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Terminals Australia

Noise Assessment, Proposed Intermodal Terminal, Parkes NSW

January 2006

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Glossary

dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
L_N	Statistical sound measurement recorded on the linear scale.
L_{AN}	Statistical sound measurement recorded on the "A" weighted scale.
$L_{A10\ (Time)}$	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
$L_{A10\ (1\ hour)}$	The L_{A10} level measured over a 1-hour period.
$L_{A10\ (18\ hour)}$	The arithmetic average of the L_{A10} levels for the 18-hour period between 0600 and 2400 hours on a normal working day. It is a common traffic noise descriptor.
$L_{Aeq\ (Time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{Aeq\ (15\ hr)}$	The L_{Aeq} noise level for the period 7 am to 10 pm. (Day and Evening)
$L_{Aeq\ (9\ hr)}$	The L_{Aeq} noise level for the period 10 pm to 7 am. (Night)
$L_{Aeq\ (1\ hr)}$	The L_{Aeq} noise level for a one-hour period. It represents the highest tenth percentile hourly A-weighted L_{eq} during the period 7 am to 10 pm, or 10 pm to 7 am, (whichever is relevant).
$L_{A90\ (Time)}$	The A-weighted sound pressure level that is exceeded for 90 per cent of the time over which a given sound is measured. This is considered to represent the background noise e.g. $L_{A90\ (15\ min)}$
$L_{AMax\ (Time)}$	The maximum sound level recorded during a specified time interval
$L_{AMin\ (Time)}$	The minimum sound level recorded during a specified time interval
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24 hour period used for the assessment background level). This is the level used for assessment purposes. It is defined as the median value of: All the day assessment background levels over the monitoring period for the day; (7 am to 6 pm) All the evening assessment background levels over the monitoring period for the evening; (6 pm to 10 pm) or All the night assessment background levels over the monitoring period for the night. (10 pm to 7 am)

Executive Summary

GHD Pty Ltd (GHD) was commissioned by Terminals Australia, as part of a Masterplan and Environmental Impact Statement (EIS), to assess the acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The basis of the assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

Unattended noise monitoring was undertaken to determine the existing background and noise environment in the vicinity of the proposed facility. Detailed noise modelling was undertaken based on the predicted maximum sound power levels of primary noise sources for the facility. The noise model undertook a worst-case scenario with all plant items listed operating at their maximum sound power levels with wind directed at the nearest residences.

Results of the noise modelling suggest that noise emanating from the proposed Parkes intermodal terminal will meet the DEC Industrial Noise Policy (INP) project specific noise goals.

Construction noise has the potential to exceed the project specific noise criteria in a worst-case scenario, however this can be mitigated through the utilisation of best management practices as outlined in this assessment.

Results of the noise modelling based on the increase in expected rail movements at the site suggest that 24hr L_{Aeq} levels in the vicinity of the intermodal terminal will remain below the NSW DEC 24hr recommended guidelines.

Predicted future traffic noise resulting from the haulage routes associated with the proposed terminal were modelled using information for future traffic counts. Based on the information provided and modelling under various day and evening scenarios, it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines.

Therefore, based in the findings of this acoustic assessment, it is considered that operational, construction and traffic noise generated from the proposed Parkes intermodal terminal can meet the relevant noise guidelines.

1 Introduction

GHD Pty Ltd (GHD) was commissioned by Terminals Australia, as part of a Masterplan and Environmental Impact Statement (EIS), to assess the potential acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

1.1 Scope of Works

- Review of supplied background data (i.e. Details of all plant and equipment and their specified noise levels, proposed operation times and review of available traffic data);
- Development of sampling methodology and identification of suitable monitoring locations through consultation with the client;
- Site inspection and noise monitoring assessment. This included:
  - Long-term background noise monitoring at two representative locations (in the vicinity of the proposed development area), of the ambient noise environment for a period of 7 days;
  - Noise levels were recorded and assessed against the statistical parameters L_{Amax}, L_{Amin} $L_{A10,}$ L_{A90}, and $L_{Aeq,}$ with consideration to the DEC's guidelines; and
  - Noise modelling was undertaken for this project to ascertain the acoustic contribution of the development with consideration to project specific noise goals.
- Data Interpretation;
  - Noise data was assessed and filtered to remove invalid data due to extraneous noise or adverse weather conditions;
- Preparation of report with consideration to NSW DEC publications Environmental Noise Control Manual Chapter 171 Construction site noise (ENCM), Environmental Criteria for Road Traffic Noise (ECRTN), and Industrial Noise Policy (INP), including:
  - A brief description of the project;
  - A brief description of the ambient noise environment;
  - A brief description of the items to be used on site likely to emit noise;
  - Location of the noise monitoring with respect to the proposed terminal;
  - Charts of the noise parameters including L_{Amax}, L_{Amin} $L_{A10,}$ L_{A90}, and $L_{Aeq,}$ for the unattended noise monitoring;

- Based on monitoring results, establish project specific noise goals for the operation of the proposed new intermodal terminal with consideration to the NSW DEC publications Environmental Noise Control Manual Chapter 171 Construction site noise, (ECRTN), and (INP);
- Discussion of the noise monitoring and modeling results with relation to project specific noise goals and guidelines; and
- Proposing possible noise mitigation measures if the noise assessment suggests that project specific noise goals may be exceeded.

1.2 Approach

The following steps were undertaken:

- Compliance criteria determined;
- Existing ambient noise sources identified and classified as operational (local or tonal), extraneous or construction;
- New noise sources identified: including plant noise sources;
- Site noise monitoring locations selected for permanent monitoring (2);
- Site noise monitoring measurements undertaken;
- Assessment of noise measurements made leading to the determination of background and various time related noise levels;
- Evaluation of extraneous noises and constant noise;
- Projection of new noises to the surrounding sensitive noise receptors;
- Summation of existing and projected noise;
- Assessment of compliance; and
- Comment on noise control requirements.

1.3 Limitations

This report has been prepared for Terminals Australia. The purpose of the report is to provide an independent review of the proposed intermodal terminal at Parkes.

It is not the intention of the assessment to cover every element of the acoustical environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the monitoring and the conditions of the area at that time. It is the nature of environmental monitoring that all variations in environmental conditions cannot be accessed and all uncertainty concerning the conditions of the ambient noise environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise were referred to. This work has been conducted in good faith with GHD's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2 Project Description

The purpose of the Intermodal Terminal would be to provide a strategic location between the freight service user and a destination such as a port, where by freight operators could take advantage of the road/rail transport modes. In addition, the freight operators could utilise terminal facilities such as cold storage, refuelling facilities and long/short-term storage. The Intermodal Terminal would have the primary function of:

- Container stack and storage facilities, including storage capacity for empty containers;
- Warehousing and distribution facilities; and
- Associated rail and road infrastructure to support the Terminal.

The potential users of the Intermodal Terminal would include:

- Importers who are dependent on a single port of call shipping service; and importers wanting to uses a single port rather than multiple ports. Importers could build supply chains around Parkes warehouse and terminal;
- Major refrigerated facilities could be developed for cold storage;
- The Terminal could provide a consolidation point for East Coast wool handling, packaging and distribution for export;
- Terminal for rail freight moving on the East Coast freight corridors and for double stacking and reconfiguration of trains for West Coast services; and
- Bulk freight, including fuel and minerals could benefit from the facility.

It is envisaged that the Parkes Intermodal Terminal will be developed on a progressive basis driven by market forces.

2.1.1 Initial Stage

The initial stage, as outlined in GHD's Engineering and Infrastructure report (January, 2006), contains the essential facilities and associated infrastructure to enable the commencement of operations within the intermodal terminal facility within 5 years of project initiation, which comprises of the following:

- Intermodal Terminal Facility infrastructure:
  - 2 intermodal terminal sidings (including connections to both the Parkes-Narromine rail line and the proposed Master Siding);
  - Container storage area (14 Ha);
  - Administration office and carpark (5,000 sq.m);
  - Terminal plant refuelling & maintenance facility (5,000 sq.m); and
  - Rail mounted gantries including structural foundations and rails.

To support the initial stage facilities, the following major infrastructure is also planned for construction:

- Mainline Siding on the Parkes-Narromine rail line;
- Master Siding connecting the Parkes-Narromine rail line to the Main Western rail line;
- Internal Access roads to the facility including multiple intersections at Brolgan Road;
- Required initial stage public utilities and services;
- Initial stage stormwater drainage which includes the expansion of the existing dam at the south east corner of Lot 200 DP 627302; and
- Landscaping of designated areas.

The proposed initial stage development for the Parkes Intermodal Terminal is presented in the *Engineering and Infrastructure Report* (Drawing No. 21-13701-R020A).

2.1.2 Ultimate Stage

It is envisaged that the remaining facilities and infrastructure required to satisfy the outstanding functional requirements of the Parkes Intermodal Terminal will be provided in a piecemeal approach with the provision of these facilities and associated infrastructure being dependent on market forces and the organic growth of the intermodal terminal facility.

The remaining facilities and associated infrastructure to be delivered by the ultimate stage in 2020 comprises of the following:

- Intermodal Terminal Facility infrastructure:
  - Additional 2 intermodal terminal sidings;
  - Additional container storage area (Additional 10 Ha);
  - Train refuelling & sanding facility (5,000 sq.m); and
  - Additional rail mounted gantry.
- Warehousing (Stage 1 = 4 Ha; Stage 2 = additional 6 Ha; with future provision for an additional 16 Ha to be developed as required);
- Containerised Fuel Storage Facility;
- Heavy Engineering Facility; and
- Wagon Storage Sidings.

To support the remaining facilities for the site to achieve the ultimate stage functional requirements, the following major infrastructure will also be delivered:

- Internal Access roads to the facilities including a northern access road to MR61 (Condobolin Road) which also requires a grade separated crossing (in the form of a road over rail bridge) and further multiple intersections at Brolgan Road;

- Remaining public utilities and services not installed, or requiring capacity increases since initial stage; and
- Remaining stormwater drainage structures not installed in the initial stage.

2.2 Location

The proposed site for the Intermodal Terminal facility is located approximately 5 kms west of the urban centre of Parkes. The site is located south of the State Route 90, north of Brolgan Road and west of the Parkes Narromine Railway. The primary access to the site will be via Brolgan Road.

Dominant features of the landscape includes the Parkes-Narromine rail line, derelict dwellings, agricultural fields and associated dwellings/fences, Brolgan Road, the Sydney-Adelaide-Perth rail line and a predominant ridge on the western side of the site. The subject site is shown in Figure 1.

2.3 Previous Reports

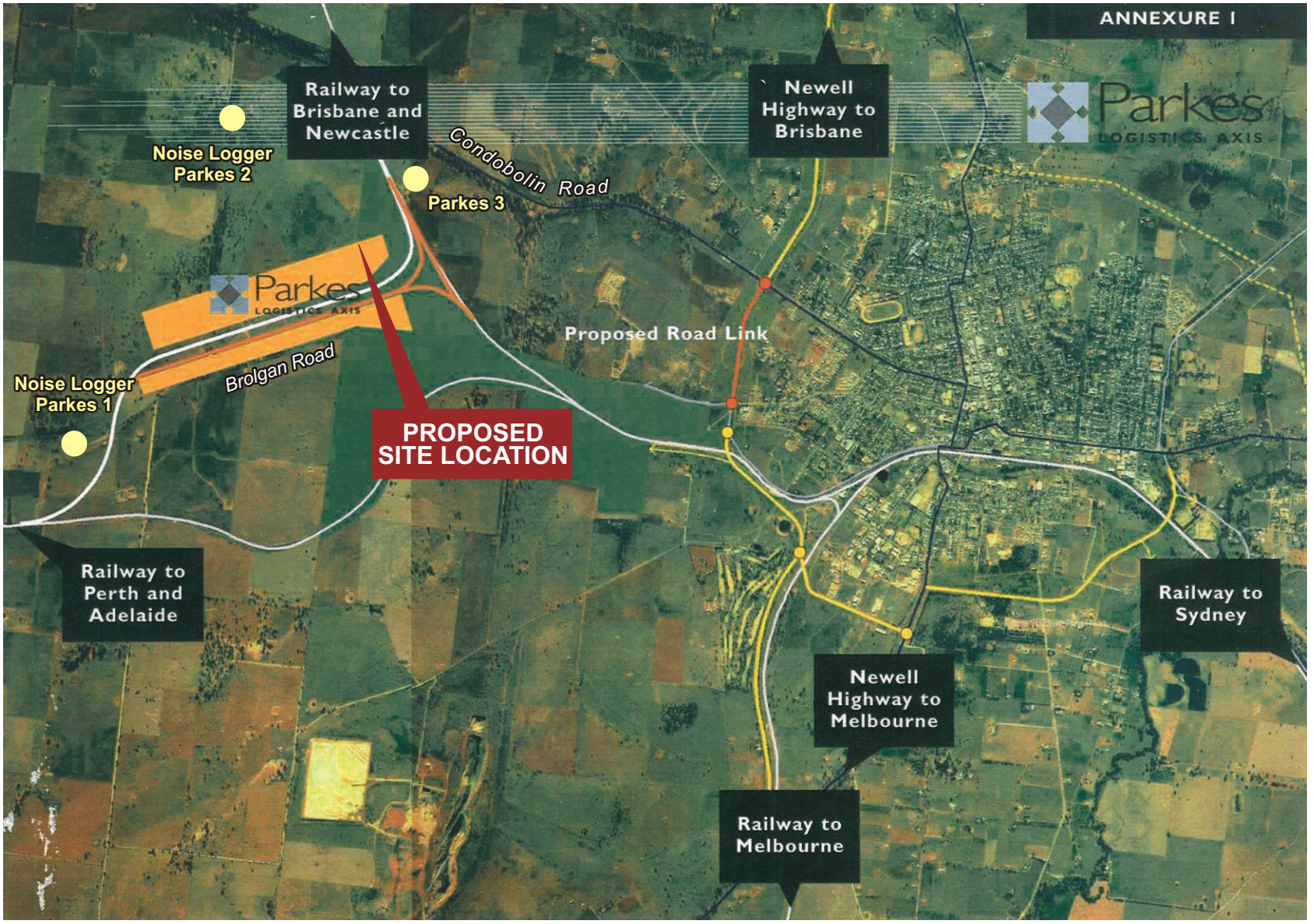
A number of previous noise assessment reports have been undertaken detailing the potential acoustic impacts of the proposed expansion of the Parkes industrial area and the use of local roads as heavy vehicle haulage routes.

Background noise monitoring has been undertaken at various locations surrounding the proposed PIT site, with the most recent acoustic assessment undertaken in 2002 investigating noise restrictions that may potentially limit the available area of land surrounding the proposed Parkes industrial hub following its commissioning and operation.

Road traffic noise for a number of traffic scenarios, in particular the use of Hartigan Avenue as a heavy vehicle transport route has also been assessed. Previous assessment of potential road traffic noise has taken into consideration existing traffic data at the time of the assessment and potential impacts of increased road traffic noise at residential receiver locations along the proposed traffic routes.

A list of previous background reports available at the time of this assessment is provided below:

- Parkes Shire Council, *Review of Environmental Factors, Access Road for the Goobang Junction Industrial Area;*
- Parkes Shire Council, *Strategic Plan for Major Road and Transport Infrastructure for Parkes and Environs,* April 2006;
- Indigo Acoustics, *Parkes Hub, Environmental Audit Noise Assessment,* March 2002;
- Civil Design and Modelling Consultants, *Noise Prediction Study for Proposed Subdivision Development at Parkes,* February 2000; and
- RTA Technology, *Traffic Noise Modelling of the Proposed upgrade of Hartigan Avenue, Parkes as a heavy vehicle route,* August 1997.



Date: 11 November 2004

Site Location

File Name: 2212447_LTN_01.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 1

3 Noise Monitoring and Results

3.1 Monitoring Locations

Two Acoustic Research Laboratories EL215 Type 2 continuous noise loggers were used to monitor the noise environment at the following locations:

- **Location 1** (also known as Parkes 1): Keith Residence, Brolgan Road, south west of the subject site; and
- **Location 2** (also known as Parkes 2): Clifton Residence, off Condobolin Road, north of the subject site.

Noise monitoring locations are shown in Figure 1.

A site inspection was conducted to determine appropriate long term noise monitoring locations for the assessment. The two locations chosen were deemed to be sites that were indicative of the local residential noise environment with the Keith residence being closest to the subject site while the Clifton residence provided an additional location indicative of the local ambient noise environment.

It is acknowledged that the Keith resident will be relocating during operation of the proposed terminal, however the exact location of the new residence was not yet confirmed, therefore the noise logger was placed within the property boundary of the existing residence.

Following the completion of long term monitoring at the two nominated locations, it was understood Parkes Shire Council had approved a development application for the construction and occupation of a third residence within close proximity to the terminal site. Background noise monitoring was not undertaken at this location (as the rating background level is anticipated to be similar to that at the tow original noise monitoring locations), however the location of the proposed residence was included in noise modelling.

The anticipated third residence adjacent to the site is known as Parkes 3.

Long term noise monitoring took place between the 25 August and 2 September 2005. The instruments were programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period. Internal software then calculated and stored the Ln percentile noise levels for each sampling period, which was later retrieved for detailed analysis. The instruments were calibrated before and after the logging periods. Table 3.1 provides details of the noise loggers and their locations.

Table 3.1 Continuous Noise Logger Details

Measurement Title	Parkes 1	Parkes 2
Monitoring Location	Keith Residence - Brolgan Road	Clifton Residence - Off Condobolin Road
Logger Serial No.	194560	193400
Measurement Started at	09:15 August 26, 2005	17:30 August 25, 2005
Measurement Stopped at	09:45 September 2, 2005	09:15 September 2, 2005
Pre-measurement Reference	110.1 dB(A)	110.2 dB(A)
Post-measurement Reference	110.0 dB(A)	110.0 dB(A)
Frequency Weighting	A	A
Engineering Units	dB(A) SPL	dB(A) SPL

3.2 Weather Results

Meteorological data (wind speed, direction, rainfall) was recorded continuously at noise monitoring location 1, using a Davis Instruments Vantage Pro Weather Envoy weather station set to record 15-minute averages. The details of the weather data are provided in Table 3.2. Wind speed is presented graphically in Figure 2.

Table 3.2 Weather Data

Data File Name	Clifton Residence
Measurement Started at	17:00 August 25, 2005
Measurement ended at	09:15 September 2, 2005
Percentage of non weather affected data	65%

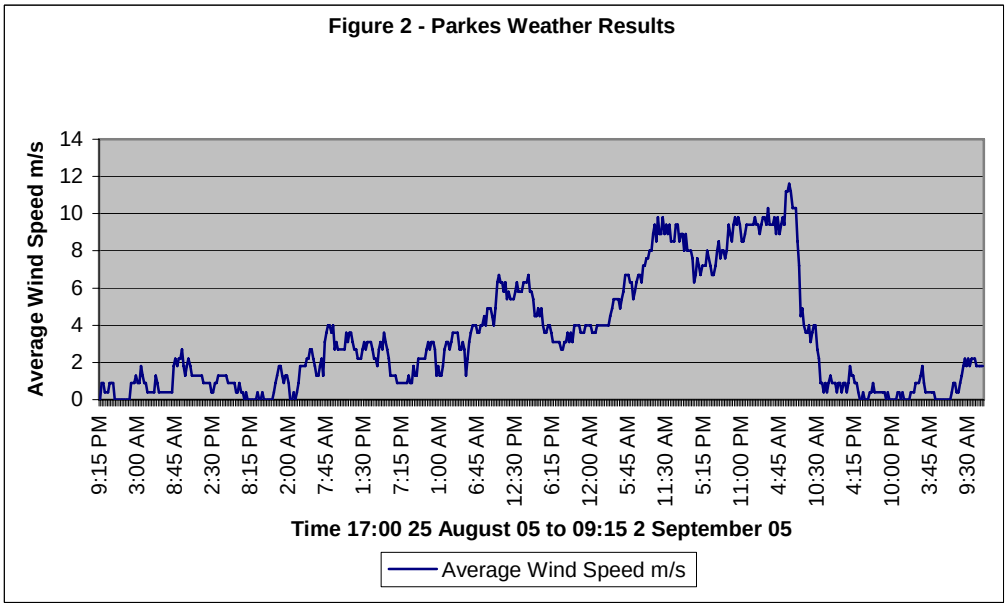


Figure 2 Windspeed Results Clifton Residence

No rainfall was recorded for the duration of the monitoring period.

3.3 Noise Monitoring Results

Figures 3 and 4 provide a graphical summary of the long term noise monitoring conducted at the Keith residence and the Clifton residence.

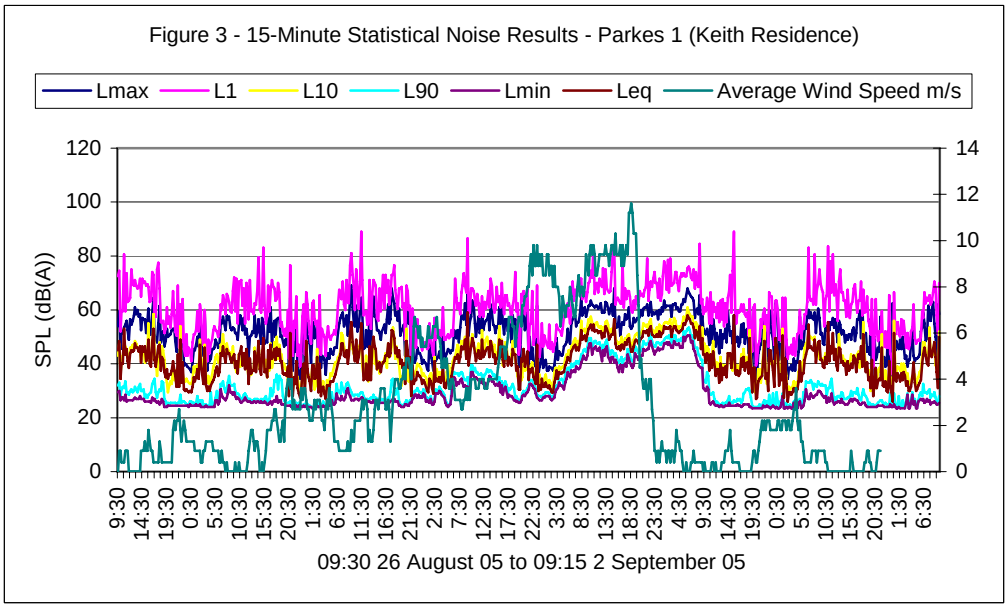


Figure 3 Results of Noise Monitoring Keith Residence

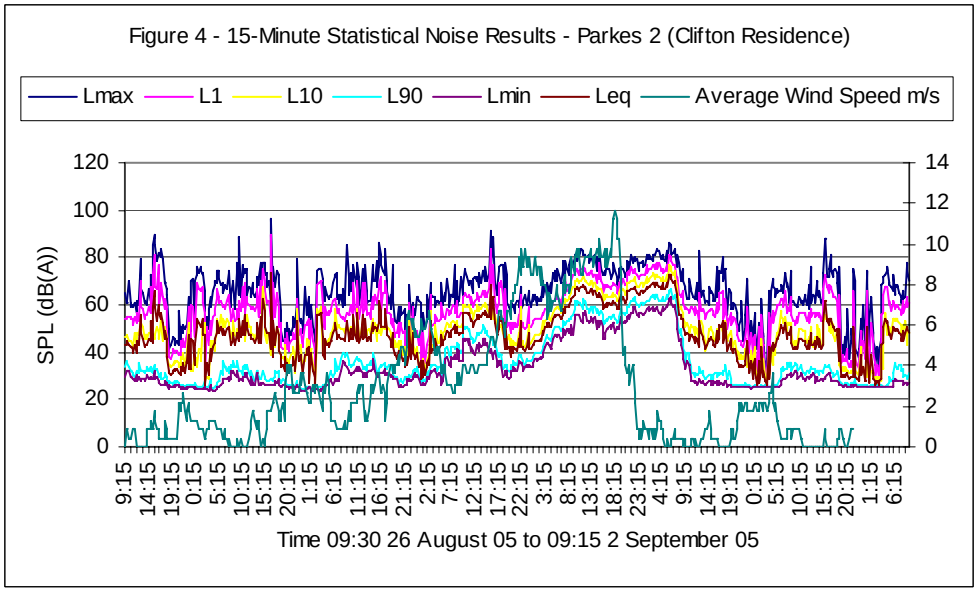


Figure 4 Results of Noise Monitoring Clifton Residence

Noise data from the daytime period of the 29 August and between day and night time periods of 30 August were excluded from the analysis due to the influence of wind speeds greater than 5 m/s.

Long term noise monitoring indicates a noise environment typical of a rural or suburban environment.

Calculated background L_{A90} day, evening, and night, $L_{Aeq(15hr)}$, $L_{Aeq(9hr)}$, $L_{Aeq(24hr)}$, $L_{Amaxeq(15hr)}$, $L_{Amaxeq(9hr)}$, and $L_{A10(18hr)}$ for the monitoring period are provided in the following tables[1].

[1] Refer to Glossary page for definition of these parameters

Table 3.3 Noise Monitoring Results – Background L_{A90} Noise Levels at Brolgan Road (Parkes 1)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
26/08/05	27.8	25.0	ND
27/08/05	26.5	25.0	24.3
28/08/05	26.7	24.8	24.3
29/08/05	30.5	26.8	25.5
30/08/05	25.5	ND	ND
31/08/05	ND	24.0	ND
01/09/05	27.0	24.8	24.0
02/09/05	ND	ND	24.0
RBL	26.8	24.9	24.3

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.4 Noise Monitoring Results – Background L_{A90} Noise Levels at Condobolin Road (Parkes 2)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
25/08/05	30.7	24.5	ND
26/08/05	29.7	25.5	24.5
27/08/05	28.2	25.5	25.0
28/08/05	33.0	27.0	24.5
29/08/05	38.5	32.3	27.8
30/08/05	ND	ND	ND
31/08/05	29.5	25.5	ND
01/09/05	31.0	26.3	25.5
02/09/05	ND	ND	25.5
RBL	30.7	25.9	25.3

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.5 Noise Monitoring Results – $L_{Aeq(15hr)}$ 7:00 am to 10:00 pm

Date	Parkes 1	Parkes 2
25/08/05	ND	49.9
26/08/05	44.8	52.2
27/08/05	42.9	56.7
28/08/05	46.3	50.5
29/08/05	46.3	55.7
30/08/05	ND	ND
31/08/05	45.1	48.1
01/09/05	44.3	50.0
Average	45.1	53.0

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.6 Noise Monitoring Results – $L_{Aeq(9hr)}$ 10:00 pm to 7:00 am

Date	Parkes 1	Parkes 2
25/08/05	ND	51.6
26/08/05	ND	48.1
27/08/05	39.8	48.9
28/08/05	38.1	44.4
29/08/05	36.6	51.0
30/08/05	ND	ND
31/08/05	43.5	44.3
01/09/05	39.6	46.6
Average	40.2	48.7

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.7 Noise Monitoring Results – $L_{A10(18hr)}$ 6:00 am to 10:00 pm

Date	Parkes 1	Parkes 2
26/08/05	ND	45.3
27/08/05	46.1	48.5
28/08/05	42.7	52.4
29/08/05	44.6	50.0
30/08/05	44.9	51.6
31/08/05	ND	ND
01/09/05	45.3	50.2
02/09/05	44.9	48.4
Average	44.8	50.0

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Table 3.8 Noise Monitoring Results – $L_{Aeq(24hr)}$ 12:00 am to 12:00 am

Date	Parkes 1	Parkes 2
26/08/05	ND	49.9
27/08/05	44.5	51.8
28/08/05	42.0	55.1
29/08/05	44.5	50.0
30/08/05	43.9	53.2
31/08/05	ND	ND
01/09/05	44.9	47.6
02/09/05	43.7	48.6
Average	43.9	51.6

ND: No data – all recorded values excluded from analysis due to wind speeds >5m/s.

Data from 30 and 31 August was excluded on some occasions due to the extraneous influence of wind speed, which affected the overall noise levels.

Field observations noted that the ambient noise environment at both locations (Parkes 1 and 2) were dominated by relatively low background noise levels with intermittent noise such as dogs, wildlife and local residential noise. Intermittent traffic noise was also noted as being part of the ambient noise environment but not being a dominant factor. The Narromine train line was intermittently apparent at location 2, the Clifton residence.

4 Environmental Noise Criteria

4.1 Construction Noise Criteria

Criteria for the construction phase applied to the assessment were sourced from Section 171 of the DEC's Environmental Noise Control Manual. The criteria was established using the measured background noise levels and applying a conversion factor based on the expected construction period. Construction noise criteria based on Tables 3.3 and 3.4 background noise levels are shown in Table 4.1.

Table 4.1 Construction Noise Criteria

Construction Period	Level Restrictions	Parkes 1 – Keith Residence L_{A10}	Parkes 2 – Clifton Residence L_{A10}	Parkes 3 – Proposed Residence
Less than 4 weeks	Background + 20 dB	55	55	55
Less than 26 weeks	Background + 10 dB	45	45	45
More than 26 weeks	Background + 5 dB	40	40	40

Normal construction hours are 7 am to 6 pm Monday to Friday, and 8 am to 1 pm Saturday. Construction activity outside those hours is not preferred but can usually occur provided the normal operational noise criteria are met and construction noise is not substantially audible or intrusive inside a dwelling.

4.2 Operational Noise Criteria

The INP provides guidance on the assessment of operational noise impacts. The guidelines include both intrusive and amenity criteria that are designed to protect receivers from noise significantly louder than the background level and to limit the total noise level from all sources near a receiver.

Intrusive noise limits set by the INP control the relative audibility of operational noise compared to the background level. Amenity criteria limit the total level of extraneous noise. Both sets of criteria are calculated and the lowest of the two in each time period normally apply. Table 2.2 in the INP provides modifications to the amenity criteria for existing levels of industrial noise. Attended observations noted that existing levels of industrial noise in the area are not a significant contributor to the existing ambient noise level in the vicinity of the development therefore no Table 2.2 adjustments are necessary for the amenity noise criteria. Intrusive criteria are simply 5 decibels above the measured (or adopted) background level with a minimum of 35 dB(A).

Amenity criteria are determined based on the overall acoustic characteristics of the receiver area and the existing level of noise excluding other noises that are uncharacteristic of the usual noise environment. Residential receiver areas are characterised into 'urban', 'suburban', 'rural' or other categories based on land uses, the existing level of noise from industry, commerce, and road traffic.

Nearest residents to the proposed terminal are considered to live in a 'rural' area as it is an area that is defined by an acoustic environment that is dominated by natural sounds, having little or not traffic. The INP specifies that a suburban area may be located in either a rural, rural-residential, environmental protection zone or scenic protection zone, as defined by an LEP or other planning instrument.

The project specific noise levels are provided in Table 4.2.

Table 4.2 Project Specific Noise Levels

	Parkes 1 – Keith Residence			**Parkes 2 – Clifton Residence**		
Criterion	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
A: Rating Background Level	27* $L_{A90(day)}$	25* $L_{A90(evening)}$	24* $L_{A90(night)}$	30 $L_{A90(day)}$	26* $L_{A90(evening)}$	25* $L_{A90(night)}$
B: Intrusiveness Criteria (A + 5dB)	35 $L_{Aeq(day)}$	35 $L_{Aeq(evening)}$	35 $L_{Aeq(night)}$	35 $L_{Aeq(day)}$	35 $L_{Aeq(evening)}$	35 $L_{Aeq(night)}$
C: Rural Amenity Criteria (Table 2.1 INP)	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$
D: Amenity Criteria: (INP Table 2.2 Adjusted)	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$	50 $L_{Aeq(day)}$	45 $L_{Aeq(evening)}$	40 $L_{Aeq(night)}$
E: Project Specific Noise Level (Pg 21 INP)	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(night)}$**	**35 $L_{Aeq(15min)}$**	**35 $L_{Aeq(evening)}$**	**35 $L_{Aeq(night)}$**

* Note – The INP states that where the rating background level is found to be less than 30 dB(A), then it is set at 30 dB(A), therefore these values have been adjusted to 30dB for further calculations.

The rating background level at Parkes 3 (the proposed new residence) is anticipated to be similar to that existing at locations Parkes 1 and Parkes 2. As such, similar project specific noise levels were adopted for location Parkes 3.

4.3 Road Traffic Noise Criteria

Road traffic noise criteria are sourced from the DEC's Environmental Criteria for Road Traffic Noise. (ECRTN). The ECRTN contains a number of criteria applied to residential receivers near roads, depending on the situation and the road classification.

Road classifications and relevant criteria can be seen in Table 4.3.

The ECRTN criterion additionally states that if the noise limits are already exceeded then the traffic noise arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Table 4.3 ECTRN Road Traffic Noise Criteria L_{Aeq}

	Day	Night	Road Classification
Brolgan Road	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Condobolin Road	$L_{Aeq(1hr)}$ 60	$L_{Aeq(1hr)}$ 55	Collector
Newell Highway (north)	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Arterial Road
Newell Highway (south)	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Arterial Road
Orange Road	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	Sub-arterial Road
Hartigan Avenue	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Dalton Street	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road
Bogan Street	$L_{Aeq(1hr)}$ 55	$L_{Aeq(1hr)}$ 50	Local Road

4.4 Rail Noise Criteria

The NSW DEC publication Environmental Noise Control Manual (ENCM) Chapter 163 provides guidance for rail traffic noise. The noise criteria are set for residential receivers and are specified as 24hr L_{Aeq} and as a maximum pass-by level.

The project specific noise levels are provided in Table 4.4.

Table 4.4 Operational Project Specific Noise Levels

Planning Levels	Maximum Levels
$L_{Aeq, 24hr}$ = 55 dB(A)	$L_{Aeq, 24hr}$ = 60 dB(A)
L_{Amax} = 80 dB(A)	L_{Amax} = 85 dB(A)

4.5 Sleep Disturbance Criteria

The NSW DEC publication ENCM, Chapter 19 provides consideration for sleep arousal levels. It states that noise control should be applied with the general intent to protect people from sleep arousal. The purpose of sleep arousal guidelines is to address short high level noise likely to cause awakening during night time period 10 pm to 7 am and 8 am on Sundays and Public Holidays. To achieve this, the L1 level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) when measured outside the bedroom window.

5 Assessment of Potential Impacts

5.1 Construction Noise Assessment

The construction noise criteria are set for noise levels determined as $L_{10(15min)}$. During a full 15-minute period, the machinery items to be used on site will operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power.

In addition, mobile machinery will likely move about during the 15-minutes, variously altering the directivity of the noise source with respect to individual receivers.

As it has been indicated, that initial construction activities at the site are expected to occur in stages over a 5-year period (ie. more than 26 weeks), and the site is expected to be operational by the year 2020, the construction noise criterion should be considered as being Background + 5 dB(A). As a consequence, in a worst case configuration, noise levels have the potential to exceed project specific noise levels during construction. However, it is highly unlikely that all of the machinery would be operating at full power at the same time for an extended period.

Typical noise levels produced by construction plant anticipated to be used on site were sourced from AS 2436 – 1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites and from GHD's internal database. The power levels were then distance attenuated from the proposed construction site. Propagation calculations take into account sound intensity losses due to spherical spreading, with additional minor losses such as atmospheric absorption, directivity and ground absorption were ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism. Received noise at each assessed distance, from each item of plant on site, is added (where appropriate) to determine the total received noise at that distance from construction activities and compared to the criteria.

Received noise produced by anticipated activities, during the construction of the upgraded facility is shown in Table 5.1 for a variety of distances to a typical receiver, with no noise barriers or acoustic shielding in place and with each plant item operating at full power.

It should be noted that the INP requires trucks and other mobile machinery including forklifts to be assessed as site sounds other than traffic. This means vehicles serving the facility change their status from road traffic to site noise as they enter the site then change back to road traffic as they leave the site.

Table 5.1 Predicted Plant Item Noise Levels, dB(A) L_{10}

Plant Activity SWL dB(A)	160 m	320 m	640 m	1280 m
Crane 110	58	52	46	40
Backhoe 108	56	50	44	38
Compressor 100	48	42	36	30
Concrete Pump 109	57	51	45	39
Dump Truck 108	56	50	44	38
Water Tanker 109	57	51	45	39
Compactor 110	58	52	46	40
Concrete Saw 118	66	60	54	48
Paver 113	61	55	49	43
Rock Breaker 118	66	60	54	48

The sound power levels shown in Table 5.1 are maximum levels produced when machinery is operated under full load.

5.2 Operational Noise Assessment

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of industrial noise generated by the proposed intermodal terminal.

CadnaA is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to ISO 9613-2.

Modelling results are based on available information provided and should only be used as a guide for comparative purposes.

Modelling was based on vehicle movements provided by the Roads and Traffic Authority (RTA) and rail movements provided by Australian Rail Track Corporation (ARTC).

According to the road traffic assessment, the current throughput likely to use the proposed intermodal terminal was a net number of approximately 12 trucks per hour through the terminal, or 1 truck every 5 minutes.

An assessment of rail freight movements predicted that an average of 8 trains would arrive into the terminal every day.

The model took into account the sound power levels of the primary noise sources to be used at the facility and onsite traffic, based on information provided by the client. Where no noise data was provided for equipment or machinery, sound power levels were sourced from GHD's internal database, based on a rail facility located at Hornsby which undertakes similar engineering maintenance to the proposed rail siding. Estimated power levels for primary noise generating equipment at the fleet centre are provided in Table 5.2.

Table 5.2 Estimated Sound Power Levels for Primary Noise Generating Equipment SWL dB(A)

Item	SWL dB(A)
Shunting Tractor	110.6
Forklift – Fantuzzi FDC 450 G4[1]	96.0
KONE 15-Tonne Crane during Operation	97.0
Overhead Crane 20-Tonne during Operation	81.7
Train Approaching Facility (approximately 20 km/h)	75.9

[1] – Sound power level provided by client

CadnaA noise prediction software considers topography, weather conditions, site sources and the location of the receiver areas to predicted received noise levels from the proposed terminal facility. The location of the noise sources within the site was done with reference to site layout plans.

5.2.1 Noise Modelling

Assumptions undertaken for the modelling are listed below:

- Sources were modelled using:
  - 15 x Fantuzz forklifts;
  - 1 x shunting tractor;
  - train approaching at approximately 20 km/h from the north and the west;
  - 1 x 15-tonne overhead crane;
  - 2 x 20-tonne overhead crane[2];
  - assumed 50 private vph during peak hour conditions; and
  - 12 commercial vph during peak hour conditions.
- All noise sources were modelled without any noise barriers or building attenuation in place and modelled as external point sources;
- Day, evening and night time periods have been modelled under the same scenarios;
- Modelling was undertaking using a ground absorption of 0.8;
- Temperature was modelled at 10^{o}C and relative humidity of 70 %; and
- Average warehouse heights were approximately 15 m.

[2] Note that numbers of anticipiated equipment (cranes and forklifts) were provided and modelled according to predicted numbers. Sound power levels were only provided for forklifts, and therefore a measure of conservatism has been applied for modelling of the anticipated cranes during site operation based on data from GHD's internal database.

The above scenarios were modelled under four differing meteorological conditions as follows:

- Scenario 1 – calm weather conditions, neutral, with no wind;
- Scenario 2 – Class F[3] concawe weather conditions, wind speed 2 m/s towards north west, noise monitoring location 2 (Clifton residence) under worst case conditions during the evening period;
- Scenario 3 – Class F concawe weather conditions, wind speed 2 m/s towards south west, noise monitoring location 1 (Keith residence) under worst case conditions during the evening period; and
- Scenario 4 – Class F concawe weather conditions, wind speed 2 m/s towards north east, proposed residential dwelling under worst case conditions during the evening period.

Results of the noise modeling are provided in Figures 5, 6, 7 and 8 and are based on a worst-case scenario with all plant items operating at their maximum levels including wind direction toward both the residences and calm weather conditions.

5.3 Modelled Operation Results

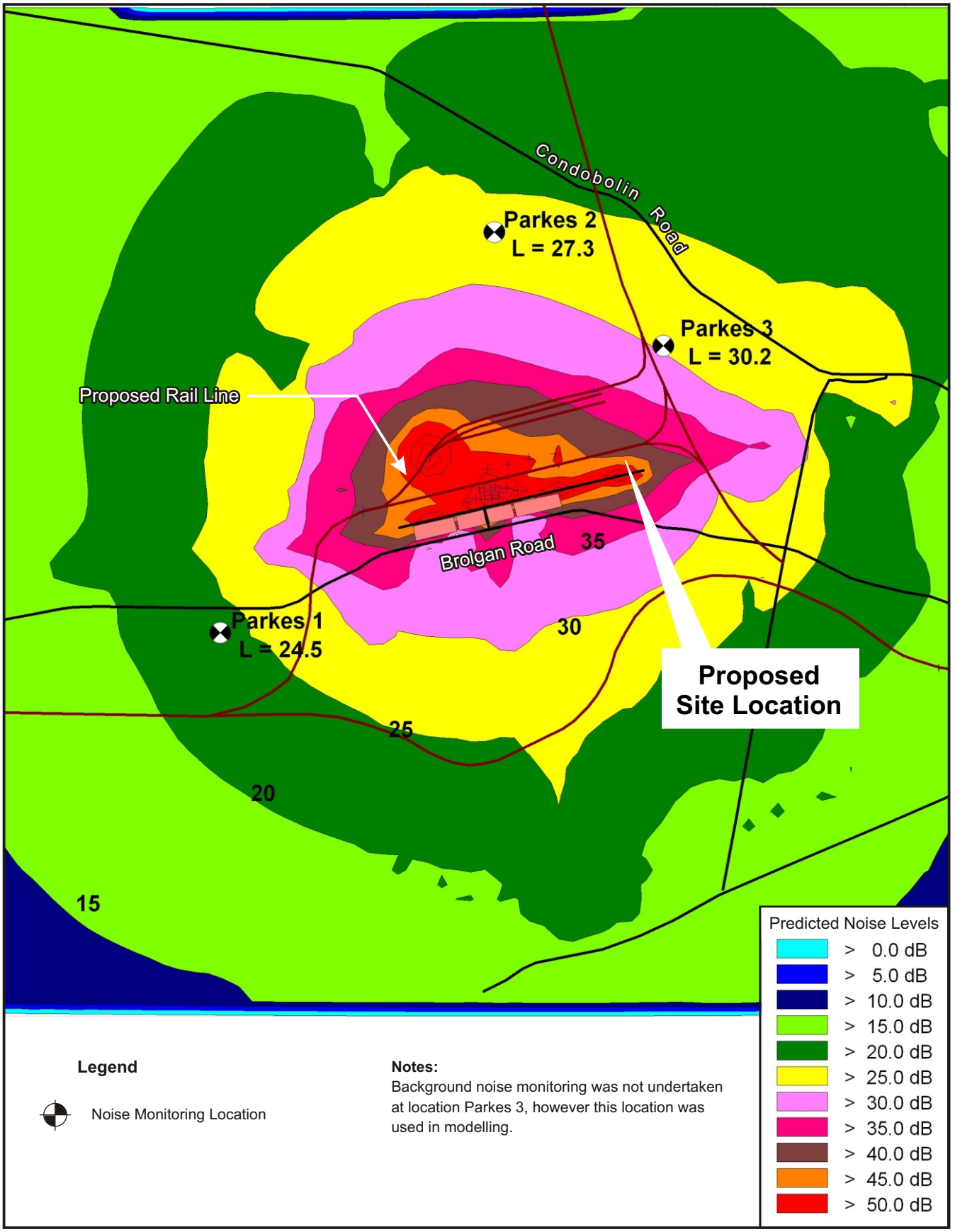
Modelled sound pressure levels at the residential receiver locations for the three different scenarios are summarised in Table 5.3.

Table 5.3 Modelled Receiver Sound Pressure Levels dB (A)

	Scenario 1 dB(A)	Scenario 2 dB(A)	Scenario 3 dB(A)	Scenario 4 dB(A)
Parkes 1	24.5	24.5	29.2	24.5
Parkes 2	27.3	31.6	27.3	31.6
Parkes 3	30.2	33.0	30.2	33.0
Project Specific Noise Goals (Day)	**35**	**35**	**35**	**35**
Project Specific Noise Goals (Evening)	**35**	**35**	**35**	**35**

Project specific noise levels for monitoring locations were based on the intrusive noise criteria. Modelled results, as shown in Figures 5, 6, 7 and 8 suggest that project specific noise goals can be met at both monitoring locations under the four meteorological conditions as specified.

[3] The default inversion parameter Class F has been used based on the area classified as a non-arid area.



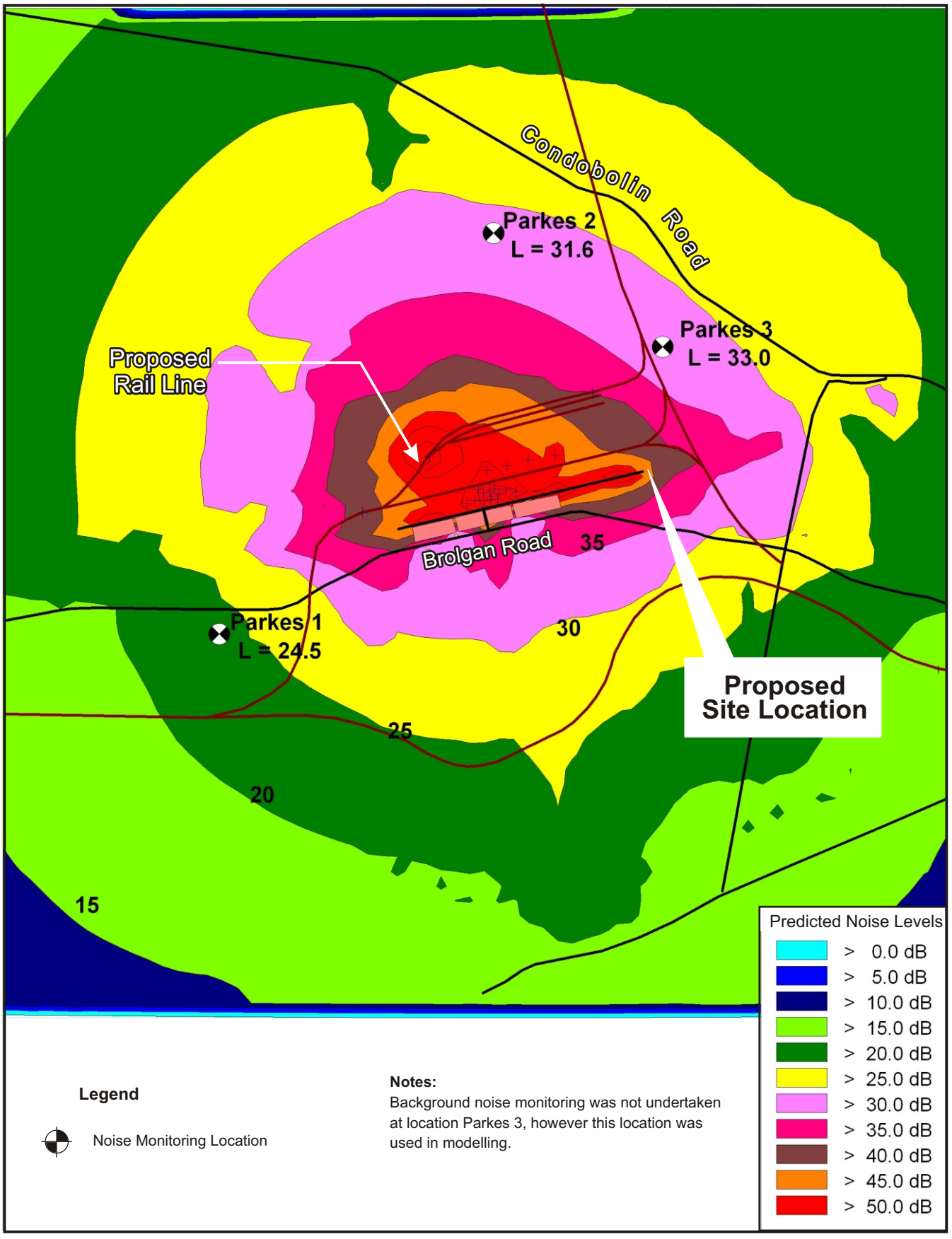
Date: 2 February 2006

Predicted Noise Levels - Scenario 1

File Name: 2212447_LTN_02.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 5



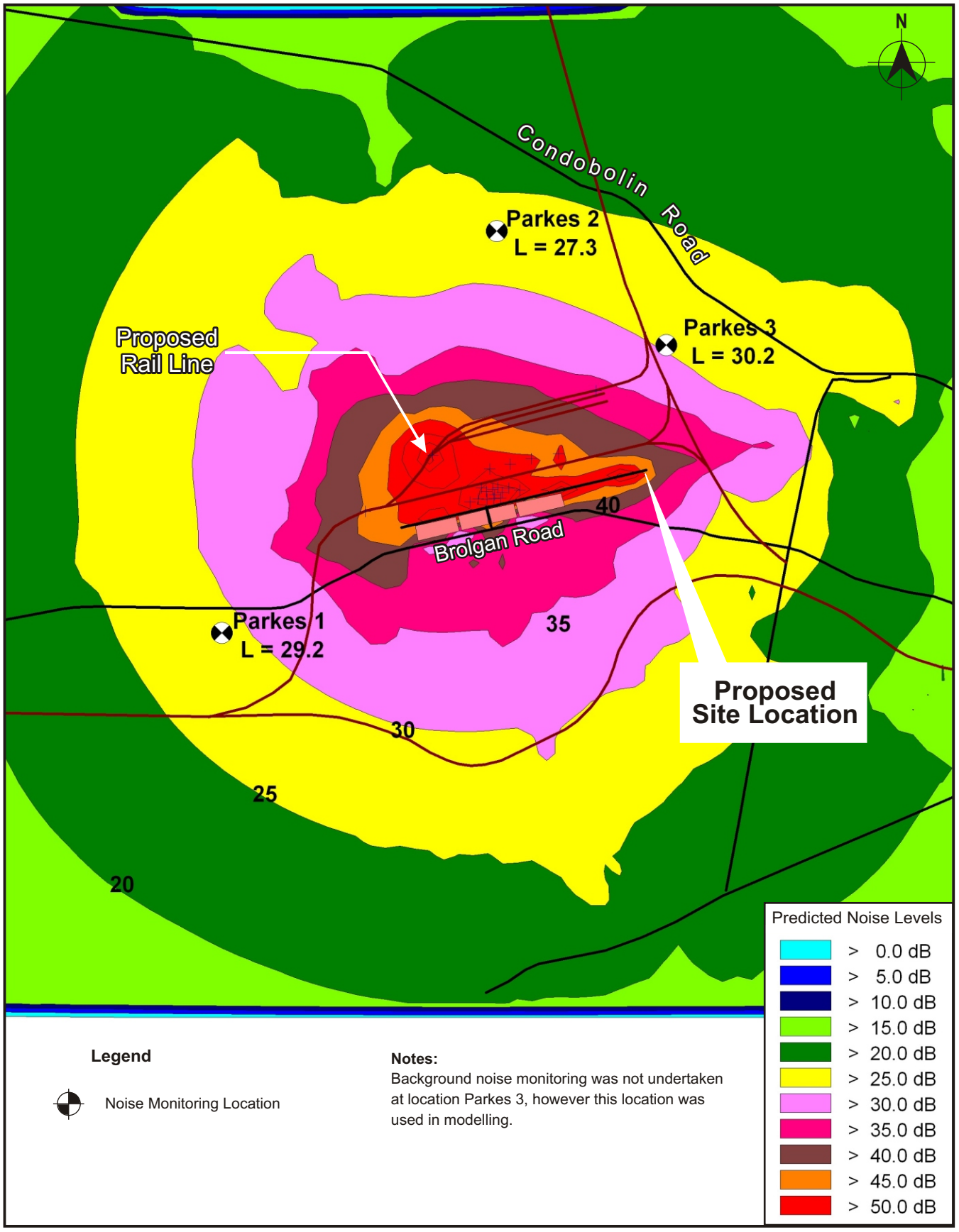
Date: 2 February 2006

Predicted Noise Levels - Scenario 2

File Name: 2212447_LTN_03.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 6



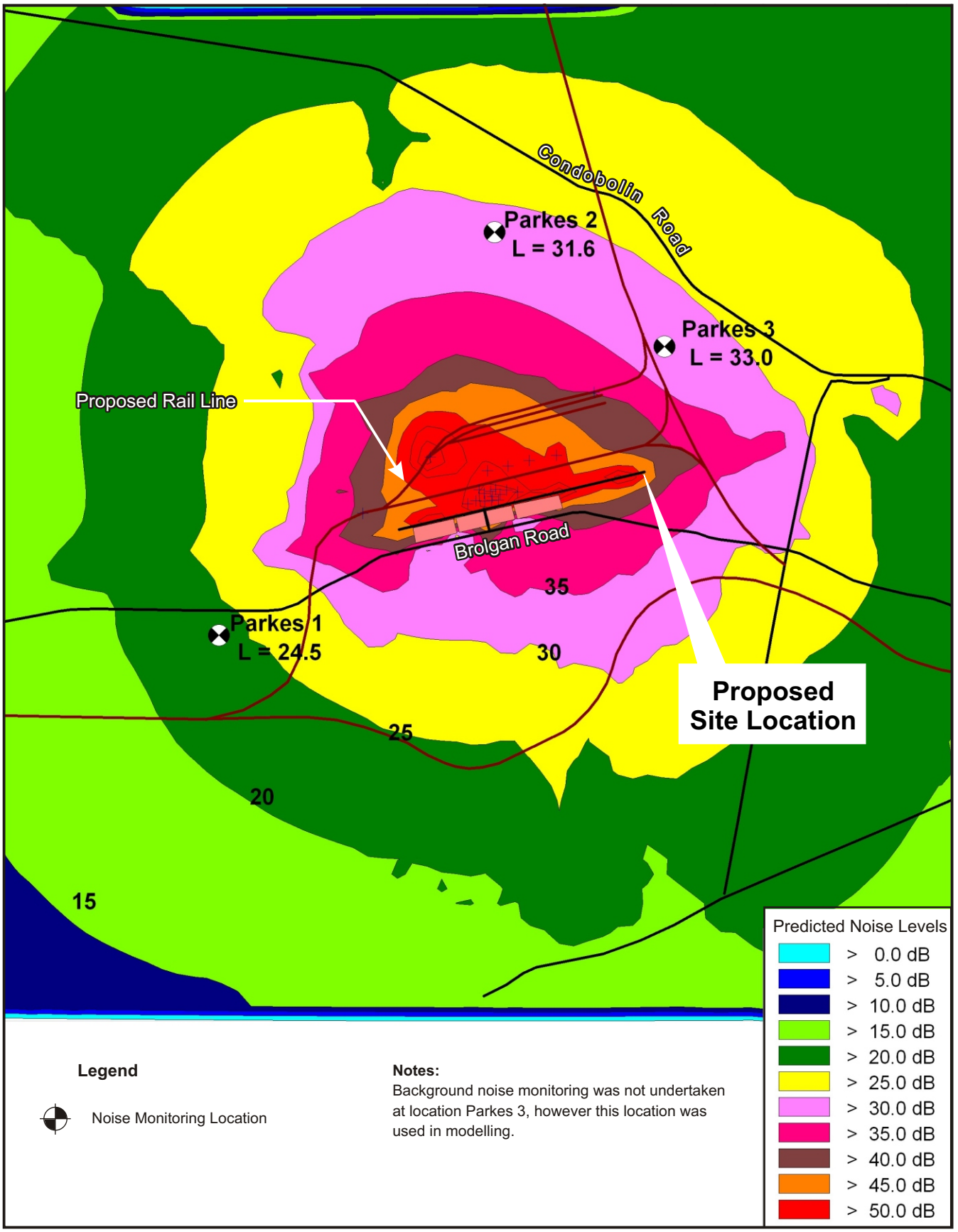
Date: 2 February 2006

Predicted Noise Levels - Scenario 3

File Name: 2212447_LTN_04.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 7



Date: 2 February 2006

Predicted Noise Levels - Scenario 4

File Name: 2212447_LTN_05.cdr

Acoustic Assessment - Proposed Intermodal Terminal, Parkes

Figure 8

5.4 Operational Road Traffic Noise Assessment

An operational traffic noise assessment was undertaken using the Calculation of Road Traffic Noise (CoRTN)[4] algorithm, which is implemented in CadnaA to determine the traffic noise generated from the PIT traffic.

Operational traffic movements are primarily attributed to freight transport and delivery vehicles.

5.4.1 External Haulage Routes

External haulage routes were modelled based on information provided in GHD's traffic assessment report.

Both current and predicted intermodal traffic data used for modelling are presented in Table 5.4 below.

[4] CoRTN algorithim is published by the UK Department of Transport, 1998.

Table 5.4 Existing and predicted traffic data

	Existing – No PIT Traffic						Predicted - Including PIT traffic			
	2005		2010		2020		2010		2020	
	AADT	%HV	AADT	%HV	AADT	%HV	AADT	%HV	AADT	%HV
Brolgan Road	188	2	200	2	227	2	1052	48	2380	50
Condobolin Road	1036	8	1064	9	1138	11	1087	9	1200	12
Newell Highway – north	5337	17	5685	18	6597	21	5780	19	6842	22
Newell Highway – south	5620	27	5914	13	6684	35	6051	15	7032	37
Orange Road	2031	5	2099	6	2276	8	2124	7	2342	8
Hartigan Avenue	450	7	690	20	762	20	1264	50	2302	63
Bogan Street	5427	16	5789	17	6587	19	6095	19	8615	34
Dalton Street	1943	5	1992	5	2094	5	2237	4	2878	7

Notes AADT = average annual daily traffic

%HV = percentage of heavy vehicles

5.4.2 Initial road traffic noise assesment

The ECRTN criterion states that if the noise limits are already exceeded then the traffic noise arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Since residential receivers along the haulage routes have not been provided nor have background measurements been taken an initial qualitative assessment has been undertaken to assess whether the predicted traffic as a result of haulage routes associated with the proposed terminal will lead to an increase of 2 dB or more on any of the roads.

Note that it is unknown whether any of the roads currently exceed the ECRTN criteria however if the increase is less than 2 dB then further detailed assessment at the residential locations is not required.

The CoRTN algorithm implemented in CadnaA models road traffic emission as $L_{10(18hr)}$ or $L_{10(1hr),}$ however the respective road criteria are given as $L_{eq(period)}$. Therefore the $L_{eq(15hr)}$ day and $L_{eq9(hr)}$ night as specified in the NSW ECRTN emission levels, were determined by using traffic noise descriptor conversion factors of –2.2 dB and -5.1 dB respectively. These noise descriptor conversion factors were obtained from Table 2 of Austroads Research Report, "*Modelling, Measuring and Mitigating Road Traffic Noise*", 2005.

The emission levels for each road is reported as sound pressure levels at a reference distance of approximately 10 m from the edge of the carriageway. Emission levels for day and evening periods for the respective roads are shown in Table 5.5 and Table 5.6 for existing traffic and predicted traffic as a result of haulage routes associated with the proposed terminal for the years 2005, 2010 and 2020.

Table 5.5 $L_{eq(1h)}$ Day - Emission Level at 10 m from edge of the carriageway

Road Name	Existing dB(A)			PIT dB(A)	
	2005	2010	2020	2010	2020
Brolgan Road	53.1	53.4	53.9	65.3	69.2
Condobolin Road	61.6	61.9	62.4	61.9	62.8
Newell Highway – north	69.9	70.3	78.2	70.5	71.5
Newell Highway – south	71.1	69.9	72.5	70.2	72.9
Orange Road	64.0	64.3	65.0	64.5	65.1
Hartigan Avenue	53.5	57.8	58.2	63.4	67.0
Bogan Street	66.1	66.6	67.5	67.1	70.5
Dalton Street	59.3	59.4	59.6	59.6	61.5

Table 5.6 $L_{eq(1hr)}$ Night - Emission Level at 10 m from edge of the carriageway

Road Name	Existing dB(A)			PIT dB(A)	
	2005	2010	2020	2010	2020
Brolgan Road	50.2	50.5	51.0	62.4	66.3
Condobolin Road	58.7	59.0	59.5	59.0	59.9
Newell Highway – north	67.0	67.4	68.3	67.6	68.6
Newell Highway – south	68.2	67.0	69.6	67.3	70.0
Orange Road	61.1	61.4	62.1	61.6	62.2
Hartigan Avenue	50.6	54.9	55.3	60.5	64.1
Bogan Street	63.2	63.7	64.6	64.2	67.5
Dalton Street	56.4	56.5	56.7	56.3	58.6

Based on modelled results and data provided, traffic emissions should not increase by more than 2 dB on any of the haulage routes except Brolgan Road and Hartigan Avenue as a result of the proposed predicted traffic due to haulage routes.

Brolgan Road and Hartigan Avenue emission levels are predicted to increase, due to the large percentage increase in predicted traffic associated with the haulage routes, in particular, the increase in percentage of heavy vehicular movement (up to 300% increase in heavy vehicle traffic). Therefore, further assessment and modelling needs to be undertaken to determine whether ECRTN criteria are exceeded.

5.4.3 Brolgan Road traffic noise assesment

The initial assessment indicated that Brolgan Road and Hartigan Avenue emission levels increase considerably due to the large percentage increase in predicted traffic as a result of haulage routes associated with the proposed terminal. Therefore further assessment of the predicted road traffic noise impacts on Brolgan Road and Hartigan Avenue has been undertaken to determine whether the ECRTN criteria is satisfied.

According to the ECRTN, both Brolgan Road and Hartigan Avenue are classified as local roads with a road traffic noise criteria of 55 $L_{eqmax(1hr)}$ day and 50 $L_{eq(1hr)max}$ night at potential noise sensitive receivers. The CoRTN algorithm implemented in CadnaA is used to calculate the respective $L_{eq(1hr)}$ levels and is depicted on a contour plots to graphically represent the land areas that exceed the criteria levels.

Parkes Shire Council recorded existing hourly traffic data, including vehicle class, on Brolgan Road for Friday, 9 December 2005 to Friday, 16 December 2005, which is used in this assessment.

According to this data the existing day $L_{eq(1hr)max}$ is expected to occur during the afternoon peak-hour between 5 pm – 6 pm with a weekday average of 16 vehicles with approximately 10% HV. The existing Night $L_{eq(1hr)max}$ is expected to occur during the late evening period between 10 pm – 11 pm with a weekday average of 4.4 vehicles with approximately 32% HV.

The corresponding predicted hourly traffic resulting from the haulage routes associated with the proposed terminal on Brolgan Road, obtained from Tables 39 and 40 of the GHD traffic report, are as follows:

- 2010 peak-hour PIT traffic – 48 hvph[5] (two-way);
- 2010 24 hour average PIT traffic – 20 hvph (two-way);
- 2020 peak-hour PIT traffic – 110 hvph (two-way); and
- 2020 24 hour average PIT traffic – 46 hvph (two-way).

Since no hourly traffic data was available for Hartigan Avenue, the following assumptions have been made:

- For the $L_{eq1hr(max)}$ Day, the afternoon peak hour is assumed to be 10% of the AADT; and
- For the $L_{eq1hr(max)}$ Night, the evening period is assumed to be the 24 hour AADT average.

The CoRTN algorithm calculates the $L_{10(1hr)}$ therefore the following general conversion factor was used for converting between road traffic noise descriptors:

$L_{eq(1hr)} = L_{10(1hr)} – 3$ dB[6].

The following scenarios were modelled:

- Existing traffic noise level (2005) – Day $L_{eq(1hr)max;}$
- Existing traffic noise level (2005) – Night $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2010) – Day $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2010) – Night $L_{eq(1hr)max;}$
- Predicted traffic noise levels associated with the proposed terminal (2020) – Day $L_{eq(1hr)max}$; and
- Predicted traffic noise levels associated with the proposed terminal (2020) – Night $L_{eq(1hr)max}$.

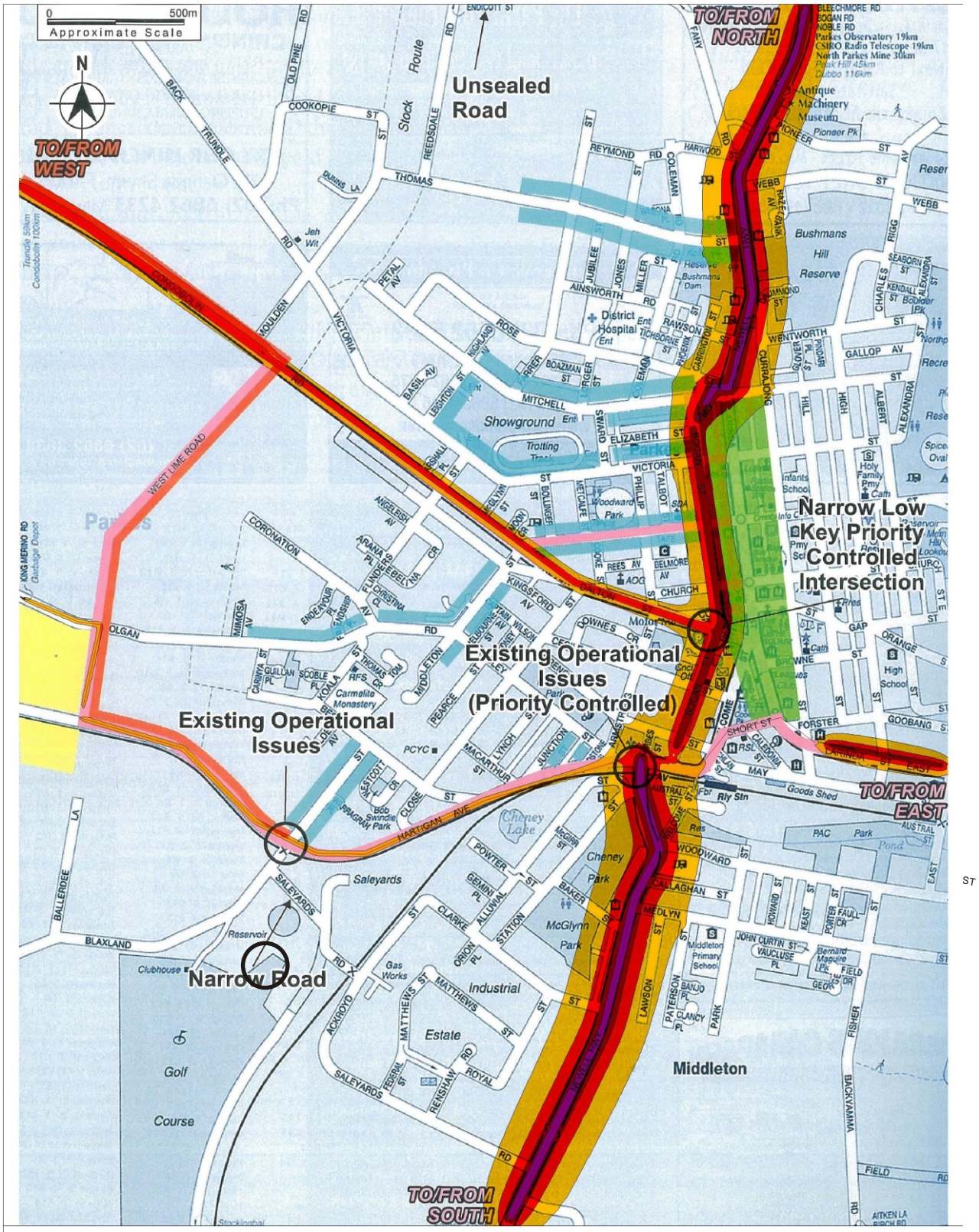
[5] Note – hvph = heavy vehicles per hour

[6] This relationship was originally derived based on short term noise measurements an is also used as a formula for converting between L_{Aeq} and L_{A10} (*Burgess, 1978*)

The modelled scenarios are presented in Figures 9 – 14 below as contour plots to graphically represent the land areas that exceed the criteria levels. Sensitive land use areas (residential, recreational and educational dwellings) were documented in GHD's traffic assessment report and identified on the following road traffic noise figures (identified by blue shading).

The predicted traffic noise levels indicate that areas exceeding the ECRTN criteria along Brolgan Road and Hartigan Avenue are unlikely to overlap any noise sensitive locations that have been specified or provided.

Therefore based on the information provided it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines at the nearest potentially sensitive receptors.



Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 9 - Existing traffic noise level (2005) Day Leq(1hr)max

31 May 2006
JN 22 12447

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Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD

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Figure 10 - Existing traffic noise level (2005) Night Leq(1hr)max

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Legend

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- Industrial Uses
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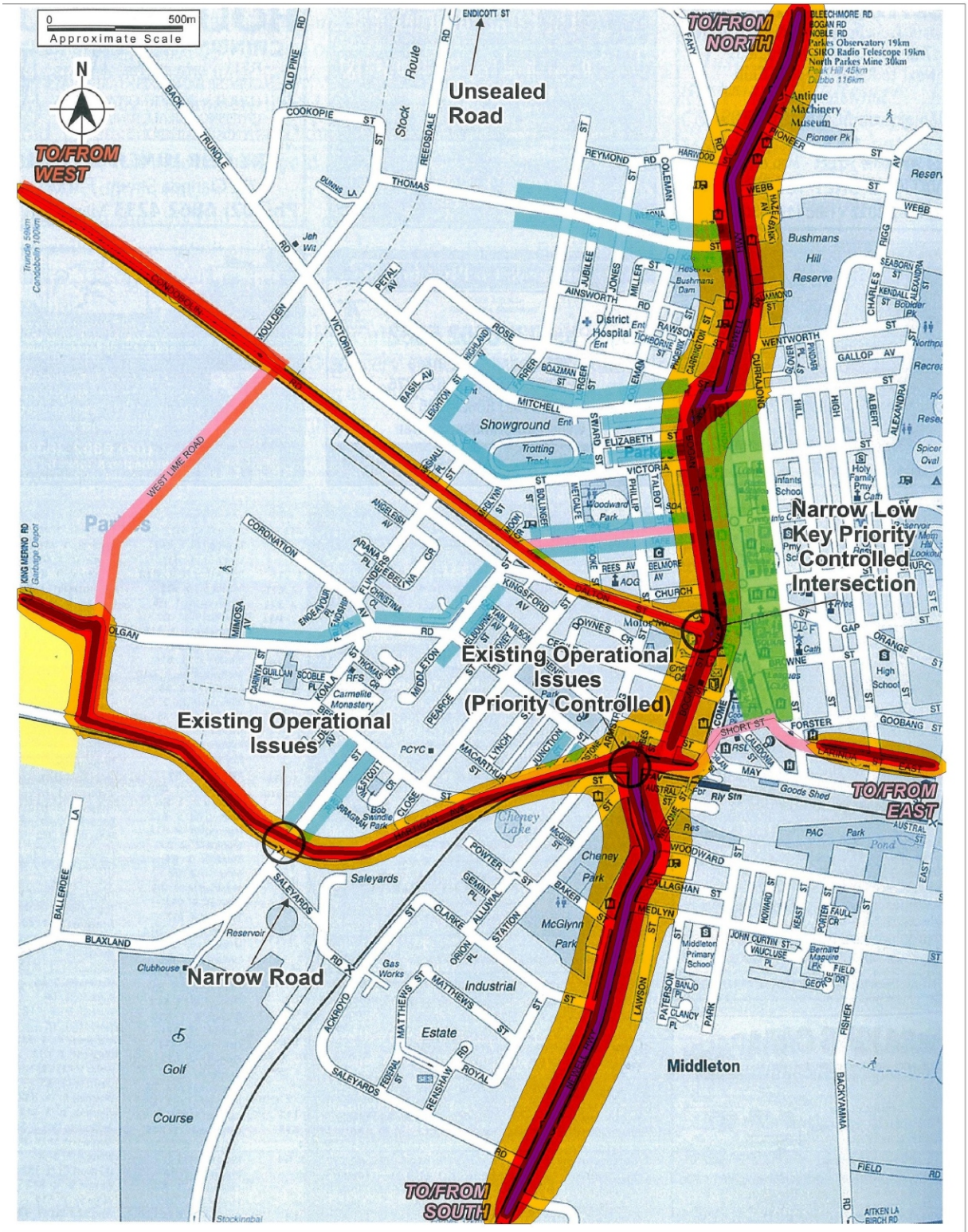

Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

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Figure 11 - Predicted traffic noise levels (2010) Day Leq(1hr)max

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- Industrial Uses

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Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 12 - Predicted traffic noise levels (2010) Night Leq(1hr)max

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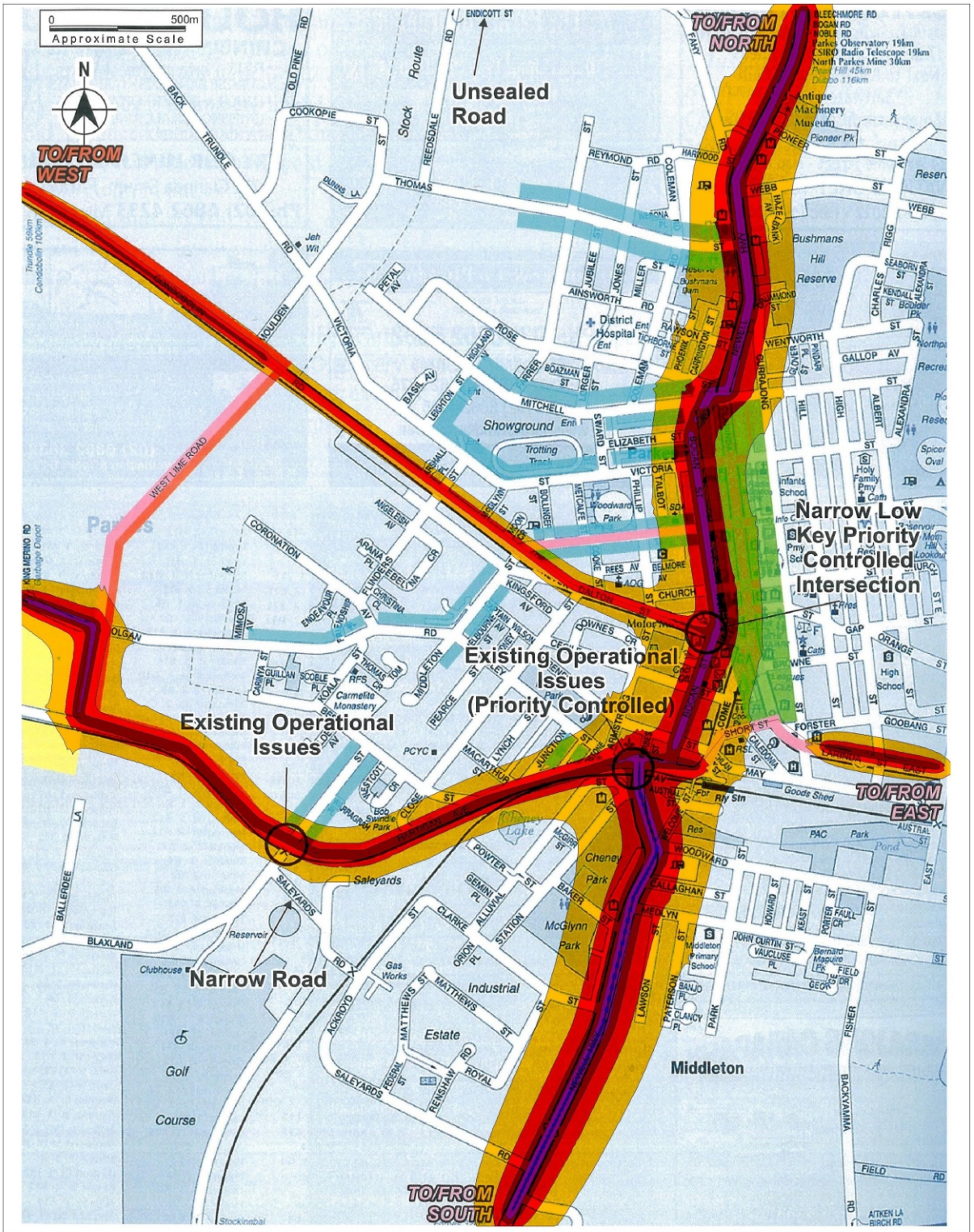

Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 13 - Predicted Traffic Noise Levels (2020) Day Leq(1hr)max

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Legend

- Approved B Double Truck Routes
- Approved Road Train Truck Routes
- Sensitive Land Use (Residential, Recreational, Educational)
- Industrial Uses
- CBD

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Sound Pressure Level dB(A)

- > 55.0 dB(A)
- > 60.0 dB(A)
- > 65.0 dB(A)
- > 70.0 dB(A)
- > 75.0 dB(A)
- > 80.0 dB(A)
- > 85.0 dB(A)

Parkes Intermodal Terminal Acoustic Assessment

Figure 14 - Predicted Traffic Noise Levels (2020) Night Leq(1hr)max

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Legend

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5.5 Rail Noise Assessment

The current NSW DEC recommended guideline for rail traffic noise is an $L_{eq(24hr)}$ of 55 dB(A) and an $L_{eq(max)}$ of 80. The existing rail traffic is 3 single stack trains per day from the west rail line. Rail traffic for the proposed terminal at the ultimate stage is 8 double stack trains in total per day distributed evenly from the North, South East and West rail lines (which over a 24 hour period equates to less than 1 train per hour). Calculations were performed using the Calculation of Rail Noise (CRN[7]) algorithm using the predicted increase in train movements.

Results indicated there will be no noticeable increase in the $L_{eq(24hr)}$ levels and that the predicted rail noise will remain below the NSW DEC recommended guidelines.

5.6 Sleep Disturbance Assessment

The INP states that the L1 level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) when measured outside the bedroom window.

The adjusted operational noise levels are provided in Table 5.9.

Table 5.9 Sleep Disturbance Noise Levels

	Scenario 1 dB(A)	Scenario 2 dB(A)	Scenario 3 dB(A)	Scenario 4 dB(A)
Parkes 1	24.5	24.5	29.2	24.5
Parkes 2	27.3	31.6	27.3	31.6
Parkes 3	30.2	33.0	30.2	33.0
Project Specific Noise Goals (Background Level)	**35**	**35**	**35**	**35**
Sleep Disturbance Level (Background +15 dB)	**50**	**50**	**50**	**50**

Noise modelling suggests that sleep disturbance criteria can be met at all three monitoring locations during operation of the intermodal terminal.

[7] The CRN algorithim is published by the UK Department of Transport, 1995.

6 Recommended Mitigation Measures

To minimise noise emissions during construction, the following management and mitigation measures are available to ameliorate likely noise impacts:

- All combustion engine plant, such as generators, compressors and welders should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers;
- Vehicles will be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes will be eliminated, where practicable;
- Where practical, all vehicular movements to and from the construction site must be made only during normal working hours;
- Where practical, machines should be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods;
- Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made; and
- Where practical, impact wrenches should be used sparingly with hand tools or quiet hydraulic torque units preferred.

With regard to potential traffic noise, by keeping vehicles serviced, fitted with mufflers, eliminating exhaust brake usage and posted speed limits, noise due to trucking activity associated with the operation and construction of the terminal can be significantly mitigated.

As modelled results suggest, operational noise is not expected to exceed project specific noise goals, no engineered acoustic mitigation measures are required. However, best practice noise management as described, but not limited to the above, should be implemented to control operational noise.

7 Conclusion

GHD were commissioned by Terminals Australia, as part of an Environmental Impact Statement (EIS), to assess the acoustic impacts for the construction and operation of an Intermodal Terminal for the large-scale transport, warehousing, manufacturing and storage of freight located at Parkes, western NSW. The basis of the assessment was to ascertain whether the proposed facility would have an acoustic effect on the amenity of nearby sensitive noise receptors within close proximity of the site, during both construction and operation of the terminal.

Unattended noise monitoring was undertaken to determine the existing background and noise environment in the vicinity of the proposed facility. Detailed noise modelling was undertaken based on the predicted maximum sound power levels of primary noise sources for the facility. The noise model undertook a worst-case scenario with all plant items listed operating at their maximum sound power levels with wind directed at the nearest residences.

Results of the noise modelling suggest that noise emanating from the proposed Parkes intermodal terminal can potentially meet the DEC INP project specific noise goals at the three locations as outlined in the modelling.

Construction noise has the potential to exceed the project specific noise criteria in a worst-case scenario, however this can be mitigated through the utilisation of best management practices as outlined in this assessment.

Results of the noise modelling based on the increase in expected rail movements at the site suggest that 24hr L_{Aeq} levels in the vicinity of the intermodal terminal will remain below the NSW DEC 24hr recommended guidelines.

Predicted future traffic noise resulting from the haulage routes associated with the proposed terminal were modelled using provided information for future traffic counts. Based on the information provided and modelling under various day and evening scenarios, it is unlikely that traffic noise levels due to the predicted haulage routes associated with the proposed terminal will exceed the noise guidelines.

Therefore, based in the findings of this acoustic assessment, it is considered that operational, construction and traffic noise generated from the proposed Parkes intermodal terminal has the potential to meet the relevant noise guidelines at the three locations modelled in this report.

8 References

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GHD Pty Ltd ABN 39 008 488 373

352 King St Newcastle NSW 2300
PO Box 5403 Hunter Region Mail Centre NSW 2310
T: (02) 4979 9999 F: (02) 4979 9988 E: ntlmail@ghd.com.au

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