates during the day time hours of the Policy (7:00am to 10:00pm). Without acoustic treatment, the predicted noise level at the closest point on the subject land would exceed the 52 dB(A) outdoor criterion of the Policy.

The noise model described previously has been used to extrapolate the measured noise levels across the site. Contours of the predicted shooting range noise levels are provided in Appendix C and are inclusive of the penalty for impulsive noise character.

Recommendation

It is recommended that any area which is predicted to exceed the 52 dB(A) criterion be designated in the Overlay. By incorporating SEC 1 treatments to residences, the 28 dB(A) reduction results in an internal noise level of no greater than 29 dB(A), achieving the 32 dB(A) internal criterion of the Policy.

The area recommended to be designated in the Overlay is shown in the figure below:



MICK O'SHEA'S

For the noise from an entertainment venue, such as the nearby hotel, the Overlay provides the most relevant criteria.

For areas which are designated within the Overlay, the following applies during the Development Application Stage:

Deemed-to-Satisfy Criteria / Designated Performance Feature

DTS/DPF 1.1

Sensitive receivers satisfy all of the following:

…

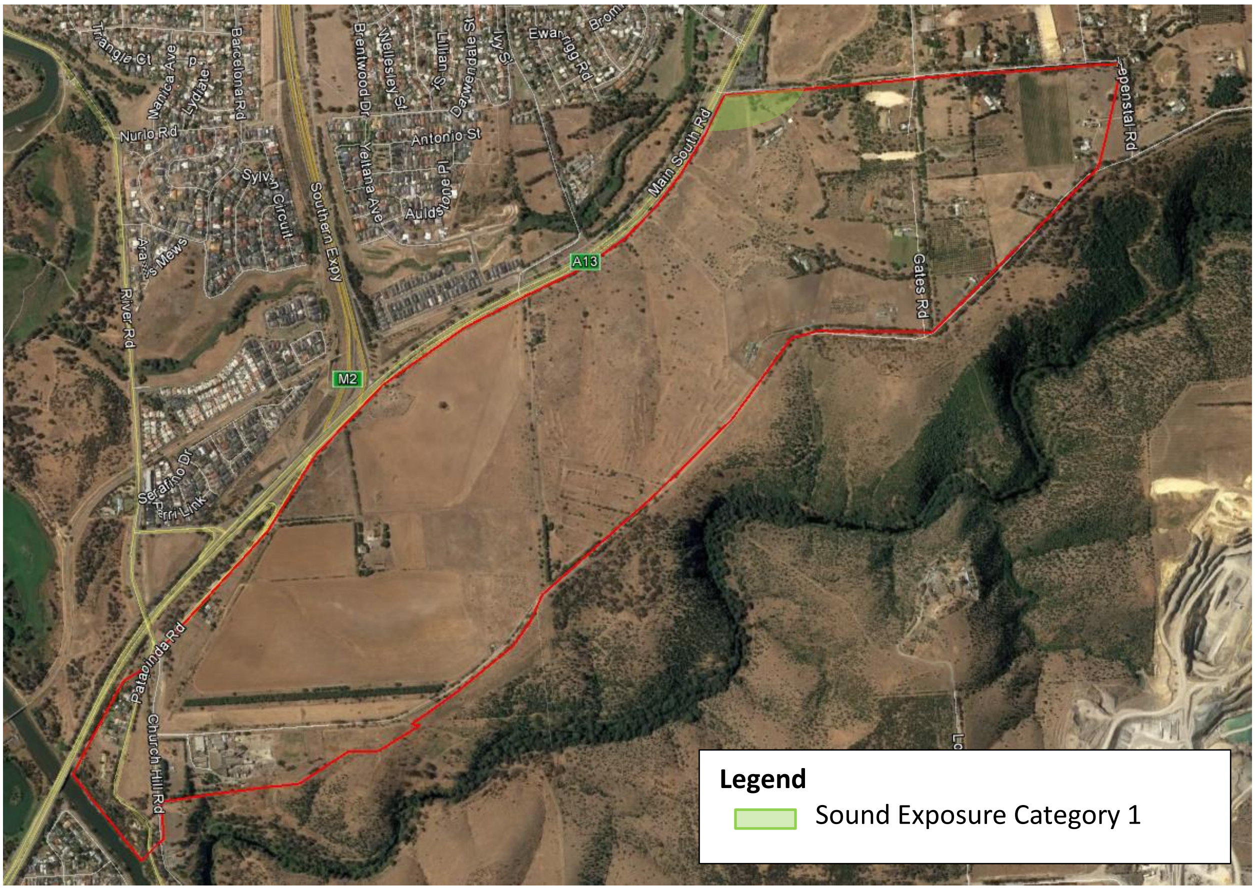
2. *adjoining development incorporating music includes noise attenuation measures to achieve a noise level in any bedroom exposed to music noise (L_{10}) less than:*
    1. *8 dB above the level of background noise ($L_{90,15\ min}$) in any octave band of the sound spectrum; and*
    2. *5 dB(A) above the level of background noise ($L_{A90,15\ min}$) for the overall (sum of all octave bands) A-weighted levels.*

These criteria will result in a suitable level of amenity within residences and will protect Mick O'Sheas from future action under the *Liquor Licensing Act 1997*.

It is noted that similar interfaces are often accommodated and the objective criteria achieved by upgrading the facade constructions. By including the area closest to the hotel in the Overlay, an assessment of music noise would be required at the Development Application stage. The assessment would ensure that the objective criteria provided above for entertainment venues are achieved inside the bedrooms.

The assessment would likely result in a need for masonry walls, laminated glazing and upgraded roof/ceiling insulation.

In order to ensure that an assessment of music noise is made under the Overlay, it is recommended that the following portion of the subject site be designated in the Overlay.


Legend
Sound Exposure Category 1
Main South Rd
Southern Expy
Gates Rd
Church Hill Rd
Pataoinda Rd
River Rd
Antonio St
Nurlo Rd
Barcelona Rd
A13
M2

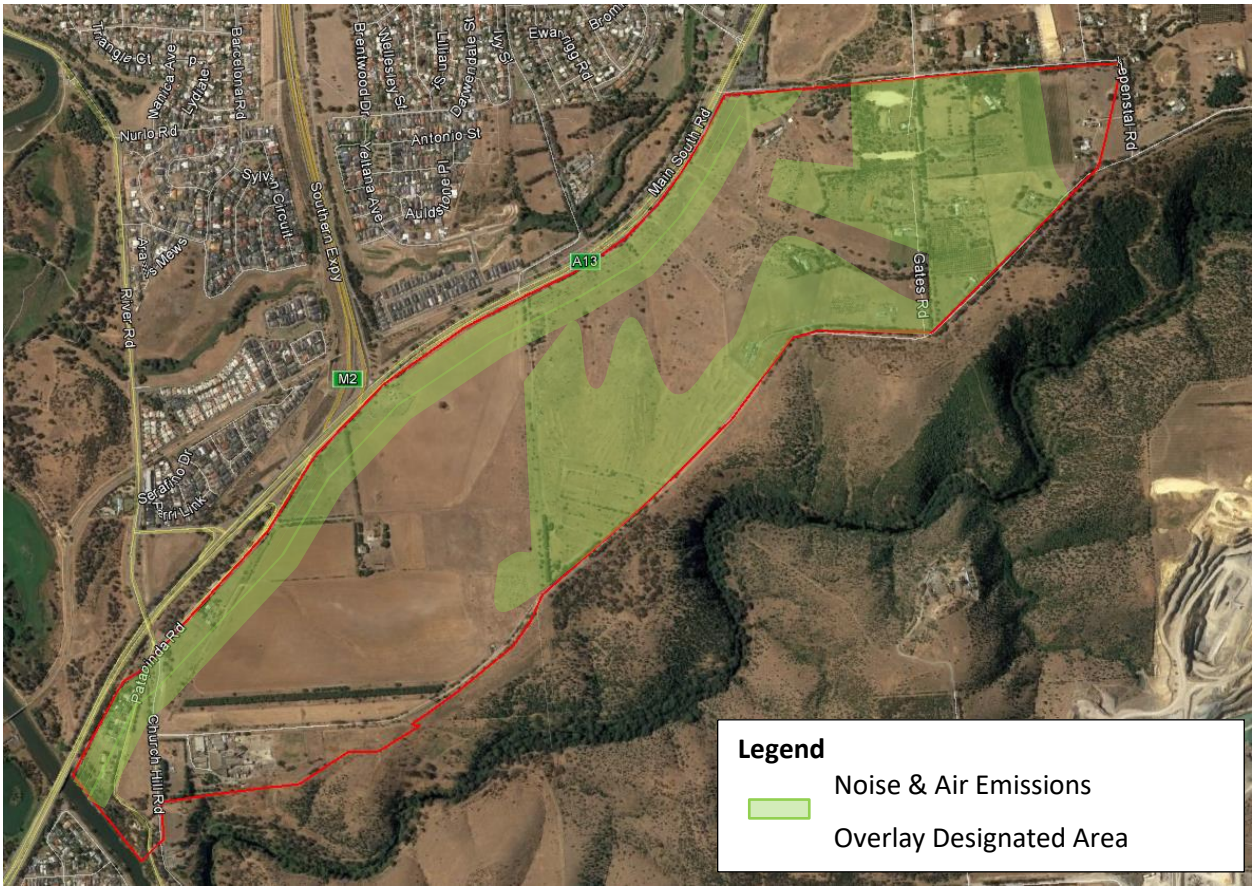
SUMMARY

An environmental noise assessment has been made of the proposed Planning and Design Code Amendment land at Hackham.

There are a number of noise sources in the vicinity of the proposed land, with the potential to impact on any future residences, as follows:

- traffic on Main South Road;
- a quarry;
- a shooting range; and,
- Mick O'Shea's Hotel.

Based on the assessment, it is recommended that the Code Amendment include designating specific areas of the subject land within the Noise and Air Emissions Overlay. The following figure shows the extent of the site to be designated:



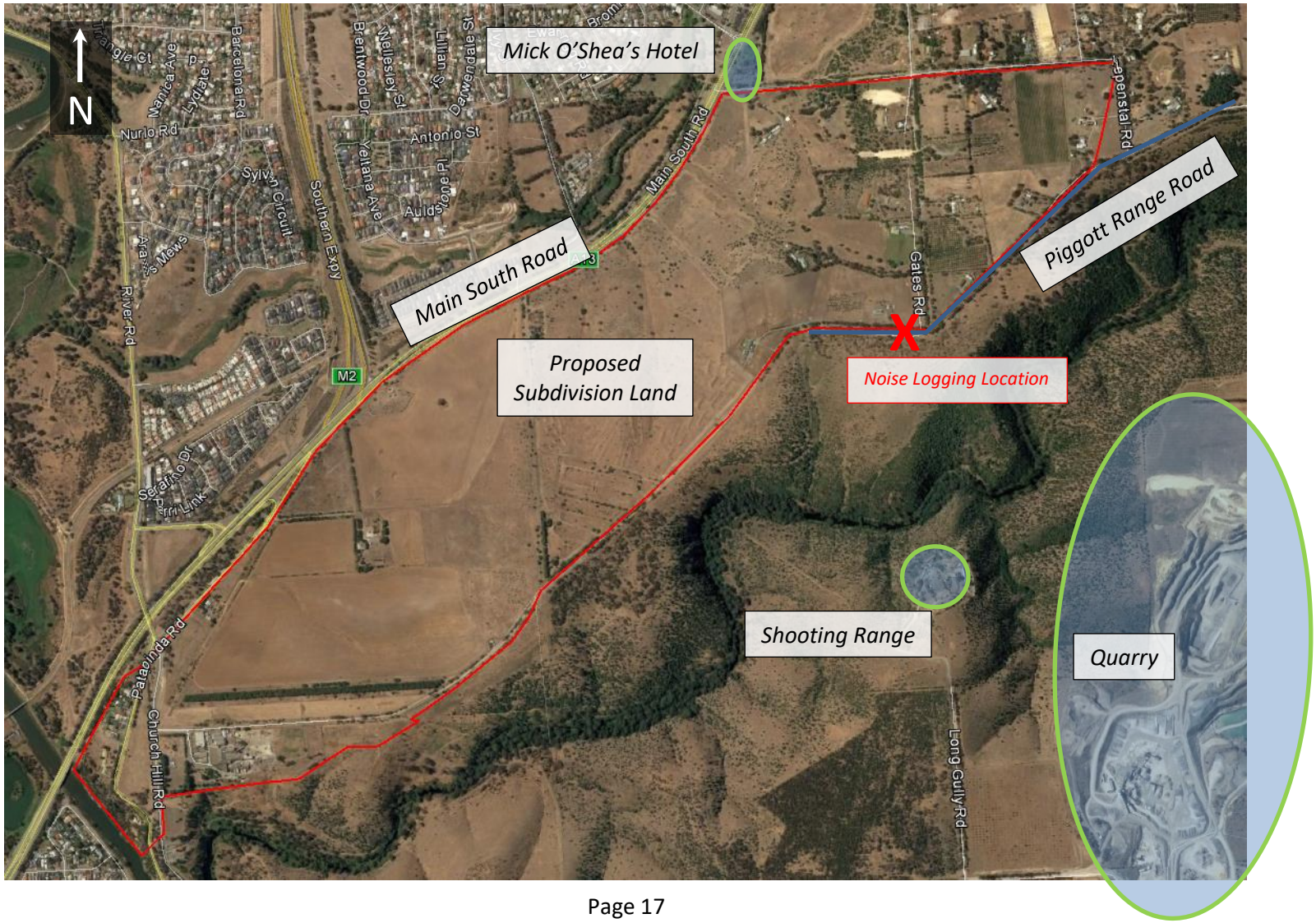
Designating these areas of the site in a Noise and Air Emissions Overlay will result in:

1. Mandating the inclusion of acoustic treatment into the façade of the residential buildings to:
   I. address the influence of traffic noise into those residences;
   II. address the interface with the *Hills Face Zone* (including the quarry and shooting range).
2. Requiring the assessment of music noise from the entertainment venue (Mick O'Shea's) and inclusion of acoustic treatment into the facade of the residential buildings to address the interface.

These measures will ensure that reasonable levels of residential amenity are achieved at future residences and that existing lawful activities are protected from future action.

The assessment has been based on the existing assessment pathways of the Planning and Design Code and demonstrates that by implementing the Noise and Air Emissions Overlay, the Code Amendment will achieve the other provisions of the Code.

APPENDIX A Subject Site & Nearby Noise Sources



APPENDIX B: Example MSB 010 Treatments based on Sound Exposure Category

Sound Exposure Category 4

An example of Sound Exposure Category 4 treatments are detailed below.

Table 4: Sound Exposure Category 4

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
	Room	***Area of Glazing***	***Requirement***
Windows and glazed doors	*Bedrooms (including attached non-habitable rooms)*	Restrict total glazing area to no more than 20% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 12.5mm thick laminated glass in sliding doors; • minimum 10mm thick glass as fixed panes, awning, casement, or side hung doors.
	Habitable rooms other than bedrooms (including attached non-habitable rooms)	Restrict total glazing area to no more than 40% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 12.5mm thick laminated glass in sliding doors; • minimum 10mm thick glass as fixed panes, awning, casement, or side hung doors.
External walls	*All habitable rooms*	Ensure external walls are the acoustic equivalent of a brick veneer construction incorporating: • single leaf of minimum 90mm thick brick; • a row of minimum 64mm thick studwork with minimum 25mm cavity to the brick; • 75mm thick insulation with a minimum density of 11kg/m^3 between studwork, and; • one layer of 10mm thick plasterboard fixed to the inside face.	
Roof and ceiling systems	*Bedrooms*	Ensure the roof is sheet metal or tile, and ceilings are constructed from 2 layers of 13mm thick fire rated plasterboard fixed to furring channels under the truss and with 165mm thick insulation (with a minimum density of 7kg/m^3) laid over the ceiling.	
	All habitable rooms other than Bedrooms	Ensure the roof is sheet metal or tile, and ceilings are constructed from 1 layer of 16mm thick fire rated plasterboard with 165mm thick insulation (with a minimum density of 7kg/m^3) laid over the ceiling.	
Ventilation	*All*	No outside air ventilation (other than openable windows) should be provided across these facades, with the exception of outside air into a ducted system via a minimum 3m length of acoustically insulated ductwork.	
External Doors (other than external glazed doors)	*All habitable rooms*	Ensure external doors are a minimum 35mm thick solid core, fully fitted with Raven “RP8” and “RP10” (or equivalent) acoustic doors seals. These seals should be fitted and adjusted to ensure that the doors are sealed as close as practicable to airtight when closed. If a glass infill is proposed a minimum of 6.38mm thick laminated glass should be incorporated and sealed airtight into the door.	
Ground Floor	*All habitable rooms*	Ensure the dwelling is constructed on a concrete slab.	

Sound Exposure Category 3

An example of Sound Exposure Category 3 treatments are detailed below.

Table 4: Sound Exposure Category 3

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
	Room	***Area of Glazing***	***Requirement***
Windows and glazed doors	*Bedrooms (including attached non-habitable rooms)*	Restrict total glazing area to no more than 20% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
	Habitable rooms other than bedrooms (including attached non-habitable rooms)	Restrict total glazing area to no more than 40% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
External walls	*All habitable rooms*	Ensure external walls are the acoustic equivalent of a brick veneer construction incorporating: • single leaf of minimum 90mm thick brick; • a row of minimum 64mm thick studwork with minimum 25mm cavity to the brick; • 75mm thick insulation with a minimum density of 11kg/m^3 between studwork, and; • one layer of 10mm thick plasterboard fixed to the inside face.	
Roof and ceiling systems	*Bedrooms*	Ensure the roof is sheet metal or tile, and ceilings are constructed from 1 layer of 16mm thick fire rated plasterboard with 165mm thick insulation (with a minimum density of 7kg/m^3) laid over the ceiling.	
	All habitable rooms other than Bedrooms	Ensure the roof is sheet metal or tile, and ceilings are constructed from 1 layer of 10mm thick plasterboard with 165mm thick insulation (with a minimum density of 7kg/m^3) laid over the ceiling.	
Ventilation	*All*	No outside air ventilation (other than openable windows) should be provided across these facades, with the exception of outside air into a ducted system via a minimum 3m length of acoustically insulated ductwork.	
External Doors (other than external glazed doors)	*All habitable rooms*	Ensure external doors are a minimum 35mm thick solid core, fully fitted with Raven “RP8” and “RP10” (or equivalent) acoustic doors seals. These seals should be fitted and adjusted to ensure that the doors are sealed as close as practicable to airtight when closed. If a glass infill is proposed a minimum of 6.38mm thick laminated glass should be incorporated and sealed airtight into the door.	
Ground Floor	*All habitable rooms*	Ensure the dwelling is constructed on a concrete slab.	

Sound Exposure Category 2

An example of Sound Exposure Category 2 treatments are detailed below.

Table 5: Sound Exposure Category 2

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
	Room	***Area of Glazing***	***Requirement***
Windows and glazed doors	*Bedrooms (including attached non-habitable rooms)*	Restrict total glazing area to no more than 40% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
	Habitable rooms other than bedrooms (including attached non-habitable rooms)	Restrict total glazing area to no more than 60% of the floor area	Ensure the following glass is incorporated into systems that can be sealed airtight when closed: • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
External walls	*All habitable rooms*	Ensure external walls are the acoustic equivalent of: • brick veneer construction incorporating: ○ single leaf of minimum 90mm thick brick; ○ a row of minimum 64mm thick studwork with minimum 25mm cavity to the brick; ○ 75mm thick insulation with a minimum density of 11kg/m^3 between studwork, and; ○ one layer of 10mm thick plasterboard fixed to the inside face. OR; • Hebel construction incorporating: ○ a row of minimum 90mm thick timber studwork; ○ 75mm thick Hebel Powerpanel fixed to the studwork with minimum 22mm thick battens ○ 90mm thick insulation with a density of 10.5kg/m^3 between the studwork, and; • one layer of 10mm plasterboard fixed to the inside face.	
Roof and ceiling systems	*Bedrooms*	Ensure the roof is sheet metal or tile, and ceilings are constructed from 1 layer of 10mm thick plasterboard with 165mm thick insulation (with a minimum density of 7kg/m^3) laid over the ceiling.	
Ventilation	*All*	No outside air ventilation (other than openable windows) should be provided across these facades, with the exception of outside air into a ducted system via a minimum 3m length of acoustically insulated ductwork.	
External Doors (other than external glazed doors)	*All habitable rooms*	Ensure external doors are a minimum 35mm thick solid core, fully fitted with Raven "RP8" and "RP10" (or equivalent) acoustic doors seals. These seals should be fitted and adjusted to ensure that the doors are sealed as close as practicable to airtight when closed. If a glass infill is proposed a minimum of 6.38mm thick laminated glass should be incorporated and sealed airtight into the door.	
Ground Floor	*All habitable rooms*	Ensure the dwelling is constructed on a concrete slab.	

Sound Exposure Category 1

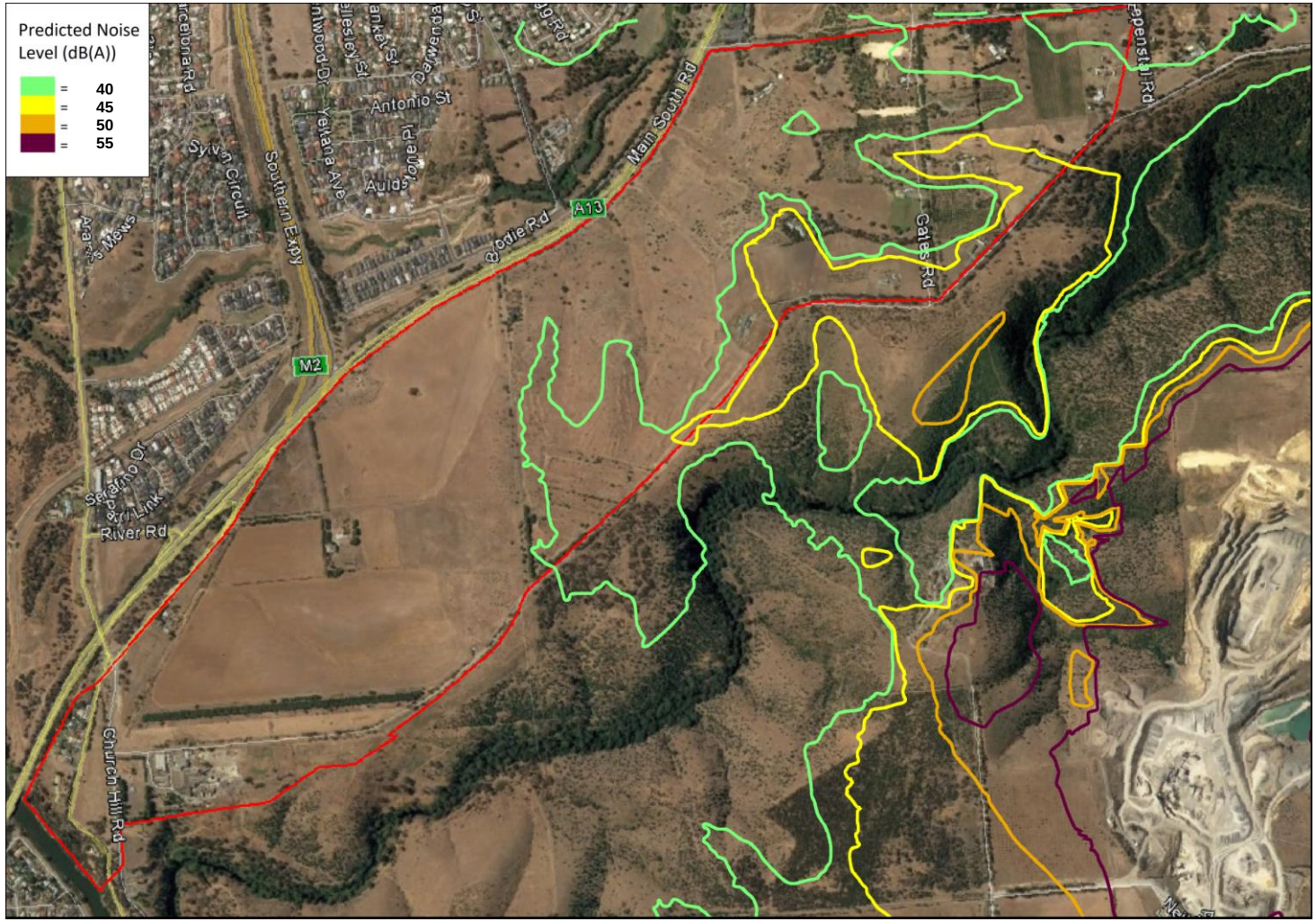
An example of Sound Exposure Category 1 treatments are detailed below.

Table 6: Sound Exposure Category 1

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
	Room	***Area of Glazing***	***Requirement***
Windows and glazed doors	*Bedrooms (including attached non-habitable rooms)*	Restrict total glazing area to no more than 40% of the floor area	Ensure a minimum 6.38mm thick laminated glass is incorporated into systems that can be sealed airtight when closed.
	Habitable rooms other than bedrooms (including attached non-habitable rooms)	Restrict total glazing area to no more than 60% of the floor area	Ensure a minimum 6.38mm thick laminated glass is incorporated into systems that can be sealed airtight when closed.
External walls	*All habitable rooms*	Ensure external walls are the acoustic equivalent of: • brick veneer construction incorporating: ○ single leaf of minimum 90mm thick brick; ○ a row of minimum 64mm thick studwork with minimum 25mm cavity to the brick; ○ 75mm thick insulation with a minimum density of 11kg/m^3 between studwork, and; ○ one layer of 10mm thick plasterboard fixed to the inside face. OR; • Hebel construction incorporating: ○ a row of minimum 90mm thick timber studwork; ○ 75mm thick Hebel Powerpanel fixed to the studwork with minimum 22mm thick battens ○ 90mm thick insulation with a density of 10.5kg/m^3 between the studwork, and; ○ one layer of 10mm plasterboard fixed to the inside face.	
Ventilation	*All*	No outside air ventilation (other than openable windows) should be provided across these facades, with the exception of outside air into a ducted system via a minimum 3m length of acoustically insulated ductwork.	

APPENDIX C Grid Nosie Maps

Quarry



Shooting Range