APPENDIX 7. INVESTIGATIONS – ENVIRONMENTAL NOISE ASSESSMENT

O’Sullivan Beach Code Amendment

Environmental Noise Assessment

January 2022

S6537C7

sonus.

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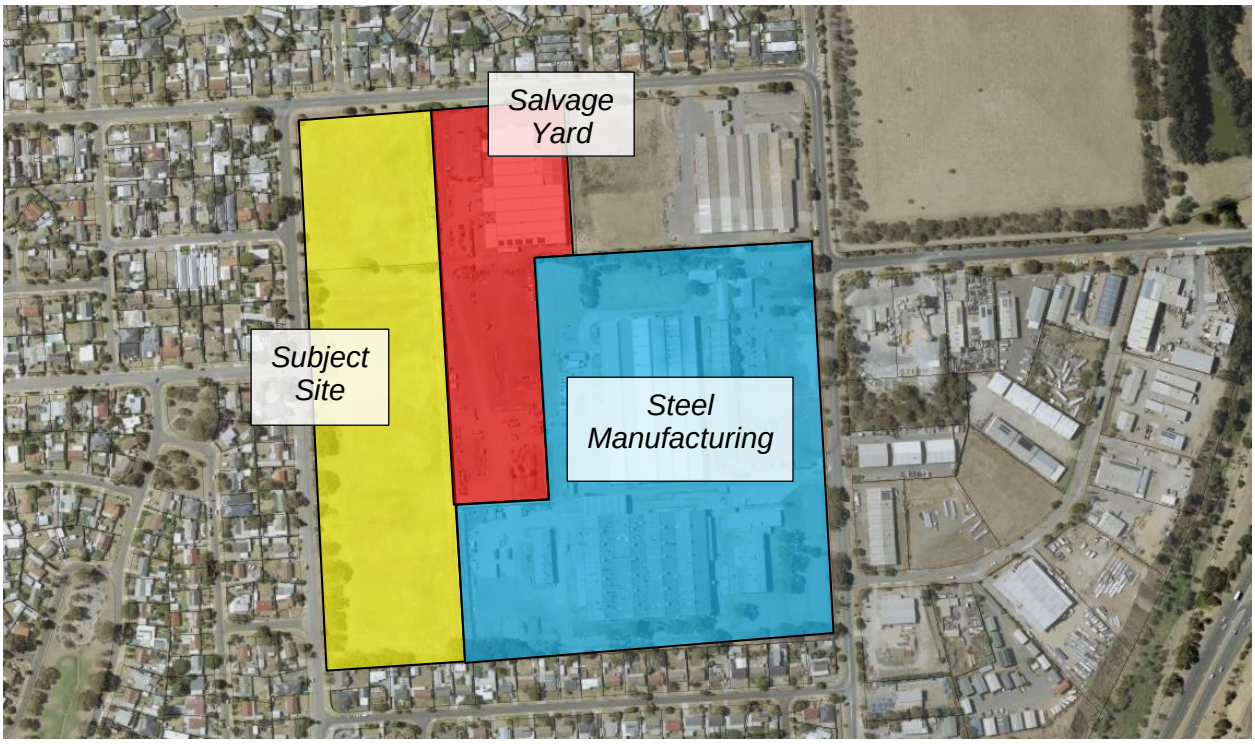
1 INTRODUCTION

An environmental noise assessment has been made of the proposed Planning and Design Code Amendment (**Code Amendment**) at Gumeracha Road, O'Sullivan Beach. The extent of land proposed to be rezoned as part of the Code Amendment is shown as yellow in the following figure (the **Subject Site**).



The subject site is currently located within a *Strategic Employment Zone* of the *South Australian Planning and Design Code*[1] (**the Code**). The proposed Code Amendment seeks to rezone the subject site as a *General Neighbourhood Zone* which promotes residential land use.

There are a number of existing industrial activities occurring within the vicinity of the proposed residential area and future dwellings within the subject site will be at the interface with these activities. These include a salvage yard and steel manufacturing facility, as highlighted in the figure above. Therefore, this assessment considers the two key potential noise impacts associated with future dwellings on the subject land:

1. the amenity at the future dwellings when exposed to the existing and envisaged industrial activity.
2. the potential constraint that future dwellings may have on existing and potential future industrial activities.

[1] Consolidated - 04 November 2021.

2 CRITERIA

The *Environment Protection (Noise) Policy 2007* (**the Policy**) is referenced by the General Development Policies, Interface Between Land Uses section of the Code and 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 protects 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 and would protect existing activities from any action under the *Environment Protection Act 1993* in the event of a noise complaint.

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 incorporated into the facade.

The Policy provides goal noise levels based on the zones in which the noise source (industrial activity) and receivers (future dwellings) are located. Based on the proposed General Neighbourhood Zone of the subject site and the existing Strategic Employment Zone, the Policy provides the following goal noise levels to be achieved:

- Daytime (7:00am to 10:00pm) average (L_{Aeq}) noise levels of 59 dB(A) outside or 39 dB(A) inside the future dwellings, where acoustic treatment is incorporated into the facade; and
- Night time (10:00pm to 7:00am) average noise levels of 50 dB(A) outside or 30 dB(A) inside the future dwellings, where acoustic treatment is incorporated into the facade.

Under the Policy, penalties may be applied to the measured or predicted noise levels for each characteristic of tone, impulse, low frequency and modulation that the noise source exhibits. For a penalty to apply, it must be considered dominant in the context of the existing acoustic environment. The application therefore varies depending on the noise level, time of day and existing noise sources in the environment. The application of penalties is discussed later in this report.

3 NOISE MEASUREMENTS

Noise levels at the subject site have been continuously measured between 8 and 19 November 2021, at three separate locations. The locations are shown in the following figure and were chosen as having the potential for highest impact from the adjacent sites, taking into account the existing earth mound between the sites at the southern end, which varies in height from approximately 1.5m up to 2m tall.

During the noise monitoring period, weather observations were recorded at the nearby Noarlunga Bureau of Meteorology site. Periods when there were wind speeds of greater than 5m/s or when rain occurred have been excluded from the data analysis. The results of the noise monitoring are provided as Appendix B.

Digital audio recording at each of the logging locations has been used to identify times when the noise resulted from activity on the industrial sites. Noise levels have been excluded where the recorded noise was from wind on the microphone, birds, insects or mowing.

For most of the time, there is no significant noise from the industrial activity, with occasional activity at higher noise levels. Based on the analysis, the highest measured noise level at the boundary which is attributed to the industrial sites is 63 dB(A) during the day period (7:00am to 10:00pm) and 52 dB(A) during the night (10:00pm to 7:00am). The daytime noise level was from the movement of an excavator (or similar) with tracks, while the night time measurement was from forklift and manufacturing activity.

For the character of noise which has been measured, a penalty (adjustment of 5 dB(A)) would apply. The application of a penalty effectively increases the highest noise levels at the subject site to 68 dB(A) during the day and 57 dB(A) dB(A) during the night.

Without any noise attenuation, the measured noise levels exceed the outdoor criteria under the Policy which would apply at a dwelling on the subject site, by up to 9 dB(A). It is therefore recommended that acoustic treatment be incorporated to reduce outdoor noise levels and to achieve the internal goal noise levels of the Policy (39 dB(A) during the day and 30 dB(A) at night).

4 ACOUSTIC TREATMENT

An assessment has been made to determine the measures that could be taken to reduce noise levels to the Policy goals. The assessment considers a combination of treatments, as follows:

- Construction of a barrier at the interface;
- Restricting the number of levels of residences at the interface; and,
- Upgraded facade constructions.

These treatments can be incorporated through conditions of approval and designation in the Interface Management Overlay. It is recommended that the Interface Management Overlay be implemented for any area where the outdoor noise criteria would be exceeded.

Being designated in the Interface Management Overlay will require that at the time of the applications, consideration be given to "*…community exposure to potential adverse hazards and environmental and amenity impacts generated by the lawful operation of proximate significant activities*". Residences within the area will therefore be required to provide upgraded facade constructions and the relevant assessment location becomes inside the residences.

A noise model has been used to extrapolate the measured noise levels at discreet locations to the remainder of the site. The predictions take into account:

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

The noise model has been calibrated based on the results of the noise monitoring and includes typical activity which may occur on similar sites, such as:

- Car park activity;
- Forklifts operating;
- Truck movements;
- Loading and unloading of heavy equipment (such as excavators or loaders); and,
- Manufacturing inside the buildings.

4.1 Barrier

The noise model has also been used to determine the noise level resulting at the site based on various heights of barrier at the interface. Based on the results, prior to dwellings being constructed on the land (for example, as part of the land division application) a barrier should be constructed in accordance with the following:

- No less than 2.4m in overall height for the extent shown as **BLUE** below;
- Located on the boundary line and the height measured from the ground level of the industry side;
- Constructed to avoid gaps, including at the ground; and,
- Constructed from a material such as 0.42 BMT sheet steel ("Colorbond" or similar), a material with similar or greater surface density (such as 6mm thick fibre cement sheet), an earth mound or a combination of these.

It is noted that because of the slope of the land, a barrier of 2.4m at the property boundary would be more than 3m above the building location for most blocks.

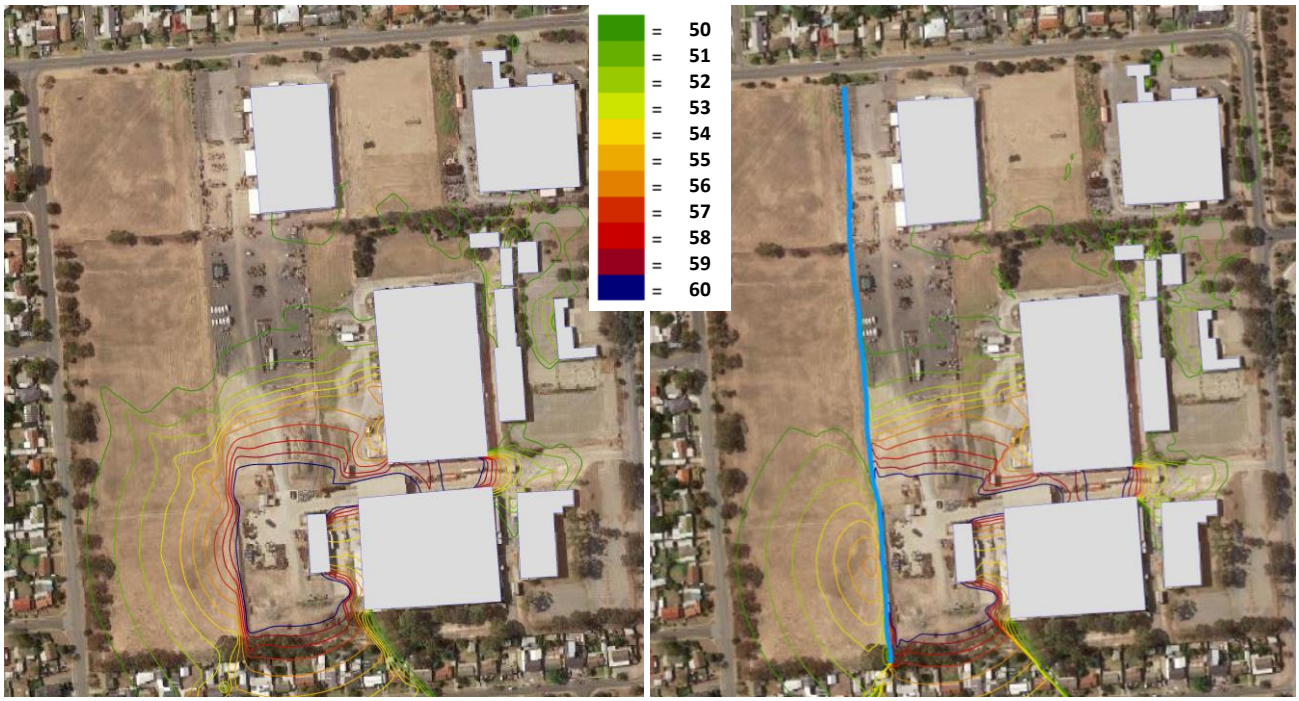
With the inclusion of a barrier at the interface, outdoor noise levels at the closest point for single storey development are predicted to be reduced to 57 dB(A) during the day and 51 dB(A) during the night.

Noise contours (which have the character penalty added), with and without a barrier are provided below. It is noted that although the noise contours show a variation in noise levels along the boundary, the highest levels have been assumed to occur along the full length of the boundary for the purposes of determining the acoustic treatments.

Night

Without Barrier

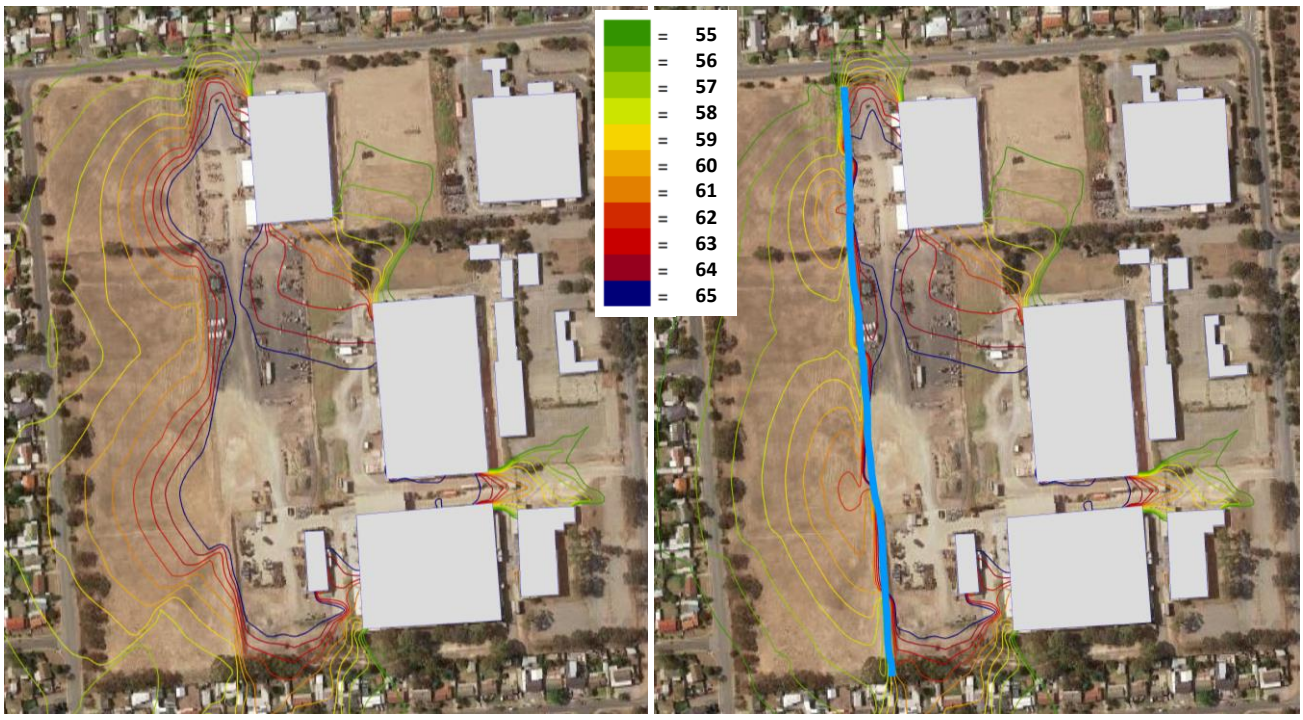
With Barrier



Day

Without Barrier

With Barrier

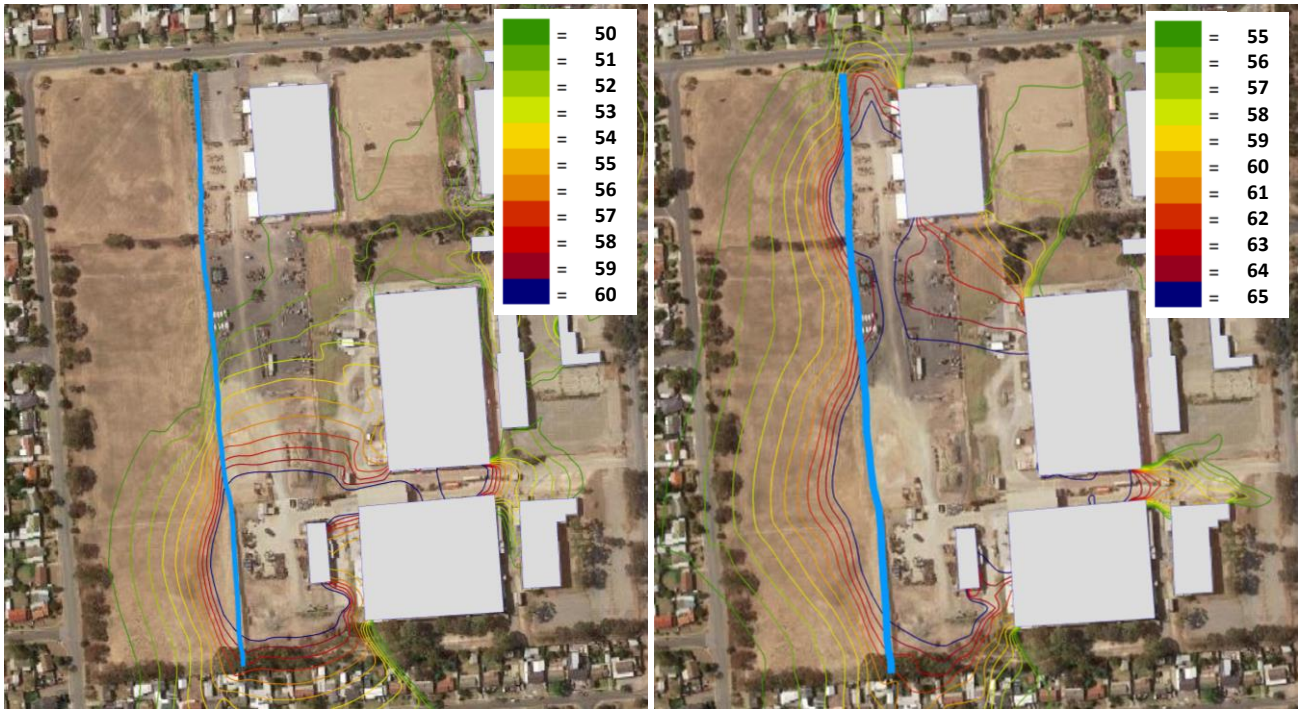


4.2 Multi-Storey Development

The proposed barrier construction does not reduce the noise level for multi-storey development at the interface. At the interface, a noise level of up to 70 dB(A) is predicted outside of the upper level of a residence during the day and 61 dB(A) is predicted at night. Noise contours for the second level of residences with the barrier included are provided below:

Noise level at 2nd Storey

Night *Day*



To maintain the effectiveness of the barrier, it is recommended that residences at the interface be restricted to a single storey. Specifically, the following area of land should be limited to single storey dwellings.

4.3 Facade Treatments

Based on the prediction model, a large portion of the subject site will also require facade treatments to ensure that the goal levels of the Policy are achieved. It is understood that these areas would be included in the Interface Management Overlay as part of the Code Amendment, to ensure that the Policy is achieved at all locations. The area will result in the Planning Application for each dwelling needing to consider the potential noise impact of the nearby industrial area and incorporate facade treatments of both single storey residences at the interface and also any two-storey residences. The recommended area is shown below:

To provide an indication of the level of acoustic treatment required within this area, reference is made to the Ministerial Building Standard MBS 010 *Construction requirements for the control of external sound* (**MBS 010**), March 2021. MBS 010 "*contains provisions for reducing the intrusion of unacceptable levels of sound into habitable rooms of residential buildings*". Although it will not be mandated for the site at building rules consent stage[2], it does provide a useful scale of acoustic treatment, with five (5) Sound Exposure Categories (**SECs**) ranging from 1 to 5. The treatments vary from SEC 1 resulting in relatively minor upgrades to SEC 5 resulting in significant upgrades.

The SECs have sometimes been used by Councils as a condition of planning consent. For example, in an area which is not within the Noise and Air Emissions Overlay, a condition could be imposed for *the building construction to achieve the requirements of Sound Exposure Category 1 in accordance with the Ministerial Building Standard MBS 010.*

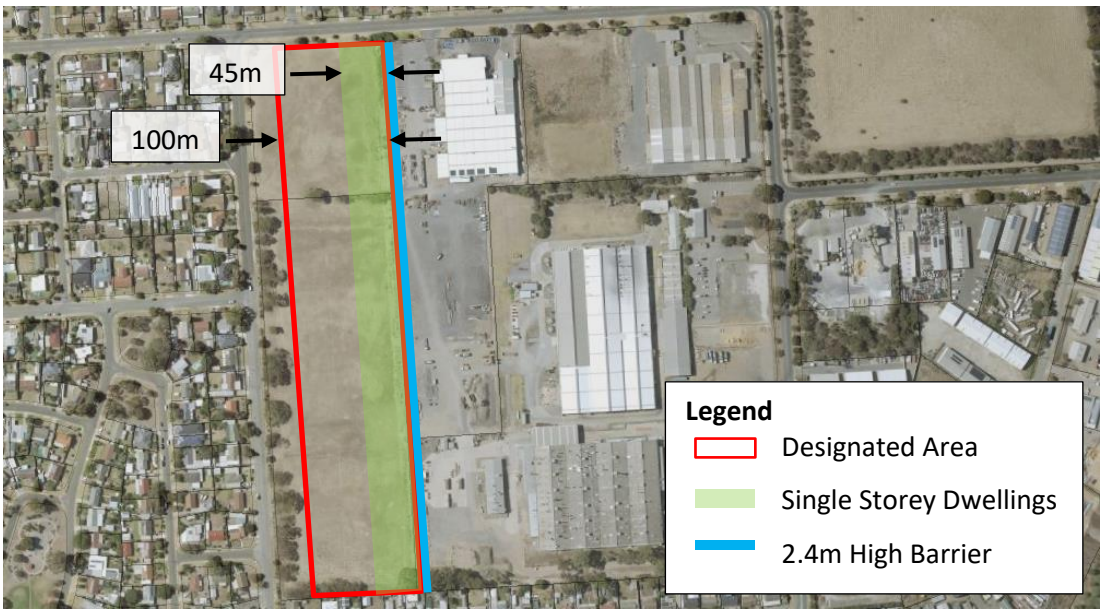
The relatively minor building upgrades of SEC 1 are based on noise levels of up to 63 dB(A) outside and therefore achieving a reduction of at least 28 dB(A) across the facade. Examples of SEC1 treatments are provided in Appendix A based on a typical residence. The final treatments are based on the specific dwelling design, taking into account design features such as the area of glazing and therefore there are other construction methods and materials which could achieve the SEC 1 requirements.

With the inclusion of treatments such as SEC1 under MBS010 to dwellings and therefore achieving a reduction of 28 dB(A) across the facade, noise levels (including a penalty for character) within the designated area will be no more than 34 dB(A) during the day and 28 dB(A) at night (in comparison to the criteria being 39 dB(A) and 30 dB(A)).

4.4 Treatment Summary

The following detail is a consolidated mark-up of the site, showing the recommended area to be designated in the Interface Management Overlay, the area where development should be restricted to single storey and the extent of the 2.4m high barrier which should be constructed:

[2] The provisions are mandatory for an area which is designated in the Noise and Air Emissions Overlay.


45m
100m
Legend
Designated Area
Single Storey Dwellings
2.4m High Barrier

5 SUMMARY

An environmental noise assessment has been made of the proposed Code Amendment at O'Sullivan Beach.

The Code Amendment proposes to change a portion of land from a Strategic Employment Zone to a General Neighbourhood Zone, which promotes residential land uses. There are existing industrial facilities in the vicinity with the potential to have a noise impact on any future residential use. The ongoing operation of these facilities and the residential amenity of dwellings have both been considered in the assessment.

To provide a suitable interface, the following measures are recommended:

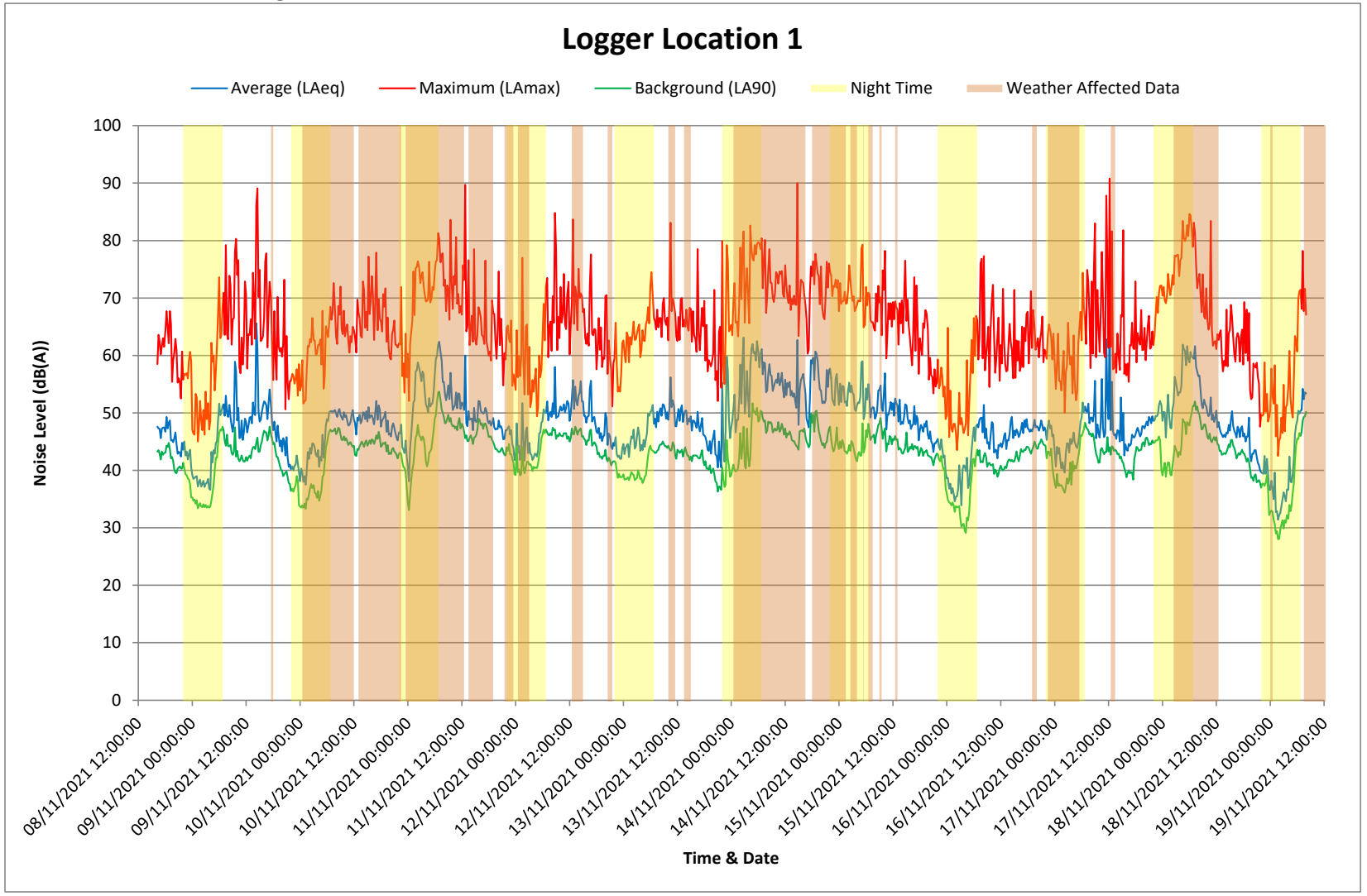
- Construction of a barrier at the interface with the industry;
- Restricting development on a portion of the land to only single storey residences; and,
- Upgrades to the facade construction of residences.

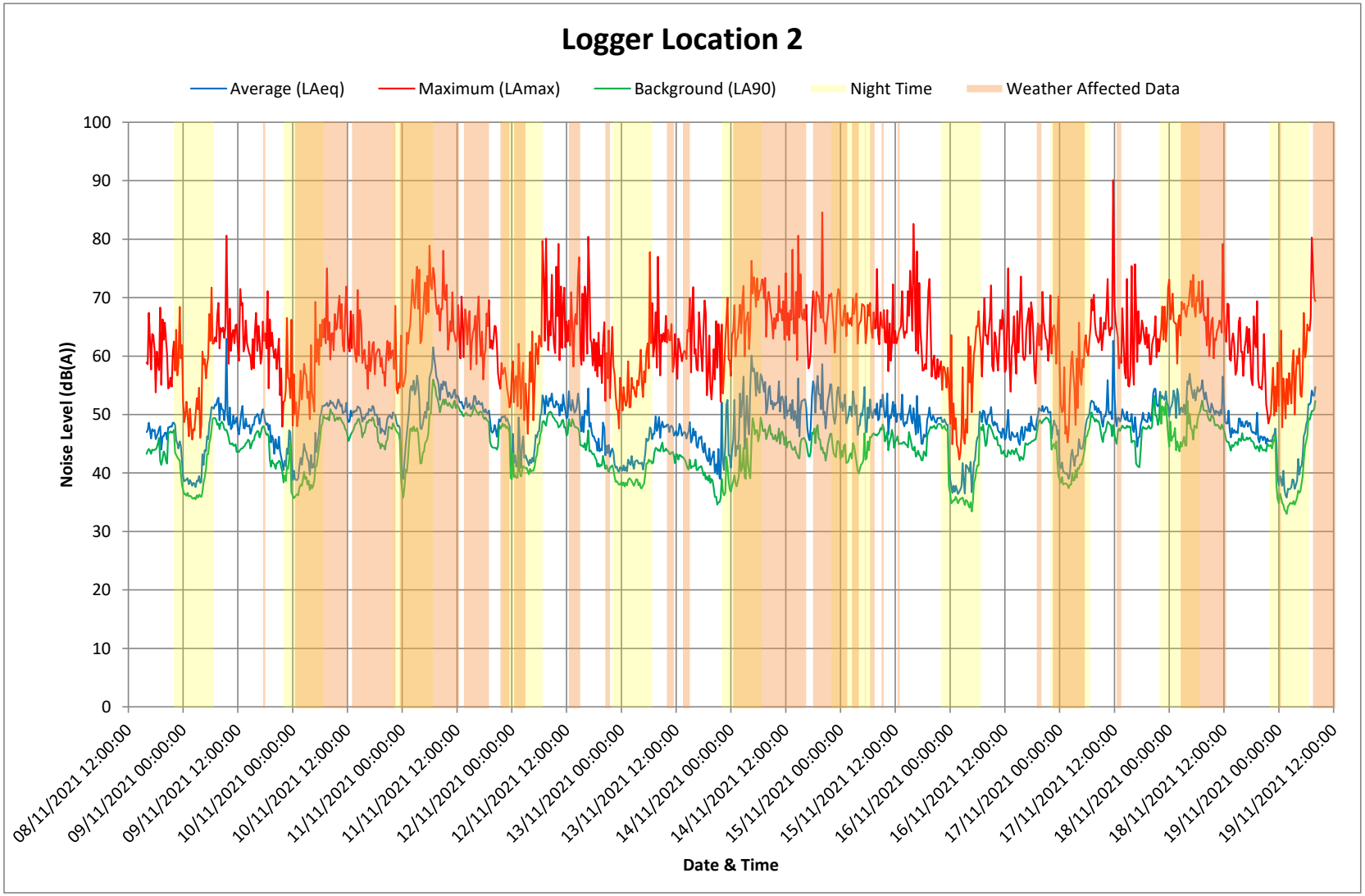
The combination of measures recommended will ensure that reasonable levels of residential amenity are achieved at future dwellings and that existing and future lawful activities (commercial or industrial uses) are protected from action by these residences.

APPENDIX A: Example MSB 010 Treatments based on Sound Exposure Category 1

BUILDING ENVELOPE ELEMENT	ACOUSTIC REQUIREMENTS OF MSB 010		
	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: (A) one row of 90mm studs at 600 centres with- (aa) 9.5mm hardboard, 9mm fibre cement sheeting or 11mm fibre cement weatherboard cladding fixed to the outside of studs; and (bb) not less than 75mm thick glass or mineral wool insulation, having a minimum density of 11 kg/m^3, or 75mm thick polyester insulation with a density of 14 kg/m^3, positioned between the studs; and (cc) two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs; Or (B) one row of 90mm studs at 600 centres with- (aa) steel channels fixed to the outside of the studs; and (bb) one layer of 19mm board cladding fixed to the outside of the channels and 6mm fibre cement sheets fixed to the inside of the channels; and (cc) not less than 75mm thick glass or mineral wool insulation, having a minimum density of 11 kg/m^3, or 75mm thick polyester insulation with a density of 14 kg/m^3, positioned between the studs; and (dd) one layer of 16mm fire-protective grade plasterboard fixed to the inside face of the studs.	
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 B: Results of Noise Monitoring




Logger Location 2
Average (LAeq)
Maximum (LAmax)
Background (LA90)
Night Time
Weather Affected Data
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
10
0
08/11/2021 12:00:00
09/11/2021 00:00:00
09/11/2021 12:00:00
10/11/2021 00:00:00
10/11/2021 12:00:00
11/11/2021 00:00:00
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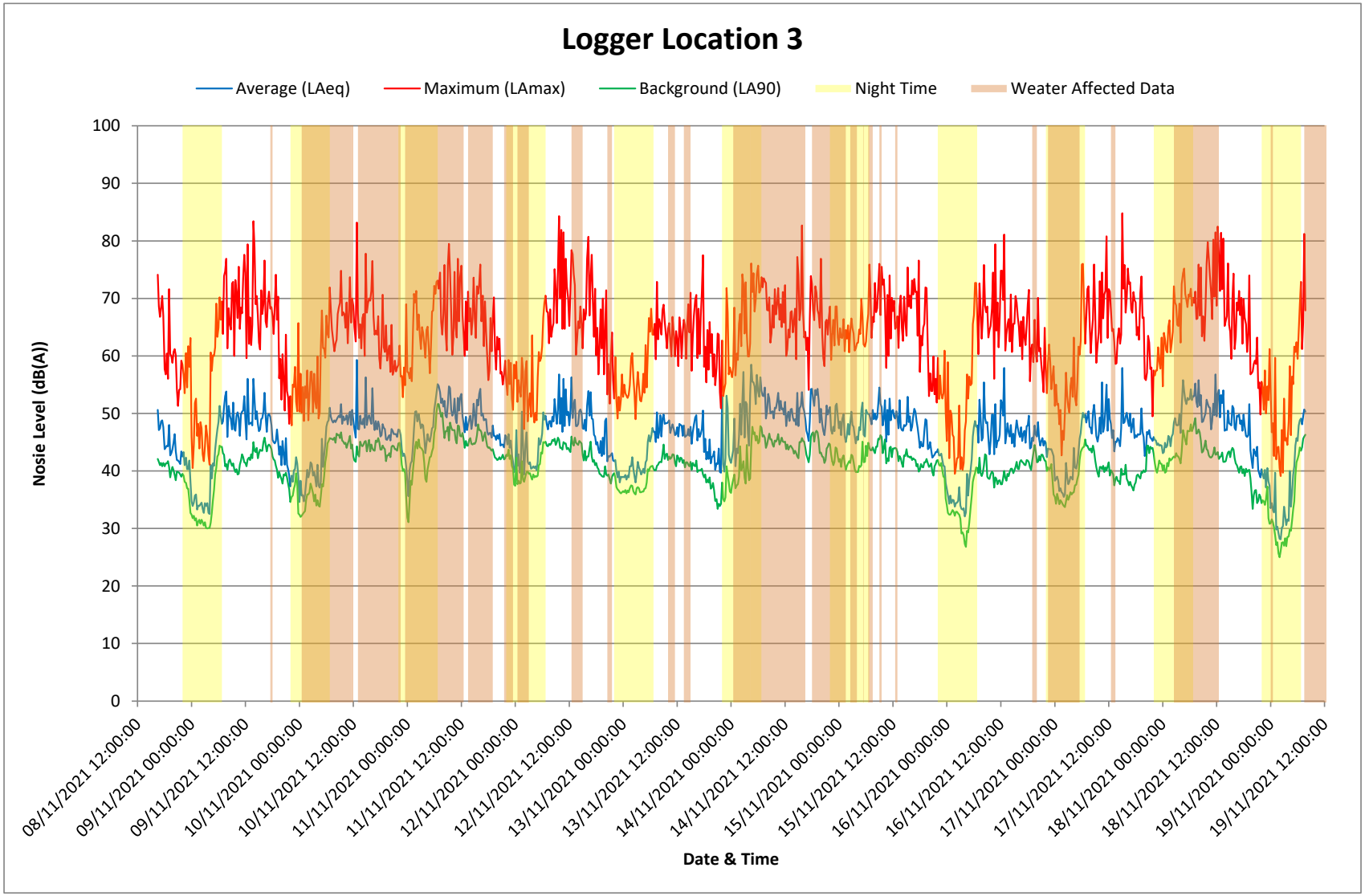
Date & Time


Logger Location 3
Average (LAeq)
Maximum (LAmax)
Background (LA90)
Night Time
Weater Affected Data
Nosie Level (dB(A))
100
90
80
70
60
50
40
30
20
10
0
08/11/2021 12:00:00
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