

SATTERLEY

**CATALINA GREEN SUBDIVISION
TAMALA PARK**

SPP 5.4 NOISE ASSESSMENT

SEPTEMBER 2024

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NOISE ASSESSMENT
CATALINA GREEN SUBDIVISION
TAMALA PARK

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FOR
SATTERLEY

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1. INTRODUCTION

Herring Storer Acoustics was commissioned by Satterley to undertake a revised road traffic and passenger rail noise assessment for the proposed development of Catalina Green, Clarkson.

The purpose of this assessment was to revise the previous noise assessment to allow for changes to the subdivision layout and to assess noise received within the development from vehicles travelling along both Neerabup Road, the Mitchell Freeway, and the Yanchep Passenger Rail Line for the future. It is noted that the previous assessment (reference 22924-4-17291) was based on road traffic only and did not include passenger rail.

As part of the study, the following was carried out:

- Revise the predictive noise model to include the updated subdivision plan which includes final height for the Lots.
- Update the predictive noise model to include passenger rail on the Perth to Yanchep Line.
- Determine by noise modelling the noise levels that would be received at residences within the development from vehicles travelling on the future road and rail system.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.4 *“Road and Rail Noise”* (SPP 5.4) for the cumulative noise from both road and rail noise sources.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

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The traffic noise assessment has been carried out in accordance with the WAPC State Planning Policy 5.4 *“Road and Rail Noise”*.

For information, the development plan is attached in Appendix A.

2. SUMMARY

Under the WAPC State Planning Policy 5.4, for this development, the appropriate “Noise Targets” to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the “outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines”. The Policy also states, under Section 6 – Policy Measures that “a reasonable degree of acoustic amenity for living areas on each residential lot”. The policy recognises that “it may not be practicable to meet the outdoor noise targets”.

The Policy states the following acceptable internal noise levels:

Internal

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

From the modelling undertaken for the future Mitchell Freeway, noise received at the development would exceed the above criteria. As the inclusion of a noise wall for the entire length of the development is not practical as future residential lots face the roadway, to comply with the requirements of SPP 5.4 "Quiet House" design is required.

Appendix C details the Quiet House Design Packages required for each individual Lot with Appendix D containing the deemed to satisfy construction methods.

We note that alternative constructions as to those listed in Appendix D, are acceptable, provided they are supported by an assessment undertaken by a suitably qualified acoustic consultant.

Due to the orientation of the lots, the outdoor living area is protected by the wall, therefore providing a barrier to noise level, hence compliance is achieved with the L_{Aeq} (night) of 50 dB(A).

3. ACOUSTIC CRITERIA

3.1 ROAD AND RAIL TRAFFIC NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 "Road and Rail Noise". The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

- a) noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in **Table 1**;*
- b) New or major upgrades of roads as specified in **Table 1** and maps (**Schedule 1, 2 and 3**); or*
- c) New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3**); or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

Policy trigger distances (Section 4.1.2)

Table 1 identifies the State's transport corridors and the trigger distances to which the policy applies.

*The designation of land within the trigger distances outlined in **Table 3.1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

*Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent."*

TABLE 3.1: (TABLE 1) TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	Trigger distance	Distance measured from
Roads		
Strategic freight and major traffic routes <i>Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume</i>	300 metres	Road carriageway edge
Other significant freight/traffic routes <i>These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either $\geq 23,000$ daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)</i>	200 metres	Road carriageway edge
Passenger railways		
	100 metres	Centreline of the closest track
Freight railways		
	200 metres	Centreline of the closest track

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

Table 2 sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

In the application of the noise targets the objective is to achieve:

- indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 3.2 (TABLE 2): NOISE TARGETS

Proposals	New/Upgrade	Noise Targets		
		Outdoor		Indoor
		Day ($L_{Aeq}(\text{Day})$ dB) (6 am-10 pm)	Night ($L_{Aeq}(\text{Night})$ dB) (10 pm-6 am)	(L_{Aeq} dB)
Noise-sensitive land-use and/or development	New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor	55	50	L_{Aeq} (Day) 40(Living and work areas) L_{Aeq} (Night) 35 (bedrooms)
Roads	New	55	50	N/A
	Upgrade	60	55	N/A
Railways	New	55	50	N/A
	Upgrade	60	55	N/A

Notes:

- The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.
- The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.

Noise Exposure Forecast (Section 6.2)

When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:

- no further measures is required;
- noise-sensitive land-use and/or development is acceptable subject to deemed-to- comply mitigation measures; or
- noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan.”

4. **NOISE MONITORING**

Noise monitoring was undertaken at two locations on the boundary of the proposed development between the 31st January and the 8th February 2018. From these measurements, the noise received at the development from vehicles travelling along Mitchell Freeway and Neerabup Road was determined.

The results of the noise data logging are summarised in Table 4.1 with pictures of the monitors and graphical data contained in Appendix D.

TABLE 4.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	Road Source	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Eastern Boundary of Development (55 metres from the road edge)	Mitchell Freeway	52.4	51.0	47.5
Northern Boundary (42 metres from road edge)	Neerabup Road	55.0	53.4	50.2

Based on the above monitoring results, the night period is less than 5 dB of the day period. However, analysis of the monitored noise levels verses the hourly traffic flows and speeds shows that the noise levels do not show a consistent pattern with those on a busy road such as the Mitchell Freeway. Due to the distance from the Freeway, the noise monitor for the night period (22:00 to 06:00) was influence by background noise once the Freeway noise levels diminished for this period of less traffic. Therefore, the ambient noise held up the night period noise levels. This falsely increases the night period when considering traffic as higher than it is.

Given the traffic flows are based on average counts, for the purpose of the assessment, it has been considered that the L_{Aeqday} is the most critical for compliance.

5. MODELLING

5.1 ROAD TRAFFIC NOISE

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Modelling of noise received within the development from the Mitchell Freeway and Neerabup Road was carried out using SoundPlan, using the Calculation of Road Traffic Noise (CoRTN) algorithms. The input data for the model included the parameters detailed in Table 5.1.

TABLE 5.1 - SUMMARY OF TRAFFIC DATA

Parameter	Mitchell Freeway	Mitchell to Neerabup Off Ramp	Mitchell to Neerabup On Ramp	Neerabup Road
Current 2021 Traffic Flow (vpd) MRWA ROM model	45,600	5,500	5,400	16,200
Current 2021 Traffic Flow (vpd) Counted	61,968	-	-	18,295
Future 2041 Traffic Flow (vpd) MRWA ROM model	128,500	8,900	8,200	27,300
Future 2045 Traffic Flow (vpd) Calculated using MRWA ROM model	141,840	9,824	9,051	30,134
Percentage Heavy Vehicles (%)	3%	7%	8%	2%
Speed (km/hr)	100	100 (220m) 70 (240m)	70 (400m) 100 (160m)	70
Façade Reflection	+2.5 dB	+2.5 dB	+2.5 dB	+2.5 dB
Road Surface	Open Grade Asphalt	Open Grade Asphalt (410m) Dense Grade Asphalt (50m)	Dense Grade Asphalt (300m) Open Grade Asphalt (260m)	Open Grade Asphalt

Note:

1. We note that with the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ being greater than 5 dB(A), achieving compliance with the day period criteria will also achieve compliance with the night period criteria. Therefore, noise modelling was only undertaken for the day period and the results are shown graphically in Appendix B.
2. The Predictive noise model for the Freeway road source has been calibrated to the measured noise level on the eastern side of the development. This noise monitor includes passenger rail movements, hence the 51 dB(A) for current noise at the development is the cumulative noise of both road and rail. Rail noise is difficult to separate from the overall noise levels hence the calibration of the model for this side of the development. Rail noise is presented separately in Section 5.2 as this is a calculated level based on volumes and individual train movements, not the overall cumulative measured noise.

The future road traffic volumes were based on information provided by the MRWA ROM department (shown in Appendix F) and the traffic maps.

Other input data for the model included:

- Traffic data from MRWA (<https://mrapps.mainroads.wa.gov.au/TrafficMap/>)
- Traffic as provided by the MRWA ROM Department #41928, Thomas Ng, as attached in Appendix E. Note, MRWA ROM modelling provided 2041 traffic forecasts. As SPP 5.4 requires 20-year future, the annual percentage increase between the MRWA provided 2021 and 2041 volumes has been used for the increase to 2045. For this road system it is a 2.5% annual increase.
- Noise source heights for the three road source strings (Passenger Vehicles, Heavy Vehicles Engine and Heavy Vehicle Exhausts) are +0.5, +1.5 and +3.6m, with a noise correction of -0.8 and -8.0 applied to the heavy vehicle's engine and exhaust noise sources.
- Topographical data, with the ground level within the development based on final Lot heights levels as per surveys conducted and client provided files (January 2026).
- A +2.5 dB adjustment to allow for façade reflection.
- Development receiver heights at 1.4m above ground level.
- Future buildings located on the boundary Lots of the development (assumed to be present for future road traffic volumes).
- Calculations based on CoRTN algorithms.
- Other parameter listed in SPP 5.4 as to guidance for modelling road traffic noise / assessment.

Noise modelling for road noise was undertaken for the following scenarios:

- S1 Previous (2018) traffic volumes for calibration to noise monitoring data. (Figure B1 – Appendix B)
- S2 Noise emissions from Mitchell Freeway and Neerabup Road (Future traffic flows 2045) No Wall and Future Housing. (Figure B2 – Appendix B)
- S3 Noise emissions from Mitchell Freeway and Neerabup Road (Future traffic flows 2045) 2.0m Wall and Future Housing. (Figure B3 – Appendix B)

The 2.0m wall for the side facing lots has been assumed to be a surface density of 15kg/m² as advised by the client.

For the noise modelling of future traffic, it has been assumed that the percentage of future heavy vehicles remains the same as for the current traffic flows. In this case, we believe that this is a conservative approach, as we believe that the percentage of heavy vehicles would fall over time.

5.2 PASSENGER TRAIN NOISE



To differentiate the noise associated with only passenger rail from the overall noise levels influenced by vehicles on the road network, analysis of individual train events has undertaken.

Measurements of the current passenger rail system have been conducted. Noise level measurements of individual train pass-by events were conducted on the Yanchep to Perth line for the 130km/hr 6 carriage B Series trains.

Passenger trains were measured on 19th June 2024. The measurement location was at the Allara subdivision, on the western side of the passenger rail line. Measurements were in a free field state, i.e no buildings or structures surrounding, or between the measurement location and the rail line.

Measurements were conducted at two locations, namely one to the south of the development where the rail line is deeper in a cutting, and at the northern end of the development where the rail line is closer to grade with the development.

Measurements were conducted using a Larson Davis sound level meter, in current calibration. The measurements were observed, handheld types for the period of the individual train passby events. Additionally, video recordings were carried out of the train pass by events to allow for calculation of speed.

Using the measured levels of the train as a basis for calibration, predictive noise modelling using Soundplan has been carried out. Predictive noise levels for the rail line which is at grade have been calculated. Nord2000 railway algorithms have been used.

Utilising this detailed data, noise levels for each train pass-by event were analysed with the resultant levels detailed in Table 5.2. For the purpose of limiting the amount of data, only a sample of train pass by events have been noted.

TABLE 5.2 - SUMMARY OF MEASURED TRAIN NOISE LEVELS

Measurement	Distance from Rail Line	Train	Direction	Speed (km/hr)	Time for Pass (s)	LAeq Average
1	40m	6 Car Train (144m long)	S	130	47	62.2
2	40m	6 Car Train (144m long)	N	Unknown	38	61.3
3	40m	6 Car Train (144m long)	N	132	35	61.7
4	40m	6 Car Train (144m long)	S	129	35	62.7
5	40m	6 Car Train (144m long)	S	128	30	61.2
6	40m	6 Car Train (144m long)	N	127	33	60.7
7	40m	6 Car Train (144m long)	S	124	29	61.4
8	40m	6 Car Train (144m long)	N	130	40	62.2
9	40m	6 Car Train (144m long)	Both	128	39	63.6
Average				128	36	62

Based on analysis of the measured noise levels, at the 15m monitoring point, train noise is present for an average of 36 seconds. The average L_{Aeq} of the train pass-by events, being a noise level of $L_{Aeq(36seconds)}$ 62 dB(A) has been considered as the calibration point of 40m from the rail line for the current passenger rail use.

The above individual train pass noise level can be used to calculate the $L_{Aeq(16hr)}$ Day, and the $L_{Aeq(8hr)}$ Night noise levels. This is based on the quantity of trains for each period, referencing the passenger rail timetable. Hence, Table 5.3 contains the details used for the calculations.

TABLE 5.3 – RELATIONSHIP BETWEEN MEASURED NOISE LEVELS AND TRAIN VOLUMES

Description	Value
Train Qty per 16 hours Day	195
Train Qty per 8 hours Night	23
Distance of receiver (metres)	40
$L_{Aeq(36second)}$ at receiver (Train pass by event)	62
Time train noise is present (Seconds)	36
Total time noise present (Minutes) Day	117
$L_{Aeq(16hr)}$ Day period @40m	52.9
$L_{Aeq(8hr)}$ Night period @40m	46.6

Based on the above monitoring results, for this project, the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ has been taken to be those listed in Table 5.3. It was assumed that these differences would apply in the future.

We note that with the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ being greater than 5 dB(A), achieving compliance with the day period criteria will also achieve compliance with the night period criteria. Thus, only noise contour plots for the day period have been shown.

To calibrate the noise model, the existing traffic volumes and current layout were modelled in Soundplan. The resultant noise level at the monitoring locations was compared to the calculated results and an adjustment made in the model to calibrate to the same result.

Noise modelling for the future passenger train was carried out based on the number of train movements as summarised in Table 5.4.

TABLE 5.4 – TRAIN MOVEMENTS

Parameter	Train Movements (per hour)		Speed
	Day	Night	Km/hour
North Bound			
6 Car Set (144 metres long)	5.9	0.75	130
South Bound			
6 Car Set (144 metres long)	6.3	0.9	130

Based on the above number of train movements, once again if compliance is achieved with the day period criteria, compliance will also be achieved with the night period criteria. Therefore, noise modelling was only undertaken for the day period.

Noise modelling for rail was undertaken for the following scenario:

- S4 Noise emissions from Yanchep to Perth passenger railway, with noise amelioration.
(Figure B4 – Appendix B)

5.3 CUMULATIVE NOISE

To allow for the cumulative noise for both road (Freeway) and rail (Yanchep Passenger Line) a operating scenario where both noise sources are included has been calculated.

This presented as Figure B5 in Appendix B and comprises the following:

- S5 Noise emissions from Yanchep to Perth passenger railway and Mitchell Freeway for future volumes (2045) with 2.0m Wall and future housing on Lots. (Figure B5 – Appendix B)

6. ASSESSMENT

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the development located at the development from vehicles travelling on the Mitchel Freeway, Neerabup Road and passenger rail associated with the Yanchep to Perth rail line has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

External	
Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}
Outdoor Living Areas (Night)	Maximum of 50 dB(A) L_{Aeq}
a	
Internal	
Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

Noise received at an outdoor area should also be reduced as far as practicable with an aim of achieving an $L_{Aeq(night)}$ of 50 dB(A).

Noise levels for the various scenarios considered have been made for individual receivers at each Lot within the subdivision.

The location plan for receivers is shown in figure 6.1, with the noise levels listed in Table 6.1.

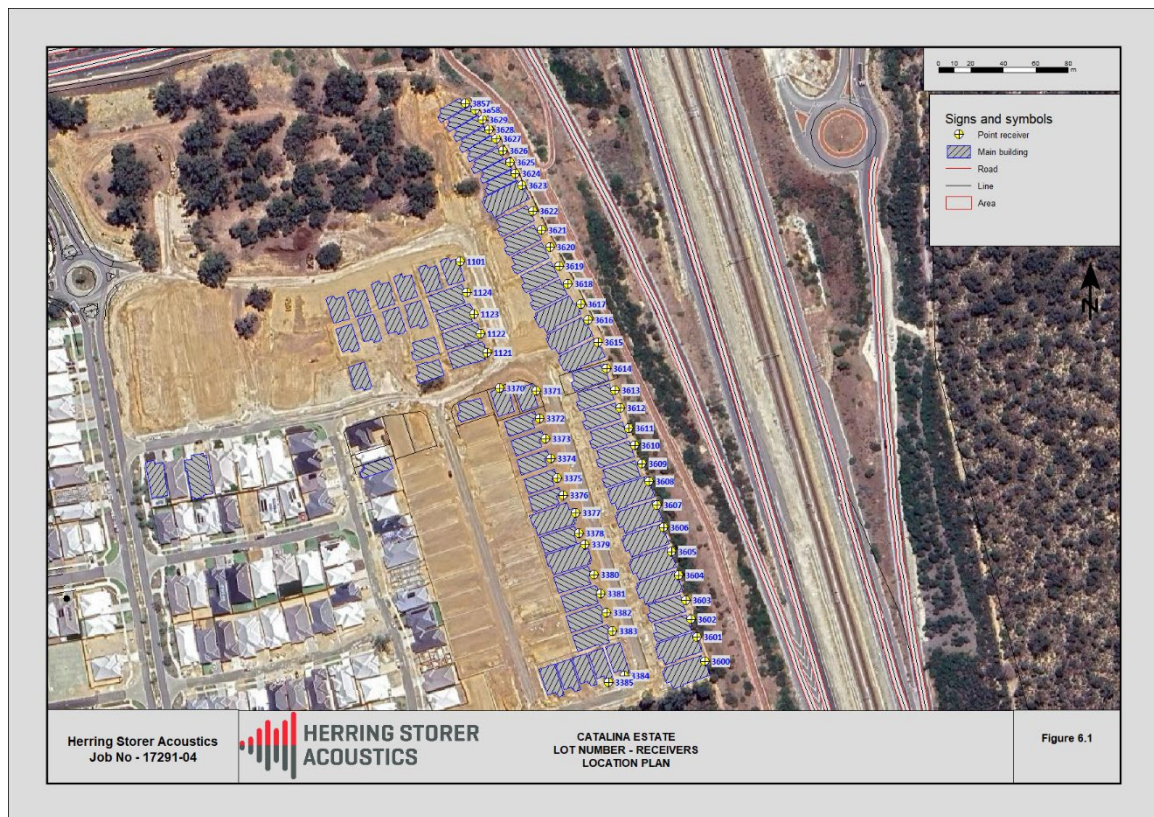


FIGURE 6.1 – INDIVIDUAL RECEIVER LOCATION PLAN

TABLE 6.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOTS, dB(A)

Lot Number	S1 - Calibration	S2 – Future No Noise Control	S3 – Future With 2.0m Wall	S4 – Future Rail – With Noise Control	S5 - Cumulative Noise Level	Required Acoustic Design
1101	53	53	53	41	53	Nil
1121	54	53	53	41	53	Nil
1122	54	53	54	43	54	Nil
1123	54	53	53	42	53	Nil
1124	53	53	53	42	53	Nil
3370	54	52	51	36	51	Nil
3371	55	54	54	42	54	Nil
3372	55	54	54	43	54	Nil
3373	55	54	54	43	54	Nil
3374	55	55	55	44	55	Notification On Tile
3375	55	55	55	44	55	Notification On Tile
3376	55	55	55	44	55	Notification On Tile
3377	54	54	54	44	54	Nil
3378	54	54	54	44	54	Nil
3379	54	53	53	40	53	Nil
3380	53	53	53	40	53	Nil
3381	53	53	53	39	53	Nil
3382	53	53	53	39	53	Nil
3383	53	53	53	38	53	Nil
3384	53	52	52	37	52	Nil
3385	52	52	52	37	52	Nil
3600	56	60	58	44	58	Package A and Notification On Tile
3601	56	59	57	41	57	Package A and Notification On Tile
3602	56	59	56	40	56	Package A and Notification On Tile
3603	56	59	55	39	55	Notification On Tile
3604	56	59	55	38	55	Notification On Tile
3605	56	59	55	38	55	Notification On Tile
3606	56	59	56	40	56	Package A and Notification On Tile

Lot Number	S1 - Calibration	S2 – Future No Noise Control	S3 – Future With 2.0m Wall	S4 – Future Rail – With Noise Control	S5 - Cumulative Noise Level	Required Acoustic Design
3607	56	60	58	44	58	Package A and Notification On Tile
3608	56	60	58	45	58	Package A and Notification On Tile
3609	56	60	58	45	58	Package A and Notification On Tile
3610	56	60	58	45	58	Package A and Notification On Tile
3611	57	60	58	44	58	Package A and Notification On Tile
3612	55	59	55	42	55	Notification On Tile
3613	56	59	55	42	55	Notification On Tile
3614	54	57	53	40	53	Nil
3615	53	56	52	37	52	Nil
3616	56	59	55	41	55	Notification On Tile
3617	55	59	55	41	55	Notification On Tile
3618	55	58	55	42	55	Notification On Tile
3619	55	58	56	43	56	Package A and Notification On Tile
3620	54	57	54	41	54	Nil
3621	54	56	55	42	55	Notification On Tile
3622	53	55	53	40	53	Nil
3623	53	55	54	39	54	Nil
3624	53	55	55	40	55	Notification On Tile
3625	53	55	54	41	54	Nil
3626	53	55	55	41	55	Notification On Tile
3627	53	56	55	41	55	Notification On Tile
3628	54	56	55	41	55	Notification On Tile
3629	54	56	55	41	55	Notification On Tile
3857	54	56	55	37	55	Notification On Tile
3858	54	57	55	41	55	Notification On Tile

It is noted that the above noise levels are based on single storey housing. If two storey housing is proposed, special acoustic advice would be required.

From the modelling undertaken for the future Mitchell Freeway, noise received at the most critical Lot (3607 to 3611) within the development would be $L_{Aeq(day)}$ 58 dB(A) which would exceed the above criteria.

Appendix C contains the deemed to satisfy construction methods.

We note that alternative constructions as to those listed in Appendix C, are acceptable, provided they are supported by an assessment undertaken by a suitably qualified acoustic consultant.

Additionally, noise modelling indicates that noise received at the closest residence (Lot 3607 to 3611) for the Passenger Railway Line would be 45 dB(A) hence would comply with the above criteria.

For information the cumulative noise of the road and rail has been presented in Appendix B, Figure B5.

APPENDIX A

DEVELOPMENT PLAN
And
MONITORING LOCATION PLAN



APPENDIX B

NOISE CONTOUR PLOT



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CATALINA ESTATE
Calibrated to Noise Monitoring (2018) Traffic Noise Levels
LA10 (18hour) Day Noise Level Contour (No Noise Walls)

Figure B1
Ref # 022



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HERRING STORER
ACOUSTICS

CATALINA ESTATE
 Future (2045) Traffic No Wall (Future Housing)
 LAeq (16hour) Day Noise Level Contour

Figure B2
 Ref # 024



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CATALINA ESTATE
 Future (2045) Traffic 2.0m Wall (Future Housing)
 LAeq (16hour) Day Noise Level Contour

Figure B3
 Ref # 026



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CATALINA ESTATE
 Future (2045) Passenger Rail 2.0m Wall (Future Housing)
 LAeq (16hour) Day Noise Level Contour

Figure B4
 Ref # 028



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HERRING STORER
ACOUSTICS

CATALINA ESTATE
 Future (2045) Mitchell Freeway and Passenger Rail 2.0m Wall (Future Housing)
 LAeq (16hour) Day Noise Level Contour

Figure B5
 Ref # 030

APPENDIX C

QUIET HOUSE DESIGN GUIDELINES

Road Traffic and Passenger Rail - Quiet House Requirements
(Based on Table 3 of State Planning Policy 5.4 2019)

Exposure Category	Orientation to corridor	Acoustic ratings					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	
A Quiet House A	Facing	Bedroom and Indoor Living and work areas ➤ $R_w + C_{tr}$ 45dB	Bedrooms: ➤ $R_w + C_{tr}$ 28dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 25dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 28 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 25 dB	➤ $R_w + C_{tr}$ 35dB	➤ At least one outdoor living area located on the opposite side of the building from the transport corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level	➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces
	Side On		Bedrooms: ➤ $R_w + C_{tr}$ 25dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 22dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 25 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 22 dB			
	Opposite		No specific requirements	No specific requirements			
B Quiet House B	Facing	Bedroom and indoor living and work areas ➤ $R_w + C_{tr}$ 50dB	Bedrooms ➤ $R_w + C_{tr}$ 31dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 28dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 31 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 28 dB	➤ $R_w + C_{tr}$ 35dB	➤ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level	➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces
	Side-On		Bedrooms ➤ $R_w + C_{tr}$ 28dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 28dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 28 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 25 dB			
	Opposite		Bedrooms ➤ $R_w + C_{tr}$ 25dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 25dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 25 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 22 dB			
C Quiet House C	Facing	Bedroom and indoor living and work areas ➤ $R_w + C_{tr}$ 50dB	Bedrooms ➤ No External doors to bedrooms facing the corridor Indoor Living and work areas ➤ $R_w + C_{tr}$ 31dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 31dB) Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 31dB	➤ $R_w + C_{tr}$ 40dB	➤ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level	➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of R_w 40dB into sensitive spaces.
	Side-on		Bedrooms ➤ $R_w + C_{tr}$ 31dB Indoor Living and work areas ➤ $R_w + C_{tr}$ 28dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 31 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 28 dB			
	Opposite		Bedrooms: ➤ $R_w + C_{tr}$ 28dB Indoor Living and work areas: ➤ $R_w + C_{tr}$ 28dB	Bedrooms: Window size dependant ➤ Minimum $R_w + C_{tr}$ 28 dB Indoor Living and work areas Window size dependant ➤ Minimum $R_w + C_{tr}$ 25 dB			

Note: The above treatments are a deemed to satisfy construction. Alternative designs are acceptable, provided they are certified by a suitable qualified acoustic consultant.

APPENDIX D

MONITORED NOISE LEVELS



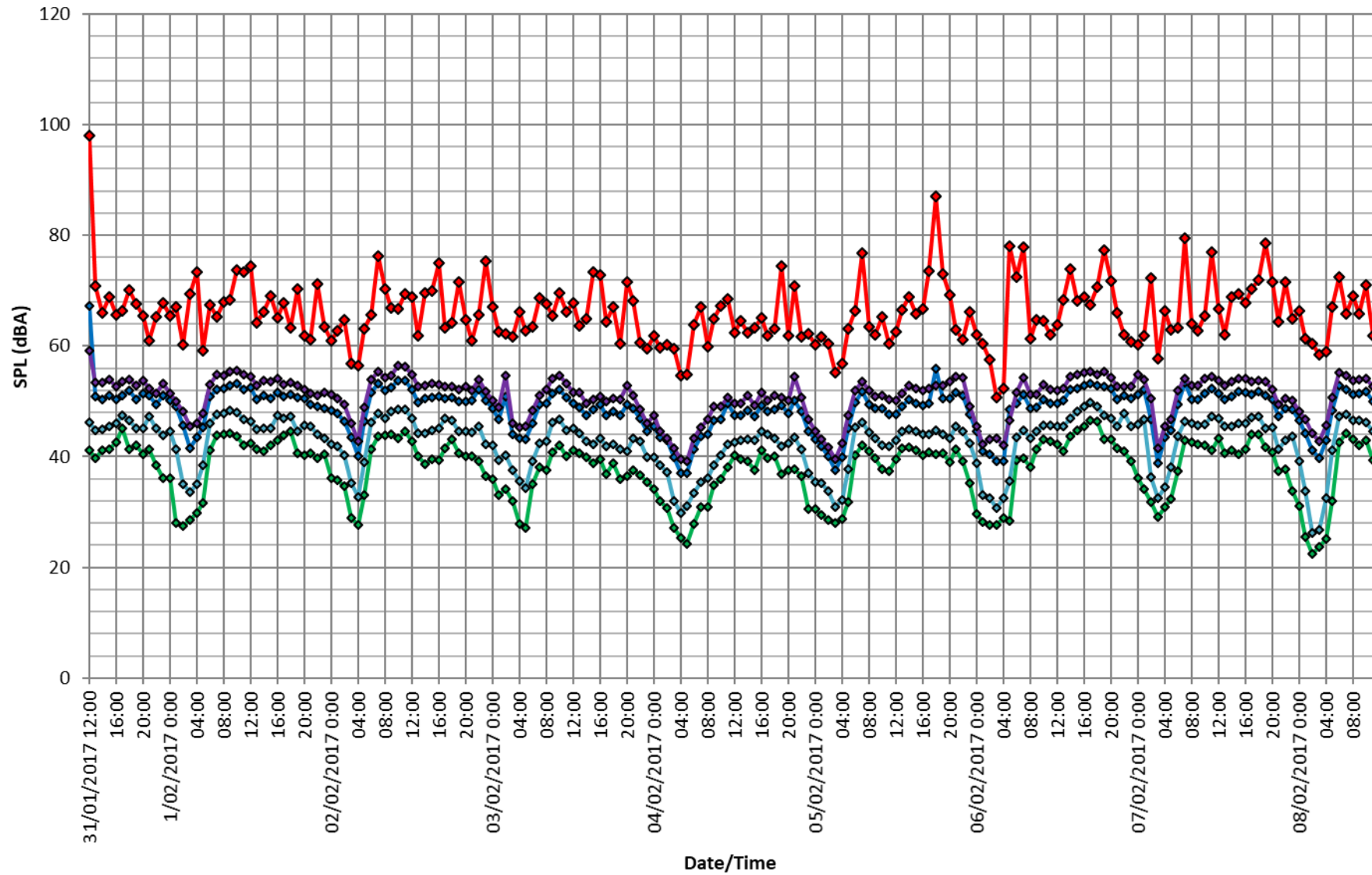
FIGURE 1 – MITCHELL FREEWAY MONITORING LOCATIONS



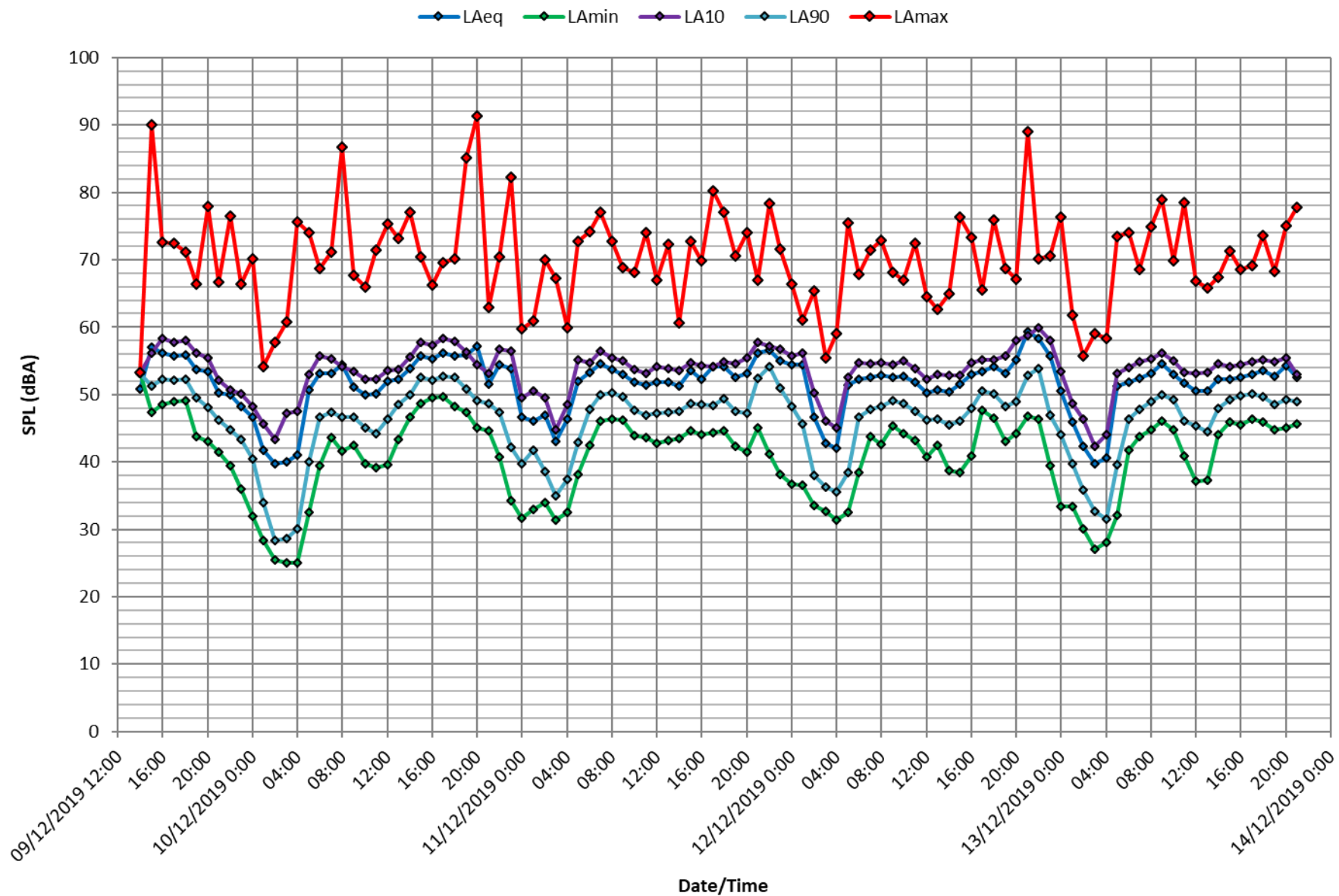
FIGURE 2 – NEERABUP ROAD MONITORING LOCATIONS

Noise Logging - Mitchell Freeway

— LAeq — LAmin — LA10 — LA90 — LAmaz



Noise Logging - Neerabup Road



APPENDIX E

MRWA TRAFFIC DATA

(Licensed to Main Roads Western Australia)

(Licensed to Main Roads Western Australia)