



**LOT 40 SANCTUARY GOLF COURSE
DEVELOPMENT**

**RESIDENTIAL SUBDIVISION
ACOUSTIC ASSESSMENT**

FOR

AZUNA

NOVEMBER 2024

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ACOUSTIC ASSESSMENT
LOT 40 SANCTARY GOLF COURSE

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FOR

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EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Azuna to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 40 Sanctuary Golf Course from road traffic noise associated with both the Forrest Highway / Australind Bypass and The Old Coast Road.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Transport Noise and Freight Considerations in Land Use Planning” (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

$L_{Aeq(Day)}$ of 60 dB(A);

$L_{Aeq(Night)}$ of 55 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.

Additional to the above, noise received at an outdoor area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

The results of the acoustic assessment indicate that without any noise amelioration, noise received at the Lots 55 to 59/Units 12 to 15 at the first floor levels would exceed the “Target Noise” level and package A “Quiet House Design”. Additionally, Notification of Titles would be required for Lots 53 to 39. Noise received at the other units / residences in the future would be less than the “Target Noise” levels and under the Policy there are no further acoustic requirements.

Details of the Package A deemed to satisfy requirements are attached in Appendix D. It is noted that alternative constructions are acceptable, provided they are supported by a report from a suitably qualified acoustic consultant.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Azuna to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 40 Sanctuary Golf Course from road traffic noise associated with both the Forrest Highway / Australind Bypass and the Old Coast Road.

This acoustic study has been undertaken to assess the suitability of residential premises in these lots and provide recommendations in regard to noise amelioration.

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

- Determine by noise modelling the noise that would be received at proposed residences within this stage of the scheme amendment from vehicles travelling on both Forrest Highway / Australind Bypass and the Old Coast Road.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles.

2. CRITERIA

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} (Day) 40(Living and work areas) L_{Aeq} (Night) 35 (bedrooms)
Roads	New	55	50	N/A
	Upgrade	60	55	N/A
Railways	New	55	50	N/A
	Upgrade	60	55	N/A

Notes:

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

Noise Exposure Forecast (Section 6.2)

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

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

3. NOISE MONITORING

Noise monitoring was undertaken within the proposed development area between the 10th and 17th December 2018. The monitoring location is shown on Figure A3, attached in Appendix A.

It is noted that with the current road works in the area, including the Bunbury Outer Ring Road and temporary closure to Estuary Drive, new noise monitoring was not undertaken. We also note that the from the MRWA Traffic Map, the latest traffic flow data for the Australind bypass is 2019 / 20, thus this data can be directly used for the purposes of calibrating the noise model.

The results of the noise data logging are summarised in Table 3.1 with the graphical data contained in Appendix B.

TABLE 3.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Within Lot 40	52.3	51.0	47.0

Based on the noise monitoring, the calculated difference between the L_{A10,18hour} and L_{Aeq,16hour}, and the L_{A10,18hr} and L_{Aeq,8hr} is -1.3 and -5.3 dB respectively. Also, as the difference between day and night L_{Aeq} noise levels is less than 5 dB(A) (i.e. 4 dB(A)), hence, the night period is the critical period for compliance.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows 20 years in the future.

The input data for the model included:

- Topographical and cadastral data, taken from Google Earth;
- Traffic data as per Table 4.1;
- Adjustments as listed in Table 4.2.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Forrest Highway	Old Coast Road
Traffic flows		
Current (2019)	33209 vpd	8705 vpd
Future (2044)	37720 vpd	12500 vpd
Heavy Vehicles (%)	11.4	3.9
Speed Limit (km/hr)	80 (East bound) 70 (West bound)	80
Road Surface	Dense Graded Asphalt	Chip Seal

From information provided by the MRWA in an Email of 18 October 2024, the increase in the traffic flows for the Australind Bypass would be :

- **1.5%** per annum without Bunbury Outer Ring Road
- **0.2%** per annum with Bunbury Outer Ring Road.

We note that the Bunbury Outer Ring Road is due to open in December 2024.

TABLE 4.2 – ADJUSTMENTS FOR NOISE MODELLING

Description	Value
Façade Reflection Adjustment	+2.5 dB
Conversion from L_{A10} (18 hour) to L_{Aeq} (16 hour) (Day)	-1.3 dB*
Conversion from L_{A10} (18 hour) to L_{Aeq} (8 hour) (Night)	-5.3 dB*

* Based on measured results listed in Table 3.1.

Other input data for the model included:

- 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 engines and exhaust noise sources.
- Traffic data for current flows were obtained from the MRWA Traffic Map (<https://mrapps.mainroads.wa.gov.au/TrafficMap/>). For reference, the traffic flow data is attached in Appendix F.
- Future traffic flows, as used in previous modelling and listed above.
- Topographical data, with the ground level within the development based on natural ground levels as per Google Earth.
- A +2.5 dB adjustment to allow for façade reflection.
- Development receiver heights at 1.4m above ground level.
- Future buildings located on the Lots (assumed to be present for future road traffic volumes).

5. TRAFFIC NOISE ASSESSMENT

The noise criteria set by MRWA and WAPC are stated in terms of the L_{Aeq} (Day) (6am to 10pm) and the L_{Aeq} (Night) (10pm to 6am). The CoRTN algorithms do not predict these parameters. As such, the empirical offsets between the L_{A10} (18 hour) and the L_{Aeq} values presented in Table 4.2 have been used to determine the values.

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq}(16hr)$ and the $L_{Aeq}(8hr)$ would be less than 5 dB(A). Therefore, if compliance with the night period noise limit is achieved, then compliance with the day period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

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

Table 5.1 details the noise level at the building envelope for each proposed development Lot, as shown on Figure A2 in Appendix A.

TABLE 5.1 – DEVELOPMENT NOISE LEVELS

Lot / Unit Number	Results (Ground Floor)		Results (First Floor)	
	L _{AeqNight} (dB(A))	Requirements	L _{AeqNight} (dB(A))	Requirements
43 - 52	< 50	Nil	< 50	Nil
53 - 54	50	N	52	N
55	50	N	53	A
56	51	N	54	A
57	51	N	54	A
58	52	N	54	A
59	52	N	55	A
60 - 67	< 50	Nil	< 50	Nil

Note: Nil No Requirements
 N Notification on Title
 A Package A Quiet House Design and Notification

The results of the acoustic assessment indicate that without any noise amelioration, noise received at some units would exceed the “Target Noise” level. Due to the adjustment for the façade reflection, standard construction can be used for those units with noise levels of 52 dB(A) or less. However, for those first-floor levels where the calculated noise level is 53 or greater, package A “Quiet House Design” is required. Additionally, Notification of Titles would be required for Lots 53 - 59. Noise received at the other Lots / Units in the future would be less than the “Target Noise” levels and under the Policy there are no further acoustic requirements.

Details of the Package A deemed to satisfy requirements are attached in Appendix D. It is noted that alternative constructions are acceptable, provided they are supported by a report from a suitably qualified acoustic consultant.

APPENDIX A

FIGURE A1 – SITE LAYOUT

FIGURE A2 – RECEIVER LOCATION MAP

FIGURE A3 – LOGGER LOCATION

FIGURE A1 – SITE LAYOUT



SURVEY STRATA RE-SUBDIVISION
 Survey Strata Lot 40 and CP 41 on SP33623
 Old Coast Road, PELICAN POINT

Plan No. 24010-01	BUNBURY OFFICE:	<p>COPYRIGHT: This document is the property of Harley Dykstra. The document may only be used for the purposes for which it was prepared and is not to be used for any other purpose without the prior written consent of Harley Dykstra.</p>
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Scale | 1:1000@A3

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey



FIGURE A2 – RECEIVER LOCATION MAP

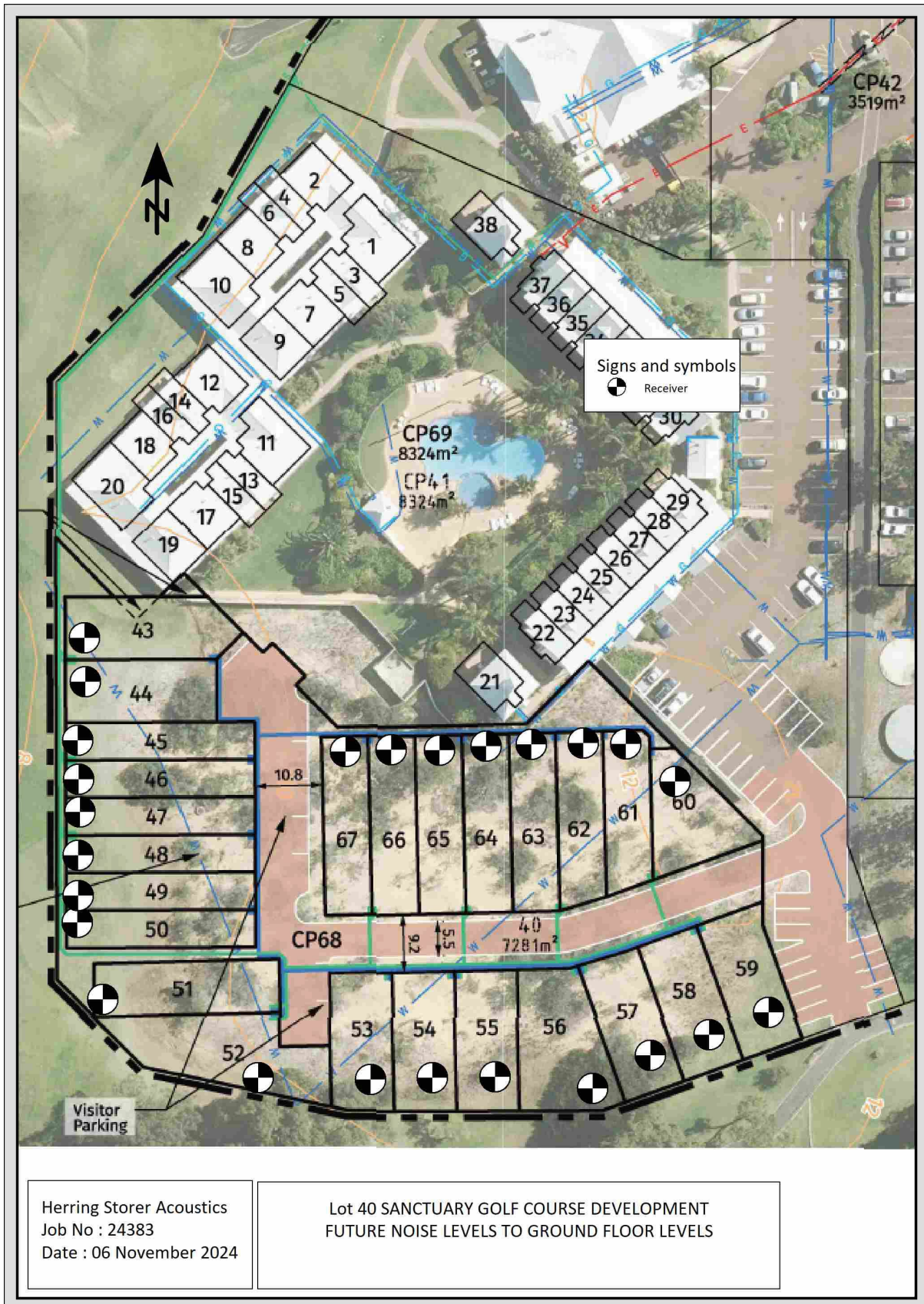


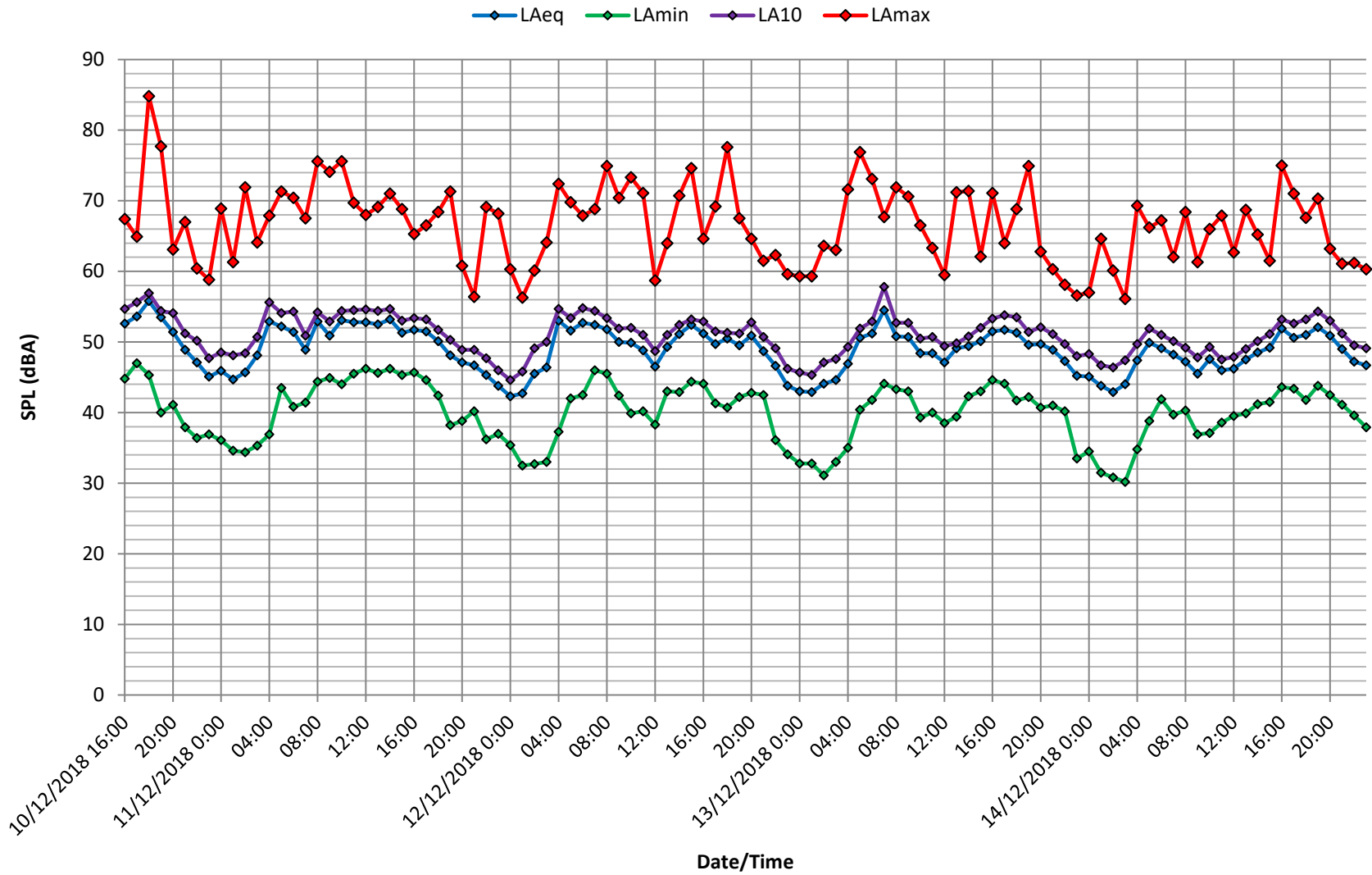
FIGURE A3 – LOGGER LOCATION



APPENDIX B

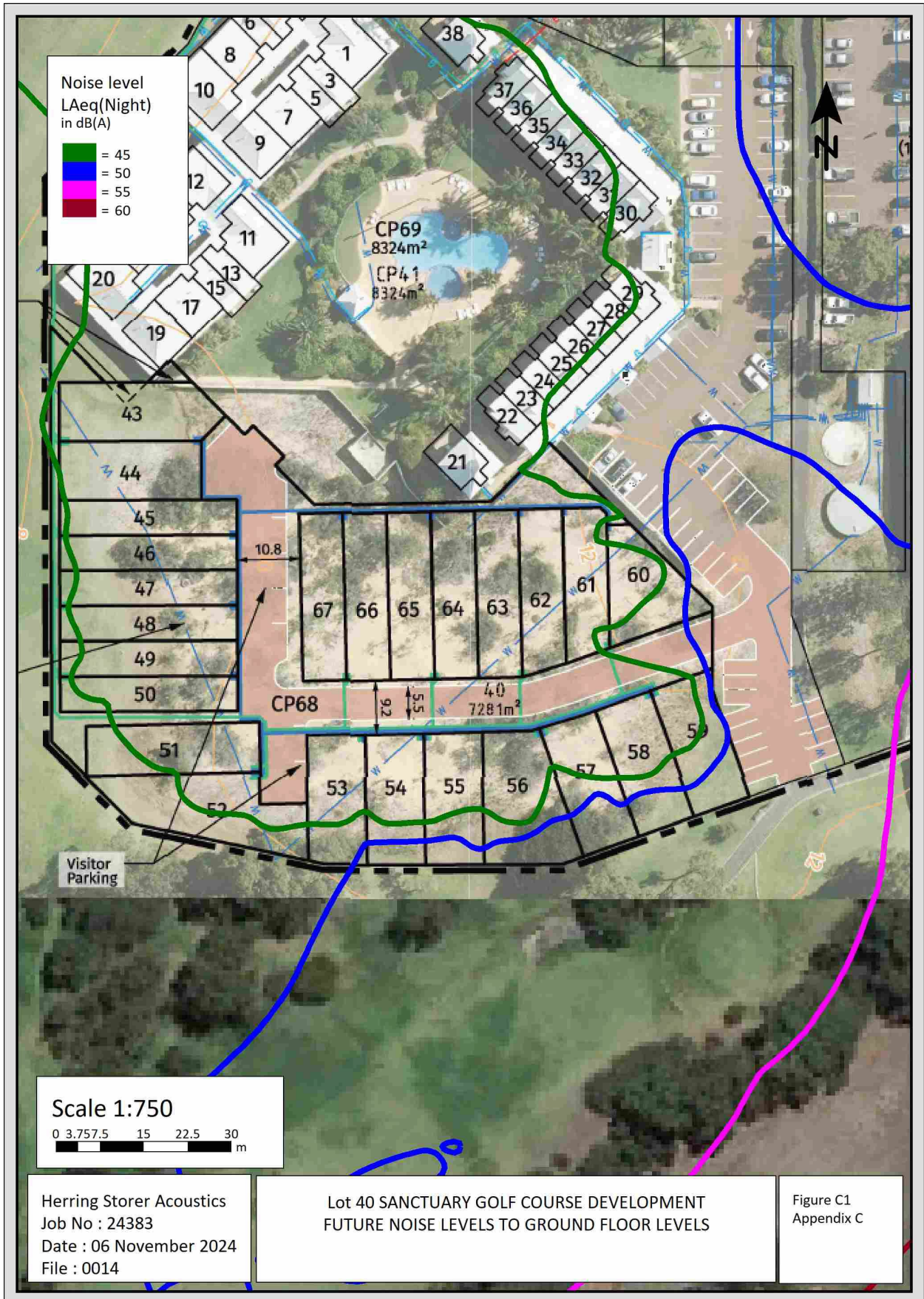
NOISE MONITORING RESULTS

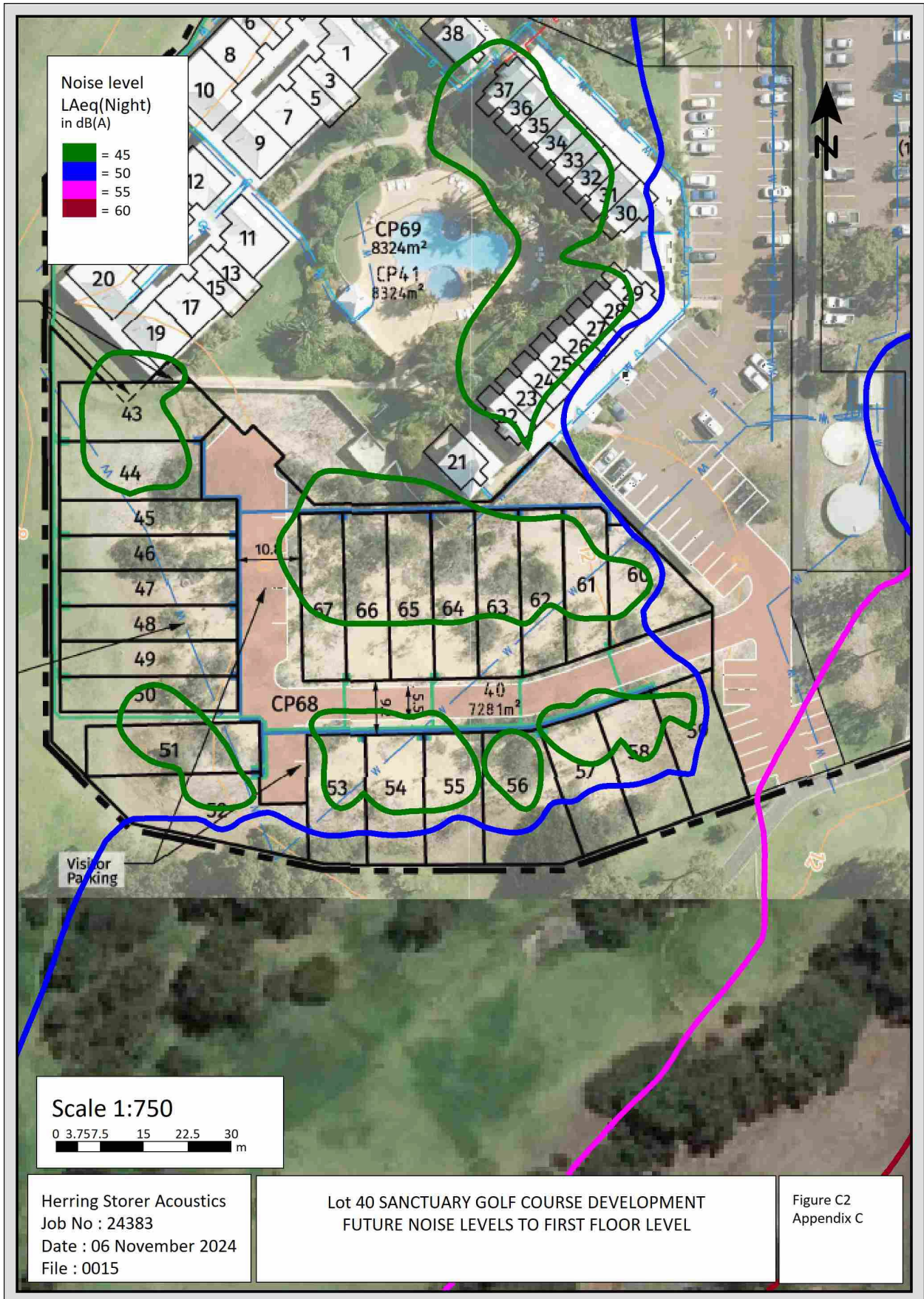
LOT 40 SANCTUARY GOLF COURSE : NOISE MONITORING RESULTS



APPENDIX C

NOISE CONTOURS PLOT





APPENDIX D

QUIET HOUSE DESIGN PACKAGE A

QUIET HOUSE DESIGN DEEMED-TO-SATISFY CONSTRUCTIONS FOR PACKAGE A

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
A Quiet House A	Facing	Bedroom and Indoor Living and work areas to $R_w + C_{tr}$ 45dB Stud Frame Walls <ul style="list-style-type: none"> ➤ One row of 92mm studs at 60mm centres with: ➤ Resilient steel channels fixed to the outside of the studs; and ➤ 9.5mm hardboard or 9mm 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 R_w+C_{tr} 28dB rated door and frame including seals and 6mm glass Indoor Living and work areas: <ul style="list-style-type: none"> ➤ 35mm solid core timber hinged door and frame system certified to R_w 28dB including seals: OR ➤ Glazed sliding door with 10 mm 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 10 mm single or 6mm-12mm-10mm double insulated glazing (R_w+C_{tr} 28 dB). Sealed awning or casement windows may use 6 mm glazing instead: OR ➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} 31dB). Indoor Living and work areas <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 (R_w+C_{tr} 25dB): OR ➤ Up to 60% floor area: As per Bedrooms at up to 40% area (R_w+C_{tr} 28 dB) : OR ➤ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} 31 dB). 	To R_w+C_{tr} 35dB <ul style="list-style-type: none"> ➤ Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling 	<ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> ➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of R_w 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: OR ➤ Double brick: two leaves of 90 mm clay brick masonry with a 20mm cavity between leaves. 	As per "Facing" above, except R_w+C_{tr} values may be 3dB less, e.g. glazed sliding door with 10 mm glass and weather seals for bedrooms	As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20%			
	Opposite		No specific requirements	No specific requirements			

Note : Alternative constructions are acceptable, provided they are supported by a report from a suitably qualified acoustic consultant.