HEGGIES

REPORT 30-1299-R1

Revision 0

45 Hearnes Lake Road
Road Traffic Noise Assessment

PREPARED FOR

BBK Development Corporation Pty Ltd
PO Box 79
Coffs Harbour NSW 2450

20 JUNE 2008

HEGGIES PTY LTD
ABN 29 001 584 612

Incorporating New Environment Graeme E. Harding & Associates Eric Taylor Acoustics

45 Hearnes Lake Road

Road Traffic Noise Assessment

PREPARED BY:

Heggies Pty Ltd
Level 1, 14 Watt Street Newcastle NSW 2300 Australia
(PO Box 1768 Newcastle NSW 2300 Australia)
Telephone 61 2 4908 4500
Email newcastle@heggies.com Web www.heggies.com

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
30-1299-R1	Revision 0	20 June 2008	Carolyn O'Brien	Katie Teyhan	Katie Teyhan

1 INTRODUCTION

Heggies Pty Ltd (Heggies) has been commissioned by BBK Development Corporation Pty Ltd to conduct a road traffic noise impact assessment of the residential development proposed for 45 Hearnes Lake Road, Woolgoolga. The primary objective of the assessment was to determine the likely impact of road traffic noise on the development.

This traffic noise impact assessment has been prepared with reference to the following NSW Department of Environment and Climate Change (DECC) policy documents:

- Environmental Criteria for Road Traffic Noise (ECRTN); and
- Industrial Noise Policy (INP).

2 SITE DETAILS

The site is located east of the Pacific Highway, south of Woolgoolga on the NSW north coast. The site is known as Lot 21, DP714858 and is zoned 2E tourist residential under the Coffs Harbour City Council LEP 2000.

3 ROAD TRAFFIC NOISE IMPACT ASSESSMENT PROCEDURES

3.1 Environmental Criteria for Road Traffic Noise

The DECC *Environmental Criteria for Road Traffic Noise* (ECRTN May 1999) presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road or residential developments as well as criteria for other sensitive land uses.

Table 1 presents the most relevant and conservative ECRTN criteria for proposed residential development affected by a freeway or arterial road (Pacific Highway) traffic noise. Noise levels provided in

Table 1 are external noise levels and refer only to road traffic noise; they do not include ambient noise from other sources.

Table 1 Road Traffic Noise Criteria for Residential and Other Sensitive Land Uses

	Criteria		
Type of Development/ Sensitive Land Use	**Day 7am – 10pm**	**Night 10pm – 7am**	**Where Criteria Are Already Exceeded/ Noise Mitigation Measures**
New residential land use developments affected by freeway/arterial traffic noise	$L_{Aeq(15hour)}$ 55 dBA	$L_{Aeq(9hour)}$ 50 dBA	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criteria via judicious design and construction of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.
Active recreation (eg golf courses)	$L_{Aeq(15hour)}$ 60 dBA	-	To achieve internal noise criteria in the short term, the most practicable mitigation measures are often related to building or façade treatments. In the medium to longer term, strategies such as regulation of exhaust noise from in-service vehicles, limitations on exhaust brake use, and restricting access for sensitive areas or during sensitive times to low noise vehicles can be applied to mitigate noise impacts across the road system. Other measures include improved planning, design and construction of sensitive land use developments; reduced new vehicle emission standards; greater use of public transport; and alternative methods of freight haulage. These medium- to long-term strategies apply equally to mitigating internal and external noise levels. Where existing levels of traffic noise exceed the criteria, all feasible and reasonable noise control measures should be evaluated and applied. Where this has been done and the internal or external criteria (as appropriate) cannot be achieved, the proposed road or land use development should be designed so as not to increase existing road traffic noise levels by more than 0.5 dBA for new roads and 2 dBA for redeveloped roads or land use development with potential to create additional traffic.
Passive recreation and school playgrounds	$L_{Aeq(15hour)}$ 55 dBA	-	

With regard to internal noise levels the ECRTN recommends, in the absence of any local codes, that internal noise levels in sleeping areas of between 35 dBA and 40 dBA are acceptable.

The ECRTN also provides guidance in the determination of sleep disturbance noise goals and draws the following conclusions in relation to sleep disturbance:

- Maximum internal noise levels below 50–55 dBA are unlikely to cause awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65–70 dBA, are not likely to affect health and wellbeing significantly.
- At the current level of understanding it is not possible to develop noise level criteria for sleep disturbance that would have the equivalent level of confidence as those noise criteria used for annoyance reactions.

3.2 Australian Standards

Australian Standard AS 2107-2000 *"Acoustics - Recommended design sound levels and reverberation times for building interiors"* recommends suitable internal noise levels for residential habitation and other buildings. The buildings should be constructed to achieve an internal noise level equal to or lower than the levels outlined in **Table 2**. How this is achieved will depend strongly on the location, orientation and type of construction of each building.

Table 2 AS 2107-2000 Internal Noise Level Criteria – Residential Buildings

Type of Occupancy - Houses and Apartments near Major Roads	**Recommended design sound level, L_{Aeq} (dBA)**	
	Satisfactory	**Maximum**
Living Areas	35 dBA	45 dBA
Sleeping Areas	30 dBA	40 dBA
Work Areas	35 dBA	45 dBA
Common Areas	45 dBA	55 dBA

Care should be taken in applying the "Satisfactory Design Levels" set out in **Table 2**. Some of these levels are relatively low and, while providing a suitable target for a prestige "up market" development with above-the-norm quality, achievement of these levels might be too onerous for a building of general, but still good, quality standard. The "Maximum Design Levels" are more indicative of the standards applicable for the latter type of development.

Australian Standard AS 3671-1989 *"Acoustics - Road traffic noise intrusion - Building siting and construction"* is concerned with the reduction of road traffic noise intrusion in buildings in areas near major roads. This standard provides guidelines for determining the type of building construction necessary to achieve acceptable internal noise levels. **Table 3** summarises the recommended building construction categories outlined in AS 3671-1989.

Table 3 Definition of Construction Categories

Category Type	Definition	Approximate Traffic Noise Reduction
Category 1	Standard construction; openings, including open windows and doors may comprise up to 10% of the exposed facade.	Up to 10 dBA
Category 2	Standard construction, except for light-weight elements such as fibrous cement or metal cladding or all-glass facades. Windows, doors and other openings must be closed.	> 10 dBA ≤ 25 dBA
Category 3	Special construction. Windows, doors and other openings must be closed.	> 25 dBA ≤ 35 dBA
Category 4	Specialist acoustic advice should be sought.	> 35 dBA

3.3 Project Specific Road Traffic Noise Goals

The criteria supplied in the ECRTN have been adopted for the purposes of this noise assessment. The noise descriptors utilised in the ECRTN are unambiguous and the noise criteria specified are consistent with the relevant Australian Standards. The relevant road traffic noise criteria for the subject development used in this assessment are provided in **Table 4**.

Table 4 Road Traffic Noise Criteria

Type of Development	Criteria		
	Day 7 am - 10 pm	Night 10 pm - 7 am	Where Criteria are Already Exceeded
New residential land use developments affected by freeway/arterial traffic noise	$L_{Aeq(15hour)}$ 55 dBA	$L_{Aeq(9hour)}$ 50 dBA	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criteria via judicious design and construction of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.

Furthermore, if these external noise goals are achieved it is likely that recommended internal noise goals (AS 2107) will also be achieved.

4 EXISTING ACOUSTICAL ENVIRONMENT

4.1 Methodology

Heggies Pty Ltd (Heggies) conducted a Noise Impact Study on behalf of BBK Development Corporation Pty Ltd in February 2003 (30-1299 LR F240204) for the proposed residential development at Lot 1 Hearnes Lake Road, Woolgoolga. An ARL Type EL316 environmental noise logger was positioned on the site, approximately 95 m from the highway. The noise logger was set to record statistical indices, over 15-minute periods, including L_{Amax}, L_{A1}, L_{A10}, L_{A90} and L_{Aeq} noise levels. An operator attended noise survey was conducted during logger deployment for a period of 15 minutes at the noise logger location.

All acoustic instrumentation employed by Heggies throughout the monitoring programme has been designed to comply with the requirements of AS 1259.2-1990, "*Sound Level Meters*" and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

4.2 Unattended Noise Monitoring

An ARL Type EL316 environmental noise logger was positioned on the site, approximately 95 m from the highway, over a period of nine days from Monday 1 December to Tuesday 9 December 2003. The noise logger was set to record statistical indices over 15-minute intervals including L_{Amax}, L_{A1}, L_{A10}, L_{A90} and L_{Aeq} noise levels.

Weather data for the survey period was obtained from the nearest Bureau of Meteorology weather station located at Port Macquarie Airport, approximately 5 km north east of the monitoring locations. Unattended noise data corresponding with periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 18km/hr) were discarded in accordance with Industrial Noise Policy (INP) data exclusion methodology.

Results of the unattended noise monitoring program indicated an overall daytime road traffic noise level of LAeq(15hour) 58 dBA and an overall night-time level of LAeq(9hour) 57 dBA. Noise levels reported here are free-field measurements, meaning that no noise reflections occurred from building façades near the noise monitoring location.

4.3 Operator Attended Noise Surveys

A site inspection was undertaken on Monday 1 December 2003 to gain an appreciation of the Hearnes Lake Road site and to begin the noise monitoring program. The noise survey conducted at the logger location (Hearnes Lake Road) was conducted over a 15 minute period using an integrating sound level meter. Results of the operator attended noise surveys indicated that traffic was the main contributor to ambient noise levels at the logger location.

5 TRAFFIC NOISE MODELLING

5.1 Methodology and Assumptions

Noise modelling of the project area was carried out using the UK Department of Transport, *"Calculation of Road Traffic Noise"* (CORTN 1988) algorithms incorporated in the SoundPLAN noise modelling software. The modelling allows for traffic volume and mix, type of road surface, vehicle speed, road gradient, reflections off building surfaces, ground absorption and shielding from ground topography and physical noise barriers.

The algorithm output of CORTN (fundamentally an L_{A10} predictor) has been modified to calculate the relevant L_{Aeq} road traffic noise emission descriptors, as required.

All reported road traffic prediction noise levels are "facade-corrected". The predicted noise levels have been adjusted upwards to include a notional 2.5 dBA reflection within the noise model computation.

The predicted levels are for receiver points 1.5 m above the external ground level.

In the original United Kingdom version of the CORTN Model, all traffic noise "sources" are located 0.5 m above the pavement. This approach is appropriate as a "standard" calculation method and yields reasonable consistency from project to project. The predicted noise levels are considered reasonably accurate for roadway conditions having a clear line of sight from receivers to the traffic.

Where noise barriers (including the edges of cuttings) are present however, the CORTN barrier reduction algorithm would tend to over-predict the reductions for truck engine and exhaust noise components, which have effective source heights above pavement considerably greater than 0.5 m.

For this project therefore, the SoundPLAN traffic noise source "strings" have been modified to incorporate four effective noise sources (and heights) in each carriageway. These comprise a "cars" source with height of 0.5 m above pavement and three "truck" sources at three separate heights representing truck tyres (0.5 m), truck engines (1.5 m) and truck exhausts (3.5 m).

The truck sources have relative sound power emission levels (compared to total truck sound power) of -5.4 dBA, -2.4 dBA and -8.5 dBA for tyres, engines and exhausts, respectively. These modifications ensure that the noise predictions (particularly in the presence of noise barriers) address the significance of the elevated heights of noise emission from truck engines and exhausts.

Topographic information for the study area was supplied by De Groot & Benson Pty Ltd. The noise model used this information together with road traffic volume information adopted from the Roadnet Pty Ltd document: *"Traffic Study" Residential Subdivision, 45 Hearnes Lake Road* dated December 2007.

Annual Average Daily Traffic (AADT) data was used to project 2018 road traffic volume information for the Pacific Highway based on historic growth trends of 3.4%.

Details of parameters utilised in the noise model are provided in **Table 5**.

Table 5 Road Traffic Volumes Utilised in Noise Model

Description		Average Daily Vehicle Count (Both Directions)		Percentage of Heavy Vehicles	
Year	**Road Traffic Source**	**Daytime (7am-10pm)**	**Night-Time (10pm-7am)**	**Daytime (7am-10pm)**	**Night-Time (10pm-7am)**
2008	Pacific Highway	15,223	1,691	8%	12%
2018	Pacific Highway	21,267	2,363	8%	12%

5.2 Noise Model Validation

A computer model was used to predict noise levels likely to be experienced at each proposed allotment. The environmental noise model was developed using SoundPLAN v6.4 software. The model used topographic data of the proposed site and was calibrated against measured noise results to create noise contours across the site.

6 ROAD TRAFFIC NOISE PREDICTIONS

6.1 No Mitigation

Analysis of road traffic noise modelling results indicated that the night-time period provides the limiting criteria. This means that noise mitigation designed for the night-time noise criteria will also be effective at reducing daytime road traffic noise levels below the relevant noise goals. Therefore, only night-time noise predictions have been provided in this report.

Road traffic noise contour predictions for the 2018 night-time scenario are provided in **Appendix A**. These noise contours do not include consideration of any mitigation measures.

The light blue contour indicates the area where the relevant noise criterion is achieved. As can be seen in **Appendix A**, external road traffic noise goals will be achieved across the entire site with the majority of the site predicted to experience average night-time road traffic noise levels less than 45 dBA.

6.2 Discussion of Results

Road traffic noise predictions show that the subject site will not be impacted by road traffic noise, with reference to the ECRTN, assuming 2018 traffic volume information and that the Pacific Highway alignment remains the same as it is currently.

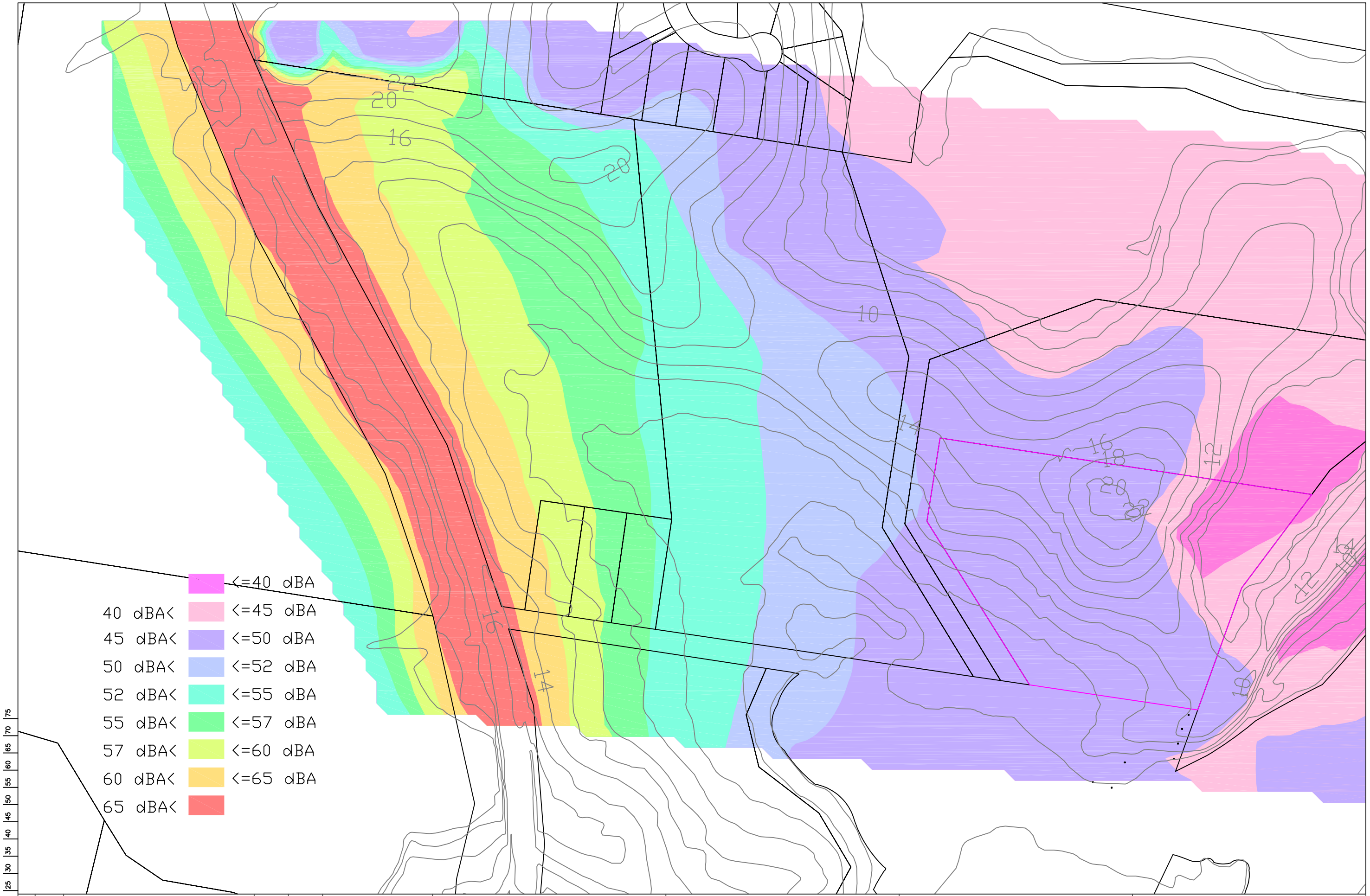
It is anticipated that the Pacific Highway upgrade and realignment will be completed prior to 2018. The potential impacts of this have previously been considered as part of the EIS for the Pacific Highway project. The *Roads and Traffic Authority: Sapphire to Woolgoolga Environmental Assessment Part 11* provides noise contour predictions for 2021, inclusive of noise barriers. These indicate that road traffic noise levels are predicted to be less than the relevant critiera across the entire 45 Hearnes Lake Road site.

7 CONCLUSION

Heggies have completed a road traffic noise impact assessment for 45 Hearnes Lake Road, Woolgoolga.

Assessment of the impact of road traffic on the proposed Hearnes Lake Road subdivision was carried out using a SoundPLAN environmental acoustic model of the site. Results from the SoundPLAN model have been used to plot predicted road traffic noise contours over the investigation area.

Road traffic noise levels are predicted to be below the criteria set out in the Environmental Criteria for Road Traffic Noise.



75 mm ON ORIGINAL

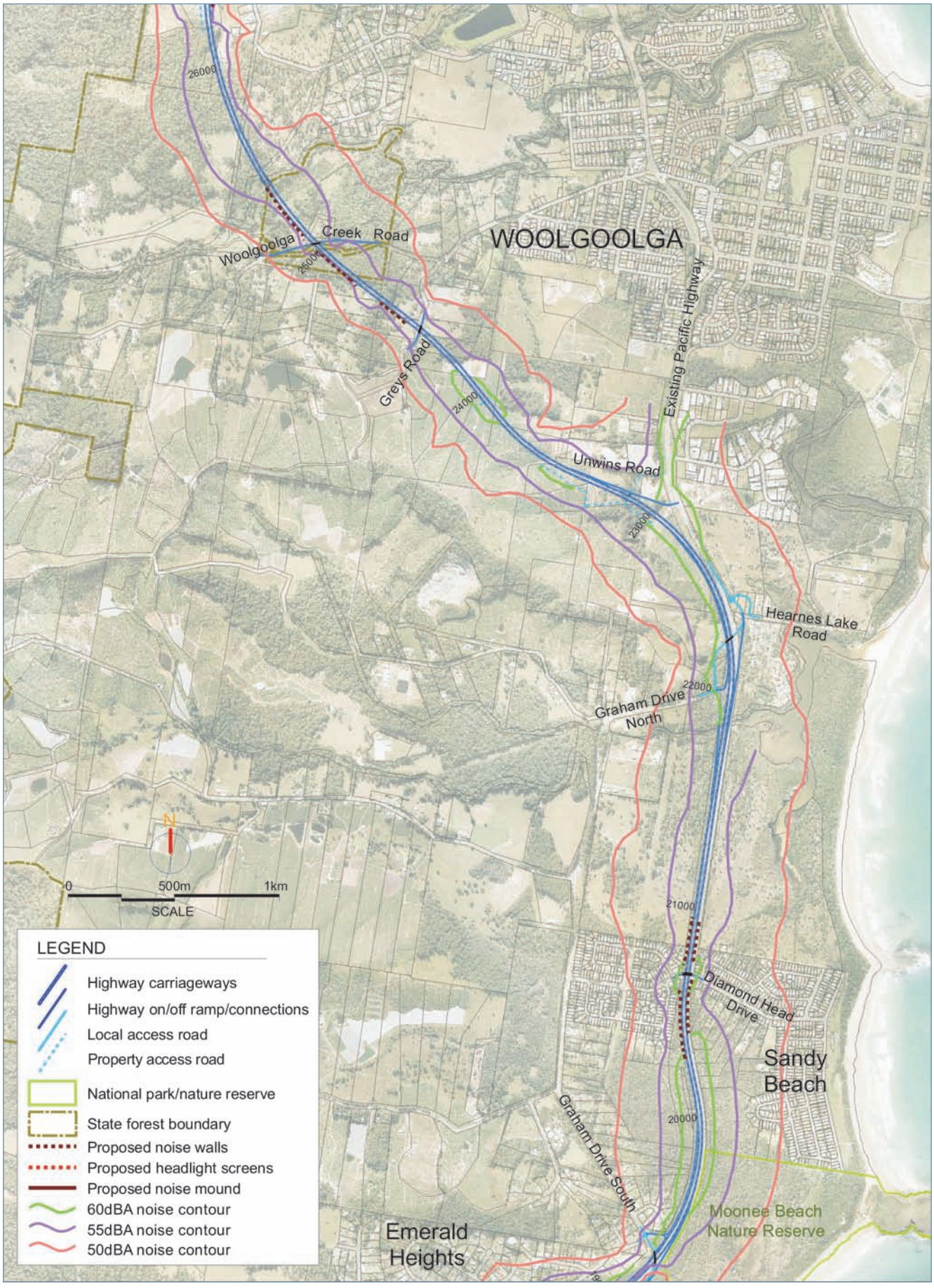
REV.	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED
0	29/05/08	Original	COB	

0 95 190
Scale = 1:9455

Heggies Pty Ltd
Level 1, 14 Watt Street
PO Box 1768
Newcastle NSW 2300
Email address newcastle@heggies.com.au
Telephone 02 4908 4500 Facsimilie 02 4908 4501

30-1299R1 Appendix A
45 Hearnes Lake Road
2018 Night Road Traffic Noise Levels

FILE NAME: 30-1299 Master.dwg
DRAWING No.: 001
REVISION: 0



Source: Aerial photography 2005 (Roger Dwyer & Associates) Cadastral Boundaries May 2007 (CHCC)

FIGURE 11.3c PREDICTED NOISE LEVELS AT 2021 (INCLUSIVE OF NOISE BARRIERS)