Lend Lease Communities (Yarrabilba) Pty Ltd

Yarrabilba Development

Stage 1 Precinct 1

Traffic Noise Assessment

Report No. 70Q-10-0302-TRP-512256-0
24 Feb 2012

DOCUMENT CONTROL

Yarrabilba Development - Stage 1 Precinct 1 Traffic Noise Assessment		
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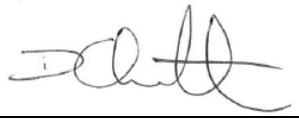
AUTHOR:		
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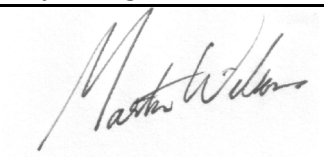
REVIEWED BY:		
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EXECUTIVE SUMMARY

Vipac Engineers & Scientists Ltd (VIPAC) has completed a traffic noise assessment for Stage 1 in Precinct 1 of the proposed Yarrabilba development on the Waterford-Tamborine Road. Noise impacts on the development have been assessed according to the Department of Transport and Main Roads (TMR), AS 3671:1989 and AS/NZS 2107:2000 noise policies.

16 Lots in Stage 1 of Precinct 1 exceed the TMR traffic noise criteria at the ground floor level and 21 Lots at the first floor level. For lots where the noise criteria are exceeded, the relevant floors require acoustic treatment.

For floors of Lots where the noise criteria is exceeded, glazing requirements were calculated and are detailed in this report. Calculations used worst case assumptions about room and window sizes. Less conservative requirements may be calculated using to AS3671 and AS2107 with final building plans when available.

For floors of Lots where the noise criteria is exceeded, acceptable indoor noise levels can be achieved with the glazing recommendations specified, however external doors and windows must remain closed. Under these conditions, alternative ventilation will be required. Alternative ventilation may include air-conditioning, borrowed ventilation, mechanically assisted ventilation or other suitable methods.

In conclusion, noise impacts associated with the proposed development can be controlled to an acceptable level by implementing the recommendations in this report.

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1. INTRODUCTION

Vipac Engineers & Scientists Ltd (VIPAC) was commissioned by Lend Lease to provide a traffic noise assessment for Stage 1 of Precinct 1 of the Yarrabilba development, to be located on the Waterford-Tamborine Road.

The purpose of this assessment is to determine the traffic noise impacts at residential Lots in Stage 1 of the development.

Noise impacts have been assessed in accordance with the Department of Transport and Main Roads (TMR), AS 3671:1989 (AS3671) and AS/NZS 2107:2000 (AS2107) noise policies.

2. PROPOSED DEVELOPMENT AND SURROUNDING AREA

The site is located on the Waterford-Tamborine Road. Stage 1 of Precinct 1 of the proposed development is to consist of approximately 55 Lots.

The following information about the surrounding area was observed on site and presented in Figure 2-1:

- North: Dowe Haven Equestrian Park and residential dwellings
- East: Further development Stages
- South: Further development Stages
- West: The Waterford Tamborine Road, and further west residential dwellings

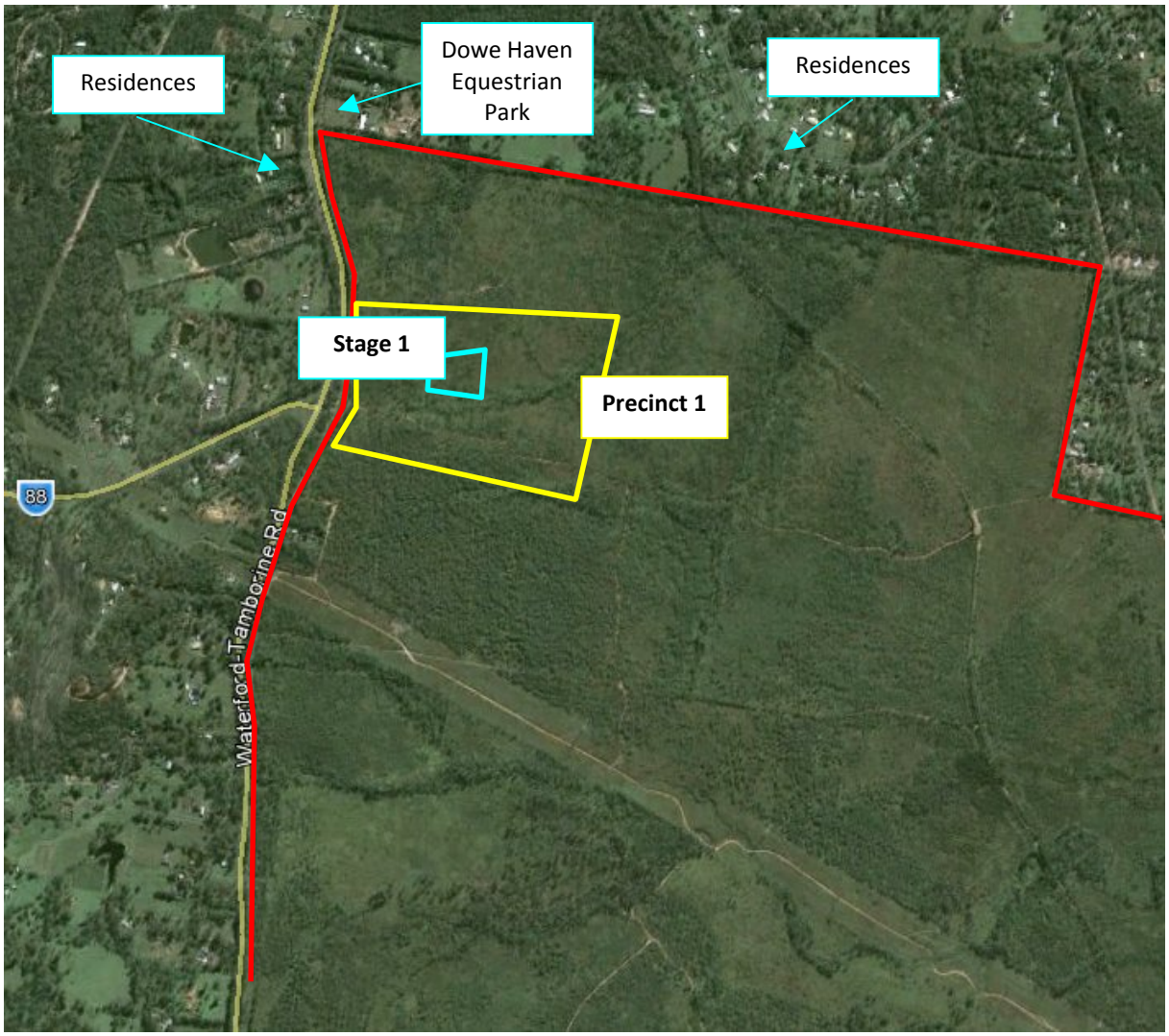

Figure 2-1: Aerial Photograph of the Site

The significant noise source that may potentially impact on Stage 1 of Precinct 1 is traffic noise from the Precinct 1 Road.

3. NOISE POLICY

The applicable noise criteria are summarised in Table 3-1.

Table 3-1: Applicable Noise Policies

Noise Source	Applicable Noise Criteria
Road traffic noise	The Department of Transport and Main Roads' (TMR) Road Traffic Noise Management: Code of Practice (COP) AS/NZS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors (AS2107) AS 3671:1989 Acoustics-Road traffic noise intrusion - Building Siting and Construction (AS3671)

The development is adjacent to the Precinct 1 Road, which will be a major road in the future. Therefore, the Department of Transport and Main Roads' (TMR) 'Road Traffic Noise Management: Code of Practice' (COP) noise criteria have been adopted. The applicable traffic noise limits are:

External noise limit at future residences:

- 57 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is less than 45 dB(A);
- 60 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is greater than 45 dB(A);

Private open space:

- 57 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is less than 45 dB(A);
- 60 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is greater than 45 dB(A);

Where external façade noise limits cannot be met, the TMR COP refers to AS/NZS 2107:2000 'Acoustics-Recommended design sound levels and reverberation times for building interiors' which has the following maximum indoor noise limits for residences near major roads:

- 40 dB(A) for bedrooms
- 45 dB(A) for living rooms

Since Lots in Stage 1 of Precinct 1 will be near a major road, the external noise limit of 60 dB(A) $L_{A10\,(18hr)}$ free field and the private open space noise limit of 60 $L_{A10\,(18hr)}$ of have been adopted for this assessment.

4. TRAFFIC NOISE MODELLING METHODOLOGY

Traffic noise calculations were carried out using SoundPLAN noise modelling software. A 3D computational model was created based on the drawings provided.

The data and assumptions used in traffic noise modelling are presented in Table 4-1. The traffic flow data obtained from Cardno is presented in Table 4-2.

Table 4-1: Data and Assumptions Used in Traffic Noise Modelling

Parameter	Data
Future Residence Receiver Heights	Ground Floor: 1.8m above building pad level First Floor: 4.6m above building pad level (assuming height of storeys as 2.8m) Assumed pad levels are included in APPENDIX B.
Future Residence Receiver Locations	Residential Receivers were placed at the minimum allowable residence setbacks from Lot edges based on "Setback Master Building Setback Plan, received from KN Group, dated 13/8/2009
Terrain Data	• Contour Road.dwg, received from Lend Lease, 3/11/2010 • x11-121base 3d design contours.dwg, received from KN Group, 1/9/2011
Development Lot Layout	V0102_Subd_120112.dwg, received from KN Group, 1/9/2011
Road Alignment	X11-121base 3d design contours.dwg, received from KN Group, 11/11/2011
Stage 1 Entrance Wall	The entrance wall adjacent to Lot 12 in Stage 1 was included in the noise model to incorporate shielding effects. The wall was positioned and dimensioned according to: • Lat27_YB_Nth Village Entry Wall Section (3).pdf, received from Lend Lease, 17/1/2012 • Lat27_YB_Nth Village Entry Wall Plan (3).pdf, received from Lend Lease, 17/1/2012
Calculation Method	UK's Calculation of Road Traffic Noise (CoRTN)
Traffic Volume Conversions - AADT to 18hr Traffic Flows	94%
Road Surface	Dense Graded Asphalt was modelled as the road surface for all roads. No road surface correction is applied to the base noise level calculated by SoundPLAN because the base noise level prediction assumes dense graded asphalt road surface.

Table 4-2: Traffic Data Used for Noise Modelling

Scenario	Road	AADT	18hr Traffic Volumes	%CV	Speed (km/h)
Ultimate	Precinct 1 Road	13,500	12,690	5%*	60

** Conservative assumptions about %CV have been used, as the information was not available at the time of issue of the report. If the %CV is higher than 5%, revised noise modelling may need to be conducted*

5. TRAFFIC NOISE MODELLING RESULTS

Predicted road traffic noise levels are up to 69 dB(A) $L_{A10\,(18hr)}$. This exceeds the applicable noise limits of 60 dB(A).

Predicted noise levels exceed the applicable noise limits by up to 8 dB(A) at the ground floor and 9 dB(A) at the first floor. 16 Lots exceed the noise limits at the ground floor and 16 Lots exceed the noise limits at the first floor as shown in Table 5-1 and Table 5-2.

Table 5-1: Lots Exceeding Applicable External Noise Limits at the Ground Floor Level

Lot	L10(18hr) (dB(A))	Lot	L10(18hr) (dB(A))	Lot	L10(18hr) (dB(A))
12	67	18	67	40	63
13	68	27	63	41	63
14	68	28	63	42	63
15	67	29	63	55	68
16	67	30	63		
17	67	39	63		

Table 5-2: Lots Exceeding Applicable External Noise Limits at the First Floor Level

Lot	L10(18hr) (dB(A))	Lot	L10(18hr) (dB(A))	Lot	L10(18hr) (dB(A))
12	69	18	69	40	65
13	69	27	65	41	65
14	69	28	65	42	65
15	69	29	65	55	69
16	69	30	65		
17	68	39	65		

Floors of future residences where the noise limits are exceeded will need to be designed and constructed according to the methods outlined in AS 3671:1989, “Acoustics-Road traffic noise intrusion - Building Siting and Construction” and the noise limits in AS2107 (see Section 3). Construction requirements are detailed in Section 5.2.

Noise contour maps are included in APPENDIX A. Predicted noise levels at all Lots exceeding the noise limits are presented in APPENDIX B.

5.1 OUTDOOR RECREATIONAL SPACE

A traffic noise contour map of the predicted free field $L_{A10\,(18hr)}$ noise at the ground floor level has been included in Figure A-1 in APPENDIX A. It can be seen that most Lots have areas that are below the TMR 60 dB(A) $L_{A10\,(18hr)}$ noise limit.

All Lots have traffic noise levels less than or equal to 63 dB(A). It is expected that when the buildings are constructed traffic noise levels will be at least 8 dB(A) lower in the space shielded by the buildings. Therefore, all Lots will have areas that comply with the TMR 60 dB(A) $L_{A10\,(18hr)}$ private open space noise limit.

5.2 ARCHITECTURAL TREATMENTS

The TMR 60 dB(A) noise limit will be exceeded at some Lots in Stage 1. Consequently, the building construction should be designed to achieve the recommended noise limits specified in AS 2107 (See Section 3):

- Bedrooms: L_{Aeq} 40 dB(A)
- Other habitable Rooms: L_{Aeq} 45 dB(A)

The recommended acoustic ratings for all walls, windows and roofing were calculated using the procedures in Australian Standard AS3671 *"Acoustics – Road Traffic Noise Intrusion Building Siting and Construction"* using worst case assumptions about room dimensions and building orientations.

The assumed construction specifications for future residences are given in Table 5-3.

Table 5-3: The Assumed Construction Specifications for Future Residences

Item	Construction	Expected R_w
External Wall	Brick Veneer	52
	10mm plasterboard	
Ceiling and Roof	Sheet metal / Cement tiles	38
	10mm Plasterboard	
	R2.5 Batts Insulation	
Glazing and Frames	4mm Float	24

Glazing requirements are specified in Table 5-4. Where glazing acoustic requirements are not specified in Table 5-4, glazing ratings from Table 5-3 can be used.

Table 5-4: Required Glazing Construction for Residences on Lots exceeding External Noise Limits to Comply with Indoor Noise Limits

Floor	Room	Orientation of Façade	Required Rw of Windows*
Ground	Bedrooms	E	34
		S	35
		W	34
	Living Rooms	E	27
		S	28
		W	27
First	Bedrooms	E	35
		S	37
		W	35
	Living Rooms	E	28
		S	30
		W	28

Table 5-4 lists the required R_w ratings (Weighted Sound Reduction Index) for glazing and frames. If consistency of glazing systems is preferred for each room, the higher of the required R_W ratings must be used.

It is required that the R_w performance ratings of the glazing systems (windows and frames) be certified by the supplier prior to installation. Glazing certificates will be required for building certification. Where glazing system requirements are considered high, the design or glazed surface area can be reduced to minimise the acoustic rating required.

For floors of Lots where the noise criteria is exceeded, acceptable indoor noise levels can be achieved with the glazing recommendations specified, however external doors and windows must remain closed. Under these conditions, alternative ventilation will be required. Alternative ventilation may include air-conditioning, borrowed ventilation, mechanically assisted ventilation or other suitable methods.

The recommended glazing requirements are conservative ratings based on preliminary data and assumptions about room sizes and component construction. It is recommended that building construction acoustic requirements be recalculated when final details of room dimensions and building component construction are available.

6. CONCLUSIONS

Vipac Engineers & Scientists Ltd (VIPAC) has completed a traffic noise assessment for Stage 1 of the Yarrabilba development on the Waterford Tamborine Road. Noise impacts on the development have been assessed according to TMR and AS2107 noise policies.

Recommendations are given in this report for noise impacts to comply with applicable noise criteria.

In conclusion, noise impacts associated with the proposed development can be controlled to an acceptable level by implementing the recommendations in this report.

APPENDIX A: NOISE CONTOUR MAPS

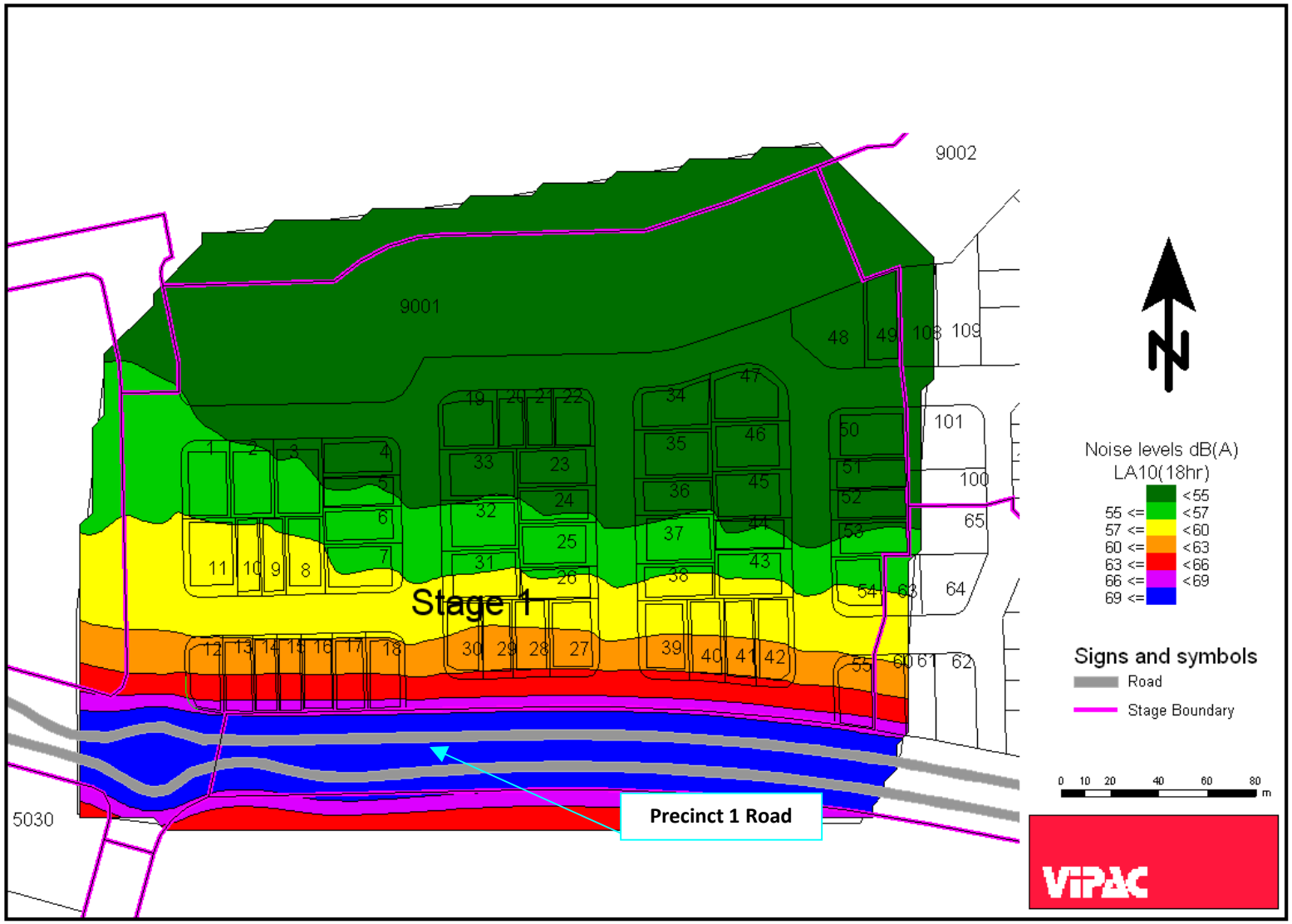

Figure A-1: Predicted Free Field LA10 (18hr) Traffic Noise Levels at the Ground Floor

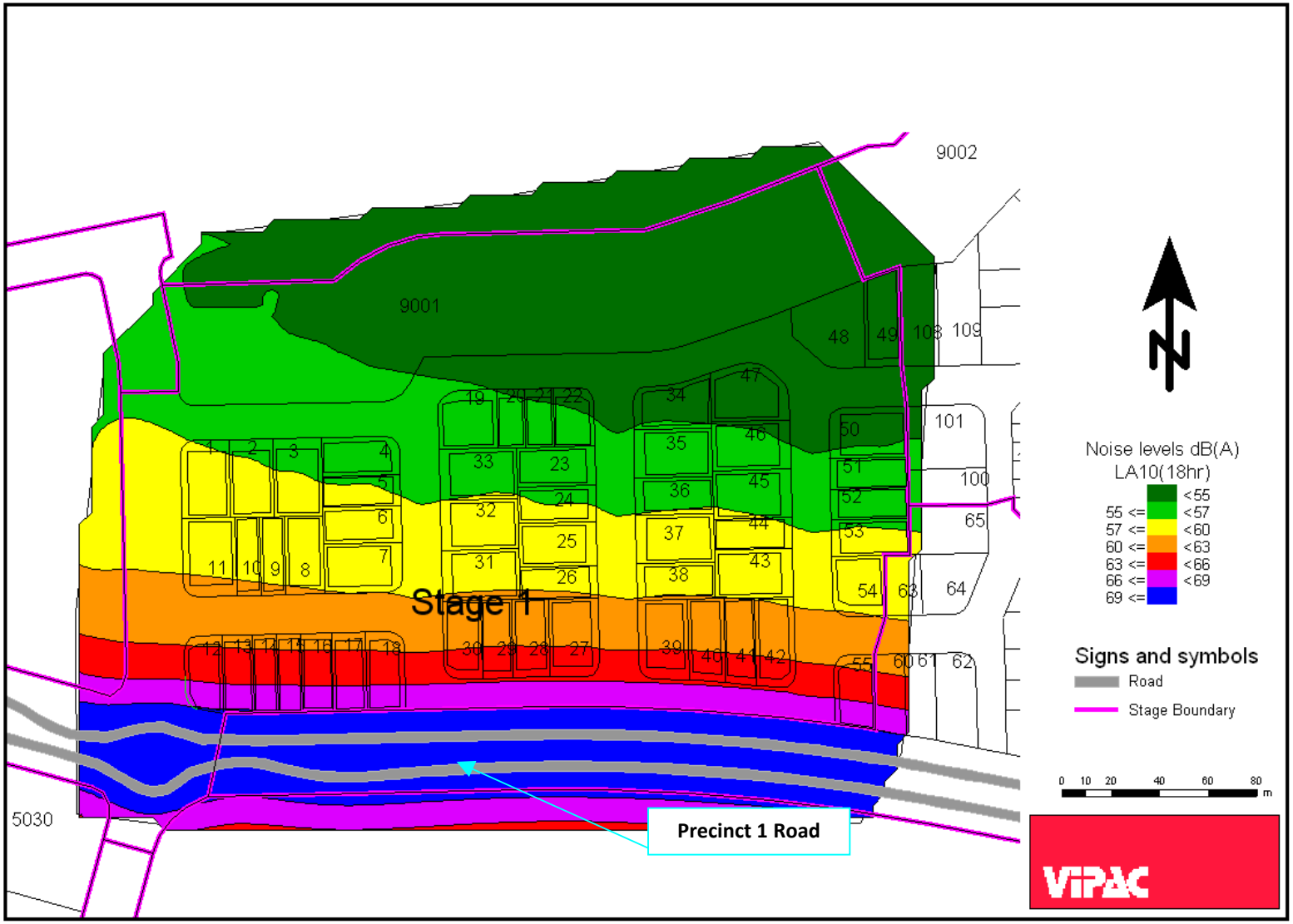

Figure A-2: Predicted Free Field LA10 (18hr) Traffic Noise Levels at the First Floor

APPENDIX B: CALCULATION RESULTS AND ASSUMED PAD LEVELS

Table B-1: Noise Modelling Results and Assumed Pad Heights

Lot	Assumed Building Pad AHD	Floor	L10(18hr) (dB(A))
12	47.77	Ground	67
		First	69
13	47.40	Ground	68
		First	69
14	47.16	Ground	68
		First	69
15	46.86	Ground	67
		First	69
16	46.55	Ground	67
		First	69
17	46.16	Ground	67
		First	68
18	45.63	Ground	67
		First	69
26	43.24	Ground	58
		First	60
27	43.72	Ground	63
		First	65
28	44.30	Ground	63
		First	65
29	44.66	Ground	63
		First	65
30	44.65	Ground	63
		First	65
31	43.96	Ground	58
		First	60
38	42.18	Ground	58
		First	60
39	42.48	Ground	63
		First	65
40	42.20	Ground	63
		First	65
41	41.76	Ground	63
		First	65
42	41.28	Ground	63
		First	65
43	41.28	Ground	58
		First	60
54	40.33	Ground	58
		First	60
55	40.43	Ground	68
		First	69