



**SATTERLEY**

**MANDOGALUP ESTATE STRUCTURE PLAN AMENDMENT  
LOTS 11, 9000, 9002 AND 9006 HOFFMAN ROAD**

**SPP 5.4 NOISE ASSESSMENT**

JULY 2024

OUR REFERENCE: 32357-7-24045



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**NOISE ASSESSMENT**  
**MANDOGALUP ESTATE**

Job No: 24045

Document Reference: 32357-7-24045

FOR

**SATTERLEY**

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## 1. INTRODUCTION

Herring Storer Acoustics was commissioned by Satterley to undertake a road and rail traffic noise assessment for the proposed development of Lots 11, 9000, 9002 and 9006 Hofman Road, Mandogalup.

The purpose of this assessment was to assess noise received within the development from vehicles travelling along the Kwinana Freeway for the future and passenger rail associated with the Perth to Mandurah passenger railway line.

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 Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Noise" (SPP5.4), the appropriate criteria for assessment for this development are as listed below for "Noise Limits".

### **EXTERNAL**

$L_{Aeq(Day)}$  of 55 dB(A); and  
 $L_{Aeq(Night)}$  of 50 dB(A).

### **INTERNAL**

$L_{Aeq(Day)}$  of 40 dB(A) in living and work areas; and  
 $L_{Aeq(Night)}$  of 35 dB(A) in bedrooms.

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).

From the modelling undertaken for the future Kwinana 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.

It is understood the noise wall will be 4.0m high and a continuation of the current wall for the northern development. The noise wall would be a minimum surface density of 15kg/m<sup>2</sup>.

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 areas would be situated to the rear, behind the house, away from the Freeway, therefore providing a barrier to Freeway noise, hence compliance with the  $L_{Aeq}$  (night) of 50 dB(A) criteria is achieved.

Additionally, noise modelling indicates that noise received at the closest residences from the Passenger Railway Line would comply with the above criteria. Therefore, no acoustic amelioration, or notifications are required for those residential lots located adjacent to the Railway Line.

### 3. ACOUSTIC CRITERIA

#### 3.1 ROAD AND RAIL TRAFFIC NOISE

The Western Australian Planning Commission (WAPC) released on 6<sup>th</sup> 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 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 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES**

<b>Transport corridor classification</b>	<b>Trigger distance</b>	<b>Distance measured from</b>
<b>Roads</b>		
<b>Strategic freight and major traffic routes</b> 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	300 metres	Road carriageway edge
<b>Other significant freight/traffic routes</b> 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 >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)	200 metres	Road carriageway edge
<b>Passenger railways</b>		
	100 metres	Centreline of the closest track
<b>Freight railways</b>		
	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 2: NOISE TARGETS**

Proposals	New/Upgrade	Noise Targets		
		Outdoor		Indoor
		Day (L <sub>Aeq</sub> (Day) dB) (6 am-10 pm)	Night (L <sub>Aeq</sub> (Night) dB) (10 pm-6 am)	(L <sub>Aeq</sub> 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 <sub>Aeq</sub> (Day) 40(Living and work areas)  L <sub>Aeq</sub> (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 as part of the study with the results used to calibrate the noise model.

In summary, the monitoring was undertaken over seven-day period commencing 6<sup>th</sup> February 2024. Monitoring was conducted at the boundary of the development, facing Kwinana Freeway. The monitor was placed 30m from the nearest running edge of respective road of interest. It is noted that for this section of the development, there is an earthen bund located between the cycle path and the Freeway. The height of the bund is approximately 3m.

The results of this monitoring are summarised in Table 4.1.

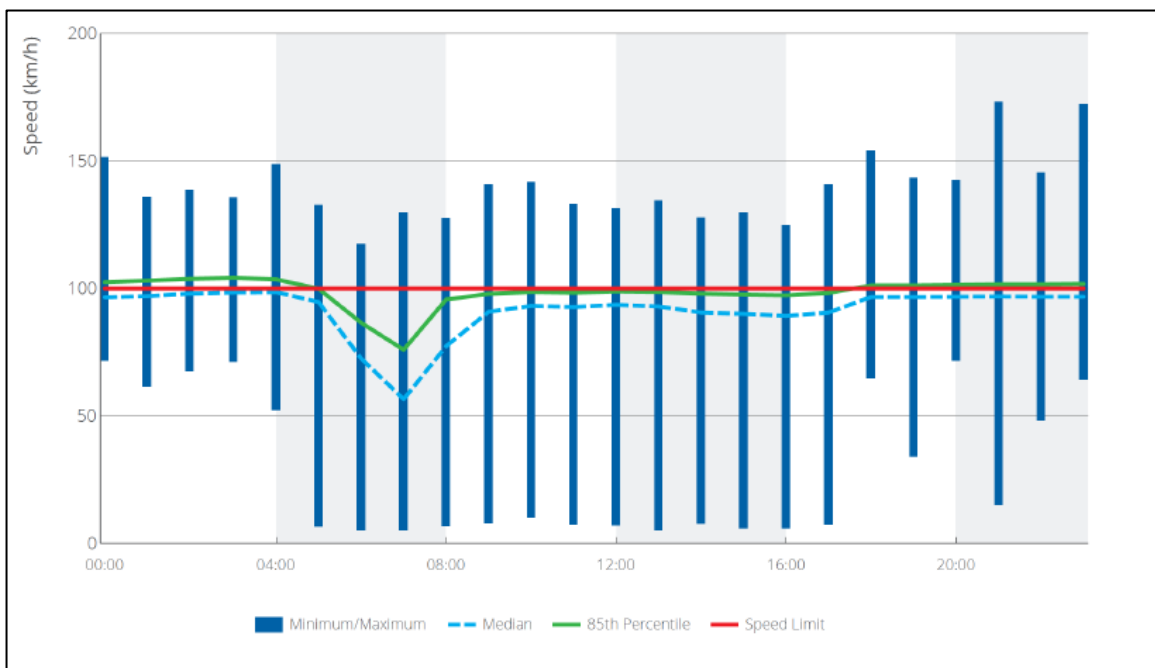
**TABLE 4.1: SUMMARY OF MEASURED ROAD TRAFFIC NOISE LEVELS (dB(A))**

Date	Kwinana Freeway Monitor		
	L <sub>A10</sub> (18hour)	L <sub>Aeq,day</sub> (6am to 10pm)	L <sub>Aeq,night</sub> (10pm to 6am)
AVERAGE	63.5	62.6	59.1

Based on the above monitoring results, the night period is less than 5 dB than that of the day period. However, analysis of the monitored noise levels verses the hourly traffic flows and speeds shows that there may be external influence during the morning part of the day period noise levels.

Therefore, additional analysis of the hourly traffic flows for the day and night periods has been undertaken with Figure 4.1 below detailing the speed of the vehicles past the development. As can be seen there is a significant decrease in speed from 06:00 to 09:00am. This speed change, likely due to traffic build up, is unduly altering the differential between the night and day periods.

Given the traffic flows are based on average counts, for the purpose of the assessment, it has been considered that the L<sub>Aeq16hr</sub> (day period) is the most critical for compliance and assessed such that compliance with the day period would yield compliance with the night period. As a result, only noise contour plots for the day period have been shown in Appendix B.



**FIGURE 4.1 – HOURLY TRAFFIC SPEEDS**

For information, the results of the monitoring are shown graphically in Appendix E with Figure 4.2 showing the location map, and Figure 4.3 showing the monitor in situ.

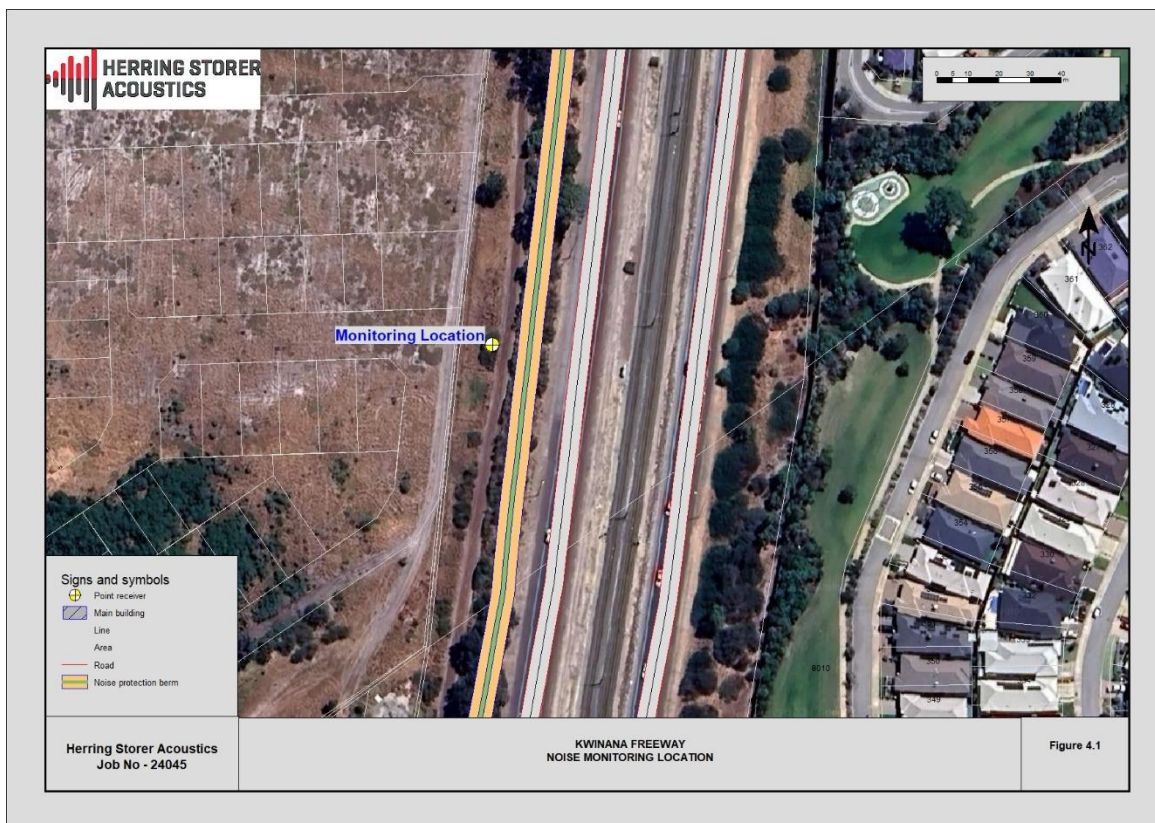


FIGURE 4.2 - NOISE MONITOR LOCATION PLAN



FIGURE 4.3 - NOISE MONITOR IN SITU

## 5. MODELLING

### 5.1 ROAD TRAFFIC NOISE

Modelling of noise received within the development from the Kwinana Freeway 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	Current (2021) MRWA Provided	Current (2024) Calculated	Future (2041) MRWA Provided	Future (2044) Calculate
Traffic flows VPD South Bound	45,800	50,018	82,400	89,988
Traffic flows VPD North Bound	45,500	49,690	80,800	88,241
Heavy Vehicles (%)	8.4%	8.4%	8.4%	8.4%
Traffic Speed km/hr	100	100	100	100
Road Surface	-	Open Grade Asphalt	Open Grade Asphalt	Open Grade Asphalt
Façade Correction	-	-	+2.5	+2.5

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, as attached in Appendix F. Note, MRWA ROM modelling provided 2041 traffic forecasts. (Ref: #42819, prepared by Clare Yu on 12/02/2024)
- 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 2044. For this road system it is a 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 natural ground levels as per surveys conducted.
- 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 Current (2024) traffic volumes for calibration to noise monitoring data.
- S2 Noise emissions from Kwinana Freeway (Future traffic flows 2044) without noise amelioration.
- S2 Noise emissions from Kwinana Freeway (Future traffic flows 2044) with a 4m noise wall, and future housing on Lots.

The 1.8m wall for the side facing lots has been assumed to be a Colorbond or equivalent.

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 Perth to Mandurah line for the 130km/hr 6 carriage B-Series trains.

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 4.1. For the purpose of limiting the amount of data, only a sample of train pass by events have been noted.

**TABLE 5.1 - SUMMARY OF MEASURED TRAIN NOISE LEVELS**

Time (Seconds)	Train 1 (15m)	Train 2 (8m)	Train 3 (8m)	Train 4 (8m)	Train 5 (15m)
1	63	57	62	60	69
2	69	61	67	67	65
3	68	66	72	88	65
4	64	78	88	92	67
5	79	92	93	92	82
6	84	92	93	92	85
7	85	93	92	91	85
8	84	92	91	78	84
9	83	87	79	71	82
10	74	74	72	70	71
11	70	72	72	68	73
12	67	71	69	65	72
13	65	70	62	60	70
<b>L<sub>Aeq</sub> Train Pass-by Event</b>	<b>79</b>	<b>88</b>	<b>88</b>	<b>87</b>	<b>80</b>

Based on analysis of the measured noise levels, at the 15m monitoring point, train noise is present for an average of 13 seconds. Using a conservative approach, the highest individual  $L_{Aeq}$  of a train pass-by event, being a noise level of  $L_{Aeq(13seconds)}$  80 dB(A) has been considered as the calibration point of 15m from the rail line for the current passenger rail use.

The above individual train pass noise level can be used to calculate the  $L_{Aeq(16hour)}$  Day, and the  $L_{Aeq(8hour)}$  Night noise levels. This is based on the quantity of trains for each period, referencing the passenger rail timetable. Hence, Table 5.2 contains the details used for the calculations.

**TABLE 5.2 – RELATIONSHIP BETWEEN MEASURED NOISE LEVELS AND TRAIN VOLUMES**

Description	Value
Train Qty per 24 hours	179
Train Qty per 16 hours Day	156
Train Qty per 8 hours Night	23
Distance of receiver (metres)	15
$L_{Aeq(20second)}$ at receiver (Train pass by event)	80
Time train noise is present (Seconds)	13
Total time noise present (Minutes) Day	34
Total time noise present (Minutes) Night	5
Total time noise present (Minutes) 24 hours	39
<b><math>L_{Aeq(16hour)}</math> Day period @15m</b>	<b>65.5</b>
<b><math>L_{Aeq(8hour)}</math> Night period @15m</b>	<b>60.2</b>

Table 5.2 shows that the difference between the day and night periods would be 5.3 dB(A), which is greater than the difference in day and night period criteria of 5 dB(A), thus, achieving compliance with the day period criteria will also achieve compliance with the night period criteria. As a result, only noise contour plots for the day period have been shown in Appendix B.

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 5.1.

**TABLE 5.3 – TRAIN MOVEMENTS**

Parameter	Train Movements (per hour)		Speed
	Day	Night	Km/hour
<b>North Bound</b>			
6 Car Set (150 metres long)	5.9	0.75	130
<b>South Bound</b>			
6 Car Set (150 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:

- S1 Noise emissions from Mandurah passenger railway, without noise amelioration.
- S2 Noise emissions from Mandurah passenger railway, with 4.0m noise wall.

## 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 Mandogalup Estate from vehicles travelling on the Kwinana Freeway and passenger rail associated with the Perth to Mandurah rail line has been undertaken.

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

<b>External</b>	
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	
<b>Internal</b>	
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).

From the modelling undertaken for the future Kwinana 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.

It is understood the noise wall will be 4.0m high and a continuation of the current wall for the northern development. The noise wall would be a minimum surface density of 15kg/m<sup>2</sup>

Appendix C details the Quiet House Design Packages required for each individual Lot with Appendix D containing the deemed to satisfy construction methods. Implementation of these Quiet House Design Packages would result in compliance with both the day time and night time internal noise levels stated above.

It is noted that an alternative to the school site has been in the south of the development has been provided as residential as final design is still underway. Additionally, Lot 11 has been included in the LSP amendment, however, at this stage of the development, the Lot alignment has not been finalised.

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.

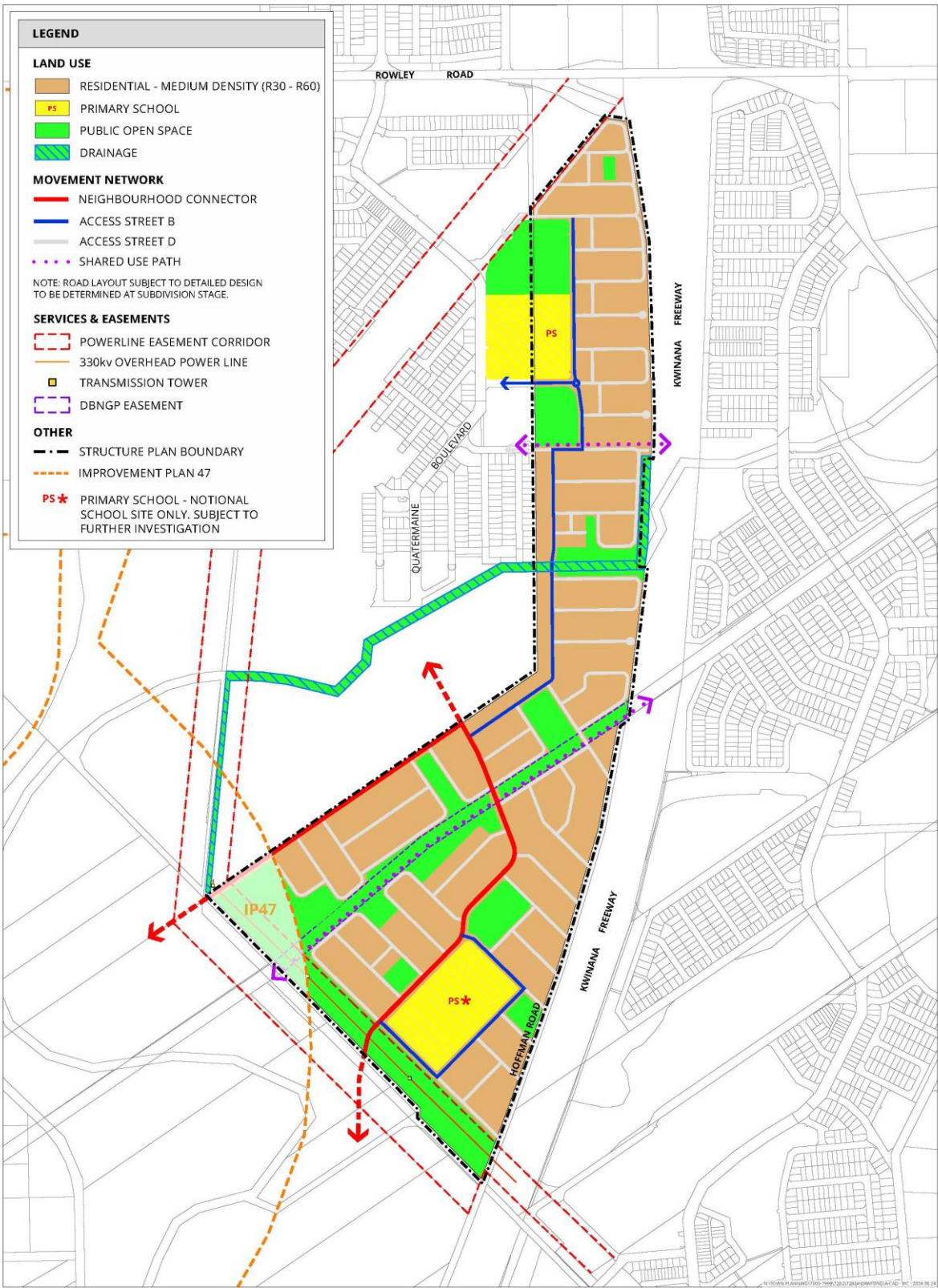
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Due to the orientation of the lots, the outdoor living area is situated behind the house, away from the Freeway, therefore providing a barrier to noise level, hence compliance is achieved with the  $L_{Aeq}$  (night) of 50 dB(A).

Additionally, noise modelling indicates that noise received at the closest residence for the Passenger Railway Line would comply with the above criteria. Therefore, no acoustic amelioration, or notifications are required for those residential lots located adjacent to the Railway Line.

# **APPENDIX A**

## DEVELOPMENT PLAN

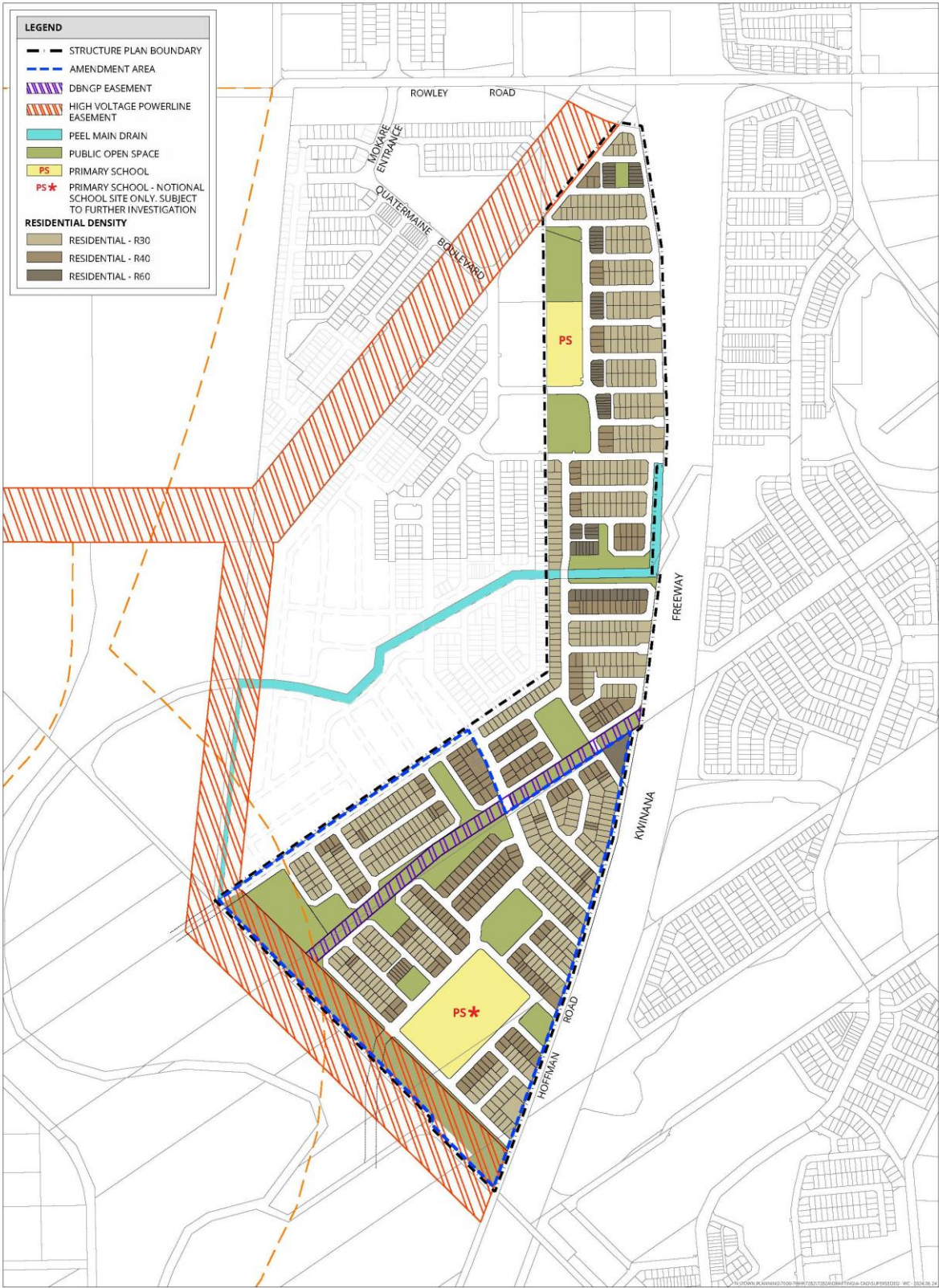


**PLAN 1 - LOCAL STRUCTURE PLAN**  
 VARIOUS LOTS - KWINANA FREEWAY & ROWLEY ROAD  
 MANDOGALUP

N  
 0 200 m  
 SCALE @ A3: 1:7500  
**7282D-LSP-09-A**

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 DATE CREATED: 2024/06/21  
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**RESIDENTIAL DENSITY CODE PLAN**  
 VARIOUS LOTS HOFFMAN ROAD  
 MANDOGALUP

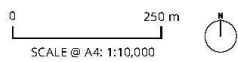
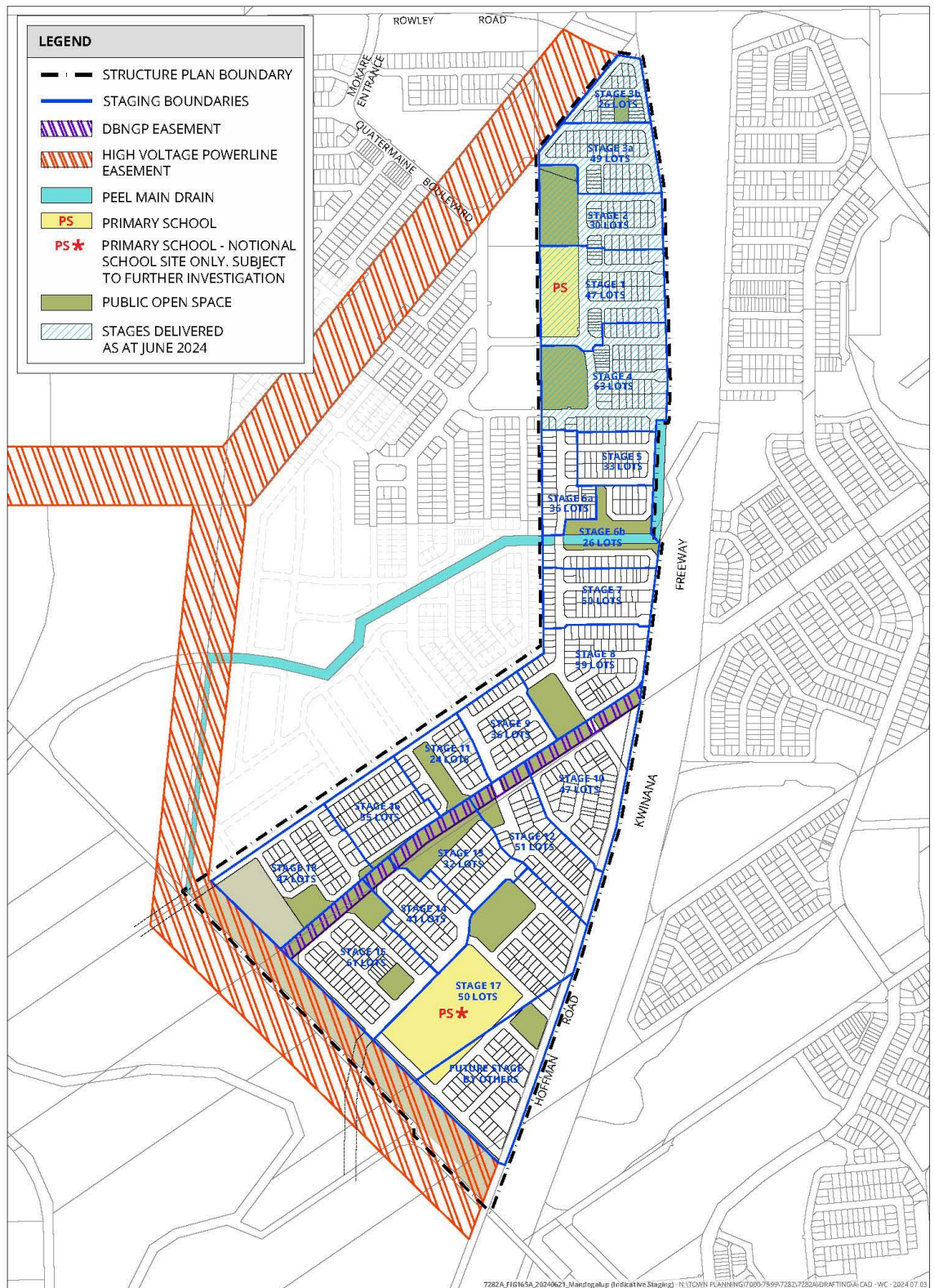
**DRAFT**



0 200 m  
 SCALE @ A3: 1:7500  
**7282A-FIG-161-A**

DATE CREATED: 2024/06/24  
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 CADASTRE: LANDIMATE  
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






**FIGURE 14**  
INDICATIVE STAGING PLAN

# **APPENDIX B**

## NOISE CONTOUR PLOTS





**Signs and symbols**

-  Wall
-  Point receiver
-  Main building
-  Line
-  Area
-  Road
-  Noise protection berm

0 20 40 80 120 160 m



**Traffic Noise Level  
LAeq (16hour) dB  
Day Time Criteria**

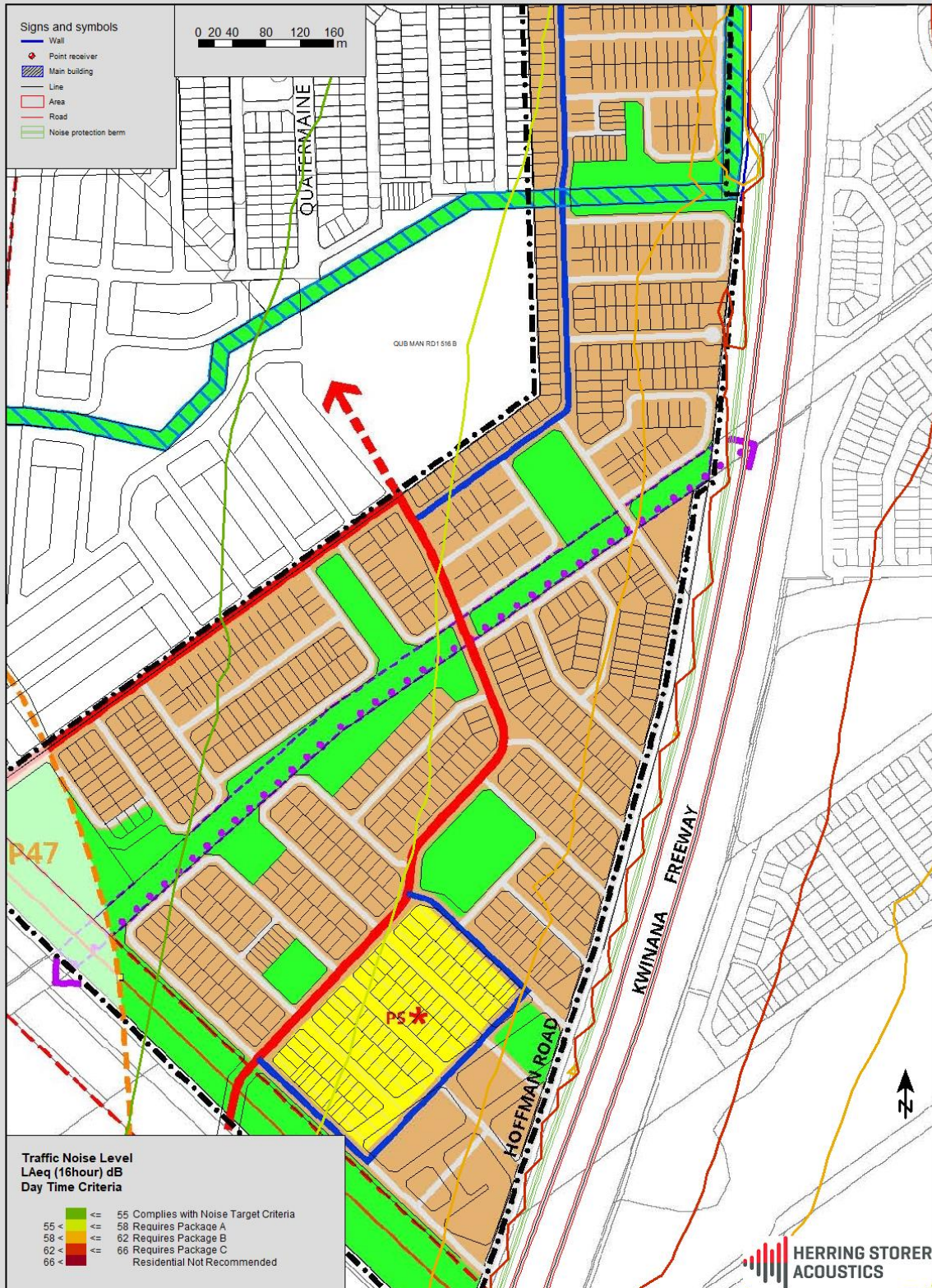
- |   |      |                                     |
|---|------|-------------------------------------|
|  | < 55 | Complies with Noise Target Criteria |
|  | < 58 | Requires Package A                  |
|  | < 62 | Requires Package B                  |
|  | < 66 | Requires Package C                  |
|   | > 66 | Residential Not Recommended         |



Herring Storer Acoustics  
Job No - 24045

MANDOGALUP ESTATE - KWINANA FREEWAY  
Current Traffic Volumes 2024  
LAeq (16hour) Day Noise Level Contour

Figure B1  
Ref # 003



Herring Storer Acoustics  
 Job No - 24045

MANDOGALUP ESTATE - KWINANA FREEWAY  
 Future Traffic Volumes - No Noise Control  
 L<sub>Aeq</sub> (16hour) Day Noise Level Contour

Figure B2  
 Ref # 004





Herring Storer Acoustics  
Job No - 24045

MANDOGALUP ESTATE - PASSENGER RAIL  
Future Traffic Volumes - No Noise Control  
LAeq (16hour) Day Noise Level Contour

Figure B4  
Ref # 007





## **APPENDIX C**

Quiet House Design – Individual Lot Requirements

**APPENDIX C – QHD REQUIREMENTS INDIVIDUAL LOTS**

<b>Lot Number</b>	<b>LAeq Day Noise Level dB(A)</b>	<b>Acoustic Requirement</b>	<b>Lot Number</b>	<b>LAeq Day Noise Level dB(A)</b>	<b>Acoustic Requirement</b>
271	51	No Requirements	331	55	No Requirements
272	48	No Requirements	332	54	No Requirements
273	49	No Requirements	333	54	No Requirements
274	55	Notification on Title	334	54	No Requirements
275	55	Notification on Title	335	54	No Requirements
276	55	Notification on Title	336	53	No Requirements
277	55	Notification on Title	337	54	No Requirements
278	55	Notification on Title	338	53	No Requirements
279	55	Notification on Title	339	49	No Requirements
280	55	Notification on Title	340	49	No Requirements
281	55	Notification on Title	341	49	No Requirements
282	55	Notification on Title	342	49	No Requirements
283	55	Notification on Title	343	48	No Requirements
284	55	Notification on Title	344	49	No Requirements
287	56	Notification on Title and Package A	345	54	No Requirements
288	56	Notification on Title and Package A	346	54	No Requirements
289	57	Notification on Title and Package A	347	55	No Requirements
290	57	Notification on Title and Package A	348	55	No Requirements
292	58	Notification on Title and Package A	349	55	Notification on Title and Package A
292	58	Notification on Title and Package A	350	56	Notification on Title and Package A
293	58	Notification on Title and Package A	351	56	Notification on Title and Package A
294	57	Notification on Title and Package A	352	57	Notification on Title and Package A
295	56	Notification on Title and Package A	353	58	Notification on Title and Package A
296	56	Notification on Title and Package A	354	59	Notification on Title and Package B
313	53	No Requirements	355	59	Notification on Title and Package B
314	52	No Requirements	356	58	Notification on Title and Package A
315	53	No Requirements	357	57	Notification on Title and Package A
316	53	No Requirements	358	55	Notification on Title and Package A
317	54	No Requirements	359	55	Notification on Title and Package A
318	54	No Requirements	360	55	No Requirements
319	55	Notification on Title	361	54	No Requirements
320	55	Notification on Title and Package A	362	54	No Requirements
321	55	Notification on Title and Package A	363	52	No Requirements
322	56	Notification on Title and Package A	364	52	No Requirements
323	56	Notification on Title and Package A	365	53	No Requirements
324	57	Notification on Title and Package A	391	52	No Requirements
325	57	Notification on Title and Package A	392	52	No Requirements
326	58	Notification on Title and Package A	393	52	No Requirements
327	58	Notification on Title and Package A	394	53	No Requirements
328	57	Notification on Title and Package A	395	53	No Requirements
329	56	Notification on Title and Package A	396	54	No Requirements
330	55	Notification on Title and Package A	397	54	No Requirements

Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement	Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement
398	55	Notification on Title	483	57	Notification on Title and Package A
399	55	Notification on Title	484	58	Notification on Title and Package A
400	56	Notification on Title and Package A	485	59	Notification on Title and Package A
401	57	Notification on Title and Package A	486	58	Notification on Title and Package A
402	57	Notification on Title and Package A	487	59	Notification on Title and Package B
403	57	Notification on Title and Package A	488	59	Notification on Title and Package B
404	57	Notification on Title and Package A	489	59	Notification on Title and Package B
405	56	Notification on Title and Package A	490	59	Notification on Title and Package B
406	56	Notification on Title and Package A	491	59	Notification on Title and Package B
407	59	Notification on Title and Package B	492	59	Notification on Title and Package B
408	59	Notification on Title and Package B	493	59	Notification on Title and Package B
409	58	Notification on Title and Package A	494	59	Notification on Title and Package B
410	57	Notification on Title and Package A	495	59	Notification on Title and Package B
411	56	Notification on Title and Package A	496	60	Notification on Title and Package B
412	56	Notification on Title and Package A	497	59	Notification on Title and Package B
415	55	Notification on Title	498	59	Notification on Title and Package B
416	48	No Requirements	499	57	Notification on Title and Package A
417	50	No Requirements	500	56	Notification on Title and Package A
418	49	No Requirements	501	54	No Requirements
419	50	No Requirements	502	52	No Requirements
420	49	No Requirements	503	52	No Requirements
421	54	No Requirements	504	51	No Requirements
422	54	No Requirements	505	51	No Requirements
423	54	No Requirements	506	53	No Requirements
424	54	No Requirements	507	53	No Requirements
425	54	No Requirements	508	53	No Requirements
426	57	Notification on Title and Package A	509	53	No Requirements
427	58	Notification on Title and Package A	510	53	No Requirements
428	58	Notification on Title and Package A	511	54	No Requirements
429	58	Notification on Title and Package A	466	57	Notification on Title and Package A
430	58	Notification on Title and Package A	467	57	Notification on Title and Package A
431	59	Notification on Title and Package B	468	57	Notification on Title and Package A
432	59	Notification on Title and Package B	469	57	Notification on Title and Package A
433	57	Notification on Title and Package A	470	57	Notification on Title and Package A
434	57	Notification on Title and Package A	471	57	Notification on Title and Package A
435	56	Notification on Title and Package A	472	57	Notification on Title and Package A
436	55	Notification on Title	473	57	Notification on Title and Package A
439	55	No Requirements	474	57	Notification on Title and Package A
512	59	Notification on Title and Package B	475	57	Notification on Title and Package A
480	55	Notification on Title	476	57	Notification on Title and Package A
481	55	Notification on Title	477	57	Notification on Title and Package A
482	56	Notification on Title and Package A	478	57	Notification on Title and Package A
398	55	Notification on Title	483	57	Notification on Title and Package A

Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement	Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement
479	57	Notification on Title and Package A	580	54	No Requirements
537	56	Notification on Title and Package A	581	55	No Requirements
538	56	Notification on Title and Package A	582	56	Notification on Title and Package A
539	56	Notification on Title and Package A	583	56	Notification on Title and Package A
540	56	Notification on Title and Package A	584	56	Notification on Title and Package A
541	56	Notification on Title and Package A	585	58	Notification on Title and Package A
542	56	Notification on Title and Package A	586	58	Notification on Title and Package A
543	56	Notification on Title and Package A	587	60	Notification on Title and Package B
544	56	Notification on Title and Package A	911	59	Notification on Title and Package A
545	55	Notification on Title and Package A	910	55	Notification on Title and Package A
546	56	Notification on Title and Package A	909	55	No Requirements
547	56	Notification on Title and Package A	908	54	No Requirements
548	56	Notification on Title and Package A	907	53	No Requirements
549	57	Notification on Title and Package A	906	54	No Requirements
550	57	Notification on Title and Package A	905	54	No Requirements
551	58	Notification on Title and Package A	904	54	No Requirements
552	58	Notification on Title and Package A	903	53	No Requirements
553	59	Notification on Title and Package A	902	53	No Requirements
554	59	Notification on Title and Package B	901	51	No Requirements
555	60	Notification on Title and Package B	900	53	No Requirements
556	56	Notification on Title and Package A	886	54	No Requirements
557	55	Notification on Title and Package A	885	51	No Requirements
558	55	Notification on Title	884	52	No Requirements
559	55	No Requirements	883	50	No Requirements
560	54	No Requirements	887	56	Notification on Title and Package A
561	54	No Requirements	888	56	Notification on Title and Package A
562	53	No Requirements	889	57	Notification on Title and Package A
563	52	No Requirements	890	58	Notification on Title and Package A
564	52	No Requirements	891	59	Notification on Title and Package A
565	51	No Requirements	892	59	Notification on Title and Package A
566	55	No Requirements	893	58	Notification on Title and Package A
567	55	Notification on Title and Package A	894	59	Notification on Title and Package B
568	56	Notification on Title and Package A	895	56	Notification on Title and Package A
569	56	Notification on Title and Package A	896	54	No Requirements
570	56	Notification on Title and Package A	897	54	No Requirements
571	56	Notification on Title and Package A	898	52	No Requirements
572	56	Notification on Title and Package A	899	53	No Requirements
619	52	No Requirements	865	52	No Requirements
576	50	No Requirements	864	51	No Requirements
577	52	No Requirements	863	52	No Requirements
578	54	No Requirements	862	52	No Requirements
579	54	No Requirements	866	54	No Requirements
479	57	Notification on Title and Package A	580	54	No Requirements

Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement	Lot Number	LAeq Day Noise Level dB(A)	Acoustic Requirement
867	54	No Requirements	820	53	No Requirements
868	55	Notification on Title and Package A	821	53	No Requirements
869	56	Notification on Title and Package A	822	53	No Requirements
870	56	Notification on Title and Package A	823	53	No Requirements
871	57	Notification on Title and Package A	824	53	No Requirements
872	57	Notification on Title and Package A	825	54	No Requirements
873	59	Notification on Title and Package B	826	54	No Requirements
874	59	Notification on Title and Package A	827	54	No Requirements
875	56	Notification on Title and Package A	828	56	Notification on Title and Package A
876	56	Notification on Title and Package A	829	57	Notification on Title and Package A
877	55	Notification on Title and Package A	830	56	Notification on Title and Package A
878	55	No Requirements	831	56	Notification on Title and Package A
879	54	No Requirements	832	53	No Requirements
880	53	No Requirements	833	53	No Requirements
881	54	No Requirements	834	53	No Requirements
882	53	No Requirements	835	51	No Requirements
842	53	No Requirements	836	51	No Requirements
841	51	No Requirements	837	49	No Requirements
840	50	No Requirements	838	49	No Requirements
843	53	No Requirements	839	48	No Requirements
844	54	No Requirements	800	52	No Requirements
845	53	No Requirements	799	51	No Requirements
846	53	No Requirements	798	50	No Requirements
847	54	No Requirements	797	50	No Requirements
848	54	No Requirements	801	52	No Requirements
849	55	Notification on Title	802	53	No Requirements
850	55	Notification on Title and Package A	803	53	No Requirements
851	57	Notification on Title and Package A	804	53	No Requirements
852	57	Notification on Title and Package A	805	53	No Requirements
853	57	Notification on Title and Package A	806	54	No Requirements
854	52	No Requirements	807	54	No Requirements
855	53	No Requirements	808	56	Notification on Title and Package A
856	53	No Requirements	809	52	No Requirements
857	51	No Requirements	810	52	No Requirements
858	51	No Requirements	811	50	No Requirements
859	52	No Requirements	812	50	No Requirements
860	50	No Requirements	813	49	No Requirements
861	51	No Requirements	814	50	No Requirements
819	52	No Requirements	815	48	No Requirements
818	49	No Requirements	780	51	No Requirements
817	50	No Requirements	779	50	No Requirements
816	50	No Requirements	778	50	No Requirements
867	54	No Requirements	820	53	No Requirements

<b>Lot Number</b>	<b>LAeq Day Noise Level dB(A)</b>	<b>Acoustic Requirement</b>
777	50	No Requirements
781	51	No Requirements
782	51	No Requirements
783	52	No Requirements
784	51	No Requirements
785	52	No Requirements
786	53	No Requirements
787	53	No Requirements
788	56	Notification on Title and Package A
789	51	No Requirements
790	52	No Requirements
791	50	No Requirements
792	51	No Requirements
793	51	No Requirements
794	51	No Requirements
795	51	No Requirements
796	50	No Requirements

# **APPENDIX D**

## **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 rating and example constructions					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	
<b>A</b> Quiet House A	<b>Facing</b>	<p><b>Bedroom and Indoor Living and work areas to Rw + Ctr 45dB</b></p> <p><b>Stud Frame Walls</b></p> <ul style="list-style-type: none"> <li>➤ One row of 92mm studs at 60mm centres with:</li> <li>➤ Resilient steel channels fixed to the outside of the studs; and</li> <li>➤ 9.5mm hardboard or 9mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and</li> <li>➤ 75mm glass wool (11kg/m3) or 75mm polyester (14kg/m3) insulation, positioned between the studs; and</li> <li>➤ -Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs.</li> </ul> <p><b>Brick Walls</b></p>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <b>R<sub>w</sub>+C<sub>tr</sub> 28dB</b> rated door and frame including seals and 6mm glass</li> </ul> <p><b>Indoor Living and work areas:</b></p> <ul style="list-style-type: none"> <li>➤ 35mm solid core timber hinged door and frame system certified to <b>R<sub>w</sub> 28dB</b> including seals: <b>OR</b></li> <li>➤ Glazed sliding door with 10 mm glass and weather seals</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (<b>R<sub>w</sub>+C<sub>tr</sub> 28 dB</b>). Sealed awning or casement windows may use 6 mm glazing instead: <b>OR</b></li> <li>➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows (<b>R<sub>w</sub>+C<sub>tr</sub> 31dB</b>).</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (<b>R<sub>w</sub>+C<sub>tr</sub> 25dB</b>): <b>OR</b></li> <li>➤ Up to 60% floor area: As per Bedrooms at up to 40% area (<b>R<sub>w</sub>+C<sub>tr</sub> 28 dB</b> : <b>OR</b></li> <li>➤ Up to 80% floor area: As per Bedrooms at up to 60% area (<b>R<sub>w</sub>+C<sub>tr</sub> 31 dB</b>).</li> </ul>	<p><b>To R<sub>w</sub>+C<sub>tr</sub> 35dB</b></p> <ul style="list-style-type: none"> <li>➤ Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling</li> </ul>	<ul style="list-style-type: none"> <li>➤ 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 <b>2 metres</b> height above ground level</li> </ul>	<ul style="list-style-type: none"> <li>➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of <b>R<sub>w</sub> 40dB</b> into sensitive spaces</li> <li>➤ Evaporative systems require attenuated ceiling air vents to allow closed windows</li> <li>➤ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements</li> <li>➤ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable</li> </ul>
	<b>Side On</b>	<ul style="list-style-type: none"> <li>➤ Single leaf of 150mm brick masonry with 13mm cement render on each face: <b>OR</b></li> <li>➤ Double brick: two leaves of 90 mm clay brick masonry with a 20mm cavity between leaves.</li> </ul>	<p>As per “Facing” above, except R<sub>w</sub>+C<sub>tr</sub> values may be 3dB less, e.g. glazed sliding door with 10 mm glass and weather seals for bedrooms</p>	<p>As above, except R<sub>w</sub>+C<sub>tr</sub> values may be 3dB less, or max % area increased by 20%</p>			
	<b>Opposite</b>		No specific requirements	No specific requirements			

**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 rating and example constructions					Mechanical ventilation/air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	
<b>B</b> Quiet House B	Facing	<p><b>Bedroom and indoor living and work areas to <math>R_w+C_{tr}</math> 50dB</b></p> <p><b>Single leaf of 90 mm clay brick masonry with:</b></p> <ul style="list-style-type: none"> <li>➤ A row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres;</li> <li>➤ A cavity of 25 mm between leaves;</li> <li>➤ 50 mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and</li> <li>➤ One layer of 10mm plasterboard fixed to the inside face</li> <li>➤ Single leaf of 220mm brick masonry with 13mm cement render on each face</li> <li>➤ 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face</li> </ul>	<p><b>Bedrooms</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <math>R_w+C_{tr}</math> 31dB rated door and frame including seals and 10mm glass</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ 35mm solid core timber hinged door and frame system certified to <math>R_w</math> 28dB including seals: <b>OR</b></li> <li>➤ Glazed sliding door with 10 mm glass and weather seals</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Total external door and window system area up to 40% of room floor areas: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (<math>R_w+C_{tr}</math> 31dB).</li> <li>➤ Up to 60% floor area: as per above but must be minimum 10mm single or 6mm-12mm-10mm double insulated glazing (<math>R_w+C_{tr}</math> 34dB)</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Up to 40% floor area; Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (<math>R_w+C_{tr}</math> 28dB). Sealed awning or casement windows may use 6mm glazing instead. : <b>OR</b></li> <li>➤ Up to 60% floor area: As per Bedrooms at up to 40% area (<math>R_w+C_{tr}</math> 31dB). : <b>OR</b></li> <li>➤ Up to 80% floor area: As per Bedrooms at up to 60% area (<math>R_w+C_{tr}</math> 34dB).</li> </ul>	<p><b>To <math>R_w+C_{tr}</math> 35dB</b></p> <ul style="list-style-type: none"> <li>➤ Concrete or terracotta tile sarking and at least 10mm plasterboard ceiling, R3.0+ insulation</li> <li><b>OR</b></li> <li>➤ Metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation</li> </ul>	<ul style="list-style-type: none"> <li>➤ 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 <b>2.4 metres</b> height above ground level</li> </ul>	<ul style="list-style-type: none"> <li>➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of <math>R_w</math> 40dB into sensitive spaces</li> <li>➤ Evaporative systems require attenuated ceiling air vents to allow closed windows</li> <li>➤ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements</li> <li>➤ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable</li> </ul>
	Side-On	<p><b>Double brick: two leaves of 90mm clay brick masonry with:</b></p> <ul style="list-style-type: none"> <li>➤ A 50mm cavity between leaves</li> <li>➤ 50mm glass wool or polyester cavity insulation (R2.0+)</li> <li>➤ Resilient ties where required to connect leaves</li> </ul> <p><b>Double brick: two leaves of 110mm clay brick masonry with</b></p> <ul style="list-style-type: none"> <li>➤ 50mm cavity between leaves and R2.0+ cavity insulation</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <math>R_w+C_{tr}</math> 28dB rated door and frame including seals and 6mm glass</li> </ul> <p><b>Indoor Living and work areas:</b></p> <ul style="list-style-type: none"> <li>➤ 35mm solid core timber hinged door and frame system certified to <math>R_w</math> 28dB including seals: <b>OR</b></li> <li>➤ Glazed sliding door with 10 mm glass and weather seals</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (<math>R_w+C_{tr}</math> 28 dB). Sealed awning or casement windows may use 6 mm glazing instead. : <b>OR</b></li> <li>➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows (<math>R_w+C_{tr}</math> 31dB).</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (<math>R_w+C_{tr}</math> 25dB). : <b>OR</b></li> <li>➤ Up to 60% floor area: As per Bedrooms at up to 40% area (<math>R_w+C_{tr}</math> 28 dB) : <b>OR</b></li> <li>➤ Up to 80% floor area: As per Bedrooms at up to 60% area (<math>R_w+C_{tr}</math> 31 dB).</li> </ul>			
	Opposite		As above, except $R_w+C_{tr}$ values may be 3dB less, or max % area increased by 20%	As above, except $R_w+C_{tr}$ values may be 3dB less, or max % area increased by 20%			

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

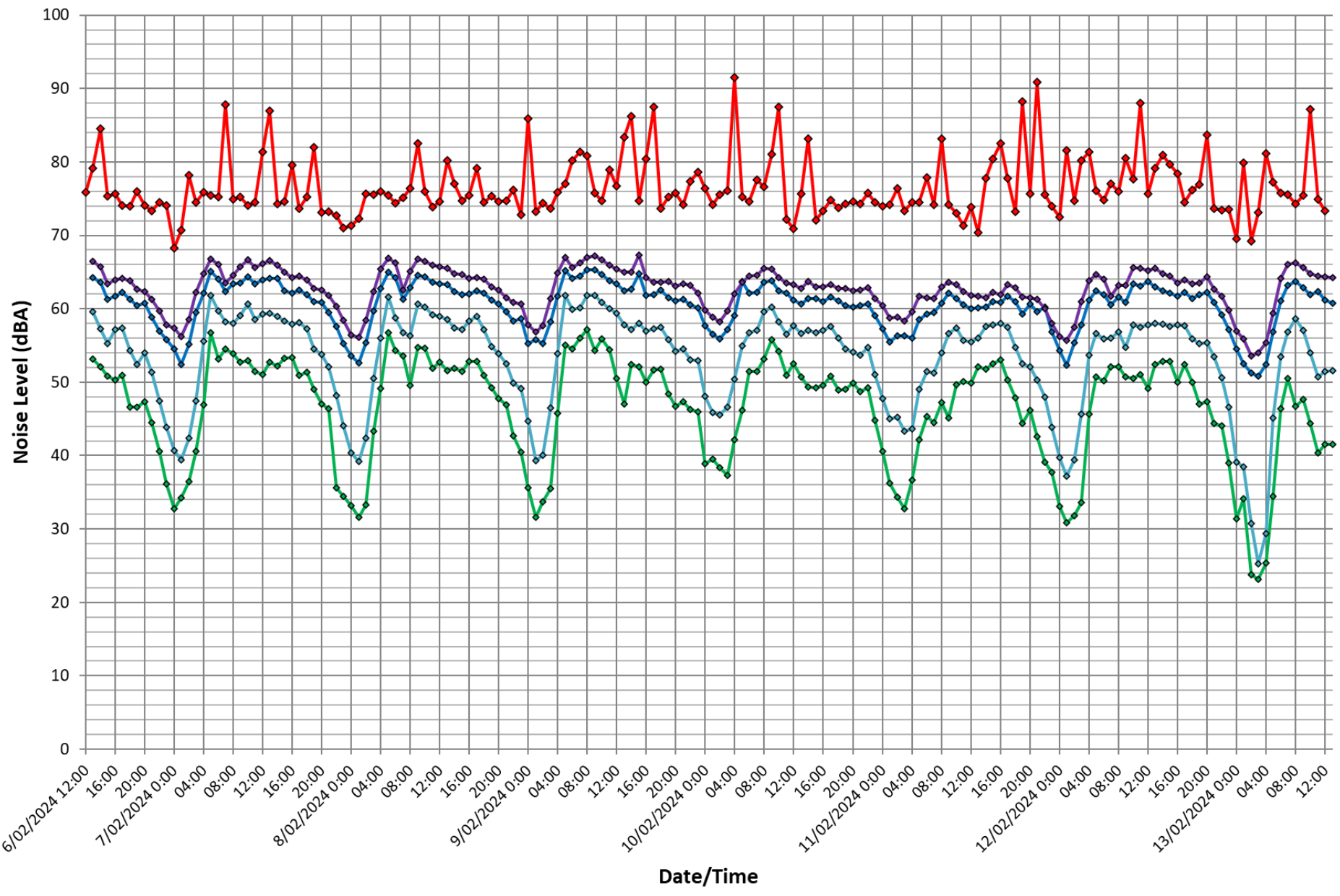
Acoustic rating and example constructions							
Exposure Category	Orientation to corridor	Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor Living areas	Mechanical ventilation/air conditioning considerations
<b>C</b> Quiet House C	Facing	<p><b>Bedroom and indoor living and work areas to <math>R_w+C_{tr}</math> 50dB</b></p> <p><b>Single leaf of 90 mm clay brick masonry with:</b></p> <ul style="list-style-type: none"> <li>➤ A row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres;</li> <li>➤ A cavity of 25 mm between leaves;</li> <li>➤ 50 mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and</li> </ul>	<p><b>Bedrooms</b></p> <ul style="list-style-type: none"> <li>➤ External doors to bedrooms facing the corridor are not recommended.</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <b><math>R_w+C_{tr}</math> 31dB</b> rated door and frame including seals and 10mm glass: <b>OR</b></li> </ul> <p>40mm solid core timber frame and door (without glass or with glass inserts not less than 6mm), side hinged with certified <b><math>R_w</math> 32dB</b> acoustically rated door and frame system including seals</p>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Total external door and window system area up to 20% of room floor area: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (<b><math>R_w+C_{tr}</math> 31dB</b>): <b>OR</b></li> <li>➤ Up to 40% floor area; as per above but must be minimum 10mm single or 6mm-12mm-10mm double insulated glazing (<b><math>R_w+C_{tr}</math> 34dB</b>).</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (<b><math>R_w+C_{tr}</math> 31dB</b>). Sealed awning or casement windows may use 6mm glazing instead: <b>OR</b></li> <li>➤ Up to 60% floor area: As per Bedrooms at up to 40% area (<b><math>R_w+C_{tr}</math> 34dB</b>)</li> </ul>	<p><b>To <math>R_w+C_{tr}</math> 40dB</b></p> <ul style="list-style-type: none"> <li>➤ To all bedrooms, 2 layers of 10mm plasterboard, or one layer 13mm high density sealed plasterboard (minimum surface density of 12.5 kg/m<sup>2</sup>), affixed using steel furring channels beneath ceiling rafters/supports: <b>and</b></li> <li>➤ R3.0+ insulation batts laid in cavity : <b>and</b></li> <li>➤ Concrete or terracotta tile roof with sarking, or metal sheet roof with foil backed R2.0+ fibre insulation between steel sheeting and roof battens</li> </ul>	<ul style="list-style-type: none"> <li>➤ 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 <b>2.4 metres</b> height above ground level</li> </ul>	<ul style="list-style-type: none"> <li>➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of <b><math>R_w</math> 40dB</b> into sensitive spaces.</li> <li>➤ Evaporative systems require attenuated ceiling air cents to allow closed windows.</li> <li>➤ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements</li> </ul>
	Side-on	<p><b>Double brick: two leaves of 90mm clay brick masonry with:</b></p> <ul style="list-style-type: none"> <li>➤ One layer of 10mm plasterboard fixed to the inside face</li> <li>➤ Single leaf of 220mm brick masonry with 13mm cement render on each face</li> <li>➤ 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face</li> </ul>	<p><b>Bedrooms</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <b><math>R_w+C_{tr}</math> 31dB</b> rated door and frame including seals and 10mm glass</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ 35mm solid core timber hinged door and frame system certified to <b><math>R_w</math> 28dB</b> including seals: <b>OR</b></li> <li>➤ Glazed sliding door with 10 mm glass and weather seals</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (<b><math>R_w+C_{tr}</math> 28 dB</b>). Sealed awning or casement windows may use 6 mm glazing instead: <b>OR</b></li> <li>➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows (<b><math>R_w+C_{tr}</math> 31dB</b>).</li> </ul> <p><b>Indoor Living and work areas</b></p> <ul style="list-style-type: none"> <li>➤ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (<b><math>R_w+C_{tr}</math> 25dB</b>): <b>OR</b></li> <li>➤ Up to 60% floor area: As per Bedrooms at up to 40% area (<b><math>R_w+C_{tr}</math> 28 dB</b> : <b>OR</b></li> <li>➤ Up to 80% floor area: As per Bedrooms at up to 60% area (<b><math>R_w+C_{tr}</math> 31 dB</b>).</li> </ul>			<ul style="list-style-type: none"> <li>➤ Openings such as eaves, vents and air inlets must be acoustically treated, close or relocated to building sides facing away from the corridor where practicable.</li> </ul>
	Opposite	<p><b>Double brick: two leaves of 110mm clay brick masonry with</b></p> <ul style="list-style-type: none"> <li>➤ A 50mm cavity between leaves</li> <li>➤ 50mm glass wool or polyester cavity insulation (R2.0+)</li> <li>➤ Resilient ties where required to connect leaves</li> <li>➤ 50mm cavity between leaves and R2.0+ cavity insulation</li> </ul>	<p><b>Bedrooms:</b></p> <ul style="list-style-type: none"> <li>➤ Fully glazed hinged door with certified <b><math>R_w+C_{tr}</math> 28dB</b> rated door and frame including seals and 6mm glass</li> </ul> <p><b>Indoor Living and work areas:</b></p> <ul style="list-style-type: none"> <li>➤ 35mm solid core timber hinged door and frame system certified to <b><math>R_w</math> 28dB</b> including seals: <b>OR</b></li> <li>➤ Glazed sliding door with 10 mm glass and weather seals</li> </ul>				

# **APPENDIX E**

## **NOISE MONITORING DATA**

### Noise Logging - Mandogalup Estate

— LAeq — LAmin — LA10 — LA90 — LAmax



# **APPENDIX F**

## TRAFFIC DATA



# 2041 ROM24 Scenario - Link Volume Plot for Kwinana Fwy, Mandogalup Noise Assessment

## All Day

Land Use Scenario: Westport Land Use based on DAEDS Version 3.3

### MODEL ASSUMPTIONS

**NETWORK:** 2041 Westport Network  
**LAND USE:** 2041 Westport Land Use based on DAEDS Version 3.3

### ROM24 Multi-Modal Model V4.40

#### 24-Hour Traffic Volumes (Factor X 100)

**Terms & Conditions:**  
 MRWA Traffic Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations. This data should not be used for any purpose other than the stated purpose for which it was requested from MRWA. The MRWA ROM is for estimating regional traffic volumes on regional and major local roads, and it should not be used for estimating local traffic on local roads. The MRWA ROM includes local roads but this is to provide connectivity in the model. MRWA Traffic Modelling Data should be interpreted by an experienced/qualified person. This data should not be used in making decisions relating to commercial or residential developments.



Transport Modelling Section  
 Enquiries Clare Yu 9323 4967  
 MRWA Reference Job #42819  
 Mon 12 Feb 2024  
 T:\VOYAGER\JOBS\_V2024\42819\Reports\LVP\42819\_All Day\_LVP\_Y41 Westport\_Kwinana Fwy\_Mandogalup.VPR

- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- >=4 Lanes Each Direction
- Zone Connector

## Surface Detail



Road	Start SLK	End SLK	CMW	Start True Dist	End True Dist	Inv Type	XSP	Width (m)	Year	Type	Aggregate Material	Aggregate Size	Adhesion Agent	Bitumen Class	Asphalt Depth (mm)	Enrich Year
H015	25.26	25.46	L	25.26	25.46	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L1	3.5	2016	Asphalt Open Graded	Granite				30	
						SULA	L2	3.5	2016	Asphalt Open Graded	Granite				30	
						SULA	ER	3.5	2015	Asphalt Open Graded	Granite				30	
						SUSH	L	2.5	2015	Asphalt Open Graded	Granite				30	
	25.46	25.68	L	25.46	25.68	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L1	3.5	2016	Asphalt Open Graded	Granite				30	
						SULA	L2	3.5	2016	Asphalt Open Graded	Granite				30	
						SULA	ER	3.5	2010	Asphalt Open Graded	Granite			320	30	
						SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30	
	25.68	25.84	L	25.68	25.84	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L1	3.5	2016	Asphalt Open Graded	Granite				30	
						SULA	L2	3.5	2016	Asphalt Open Graded	Granite				30	
						SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30	
	25.84	26.79	L	25.84	26.79	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L1	3.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L2	3.5	2015	Asphalt Open Graded	Granite			170	70	
						SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30	
	26.79	27.62	L	26.79	27.62	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30	
						SULA	L1	3.5	2015	Asphalt Open Graded	Granite			170	40	
SULA						L2	3.5	2015	Asphalt Open Graded	Granite			170	40		
SUSH						L	2.5	2001	Asphalt Open Graded	Laterite				30		
27.62	27.63	L	27.62	27.63	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30		
					SULA	L1	3.5	2015	Asphalt Open Graded	Granite			170	40		
					SULA	L2	3.5	2019	Asphalt Open Graded	Granite			170	30		
					SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30		
27.63	27.68	L	27.63	27.68	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30		
					SULA	L1	3.5	2015	Asphalt Open Graded	Granite				35		
					SULA	L2	3.5	2019	Asphalt Open Graded	Granite			170	30		
					SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30		
27.68	27.82	L	27.68	27.82	SUSH	R	1.5	2001	Asphalt Open Graded	Granite				30		
					SULA	L1	3.5	2015	Asphalt Open Graded	Granite				35		
					SULA	L2	3.5	2019	Asphalt Open Graded	Granite			170	30		

## Surface Detail



Road	Start SLK	End SLK	CMV	Start True Dist	End True Dist	Inv Type	XSP	Width (m)	Year	Type	Aggregate Material	Aggregate Size	Adhesion Agent	Bitumen Class	Asphalt Depth (mm)	Enrich Year
						SULA	ER	7.0	2019	Asphalt Open Graded	Granite			170	30	
						SUSH	L	2.5	2001	Asphalt Open Graded	Laterite				30	
	25.26	25.46	R	25.26	25.46	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2019	Asphalt Open Graded	Granite			170	30	
						SULA	R2	3.5	2019	Asphalt Open Graded	Granite			170	30	
						SULA	ER	7.0	2019	Asphalt Open Graded	Granite			170	30	
						SUSH	R	3.0	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
	25.46	25.51	R	25.46	25.51	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2009	Asphalt Open Graded	Granite			320	30	
						SULA	R2	3.5	2011	Asphalt Open Graded	Granite				30	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	25.51	25.56	R	25.51	25.56	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2001	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2011	Asphalt Open Graded	Granite				30	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	25.56	25.69	R	25.56	25.69	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2008	Asphalt Open Graded on Dense Graded	Granite			320	60	
						SULA	R2	3.5	2011	Asphalt Open Graded	Granite				30	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	25.69	25.88	R	25.69	25.88	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2008	Asphalt Open Graded on Dense Graded	Granite			320	60	
						SULA	R2	3.5	2011	Asphalt Open Graded	Granite				30	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	25.88	26.09	R	25.88	26.09	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2019	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	26.09	26.27	R	26.09	26.27	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	

## Surface Detail



Road	Start SLK	End SLK	CMV	Start True Dist	End True Dist	Inv Type	XSP	Width (m)	Year	Type	Aggregate Material	Aggregate Size	Adhesion Agent	Bitumen Class	Asphalt Depth (mm)	Enrich Year
						SULA	R1	3.5	2015	Asphalt Open Graded	Granite				25	
						SULA	R2	3.5	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	26.27	26.84	R	26.27	26.84	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2019	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	26.84	27.60	R	26.84	27.60	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2019	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2019	Asphalt Open Graded	Granite				30	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	27.60	27.66	R	27.60	27.66	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2019	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2019	Asphalt Open Graded	Granite				30	
						SULA	ER	3.8	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	27.66	27.77	R	27.66	27.77	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2017	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2017	Asphalt Open Graded	Granite				30	
						SULA	ER	3.8	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2001	Asphalt Open Graded	Laterite				30	
	27.77	27.87	R	27.77	27.87	SUSH	L	2.5	2001	Asphalt Open Graded on Dense Graded	Laterite				30	
						SULA	R1	3.5	2017	Asphalt Open Graded	Granite				30	
						SULA	R2	3.5	2017	Asphalt Open Graded	Granite				30	
						SULA	ER	3.8	2015	Asphalt Open Graded	Granite				25	
						SUSH	R	3.0	2015	Asphalt Open Graded	Laterite				25	