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ISO9001 Certified Quality Management System

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 28/11/11

Attention	Rob Ball
Company	Delfin Lend Lease
Sender	Daniel Cheetham
Date	15 Nov 2010
Reference	70Q-10-0302-TRP-762457-1
Pages	1 of 7
Subject	Yarrabilba Development, Stage 1 - Preliminary Traffic Noise Assessment

This correspondence is Commercial-in-Confidence.

Dear Rob,

This report presents the results of the preliminary traffic noise assessment conducted for Stage 1 of the Yarrabilba Development.

Vipac Engineers and Scientists Ltd (VIPAC) were commissioned by Delfin to conduct a preliminary traffic noise assessment for Stage 1 of the Yarrabilba Development and provide "in principle" recommendations to mitigate traffic noise to acceptable levels.

1 CRITERIA

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

- External Noise limit at the at the façades of residences:
  - 60 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is less than 45 dB(A);
  - 63 dB(A) $L_{A10\,(18hr)}$ where the background noise level $L_{A90(8hr)}$ is greater than 45 dB(A);
- Private open space:
  - 63 dB(A) $L_{A10\,(12hr)}$
- Where external façade noise limits cannot be meant, the DTMR COP refers to AS/NZS 2107:2000 'Acoustics-Recommended design sound levels and reverberation times for building interiors' which has the following indoor noise limits for residences near major roads:
  - 40 dB(A) for bedrooms
  - 45 dB(A) for living rooms

Noise limits at the façade include a +2.5 dB(A) factor to incorporate façade reflection adjustment.

Since Lots in Stage 1 of the development will be near a major road, the external facade noise limit of 63 dB(A) $L_{A10\,(18hr)}$ façade adjusted has been adopted for this assessment.

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 12/10/2012

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated / /

2 NOISE MODELLING

A 3D computer traffic noise model was generated using SoundPLAN noise modelling software, including the data in Table 1, which includes assumptions and data from Delfin. All residences are assumed to be single storey.

Table 1: Data used for Traffic Noise Modelling

Terrain elevation data	• Northern Area 1m Contours.dwg, received 3/11/2010, supplied by Delfin
Stage 1 Lot Layout	• overall layout.dwg, received 3/11/2010, supplied by Delfin
Ultimate Traffic volumes	Traffic Parameters, received 3/11/2010: Waterford-Tamborine Road: • AADTs, supplied by Delfin: ➢ North of Stage 1 Road Intersection: 41719 vpd ➢ South of Stage 1 Road Intersection: 34816 vpd • Speed limit: 70km/h, supplied by DTMR • %CV: 5%, Assumed* Stage 1 Road: • AADT: 16980 vpd, supplied by Delfin** • Speed limit: 60km/h, supplied by Delfin • %CV: 5%, Assumed *

** Conservative assumptions about traffic parameters have been used. The assumptions will be confirmed with Cardno at a later date. If final traffic parameters are higher than those listed, revised noise modelling with the new parameters may need to be conducted*

***Predicted initial traffic volumes are higher than ultimate traffic volumes for the Stage 1 Road, therefore initial traffic volumes have been adopted. The ultimate traffic is lower because of a proposed DTMR link road, which will draw traffic off the Stage 1 Road.*

A traffic noise contour map with no acoustic barriers is shown in Figure A-2 in Appendix A. Note that SoundPLAN adds a 2.5 dB constant to noise levels at discrete receivers attached to buildings to account for façade correction. This 2.5 dB addition is not included in the Grid Noise Maps.

Traffic noise levels will exceed the DTMR noise limit up to a distance of approximately 70 m from the northern Stage 1 road corridor boundary on and 50 m from the southern Stage 1 road corridor boundary. The difference is due to the differing topography.

Traffic noise barriers have been considered as a noise mitigation option. Traffic noise barriers have been modelled on the northern Stage 1 road corridor boundary and on the property boundary of the Lot closest to the southern Stage 1 road corridor boundary (only one Lot exceeded the noise limit south of the Stage 1 road corridor). It was found that noise barriers up to 2.8m in height are required to reduce traffic noise levels below the DTMR noise limits. A traffic noise contour map with the noise barrier solution is given in Figure A-2 in Appendix A. The barriers are detailed in Figure A-3 in Appendix A.

Future buildings on the closest Lots will shield the Lots further from the noise sources, giving adequate private open space below the criteria.

The following mitigation options will result in compliance with applicable noise limits:

- Reorientating the Lot layout such that there is a separation distance of 70m between the northern Stage 1 road corridor boundary and the closest Lots and a separation distance of 50m between the southern Stage 1 road corridor boundary and the closest Lots;

- Constructing the noise barriers depicted in Figure A-3, up to 2.8m in height;
- Designing and constructing the future residences on Lots in Stage 1 within 70m of the northern Stage 1 road corridor boundary and within 50m of the southern Stage 1 road corridor boundary using the methods outlined in AS 3671:1989 'Acoustics-Road traffic noise intrusion-Building siting and construction' such that the indoor noise limits from AS/NZS 2107:2000 of 40 dB(A) for bedrooms and 45 dB(A) for living rooms are achieved.
- Any combination of the above methods.

In summary, by implementing the noise mitigation options in this document, traffic noise levels in Stage 1 of the Yarrabilba development can be controlled to acceptable levels.

It is recommended that revised traffic noise modelling using the final Lot layout, terrain elevation information and traffic counts be performed when this data is available.

If you have any queries regarding this report, please do not hesitate to contact the undersigned on (07) 3377 0400.

Yours faithfully

VIPAC ENGINEERS & SCIENTISTS LTD

Daniel Cheetham
Consulting Engineer

REVIEWED BY:

Martin Wilson
Senior Engineer

APPENDIX A: NOISE CONTOUR MAPS

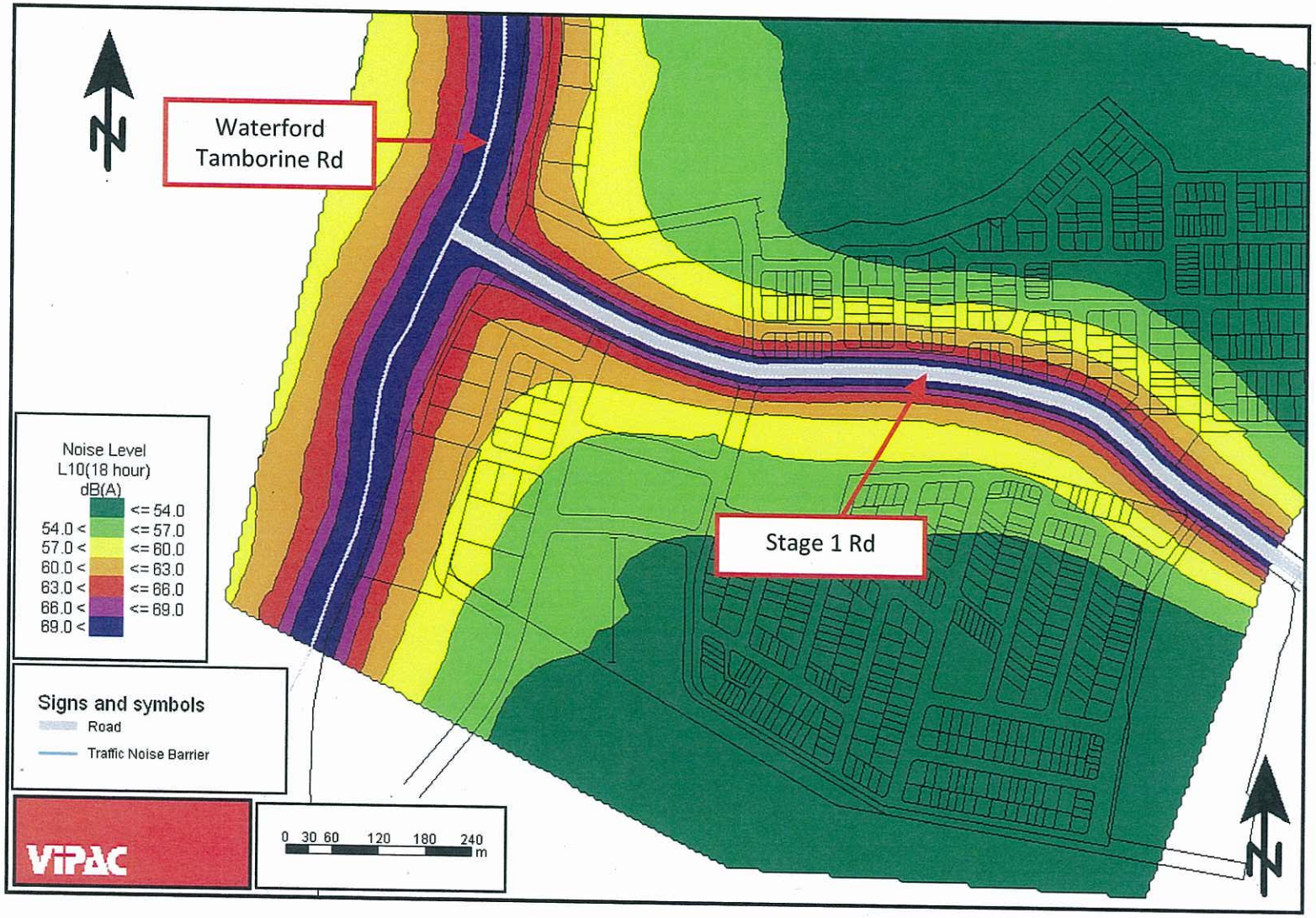

Figure A-1: Predicted Ground Floor Free Field Traffic Noise Contours with no Noise Barriers

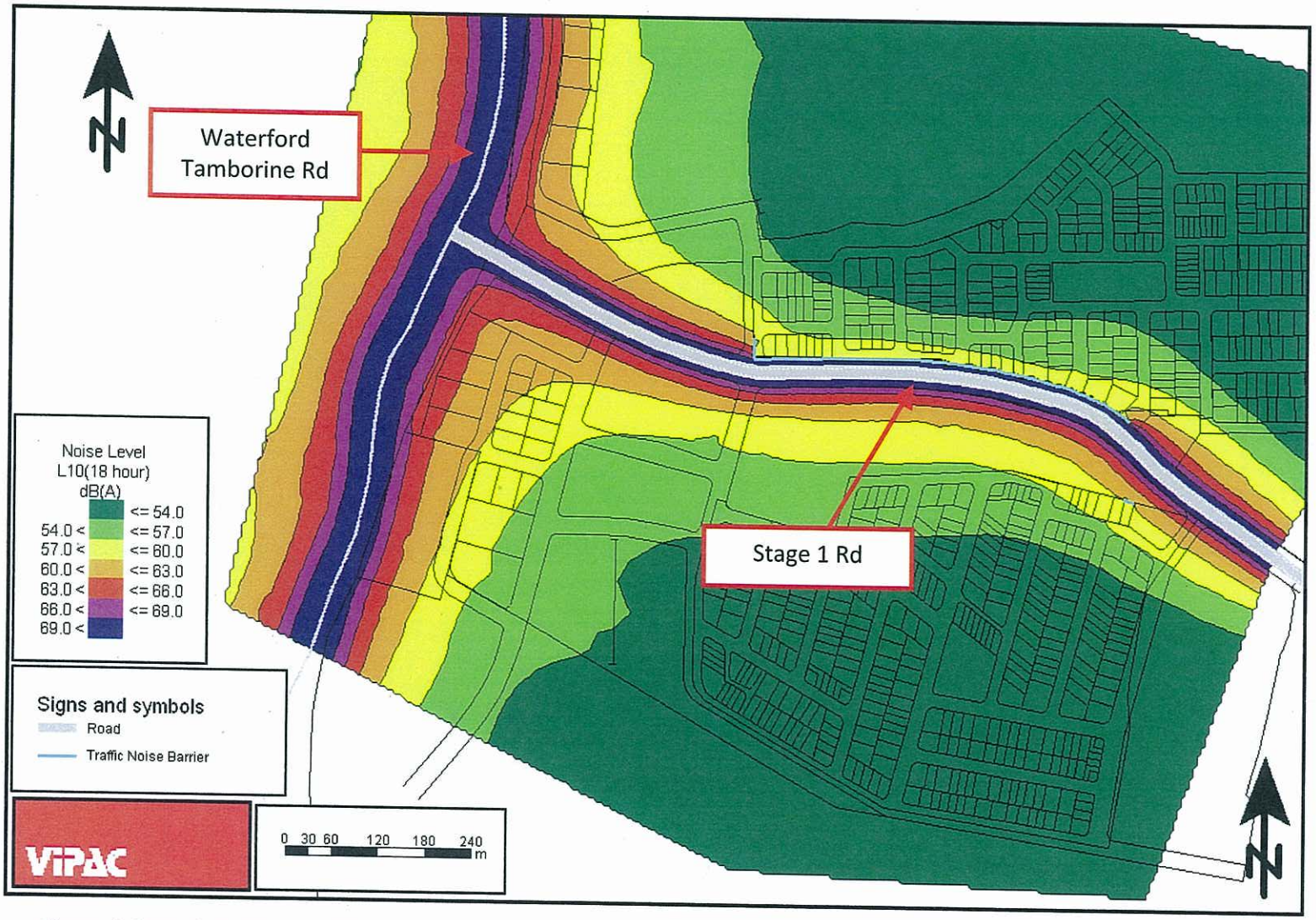

Figure A-2: Predicted Ground Floor Free Field Traffic Noise Contours with Noise Barriers Required to Achieve Compliance with Noise Criteria at All Lots

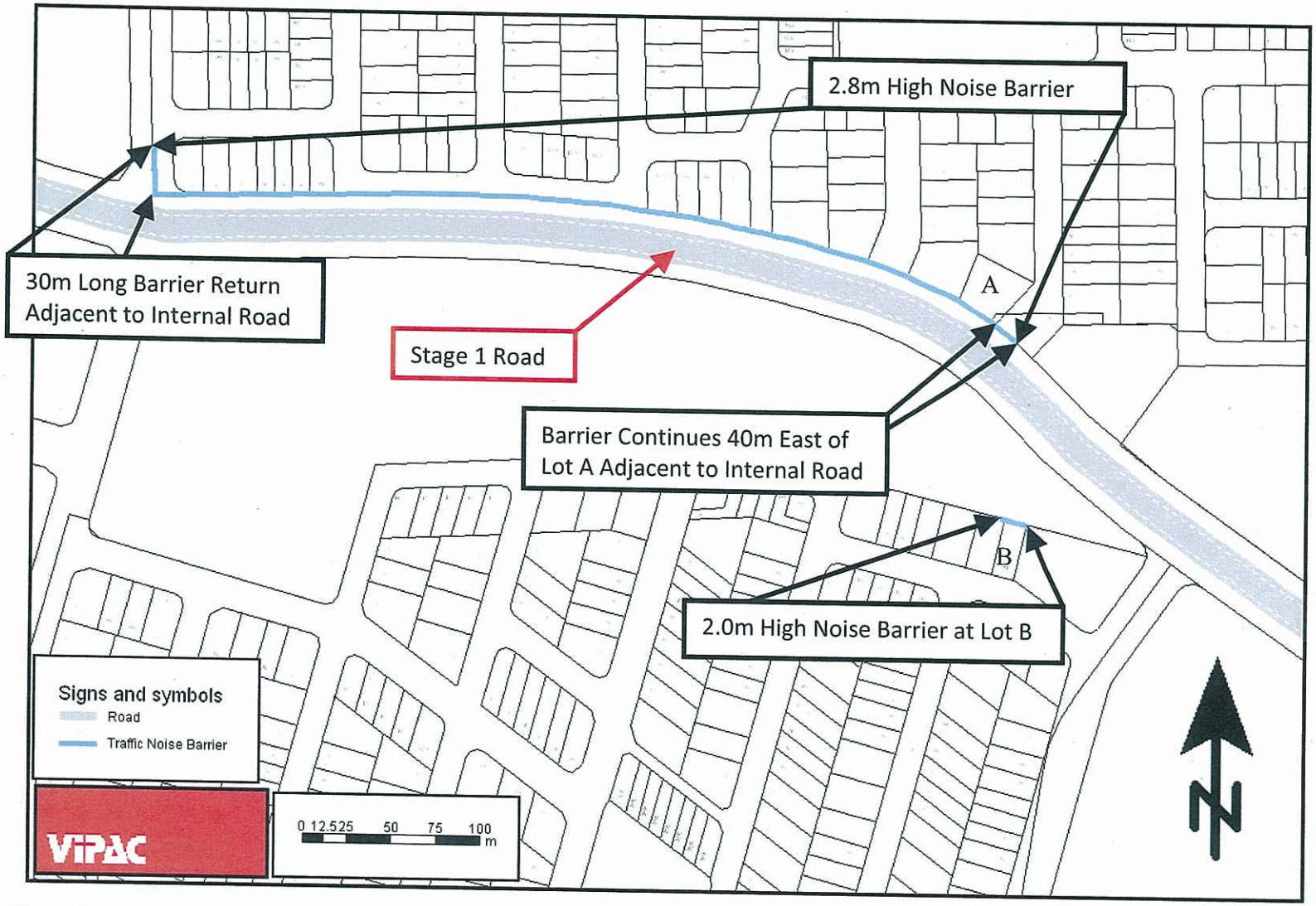

Figure A-3: Barrier Solution Required to Achieve Compliance with Noise Criteria at All Lots at the Ground Floor Level