



URBIS

**GOLDEN BAY EAST
LOTS 23-26, 28 & 161-162 SAWLEY CLOSE
GOLDEN BAY**

SPP 5.4 NOISE MANAGEMENT PLAN

JULY 2025

OUR REFERENCE: 34951-1-25249



DOCUMENT CONTROL PAGE

NOISE MANAGEMENT PLAN
GOLDEN BAY EAST

Job No: 25249

Document Reference: 34951-1-25249

FOR

URBIS

DOCUMENT INFORMATION				
Author:	Geoff Harris	Checked By:	Paul Daly	
Date of Issue:	16 July 2025			

REVISION HISTORY				
Revision	Description	Date	Author	Checked

DOCUMENT DISTRIBUTION				
Copy No.	Version No.	Destination	Hard Copy	Electronic Copy
1	1	Urbis Att: Rebecca Travaglione Email: rtravaglione@urbis.com.au		✓

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1. INTRODUCTION

Herring Storer Acoustics was commissioned by Urbis on behalf of Cape Bouvard Investments Pty Ltd to undertake a road traffic noise assessment for the proposed “Golden Bay East” development of Lots 23-26, 28 & 161-162 Sawley Close, Golden Bay.

The purpose of this assessment was to assess noise received within the development from vehicles travelling along Mandurah Road for the future.

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 Mandurah Road, noise received at the development would exceed the above criteria.

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

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 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

Transport corridor classification	Trigger distance	Distance measured from
Roads		
Strategic freight and major traffic routes 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
Other significant freight/traffic routes 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)	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 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	$L_{Aeq}(\text{Day})$ 40(Living and work areas) $L_{Aeq}(\text{Night})$ 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 five-day period commencing Friday 27th July 2025. Monitoring was conducted in the develop as shown in Figure 4.1.

The results of this monitoring are summarised in Table 4.1.

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

Date	Monitored Noise Levels		
	L _{A10} (18hour)	L _{Aeq,day} (6am to 10pm)	L _{Aeq,night} (10pm to 6am)
Average	55.7	54.6	46.7

Note: Based on the results of the noise monitoring the difference between the L_{Aeq} (Day) and L_{Aeq} (Night) is greater than 5 dB(A) (ie; 7.9 dB(A)). Hence, achieving compliance with the day period criteria would also result in compliance with the night period criteria and the day period has been used for the assessment.



FIGURE 4.1 - NOISE MONITOR LOCATION PLAN

5. MODELLING

5.1 ROAD TRAFFIC NOISE

Modelling of noise received within the development from Mandurah 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	Current (2020)	Future (2045)
Traffic flows VPD - Mandurah Road	25,280	41,470
Heavy Vehicles (%)	9.8%	9.8%
Traffic Speed km/hr	100	100
Road Surface	Chip Seal	Dense graded asphalt
Façade Correction	-	+2.5

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

- 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.

The noise model was built with the following assumptions:

- The proportion of heavy vehicles for future traffic volumes is the same as the current.

6. ASSESSMENT

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the development from vehicles travelling on Mandurah Road 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}

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).

From the modelling undertaken for the future Mandurah Road, noise received at the development would exceed the above criteria. In order to comply with the requirements of SPP 5.4 "Quiet House" design is required as listed in Appendix C for each scenario.

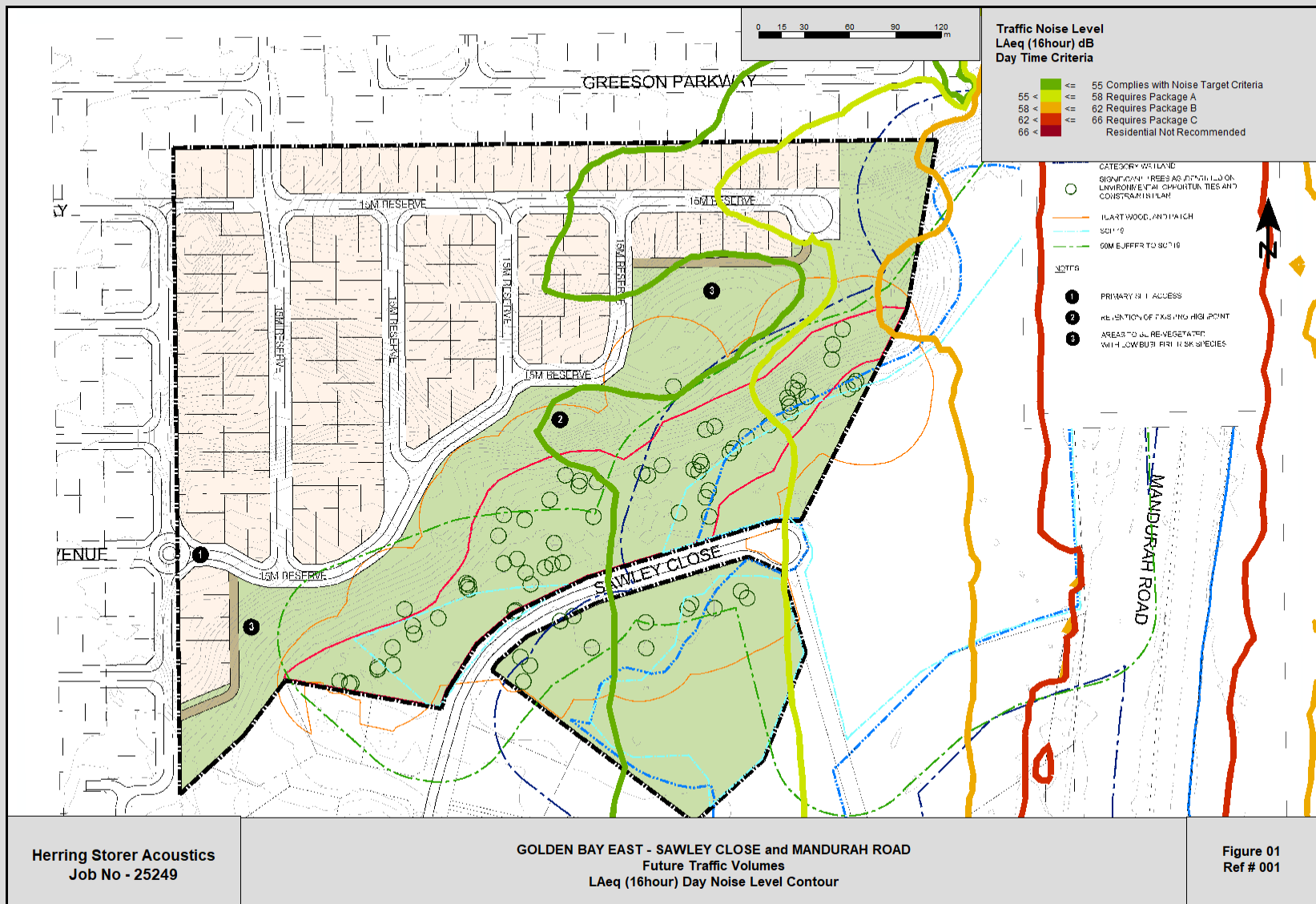
Appendix C details the Quiet House Design Packages required for each individual Lot with Appendix D containing the deemed to satisfy construction methods. We note that alternative constructions as to those listed in Appendix D, are acceptable, provided they are supported by an assessment undertaken by a suitably qualified acoustic consultant.

APPENDIX A

DEVELOPMENT PLAN

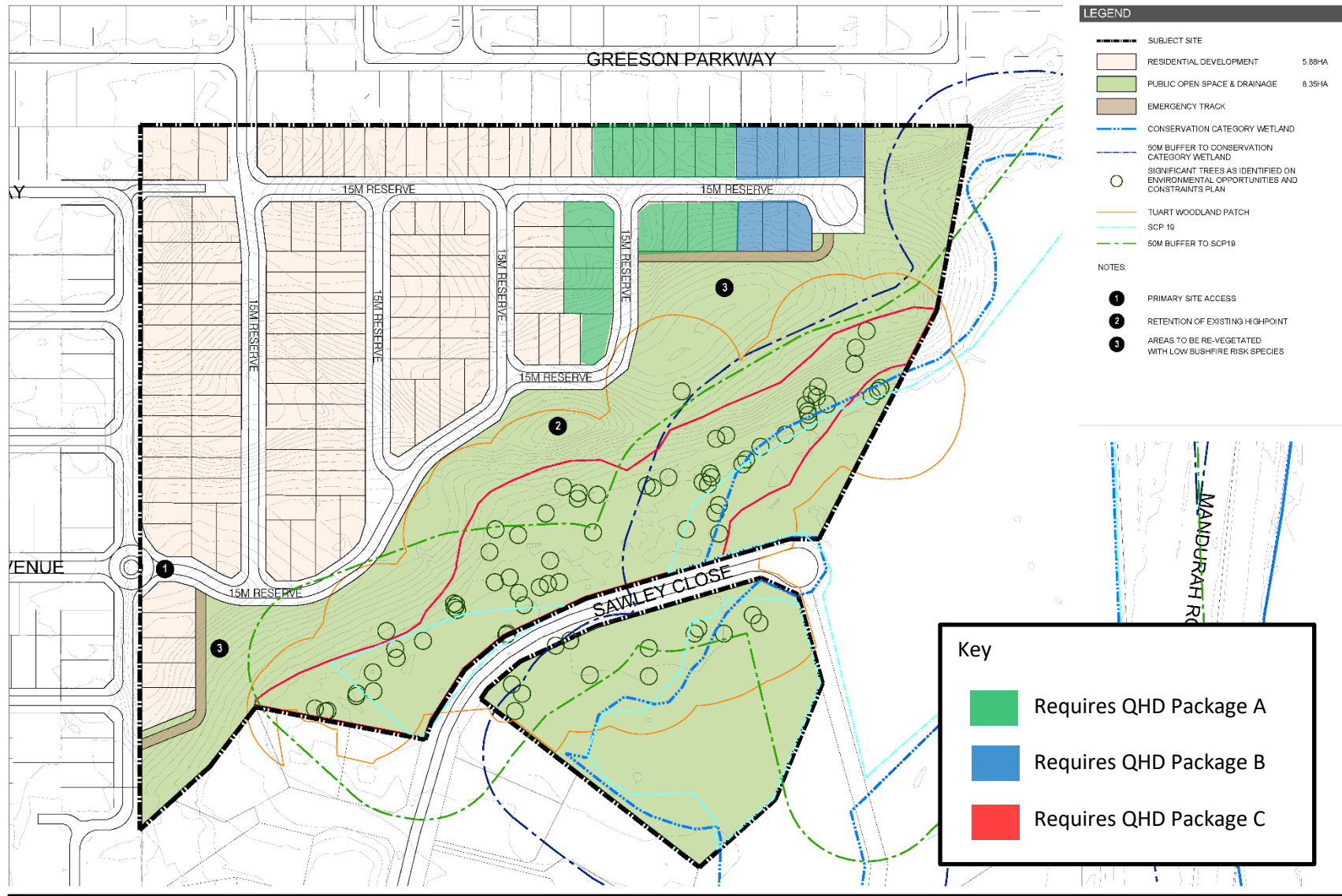
APPENDIX B

NOISE CONTOUR PLOT



APPENDIX C

Quiet House Design – Individual Lot Requirements



CONCEPT PLAN
Lots 23-26, 28 & 161 - 162 Sawley Close, Golden Bay

Level 1/4, The Quadrant | 11811m Street | Perth WA 6000 Australia | +61 8 9340 0000 | URBIS 161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000/1001/1002/1003/1004/1005/1006/1007/1008/1009/1010/1011/1012/1013/1014/1015/1016/1017/1018/1019/1020/1021/1022/1023/1024/1025/1026/1027/1028/1029/1030/1031/1032/1033/1034/1035/1036/1037/1038/1039/1040/1041/1042/1043/1044/1045/1046/1047/1048/1049/1050/1051/1052/1053/1054/1055/1056/1057/1058/1059/1060/1061/1062/1063/1064/1065/1066/1067/1068/1069/1070/1071/1072/1073/1074/1075/1076/1077/1078/1079/1080/1081/1082/1083/1084/1085/1086/1087/1088/1089/1090/1091/1092/1093/1094/1095/1096/1097/1098/1099/1100/1101/1102/1103/1104/1105/1106/1107/1108/1109/1110/1111/1112/1113/1114/1115/1116/1117/1118/1119/1120/1121/1122/1123/1124/1125/1126/1127/1128/1129/1130/1131/1132/1133/1134/1135/1136/1137/1138/1139/1140/1141/1142/1143/1144/1145/1146/1147/1148/1149/1150/1151/1152/1153/1154/1155/1156/1157/1158/1159/1160/1161/1162/1163/1164/1165/1166/1167/1168/1169/1170/1171/1172/1173/1174/1175/1176/1177/1178/1179/1180/1181/1182/1183/1184/1185/1186/1187/1188/1189/1190/1191/1192/1193/1194/1195/1196/1197/1198/1199/1200/1201/1202/1203/1204/1205/1206/1207/1208/1209/1210/1211/1212/1213/1214/1215/1216/1217/1218/1219/1220/1221/1222/1223/1224/1225/1226/1227/1228/1229/1230/1231/1232/1233/1234/1235/1236/1237/1238/1239/1240/1241/1242/1243/1244/1245/1246/1247/1248/1249/1250/1251/1252/1253/1254/1255/1256/1257/1258/1259/1260/1261/1262/1263/1264/1265/1266/1267/1268/1269/1270/1271/1272/1273/1274/1275/1276/1277/1278/1279/1280/1281/1282/1283/1284/1285/1286/1287/1288/1289/1290/1291/1292/1293/1294/1295/1296/1297/1298/1299/1300/1301/1302/1303/1304/1305/1306/1307/1308/1309/1310/1311/1312/1313/1314/1315/1316/1317/1318/1319/1320/1321/1322/1323/1324/1325/1326/1327/1328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APPENDIX D

QUIET HOUSE DESIGN GUIDELINES

Excerpt from *State Planning Policy 5.4 – Road and Rail Noise Guidelines* (2019)



Table 3: Quiet house requirements

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	
A Quiet House A	Facing	Bedroom and indoor living and work areas to Rw+Ctr 45dB <ul style="list-style-type: none"> One row of 92mm studs at 600mm centres with: <ul style="list-style-type: none"> Resilient steel channels fixed to the outside of the studs; and 9.5mm hardboard or 9mm fibre cement sheeting or 11mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and 75mm glass wool (11kg/m³) or 75mm polyester (14kg/m³) insulation, positioned between the studs; and Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs. 	Bedrooms: <ul style="list-style-type: none"> Fully glazed hinged door with certified Rw+Ctr 28dB rated door and frame including seals and 6mm glass <p>Other external doors to Rw+Ctr 25dB, e.g.</p> <ul style="list-style-type: none"> 35mm solid core timber hinged door and frame system certified to Rw 28dB including seals Glazed sliding door with 10mm glass and weather seals 	Bedrooms: <ul style="list-style-type: none"> Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 28 dB). Sealed awning or casement windows may use 6 mm glazing instead. Up to 60% floor area: as per above but must be sealed awning or casement type windows (Rw+Ctr 31dB). <p>Indoor living and work areas</p> <ul style="list-style-type: none"> Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 25dB). Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 28 dB). Up to 80% floor area: As per Bedrooms at up to 60% area (Rw+Ctr 31dB). 	To Rw+Ctr 35dB <ul style="list-style-type: none"> Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling 	<p>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.</p> <ul style="list-style-type: none"> Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces Evaporative systems require attenuated ceiling air vents to allow closed windows Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements 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
	Side on	<ul style="list-style-type: none"> Single leaf of 150mm brick masonry with 13mm cement render on each face. Double brick: two leaves of 90mm clay brick masonry with a 20mm cavity between leaves. 				
	Opposite		As per 'Facing' above, except Rw+Ctr values may be 3dB less, e.g. glazed sliding door with 10mm glass and weather seals for bedrooms.	As above, except Rw+Ctr values may be 3dB less, or max % area increased by 20%		
A Quiet House A+	All	As per Quiet House A, except double leaf masonry / brick construction only.	As per Quiet House A.	As per Quiet House A, except that <ul style="list-style-type: none"> 'Side-on' requirements same as 'Facing'. All windows comprise minimum 6 mm thick laminated or toughened glass in sealed awning or casement frames. Polymer (e.g. uPVC) window framing should be used. Evaporative air conditioning systems are not recommended. No external doors for bedrooms with entry 'Facing' transport corridor 	No specific requirements	
B Quiet House B	Facing	Bedroom and indoor living and work areas to Rw+Ctr 50dB <ul style="list-style-type: none"> Single leaf of 90mm clay brick masonry with: <ul style="list-style-type: none"> A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres; A cavity of 25mm between leaves; 50mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and One layer of 10mm plasterboard fixed to the inside face Single leaf of 220mm brick masonry with 13mm cement render on each face 	Bedrooms <ul style="list-style-type: none"> Fully glazed hinged door with certified Rw+Ctr 31dB rated door and frame including seals and 10mm glass Other external doors to Rw+Ctr 28dB, e.g. As per Quiet House A Bedrooms. 	Bedrooms: <ul style="list-style-type: none"> Total external door and window system area up to 40% of room floor area: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 31 dB). Up to 60% floor area: as per above but must be minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 34dB). <p>Indoor living and work areas</p> <ul style="list-style-type: none"> Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 28dB). Sealed awning or casement windows may use 6 mm glazing instead. Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 31 dB). Up to 80% floor area: As per Bedrooms at up to 60% area (Rw+Ctr 34dB). 	To Rw+Ctr 35dB <ul style="list-style-type: none"> Concrete or terracotta tile or metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation 	<p>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</p>
	Side-on	<ul style="list-style-type: none"> 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face 				
	Opposite	<ul style="list-style-type: none"> Double brick: two leaves of 90mm clay brick masonry with: <ul style="list-style-type: none"> A 50mm cavity between leaves 50mm glass wool or polyester cavity insulation (R2.0+) resilient ties where required to connect leaves Double brick: two leaves of 110mm clay brick masonry with a 50mm cavity between leaves and R2.0+ cavity insulation 	As per Quiet House A 'Facing' above (Rw+Ctr values may be 3dB less, or max % area increased by 20%).			
B Quiet House B+	All	As per Quiet House B example above, except use double leaf masonry construction only.	As per Quiet House B, except <ul style="list-style-type: none"> No external doors for bedrooms with entry 'Facing' or 'Side-on' to transport corridor 	As per Quiet House B, except that <ul style="list-style-type: none"> 'Side-on' requirements become the same as Quiet House B 'Facing'. All windows comprise minimum 6 mm thick laminated or toughened glass in sealed awning or casement frames. Polymer (e.g. uPVC) window framing should be used. Evaporative air conditioning systems are not recommended. 	As per Quiet House C (to Rw+Ctr 40dB).	



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	
C Quiet House C	Facing	Bedroom and indoor living and work areas to Rw+Ctr 50dB • As per Quiet House B example above	Bedrooms • External doors to bedrooms facing the corridor are not recommended. Other external doors to Rw+Ctr 30dB, e.g. • Fully glazed hinged door with certified Rw+Ctr 31dB rated door and frame including seals and 10mm glass. • 40mm solid core timber frame and door (without glass or with glass inserts not less than 6mm), side hinged with certified Rw 32dB acoustically rated door and frame system including seals	Bedrooms: • 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 (Rw+Ctr 31 dB). • Up to 40% floor area: as per above but must be minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 34dB). Indoor living and work areas • Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 31dB). Sealed awning or casement windows may use 6 mm glazing instead. • Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 34 dB).	To Rw+Ctr 40dB • To all bedrooms, 2 layers of 10mm plasterboard, or one layer 13 mm high density sealed plasterboard (minimum surface density of 12.5 kg/m ²), affixed using steel furring channels beneath ceiling rafters / supports. • R3.0+ insulation batts laid in cavity. • Concrete or terracotta tile roof with sarking, or metal sheet roof with foil backed R2.0+ fibre insulation between steel sheeting and roof battens.	As per Quiet House B • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces • Evaporative systems require attenuated ceiling air vents to allow closed windows • Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements • 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
	Side-on		As per Quiet House B 'Facing' above (Rw+Ctr values may be 3dB less, or max % area increased by 20%).			
	Opposite		As per Quiet House A 'Facing' above.			
C Quiet House C+	All	As per Quiet House B example above, except using double leaf masonry construction only. • Double brick: two leaves of 90mm clay brick masonry with: – A 50mm cavity between leaves – R2.0+ cavity insulation – resilient ties where required to connect • Double brick: two leaves of 110mm clay brick masonry with a 50mm cavity between leaves and R2.0+ cavity insulation	As per Quiet House C, except • No external doors for bedrooms with entry 'Facing' or 'Side-on' to transport corridor.	As per Quiet House C, except that • 'Side-on' requirements same as Quiet House C 'Facing'. • All windows into habitable areas comprise minimum 6 mm thick glazing in sealed awning or casement frames. Polymer (e.g. uPVC) window framing and hardware which cannot rattle loose should be used throughout. • Evaporative air conditioning systems are not recommended.	To Rw+Ctr 45dB As per Quiet House C, except • the roof must be concrete or terracotta tile construction with sarking (i.e. no steel sheet roof option). • Ceilings to bedrooms must be constructed from at least 2 overlapping layers of flush plasterboard.	

Footnotes:

- The airborne weighted sound reduction index (Rw) and traffic correction term (Ctr) are published by manufacturers/suppliers, can be determined by acoustical consultants or measured in accordance with AS ISO 717.1. Higher Rw+Ctr values infer greater sound insulation. All values are minimum Rw+Ctr (dB)
- Example construction for different external wall ratings of Rw+Ctr 45dB and 50dB are provided and are listed within Specification F5.2 in Volume 1 Part F of the National Construction Code. These values are based on the installation and sealing of joints and penetrations in accordance with Specification F5.2.

- Window and external door sound reduction values provided are based on the provision of suitable acoustic seals to prevent sound leakage. To comply with the above ratings, all external glass windows and doors specified under requirements A, B and C must have the following:
 - Operable windows and external doors must have a seal to restrict air infiltration fitted to each edge and doors must have a drop seal to provide an airtight seal when closed
 - Within doors or fixed framing, glazing must be set and sealed using an airtight arrangement of non-hardening sealant, soft rubber (elastomer) gasket and/or glazing tape, or be verified by manufacturer or approved person that the construction system as to be installed achieves the relevant Rw+Ctr value

- In this context, a seal is foam or silicon based rubber compressible strip, fibrous seal with vinyl lin interleaf or the like. Brush / pile type seals without this seal included are not allowed.
- Glazing referenced can be monolithic, laminated or toughened safety glass
- Any penetrations in a part of the building envelope must be acoustically treated so as not to degrade the performance of the building elements affected. Most penetrations in external walls such as pipes, cables or ducts can be sealed through caulking gaps with non-hardening mastic or suitable mortar

APPENDIX E

TRAFFIC DATA



Hourly Volume

Mandurah Rd (H002)

North of Dampier Rd (SLK 42.63)

2020/21

Monday to Friday

	All Vehicles		
	NB	SB	Both
00:00	31	32	63
01:00	20	21	41
02:00	16	23	39
03:00	43	21	64
04:00	158	108	266
05:00	566	229	795
06:00	779	451	1230
07:00	1082	704	1786
08:00	1159	859	2018
09:00	776	703	1479
10:00	737	700	1437
11:00	737	734	1471
12:00	747	755	1502
13:00	716	778	1494
14:00	848	904	1752
15:00	1040	1255	2295
16:00	997	1261	2258
17:00	828	1166	1994
18:00	521	660	1181
19:00	328	346	674
20:00	279	271	550
21:00	222	246	468
22:00	122	143	265
23:00	78	78	156
TOTAL	12830	12448	25278

	Heavy Vehicles			
	NB	SB	Both	%
00:00	0	3	3	4.8
01:00	1	5	6	14.6
02:00	2	6	8	20.5
03:00	6	6	12	18.8
04:00	11	22	33	12.4
05:00	38	47	85	10.7
06:00	68	80	148	12.0
07:00	72	103	175	9.8
08:00	73	92	165	8.2
09:00	74	92	166	11.2
10:00	76	107	183	12.7
11:00	58	120	178	12.1
12:00	76	111	187	12.5
13:00	70	112	182	12.2
14:00	73	117	190	10.8
15:00	67	140	207	9.0
16:00	61	127	188	8.3
17:00	47	110	157	7.9
18:00	22	61	83	7.0
19:00	18	24	42	6.2
20:00	12	22	34	6.2
21:00	8	10	18	3.8
22:00	5	12	17	6.4
23:00	1	4	5	3.2
TOTAL	939	1533	2472	9.8



Peak Statistics

AM	TIME	07:30	08:00	07:45	08:30	11:00	10:30
	VOL	1223	859	2059	79	120	185
PM	TIME	15:30	15:15	15:30	14:15	15:00	14:45
	VOL	1081	1284	2348	78	140	217

Volume

