

O'Sullivan Beach Residential Rezoning Environmental Noise Assessment

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1 EXECUTIVE SUMMARY

The proposed rezoning of the subject land to a *Residential Zone* will attract two key issues:

1. Ensuring that the amenity of the future dwellings is satisfactory at the industrial interface; and
2. Ensuring that the future dwellings will not unreasonably constrain the industrial activities.

The *Environment Protection (Noise) Policy 2007* (the Policy) and the *Minister's Specification SA 78B Construction requirements for the control of external sound (SA78B)* have been utilised in this assessment to design facade treatments for future dwellings to satisfy both of the above issues.

The extent of facade treatments varies for one and two storey dwellings and for the operating times of industry.

The highest level of treatment occurs for two storey dwellings adjacent industry which can operate during the night (defined by the Policy as after 10pm and before 7am).

The lowest level of treatment occurs for single storey dwellings adjacent industry which operates during the day period only. Indeed, this scenario, if coupled with a 3m high interface barrier at the zone boundary, results in no specific treatments to the future dwellings above and beyond typical building construction.

The assessment presents one barrier configuration (3.0m for the full extent); however, other barrier heights can be considered against the corresponding extent of façade treatment, noting that a higher barrier will result in a lower extent of treatments at dwellings and a lower barrier will result in a higher extent of treatments at dwellings.

Based on the above, the future Residential Zone could incorporate the construction of a barrier at the industrial interface and a provision which requires each dwelling to include acoustic treatments which address any residual noise impacts as defined by the method in this assessment.

The extent of acoustic treatments is provided for a 3m high barrier and typical dwelling designs in Section 3.3 and Appendix B of this assessment.

2 INTRODUCTION

A rezoning is being considered for the vacant land adjacent to Gumeracha Road, O'Sullivan Beach, for the extent depicted in yellow in Figure 1 (the **Subject Site**). The proposed rezoning will designate the subject site as a *Residential Zone* which will principally promote medium density residential development.

Figure 1: Subject land and locality.



The subject land is currently located within an *Urban Employment Zone* of the *Onkaparinga Council Development Plan*¹ with existing industrial activities occurring within the area shown in blue in Figure 1. Future dwellings within the subject site will be located at the interface with these activities. Therefore, this assessment considers the two key potential noise impacts associated with future dwellings in subject land:

1. the amenity of the future dwellings when exposed to the existing and envisaged industrial interface.
2. whether the future dwellings will unreasonably constrain the existing industrial activities.

The assessment has been based on:

- Previously procured noise data for industrial activities which occur in Urban Employment Zones; and
- Site inspection and noise measurements conducted at the subject site on several occasions including 23 July, 3 August and 6 August 2020.

¹ Consolidated - 20 December 2018.

3 CRITERIA

3.1 Development Plan

The Development Plan has been reviewed and the following provisions considered relevant to the noise assessment.

General Section – Interface between Land Uses

- Objective 1 Development located and designed to minimise adverse impact and conflict between land uses.*
- Objective 2 Protect community health and amenity from adverse impacts of development.*
- Objective 3 Protect desired land uses from the encroachment of incompatible development.*
- PDC 1 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:*
(b) Noise
- PDC 2 Development should be sited and designed to minimise negative impacts on existing and potential future land uses desired in the locality.*
- PDC 3 Development adjacent to a Residential Zone or residential area within a Township Zone should be designed to minimise overlooking and overshadowing of adjacent dwellings and private open space.*
- PDC 4 Residential development adjacent to non-residential zones and land uses should be located, designed and/or sited to protect residents from potential adverse impact from non-residential activities*
- PDC 5 Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses desired for the zone should be designed to minimise negative impacts.*
- PDC 6 Non-residential development on land abutting a residential zone should be designed to minimise noise impacts to achieve adequate levels of compatibility between existing and proposed uses.*

Noise Generating Activities

- PDC 7 Development that emits noise (other than music noise) should include noise attenuation measures that achieve the relevant "Environment Protection (Noise) Policy" criteria when assessed at the nearest noise sensitive premises.*

PDC 8 Development with the potential to emit significant noise (e.g. industry) should incorporate noise attenuation measures that prevent noise from causing unreasonable interference with the amenity of noise sensitive premises

General Section – Residential Development

Private Open Space

PDC 13 Private open space (available for exclusive use by residents of each dwelling) should be provided for each dwelling and should be sited and designed:

- (i) to minimise noise or air quality impacts that may arise from traffic, industry or other business activities within the locality*

Noise

PDC 22 External noise and artificial light intrusion into bedrooms should be minimised by separating or shielding these rooms from:

- (a) active communal recreation areas, other common access areas, parking areas and vehicle access ways*
- (b) service equipment areas and fixed noise sources on the same or adjacent sites.*

3.2 Environment Protection (Noise) Policy 2007

Interface between Land Uses PDC 7 reference the *Environment Protection (Noise) Policy 2007* (the **Policy**) which provides the most relevant noise criteria to ensure appropriate residential amenity when exposed to industrial noise sources.

The Policy is underpinned by the World Health Organisation Guidelines for community noise and provides both an objective measure of acceptable noise levels for residential amenity and also for the protection of the ongoing operation of existing industrial land uses. That is, achieving the relevant requirements of the Policy at future dwellings on the subject site would provide suitable residential amenity (satisfying all relevant provisions of the Development Plan) and would protect existing activities from any action under the *Environment Protection Act 1993* in the event of a noise complaint.

Specifically, the Policy provides noise criteria:

- outside of a residence, such as in a backyard or other private open space; or
- inside habitable rooms of a residence, such as bedrooms and living areas, in situations where acoustic treatment is applied to a facade.

The Policy provides goal noise levels based on the Development Plan localities in which the noise source (industrial activity) and receivers (future dwellings) are located. Based on the proposed future Residential Zoning and the existing Urban Employment Zone, the Policy provides the following goal noise levels to be achieved *inside the future dwellings* from industrial activity:

- Daytime (7am to 10pm) average noise level of 41 dB(A); and
- Night time (10pm to 7am) average noise level of 33 dB(A).

Under the Policy, penalties are applied to the measured or predicted noise levels for each characteristic of tone, impulse, low frequency and modulation that the noise source exhibits. In this circumstance, a 5 dB(A) penalty is applied to this assessment due the modulating noise character associated with typical industrial activity. This penalty has been included in all subsequent noise predictions in this report.

3.3 Minister's Specification SA 78B

Minister's Specification SA 78B Construction requirements for the control of external sound (SA78B) applies to "all Class 1, 2, 3, 4 or 9c aged care buildings that are in a designated area identified on the Noise and Air Emissions Overlay in the relevant Development Plan", and establishes typical façade treatments to adequately protect the occupants of residential buildings from noise from external noise sources.

The subject site is not within a "designated area" of the Development Plan, so the application of SA78B is not mandatory. Nonetheless, SA78B introduces typical acoustic treatments to achieve the various noise reductions across affected facades as expressed by the *sound exposure category (SEC)*. The different SECs are based on a standard dwelling construction achieving a 20 dB(A) noise reduction across its facade. This noise reduction is commonly accepted to be the minimum reduction a standard habitable dwelling will provide and has been tested on numerous occasions to be a satisfactory estimate. Each exposure category effectively represents a 4 dB(A) improvement in noise reduction on the previous, meaning that the extent of acoustic treatment increases accordingly.

The combination of the facade noise reduction and internal noise criteria of the Policy effectively sets the maximum allowable external noise levels for each SEC and the corresponding treatments required.

4 ASSESSMENT

4.1 Existing Acoustic Environment

To determine the existing noise levels from industrial activity at the site, noise measurements have been conducted at eastern boundary of the subject site. The measurements comprised continuous unattended noise logging over a 24 hour period. The measurements were conducted on vacant land at the interface with the industrial activity. The resulting measured noise levels are provided in Appendix A.

4.2 Maximum Industrial Activity Noise Levels

All potential activities must be considered to ensure that existing industrial uses can operate without being restricted by noise requirements at future dwellings.

To account for industrial operation at maximum capacity, noise levels have been predicted at the subject site based on the noise sources observed and previous noise measurements of industrial activity within an Urban Employment Zone. The noise sources include:

- Heavy vehicle movements, idling, and start up;
- Loader and excavator movements and loading;
- Forklift movements and loading;
- Carpark movements and general carpark activity;
- Internal warehouse activity; and
- Mechanical plant such as extraction fans.

The model has used to predict the external noise levels from industrial activity at the subject site. External noise levels have been predicted using the SoundPLAN noise modelling software. The established noise model takes into account the following:

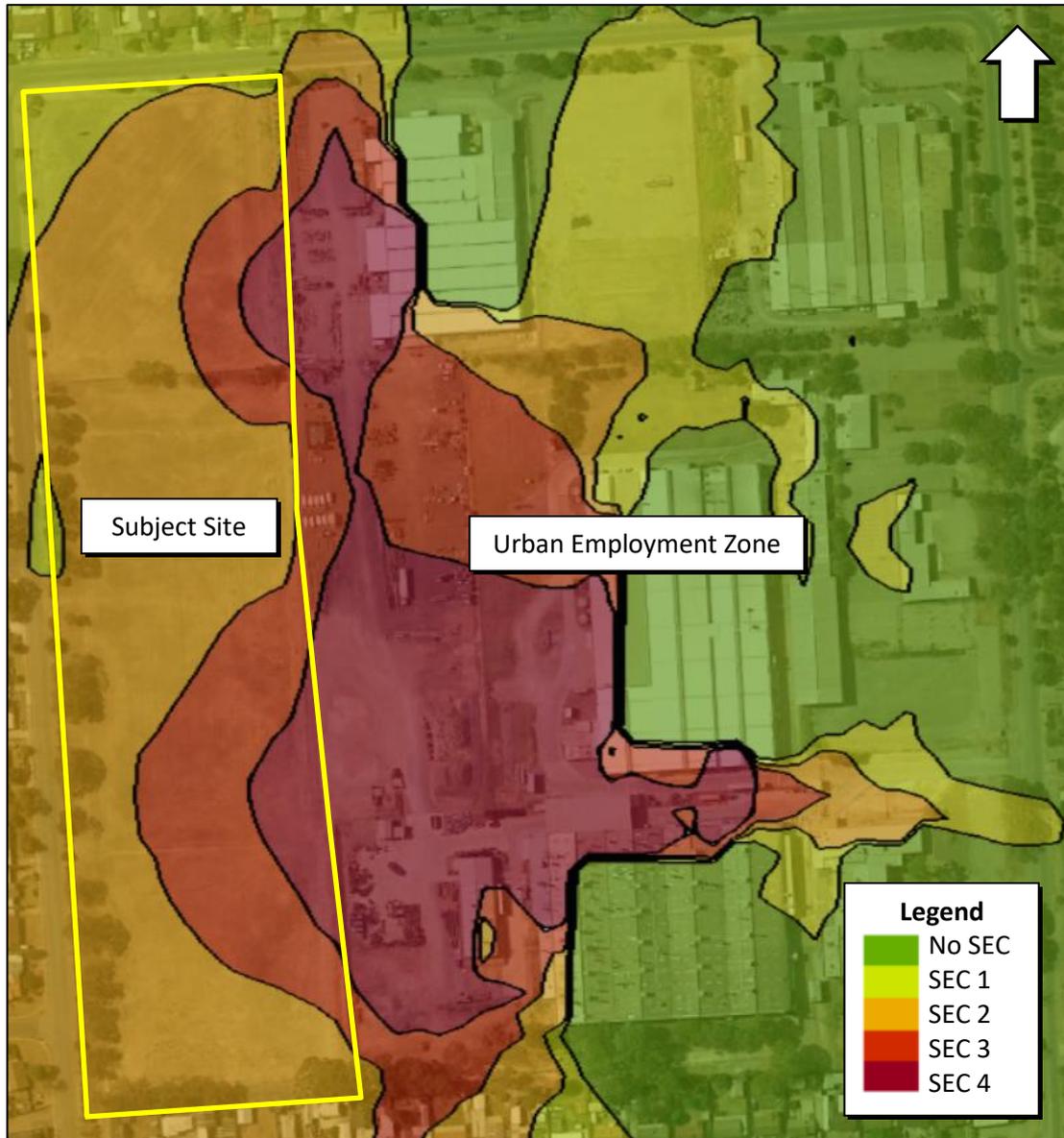
- the separation distance and ground topography² between the noise sources and the noise receivers;
- the time and duration that the noise sources operate;
- the buildings and structures on site;
- the ground and atmospheric effects; and
- worst-case meteorological conditions conducive to sound propagation.

² The topographical features in the area are taken into account, including the “amphitheatre” or “valley” effects where relevant.

Noise levels have been predicted at all locations within the subject site based on the concurrent operation of the above industrial noise sources, including at a height to account for the possibility of two-storey residential development (noting that the upper floors may overlook activity at the site and be subject to higher noise levels).

The following figure shows the predicted SECs across the subject site during the night periods with no specific fencing on the boundary. The indicative treatments can be derived from Appendix B for the corresponding SEC. With reference to the figure and the SECs and corresponding treatments, a barrier will be required at the boundary to ensure practical outcomes for future dwellings.

Figure 2: Predicted average (L_{Aeq}) noise levels from industrial activity during the night at lower levels.



The SECs of the future dwellings can be reduced by 2 for day time operation.

The figure shows that the location of dwellings in very close proximity to the *Urban Employment Zone* boundary without a barrier can result in extensive (and potentially impractical) treatments to the building facades.

4.3 Recommendations

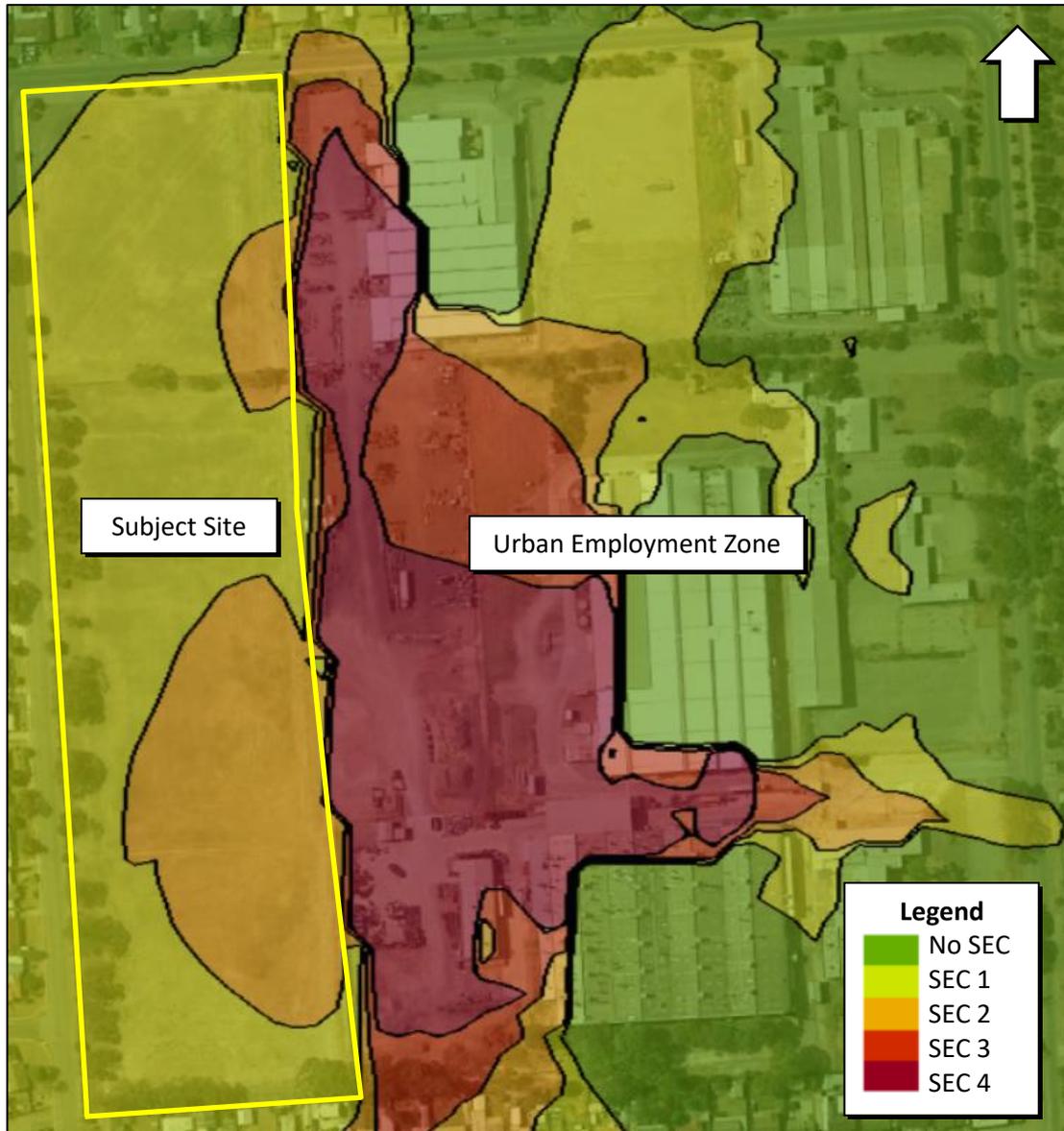
To reduce external noise levels, and therefore the requirement for the impractical upgrade of facades, a barrier may be constructed along the eastern boundary of the subject site.

To determine the effectiveness of this approach, a 3.0m barrier has been included in the noise model and the noise level has been predicted at all locations across the subject site. The noise barrier should be constructed from 0.55 BMT sheet steel (such as *Colorbond*) or another material with the same or greater surface density including a mound with a fence on top.

The barrier should seal airtight at all junctions including at the join to the ground. The specified height of the barriers should be achieved above ground level of the industrial site.

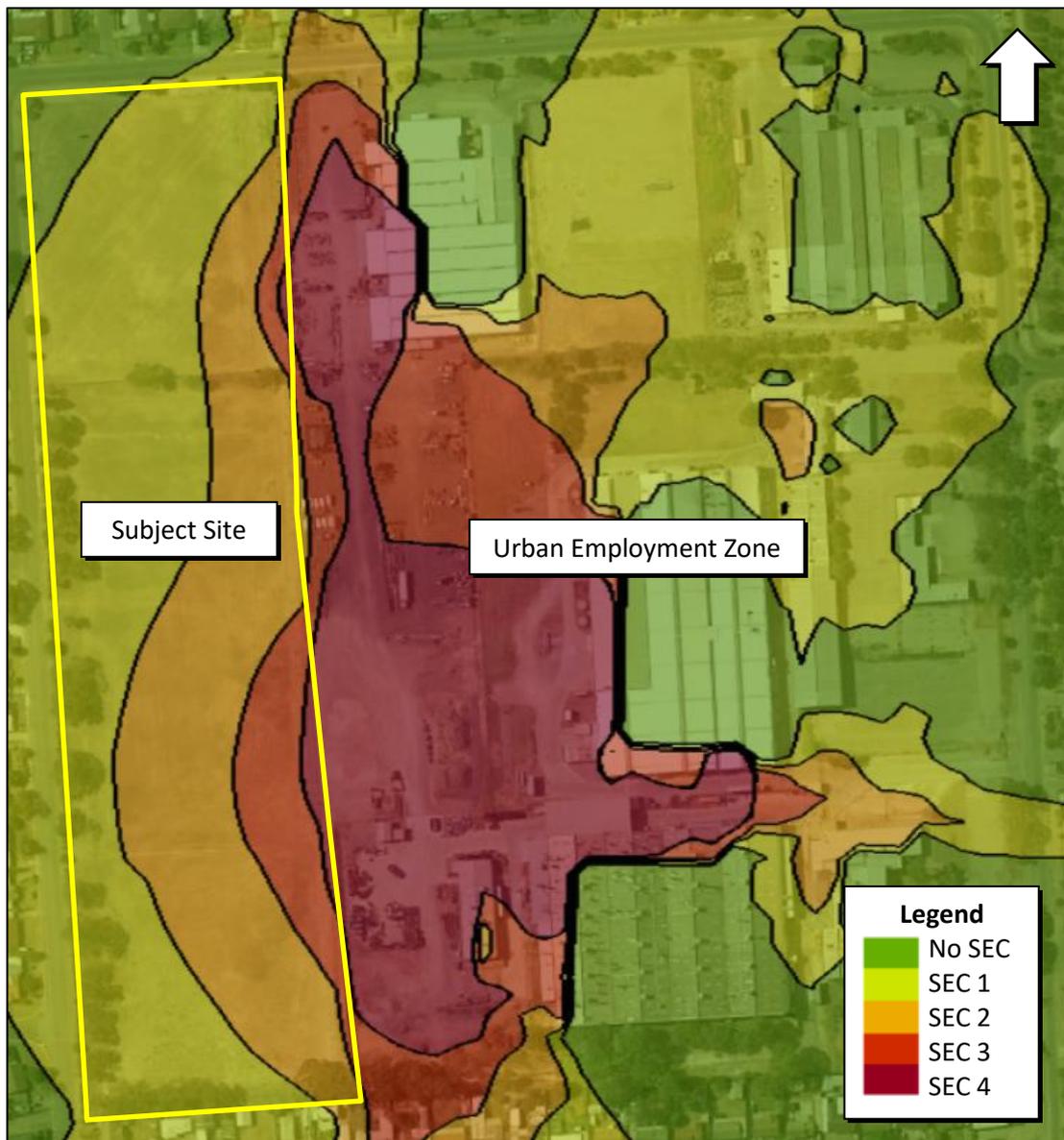
The following figures show the predicted SECs across the subject site during the night periods with the 3.0m barrier for the full extent of the eastern boundary. The indicative treatments can be derived from Appendix B for the corresponding SEC.

Figure 2: Predicted average (L_{Aeq}) noise levels from industrial activity during the night at lower levels.



The upper level of two storey dwelling will be exposed to higher noise levels where overlooking the noise barrier. The following figures show the predicted noise levels at upper levels of two storey dwellings across the site during the night with the implementation of the barrier as specified:

Figure 2: Predicted average (L_{Aeq}) noise levels from industrial activity during the night at upper levels.



Based on the above, single storey residences, lower levels of two storey residences, and upper levels of two storey residences which are *not* immediately adjacent to eastern will have no sound exposure category (and therefore require no specific treatment for the building facades) with the implementation of recommended barrier and with industrial activity limited to daytime hours.

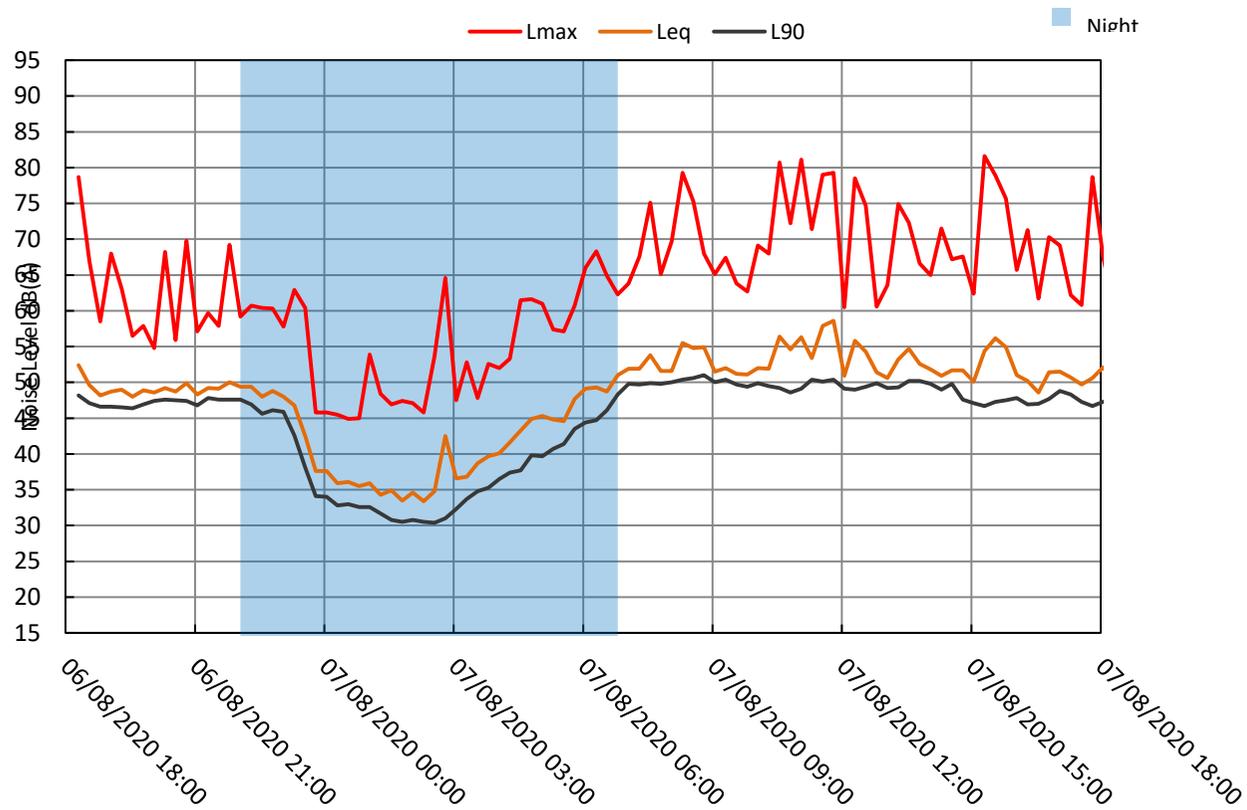
If night time (prior to 7:00am) industrial activity is to occur, a combination of façade treatments and barriers is likely to be necessary to achieve a practical outcome (SEC 3 or less).

The above has presented one barrier configuration (3.0m for the full extent); however, the fence heights can be rationalised where there is a preference for increased façade treatments over increased fence heights, or where night time activities are limited to specific locations.

It should be noted that all treatments outlined above are based on the existing land uses operating at maximum capacity, if one of these land uses were to change in the future or significantly intensify prior to residential development, then additional treatments would be required at that time.

APPENDIX A

Figure 6: Existing noise levels 6 to 7 August 2020.



APPENDIX B

Table 4: SEC 3 example treatments.

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
Windows and glazed doors	Room	Area of Glazing	Requirement
	<i>Bedrooms (including attached non-habitable rooms)</i>	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: <ul style="list-style-type: none"> • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
	Room	Area of Glazing	Requirement
	<i>Habitable rooms other than bedrooms (including attached non-habitable rooms)</i>	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: <ul style="list-style-type: none"> • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
External walls	Room		
	<i>All habitable rooms</i>	Ensure external walls are the acoustic equivalent of a brick veneer construction incorporating: <ul style="list-style-type: none"> • 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/m³ between studwork, and; • one layer of 10mm thick plasterboard fixed to the inside face. 	
Roof and ceiling systems	Room	Requirement	
	<i>Bedrooms</i>	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.	
	<i>All habitable rooms other than Bedrooms</i>	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	Room	Requirement	
	<i>All</i>	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)	Room	Requirement	
	<i>All habitable rooms</i>	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	Room	Requirement	
	<i>All habitable rooms</i>	Ensure the dwelling is constructed on a concrete slab.	

Table 5: SEC 2 example treatments.

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF SA78B		
	Room	Area of Glazing	Requirement
Windows and glazed doors	<i>Bedrooms (including attached non-habitable rooms)</i>	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: <ul style="list-style-type: none"> • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
	<i>Habitable rooms other than bedrooms (including attached non-habitable rooms)</i>	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: <ul style="list-style-type: none"> • minimum 10mm thick glass in sliding doors; • minimum 6.38mm thick laminated glass as fixed panes, awning, casement, or side hung doors.
External walls	Room		
	<i>All habitable rooms</i>	Ensure external walls are the acoustic equivalent of a brick veneer construction incorporating: <ul style="list-style-type: none"> • 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/m³ between studwork, and; • one layer of 10mm thick plasterboard fixed to the inside face. 	
Roof and ceiling systems	Room	Requirement	
	<i>Bedrooms</i>	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	Room	Requirement	
	<i>All</i>	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)	Room	Requirement	
	<i>All habitable rooms</i>	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	Room	Requirement	
	<i>All habitable rooms</i>	Ensure the dwelling is constructed on a concrete slab.	

Table 6: SEC 1 example treatments.

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: <ul style="list-style-type: none"> • brick veneer construction incorporating: <ul style="list-style-type: none"> ○ 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/m³ between studwork, and; ○ one layer of 10mm thick plasterboard fixed to the inside face. OR; • Hebel construction incorporating: <ul style="list-style-type: none"> ○ 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/m³ 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.	