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**Proposed Reconfiguration of
Lots 3, 5 and 6,
Daleys Rd,
Ripley**

**TRAFFIC
NOISE IMPACT REPORT**

Prepared for

**P & D Holdings &
SASL Investments**

5th October 2011

Decibell Report No.: 1110174

**PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 20/11/2012**

*Inquiries about this report should be directed to John Cristaudo at our Brisbane office on
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1.0 INTRODUCTION

This report is submitted in response to a request by Land Partners, on behalf of P & D Holdings & SASL Investments, for a traffic noise impact assessment of a proposed reconfiguration of Lot 3, 5 and 6 Daleys Rd, Ripley. This report forms part of the development application for consideration by the Urban Land Development Authority.

On-site noise logging and attended noise measurement were conducted, and through modelling, predictions of traffic noise impacts on the development have been produced. Based upon these predicted levels, recommendations regarding acoustic treatments and management practices have been specified.

1.1 The Proposal

The proposal is to reconfigure Lots 3, 5 and 6 Daleys Rd to yield 426 new residential Lots plus an area of parkland. The lots will be a mixture of traditional size lots (i.e. greater than 450 m²), small lots (ranging in size from 320m² up to 374 m²) and duplex lots (which will be set aside to multi unit development). The site will be developed in 14 stages.

The site is bounded by the Cunningham Highway, Daleys Rd and Deebing Creek. Daleys Rd is an unsealed road that is barely trafficable at the moment. The Cunningham Highway though is a very significant road that provides the main connection between Ipswich and Warwick. The Highway is a state controlled road and does carry reasonable load. As such this road is likely to generate traffic noise levels that could impact the site and these impacts will be considered in this report.

The topography of the site is undulating but generally decreases in height towards Deebing Creek. The site is also traversed by a couple of "gullies" that drain towards the highway. The site is at present vacant and undeveloped.

For further details of the development layout refer to appendix for site plans.

2.0 EQUIPMENT

2.1 Ambient and Road Traffic Noise Assessment

The following equipment was used to record noise impacting onto the site:

- Bruel Kjaer 4231 Calibrator;
- Larson Davis LXT Environmental Noise Logger.

3.0 MEASUREMENT PROCEDURE

3.1 Logger Noise Measurement

A noise logger was located on the boundary of the development near the corner of the site with Daleys Rd. The logger was sited with a clear view of the Cunningham Highway and as the site is vacant the measurements taken with the logger therefore can be regarded as free field. The location of the logger is indicated on the aerial photograph included in the appendix of the report.

The logger was set to record noise statistics in 15 minute blocks continually over 48 hours in consecutive periods from Wednesday 8/12/10 to Friday 10/12/10. The statistical interval was chosen to allow application of AS/NZS 2107:2000 *'Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors'*.

Road traffic noise levels were conducted generally in accordance with Australian Standard AS2702 - 1984 *'Acoustics - Methods for the measurement of road traffic noise'*.

The operation of the sound level measuring equipment was field calibrated before and after the measurement session and was found to be within 0.1 dB of the reference signal. All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory.

Weather conditions during the survey were cloudy, with temperatures ranging from 22° C to 30° C over the measurement period. Wind speeds were light over this same period.

4.0 NOISE CRITERIA

4.1 Road Traffic Noise

The proposed development site development falls within an area of land administered by the Urban Development Land Authority. Development in this area is regulated by the *Ripley Valley Urban Development Area Interim Land Use Plan*. Section 5.6 *Environmental and Sustainable* of this document states as a Requirement for development any proposal within the area must:

>> achieve acceptable noise levels within 100m of a transport corridor;

The proposed site is adjacent to the Cunningham Highway. This Highway represents a transport corridor and therefore under the *Requirements of Ripley Valley Urban Development Area Interim Land Use Plan* acceptable traffic noise level must be achieved at the site.

Acceptable traffic noise levels are not defined under the *Requirements of Ripley Valley Urban Development Area Interim Land Use Plan*. The Cunningham Highway is a state controlled road and as such traffic noise produced by this normally would be assessed with reference to the Department of Transport and Main Roads Manual *Road Traffic Noise Management: Code of Practice*. Given that criteria for acceptable traffic noise is not defined under the *Requirements of Ripley Valley Urban Development Area Interim Land Use Plan* and that traffic noise impacts would normally be assessed for a development of this type under the Department of Transport and Main Roads Manual *Road Traffic Noise Management: Code of Practice* we believe that the criteria from this code be used to determine acceptable traffic noise levels at this site. The criteria set out in the Manual for Habitable floors of Residential Properties are:

- 63 dB(A) L_{10} (18 hour)* or less, where existing levels are measured at the local government deemed-to-comply dwelling setback distance are greater than 40 dB(A) L_{90} (8 hour) between 10 pm and 6am; or
- 60 dB(A) L_{10} (18 hour)* or less, where existing levels are measured at the local government deemed-to-comply dwelling setback distance are less than or equal to 40 dB(A) L_{90} (8 hour) between 10 pm and 6am; or
- Where the above criteria cannot be met, internal maximum design criterion levels specified in AS/NZS 2107.

The Main Roads Manual *Road Traffic Noise Management: Code of Practice* also stated criteria relating to balconies and formal external open space. These criteria are:

- 63 dB(A) L_{10} (18 hour)* or less, where existing levels are measured at the local government deemed-to-comply dwelling setback distance are greater than 45 dB(A) L_{90} (18 hour); or
- 60 dB(A) L_{10} (18 hour)* or less, where existing levels are measured at the local government deemed-to-comply dwelling setback distance are less than or equal to 45 dB(A) L_{90} (18 hour);

* Note external levels stated are façade corrected.

The relevant maximum internal design criterion levels specified in *AS/NZS 2107- Recommended design sound levels and reverberation times for building interiors* mentioned under the Habitable Floors criteria of the Main Roads Manual *Road Traffic Noise Management: Code of Practice* are presented in the table below.

Type of Occupancy / Activity	Recommended Design Sound Level, L_{Aeq} , dB(A)	
	Satisfactory	Maximum
7. RESIDENTIAL BUILDINGS		
Houses and apartments near major roads –		
Living areas	35	45
Sleeping areas	30	40
Work areas	35	45
Apartment common areas (e.g. foyer, lift lobby)	45	55

Table 1: Internal noise limits for residential dwellings from Australian/New Zealand Standard AS/NZS 2107:2000 *'Acoustics - Recommended design sound levels and reverberation times for building interiors*

5.0 RESULTS & CALCULATIONS

5.1 Road Traffic Noise

5.1.1 Measured Levels Logger Survey

The table below presents measured road traffic noise levels measured over a 24 hour period at the logger measurement location facing the Cunningham Highway. As the site is vacant measurements therefore can be regarded as free field and as not including the 2.5 dB façade reflection. The $L_{10,18hr}$ noise level was measured as approximately 61 dB(A). Graphical presentation of the logger measured noise levels are presented in the appendix to this report.

Descriptor	Time Period	Measured Level dB(A)
$L_{A10,18hr}$	6:00 am to 12:00 pm	69
$L_{A90,18hr}$	6:00 am to 12:00 pm	53
$L_{A90,8hr}$	10:00 pm to 06:00 am	41

Table 2: Measured road traffic noise levels at proposed site.

5.1.2 Existing and Future Traffic Flows

The existing traffic flows for the Cunningham Highway were obtained from Department of Transport and Main Roads traffic counts. Predicted traffic flows for the year 2021 are based on a growth rate of 3 % p.a. Existing traffic flows and predicted flows for the year 2021 are presented below:

Existing Traffic Flows

Cunningham Road: 15800 vehicles per 18 hour, 16 % HV

Predicted Traffic Flows (Year 2021):

Cunningham Road: 21200 vehicles per 18 hour, 16 % HV

5.1.3 Modelled Noise Levels – Existing Situation

Road traffic noise predictions were conducted using PEN 3D 2000, a CoRTN based model produced by Ask Software Engineers, and deemed acceptable under the Environmental Protection (Noise) Policy. To verify the road traffic noise prediction model, the $L_{A10,18hr}$ traffic noise levels were calculated and compared to the measured noise levels. The following assumptions were made in the verification of the noise model:

- The road surfaces were assumed to be dense graded asphalt;
- The source line of traffic noise on both road is 0.5m above the road surface;
- The traffic speeds along the Cunningham Highway are 100 km/hr as signed;
- As the PEN 3D 2000 model predicts façade corrected levels a -2.5 dB correction has been applied to the model to allow comparison to free field levels.

A print out of the calculations performed by the model is included in the appendix to this report. The results are compared to the measured value in the table below.

Predicted $L_{A10,18hr}$	Measured $L_{A10,18hr}$
68.6	69

Table 3: A Comparison of Predicted and Measured Traffic Noise Levels at the Logger Location

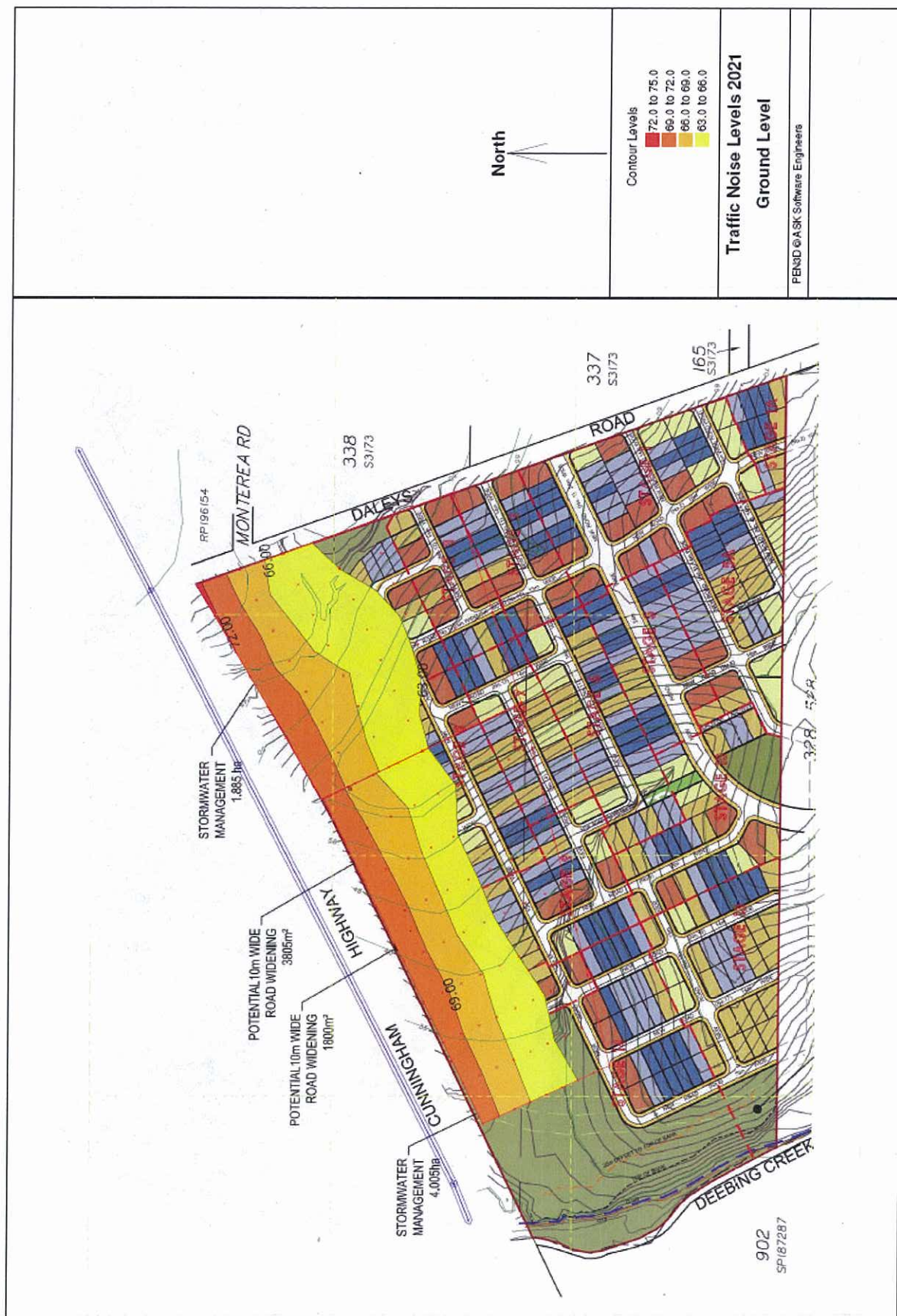
This is within the allowable 2 dB variation under the CoRTN methodology.

5.1.4 Modelled Noise Levels – Year 2020

If the validity of the model is now accepted, the predicted increased traffic flows for the year 2020 can be input into the PEN 3D 2000 model to predict the ultimate traffic noise impacts. The predicted ultimate traffic noise level $L_{A10,18hr}$ in the year 2020 at the measurement location is 69.9 dB(A).

In order to best present the results of modelling the PEN 3D 2000 model will be used to map the 63 dB(A) $L_{10,18hr}$ noise contour at both ground storey and upper storey levels over the proposed new Lots in the year 2020. This noise level represents the criteria level from the Main Roads *Road Traffic Noise Management: Code of Practice* and it should be noted that the mapped contour levels are façade corrected and include the +2.5 dB correction (i.e. the -2.5 dB correction applied to the model above has been removed). Ground storey receivers are assumed to be 1.8 m above ground level while first floor level receivers are assumed to be 4.5 m above ground level.

The noise contour maps produced by modelling are in the appendix to this report.



6.0 RECOMMENDED ACOUSTIC TREATMENTS

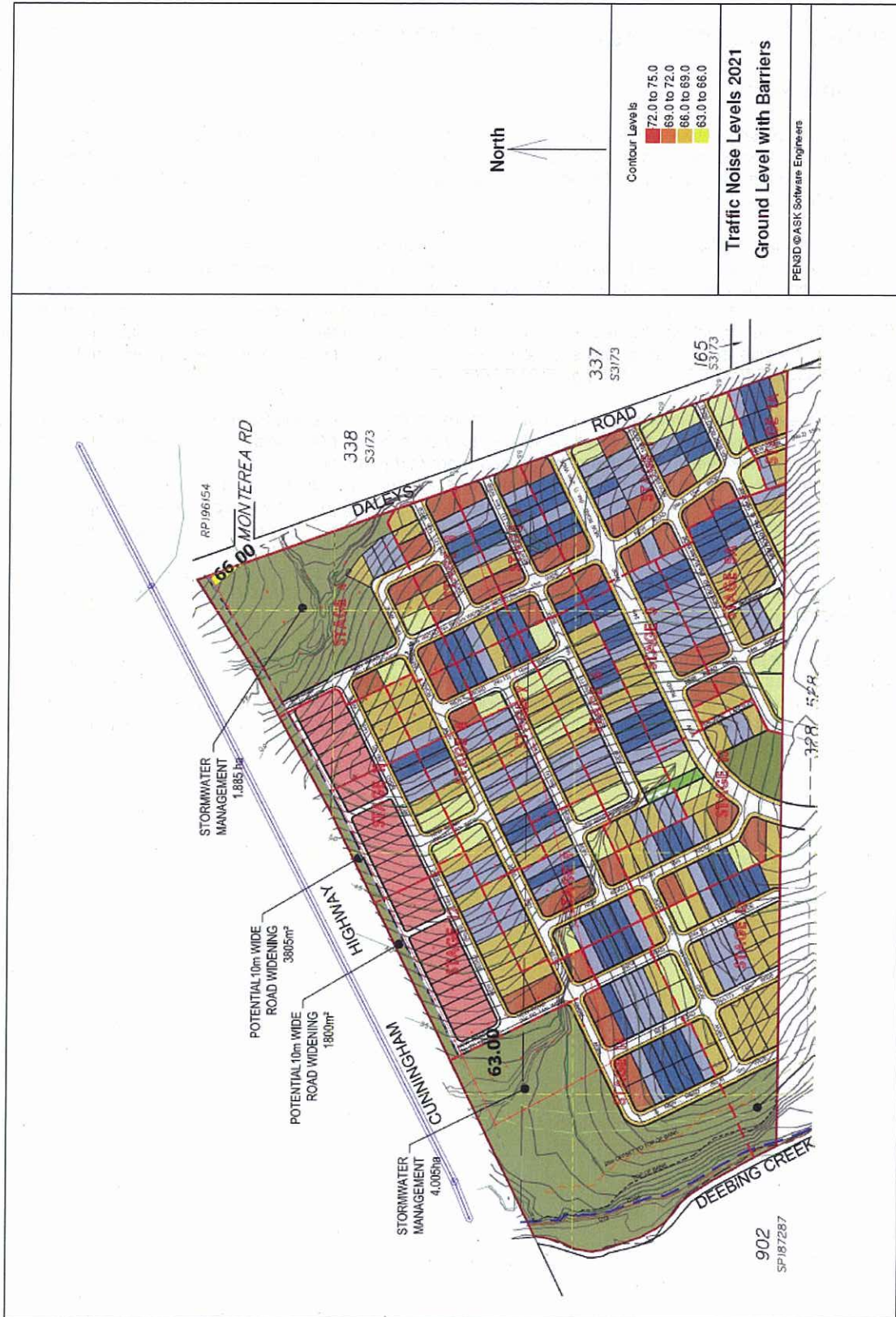
6.1 Traffic Noise

Examining the noise contour maps produced in Section 5.1 it can be seen that at ground and upper storey level traffic noise levels at the site will exceed the 63 dB(A) $L_{10,18hr}$ criteria levels from the Main Roads *Road Traffic Noise Management: Code of Practice* at a number of lots along the Cunningham Highway frontage of the site in Stages 4, 8, 9, 11, 12 and 14.

In order to mitigate traffic noise levels at these lots it is recommended that an acoustic barrier be constructed along the Cunningham Highway frontage of the site when any of the proposed Stages 4, 8, 9, 11, 12 and 14 are developed. The height of this barrier will vary from 4.5 m to 5.5m. The height of the various sections of the barrier is indicated on the site plan included in the appendix to this report. Further modelling using the PEN3D2000 noise model has been conducted with this barrier in place. Noise contour mapping has again been produced with the barrier in place at both ground and upper storey level. These noise contour maps have been included over the next two pages of this report.

Examining these noise contour maps it can be seen that traffic noise levels for all residential lots will now be below the criteria levels from the Main Roads *Road Traffic Noise Management: Code of Practice* with the barrier in place. However if the noise contour map produced in relation to traffic noise levels at upper storey level is examined it can be seen that traffic noise levels for lots 130 to 149 (inclusive) and 151 to 177 (inclusive) will be above the 63 dB(A) $L_{10,18hr}$ criteria level. To mitigate traffic noise levels in the upper storey of any future residential buildings on these lots it is recommended that property note recorded on them requiring any residential buildings constructed on them be designed in accordance with AS 3671- *Road Traffic Noise Intrusion-Building Siting and Construction* to contain sufficient sound proofing such that they would meet the recommended internal noise levels contained within AS2107-*Recommended design sound levels and reverberation times for building interiors*.

The noise contour maps produced in Section 5.1 also show that traffic noise levels on all the lots in proposed Stages 1a, 1, 2, 3, 5a, 5, 6, 7 and 10 will not exceed the 63 dB(A) $L_{10,18hr}$ criteria levels from the Main Roads *Road Traffic Noise Management: Code of Practice* even without the proposed noise barrier in place. It is therefore recommended that development of these Stages be allowed independent of the construction of the noise barrier.





7.0 DISCUSSION & CONCLUSIONS

The effects of traffic noise generated by the Cunningham Highway have been considered in this report. Modelling has determined that the ultimate traffic noise levels will exceed the criteria from Department of Transport and Main Roads *Road Traffic Noise Management: Code of Practice* at ground and upper storey level on some of the future lots along the Cunningham Highway frontage of the site in Stages 4, 8, 9, 11, 12 and 14 of the proposed development.

In order to mitigate traffic noise on the site it has been recommended that a noise barrier to constructed along the Cunningham Highway frontage of the site. The height of this barrier will vary from 4.5 m to 5.5 m. The location of the various sections of the barrier is indicated on the site plan included in the appendix to this report. Further modelling determined that the barrier will effectively mitigate traffic noise levels to below the criteria levels from the Department of Transport and Main Roads *Road Traffic Noise Management: Code of Practice* at ground level. However, modelling has shown that at upper storey level lots 130 to 149 (inclusive) and 151 to 177 (inclusive) along the Cunningham Highway frontage of the site traffic noise levels will still exceed the criteria from Department of Main Roads *Road Traffic Noise Management: Code of Practice*. In order to mitigate traffic noise levels in the upper storey of any future residential buildings on these lots it is recommended that a property note be registered over them requiring any residential buildings constructed on them be designed in accordance with AS 3671- *Road Traffic Noise Intrusion-Building Siting and Construction* to contain sufficient sound proofing such that they would meet the recommended internal noise levels contained within AS2107-*Recommended design sound levels and reverberation times for building interiors*.

The noise contour maps produced in this report also show that traffic noise levels on all the lots in proposed Stages 1a, 1, 2, 3, 5a, 5, 6, 7 and 10 will not exceed the 63 dB(A) $L_{10,18hr}$ criteria levels from the Main Roads *Road Traffic Noise Management: Code of Practice* even without the proposed noise barrier in placed. It is therefore recommended that development of these Stages be allowed independent of the construction of the noise barrier.

Subject to our calculations, the construction of the noise barrier and the registration of the property notes over Lots along the Cunningham Highway frontage, we believe that the development will meet all requirements of the *Ripley Valley Urban Development Area Interim Land Use Plan* and Department of Main Roads *Road Traffic Noise Management: Code of Practice Policy* and should be approved.

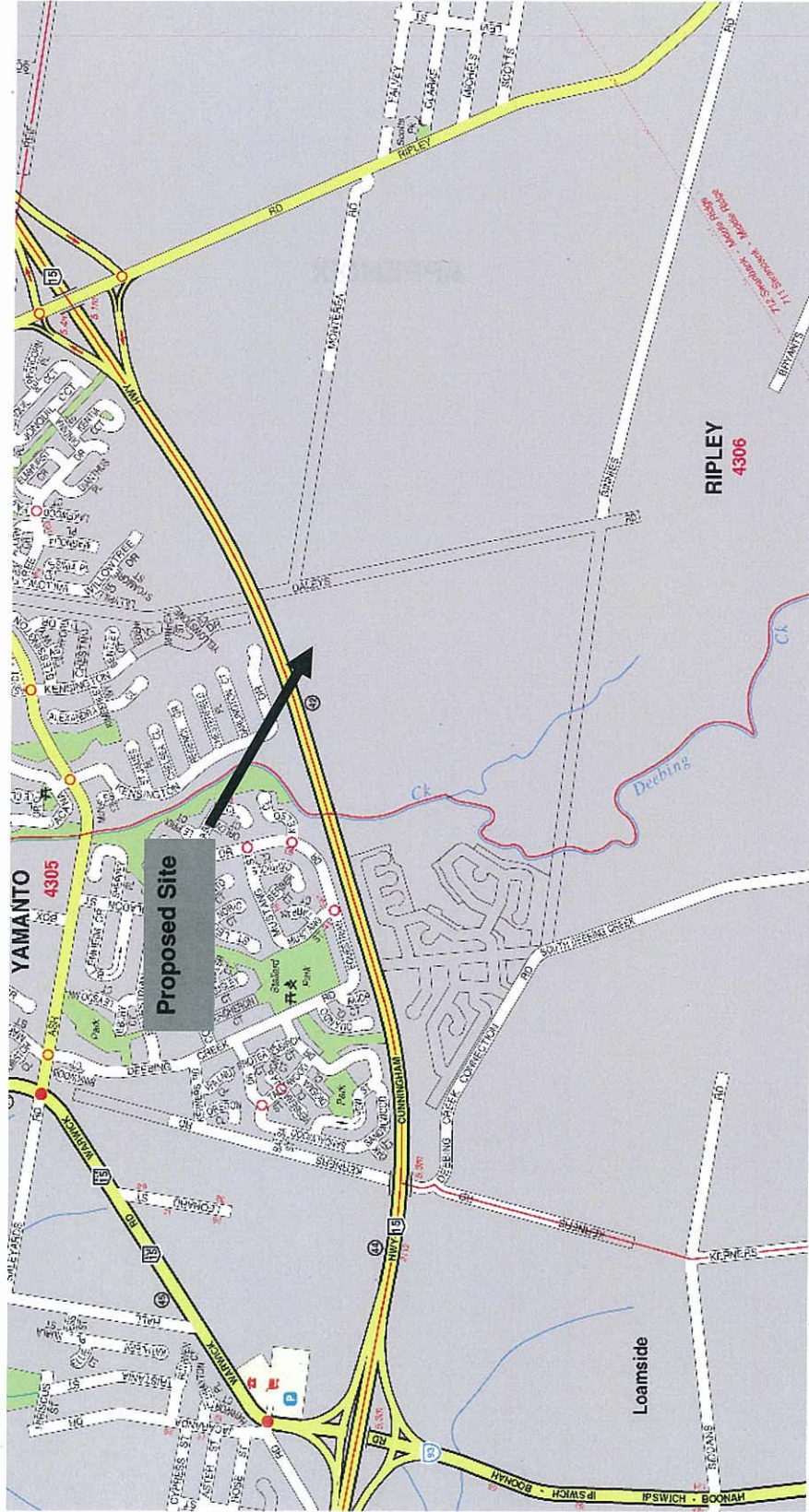
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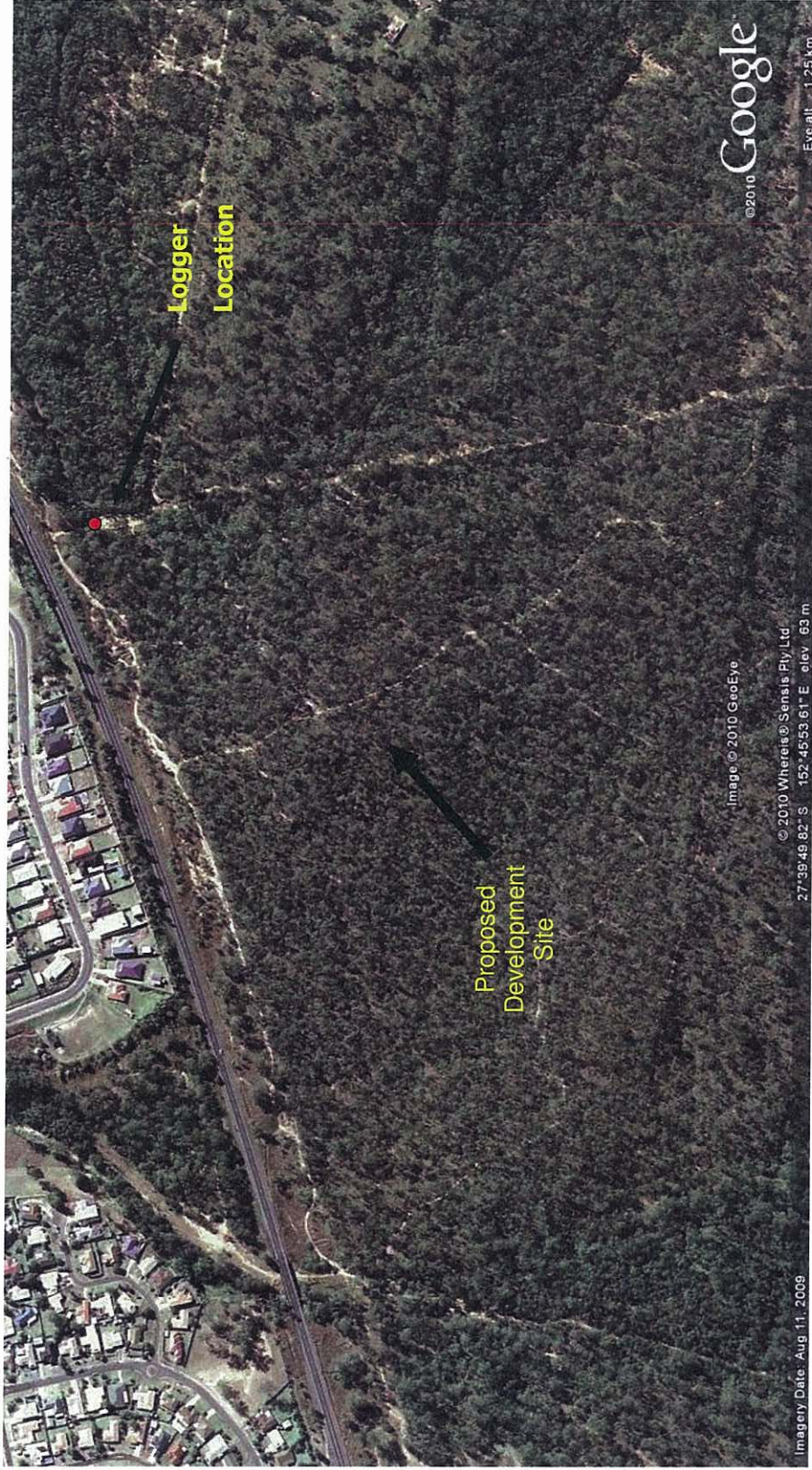
John Cristaudo
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Decibell Consulting

APPENDIX

Proposed Development Site Sketch No. 1
PLAN VIEW



Proposed Development Site Sketch No. 2
Aerial Photograph



POINT CALCULATIONS

Pen3D2000 V1.9.8

Project Code:Pen

Project Description: PEN noise model

File:C:\dB consulting\Noise Jobs\Daley Rd Ripley Valley\Daleys Rd.PEN

File Description: Logger 2011

CoRTN Calculations

All road segments included. Segmentation angle: 10degrees. Road elevations apply.

Receptor	X Posn (m)	Y Posn (m)	Height (m)	L10(18hour) (dB(A))
logger	-210.2	648.7	1.5	68.6

POINT CALCULATIONS

Pen3D2000 V1.9.8

Project Code:Pen

Project Description: PEN noise model

File:C:\dB consulting\Noise Jobs\Daley Rd Ripley Valley\Daleys Rd.PEN

File Description: Logger 2021

CoRTN Calculations

All road segments included. Segmentation angle: 10degrees. Road elevations apply.

Receptor	X Posn (m)	Y Posn (m)	Height (m)	L10(18hour) (dB(A))
logger	-210.2	648.7	1.5	69.9

Traffic Noise Levels

