

Noise Impact Study for a Planning Proposal to Rezone Land- B2 Local Centre

At the:-

Cnr. of Camden Valley Way and Corfield Road, NSW 2170.

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Prepared at the Request of

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SUMMARY

This Noise Impact Study considers the potential supermarket, liquor store, kiosk and specialty shops on the corner of Camden Valley Way and Corfield Road, Prestons NSW 2170. The development site is located in a developing area with new residential properties proposed in the vicinity. Noise from truck deliveries and mechanical plant is also considered,

Noise criteria provided by the NSW State Government have been considered. These are the Industrial Noise Policy (2000) and the Road Noised Policy (2011). The assessment procedure covers both controlling intrusive noise impacts and maintaining noise level amenity. The Road Noised Policy is used for additional on-road traffic using the potential site.

The existing acoustical climate has been previously assessed using attended monitoring and a noise logger positioned at a neighbouring dwelling to the potential site. The existing background noise levels (L_{AF90}) were found to be 42 dBA in the day time and 41 dBA in the evening time and 38 dBA at night time.

The noise goal ($L_{Aeq, 15 \text{ minute}}$) at the nearest residential properties has been set. This is 47 dBA day time based on background plus 5 dB, 45 dBA evening time and 40 dBA night time, based on the Industrial Noise Policy amenity criterion.

Acoustical modelling for the potential site has been carried out. The noise criteria will be met for the potential development at all of the neighbouring residential boundaries.

The existing ambient noise levels (L_{Aeq}) in the area, dominated by local road traffic, are significantly higher than the noise goals and the predicted noise levels for the development. As a result no significant noise impact is predicted from the potential development, provided it is constructed with acoustic fences or walls and operated as currently proposed and in accordance with the recommendations and assumptions made in this report. The only exception is the night time noise levels from the loading dock which is predicted to be marginally exceeded for the upper storey of the residence at 7 Brooman Road. Therefore an offer of an upgrade in the glazing of the first floor rooms facing the potential subject site is recommended for this property.

Any mechanical plant associated with the supermarket or other retail and business premises, must not exceed a maximum sound power level of more than 74 dBA and installed not less than 40 metres from a neighbouring residence. The supermarket outdoor condenser deck will require additional attenuation in the form of barriers, attenuators or acoustic enclosures.

The NSW Government's Road Noised Policy will be met.

1. INTRODUCTION

Noise and Sound Services was requested by Empirica Management Ltd of PO Box 524, Fortitude Valley, QLD, 4006 to carry out a Noise Impact Study (NIS) for a potential commercial development located at 1975-1985 Camden Valley Way at the corner with Corfield Road, Prestons, NSW 2170. The commercial development has potential to consist of retail and business premises potentially a supermarket, liquor store, kiosk and specialty shops. It is likely that the site will require approximately 250 car parking spaces.

The purpose of this study is to provide an independent and accurate assessment of noise levels arising from the potential development. These are then compared to the relevant NSW Government's noise criteria.

2. SITE AND DEVELOPMENT DESCRIPTION

This section describes the location of the site and provides a detailed description of the potential activity of the development.

2.1 Site Description

The site is located at the corner of Camden Valley Way and Corfield Road. Corfield Road is a relatively quiet side road with few road traffic movements; however Camden Valley Way is a relatively busy arterial road which links with the South Western Freeway (Freeway 5) and the Hume Highway to the east and with Cowpastures Road to the west. The site is currently occupied by Shepherds Landscape Supplies (NSW) Pty Ltd.

The nearest potentially affected residential premises are considered to be those to the north and west of the site the newly constructed dwellings in Weja Close and Kianga Close. There are also various other currently undeveloped residential sites in the vicinity. Marten Close is currently an empty site which is not currently accessible by vehicle.

To the east of the site are residences in Brooman Street with rear gardens which face Corfield Road. Most of these dwellings are single storey but one house at 7 Brooman Street is two-storey, see Figure 1 below.

There is an existing road traffic acoustic barrier which is approximately 4.5 metres high and extends approximately 35 metres from Camden Valley Way along the east side of Corfield Road. There is a public walkway between Corfield Road and 17/21 Brooman Street.

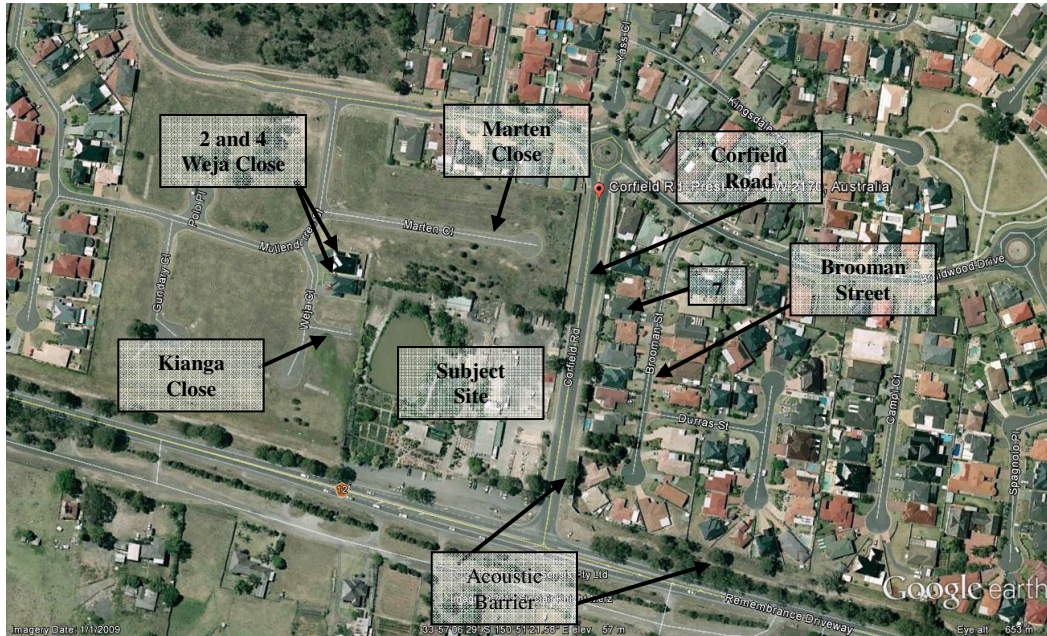


Figure 1. Site Plan Showing Neighbouring Residential Premises and Potential Neighbouring Residential Premises. (Source: Google Earth 2009). More Houses have recently been built in Weja Close and Kiangra Close.

2.2 Development Description

The site has potential for the construction of retail and business premises such as a supermarket, liquor store, kiosk and specialty shops. There is also potential for carparking with approximately 250 spaces (and loading bays) on the site. The total development area is approximately 16,900 m². Further outline details can be seen in preliminary concept plan 'Nettleton Tribe Architects' of 117 Willoughby Road, Crows Nest NSW 2065 drawing number 3965_SK048, Option 30, dated 18.05.12 (see Figure 2 below). This report is based on the preliminary concept plan but the final details may be subject to change.

Any potential supermarket will require a loading dock. The potential entrance to the loading dock could be approximately 75 metres from the nearest neighbouring boundary in Brooman Street. There is a potential for setback of approximately 5 metres between the shops and the residential properties at Weja Close, Kiangra Close and Marten Close.

2.2.1 Times of Operation

The potential maximum trading hours are: 6:00 am – Midnight, but more likely to trade 7:00 am – 10:00 pm. Deliveries are required for the hours the store is trading plus 1 hour before opening for bread and milk deliveries.



Noise criteria are provided by the NSW Government and were published by the Environment Protection Authority, (EPA). The criteria are generally in line with criteria given in other States of Australia and many Countries of the World. This includes the Industrial Noise Policy (2000), and the NSW Road Noise Policy (2011). These cover noise in urban, suburban and rural areas. Although specific local conditions can affect the criteria, convincing justification must be given for any variation to NSW Government guidelines.

The assessment procedure for industrial noise sources given in the State Government's Industrial Noise Policy (2000) has two components:-

- In assessing the noise impact of industrial or commercial noise sources all components must be taken into account for residential receivers, but, in most cases, only one will become the limiting criterion. The project-specific noise goals reflect the most stringent noise level requirement. It is derived from

intrusive and amenity criteria and this is used to set a benchmark against which noise impacts and the need for noise mitigation are assessed. The overall aim of the policy is to allow the need for industrial and commercial activity to be balanced with the desire for quiet in the community. The noise criteria in the policy are not mandatory and numerous other factors need to be taken into account including, local conditions, economic consequences and the social worth of the development.

3.1.1 Intrusive Noise Impacts

The Industrial Noise Policy (2000) states that:- *‘The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB.’* Thus, when considering the environmental consequence of noise from a specific source, any increase above the background sound pressure level, which exceeds 5 dB, may be offensive.

The perception of noise and its level of offensiveness depends greatly on the broader situation within which it occurs. Noise that might intrude into a resting or sleeping place may be found to be offensive whereas the same noise occurring in a market place or noisy working area may pass unnoticed. The concept of *‘background + 5 dB’* derives from this consideration.

Where the noise source contains characteristics such as prominent tonal components, impulsiveness, intermittency, irregularity or dominant low-frequency content adjustments to the measured level are applied to allow for the increase in the annoyance value.

3.1.2 Protecting Noise Amenity

In the Industrial Noise Policy it is stated that *“To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1.”*

The relevant parts of the recommended levels are given in Table 1 below:-

TABLE 1 – RECOMMENDED NOISE LEVELS FROM INDUSTRIAL NOISE SOURCES.

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level (dBA)	
			Acceptable	Recommend Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Hence the acceptable **amenity** noise level ANL (L_{Aeq}) for residential suburban areas is **55 dBA** day time, **45 dBA** evening time and **40 dBA** night time. Day time is defined as 07:00 to 18:00 hours, evening is 18:00 to 22:00 hours and night time is defined as 22:00 hours to 07:00 hours. The 07:00 time is changed to 08:00 hours for Sundays and Public Holidays).

3.1.3 Modifying Factor Adjustments

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same sound pressure level. A correction should be applied to both the intrusive and the amenity measurement before a comparison is made with the criteria. An abbreviated version of the correction factors is shown in Table 2 below:-

TABLE 2 – MODIFYING FACTOR CORRECTIONS

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands on both sides by a set amount (see note* below)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted Level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Impulsive Noise	Time weighting fast and impulse	If the difference in the A weighted maximum levels between 'fast' and 'impulse' are greater than 2 dB	Apply the difference in measured levels as the correction up to a maximum of 5 dB	Impulse time weighting is characterised by a short rise time (35msec) compared to 125msec for 'fast'.
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB	+ 5 dB	Adjustment to be applied for night time only

*Note: Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (above 400 Hz); 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz; or 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz.

3.2 The Noise Guide for Local Government 2004 (Updated 2010)

The NSW Noise Guide for Local Government states 'A noise source is generally considered to be intrusive if noise from the source, when measured over a 15 minute period exceeds the background noise by more than 5 dB'. It is assessed at the most affected point on or within the neighbouring residential property (unless that residence is more than 30 metres from the boundary). Intrusive noise can represent offensive noise, but whether this is always the case depends on the source of the noise, noise characteristics and cumulative noise levels.

The NSW Government recognises that many short-term high-level noises which occur at night may comply with noise goals (given above) and yet be undesirable because of the sleep disturbance or arousal effect.

Sleep arousal is a function of both the noise level and the duration of the noise. Not all people are affected to the same degree by noise and, at different times, a person will be more or less affected by the same noise. Even in cases where a person is not awoken by noise that person's sleep may be affected. The effects of noise on sleep therefore cannot be predicted with any degree of accuracy and

there is no definitive guideline to indicate a noise level that causes sleep disturbance.

A screening test can be applied that indicates the potential for the likelihood of sleep disturbance to occur. This could be where the subject noise level that is exceeded for 1% of any one-minute period ($L_{AF1, 1 \text{ minute}}$) exceeds the background level ($L_{A90, 15 \text{ minute}}$) by more than 15 dB. This is when measured outside of a bedroom window.

3.3 NSW Government Criteria for Road Traffic Noise

The NSW Government has produced criteria for road traffic noise (on public roads) i.e. the *NSW Road Noise Policy* (July 2011). This provides criteria for land use developments with potential to create additional traffic on arterial roads (such as the Camden Valley Way). Here the day time (7:00 hours until 22:00 hours) external criterion ($L_{Aeq, 1 \text{ hour}}$) is 60 dBA for the night time (22:00 hours until 07:00 hours) the external criterion ($L_{Aeq, 9 \text{ hour}}$) is 55 dBA. For local roads (such as the Corfield Road) the day time (7:00 hours until 22:00 hours) external criterion ($L_{Aeq, 1 \text{ hour}}$) is 55 dBA and the night time (22:00 hours until 07:00 hours) external criterion ($L_{Aeq, 1 \text{ hour}}$) is 50 dBA.

4. BACKGROUND AND SOURCE NOISE MEASUREMENTS

4.1 Background Noise Measurements

4.1.1 Instrumentation

The instrumentation used during the noise survey consisted of an ‘Acoustic Research Laboratories Pty Ltd’ - Environmental Noise Logger (serial number 194569). This logger conforms to Australian Standard 1259 “Acoustics - Sound Level Meters”, (1990) as a type 2 sound level meter and has accuracy suitable for field use. The calibration of the instrument was checked before and after the measurement period with a Brüel and Kjær acoustical calibrator, model 4231 (serial no. 2445349). No significant system drift occurred over the measurement period.

The environmental noise logger and calibrator have been checked, adjusted and aligned to conform to the Brüel and Kjær or RTA factory specifications and issued with conformance certificates within the last 24 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia.

4.1.2 Measurement Procedure

The acoustical measurements were carried out in accordance with Australian Standard AS 1055. "*Acoustics –Description and measurement of environmental Noise*", (1997).

The measurements of typical ambient and background noise levels were carried out at the northern side of the development site close to the boundary with Manten Close. Measurements were taken previously. These were from Monday 16th November to Monday 23rd November 2009, for long term, 24-hour 7-day measurements. The measurement location was chosen to be representative of the acoustic climate for potentially affected residential receiver locations.

Noise levels can vary with time due to different weather conditions, traffic flows, etc. However, during the noise survey the weather was dry and hot with negligible wind. The traffic speed conditions were thought to be normal.

4.1.3 Measurement Results

The rating background noise levels RBL (L_{A90}) over the monitoring period is found from the median of the assessment background noise level (ABL) value for day time, evening and night time respectively. This is shown in Table 3 below together with the logarithmic average of the existing ambient noise (L_{Aeq}). The ABL (L_{A90}) is determined by the tenth percentile method for each period (i.e. day, evening and night) and for each day and is shown in Table 4 below.

TABLE 3 – SUMMARY OF EXISTING NOISE LEVELS

Time of Day	Rating Background Noise Levels (L_{A90})	Log Average Existing Ambient Noise Levels (L_{Aeq})
Day	42	52
Evening	41	49
Night	38	46

TABLE 4 – EXISTING AREA BACKGROUND NOISE LEVELS

Date	Time of Day	Assessment Background Noise Levels (L_{A90})	Existing Ambient Noise Levels (L_{Aeq})
16/11/09	Day	N/A	N/A
16/11/09	Evening	42	49
16-17/11/09	Night	35	46
17/11/09	Day	41	52
17/11/09	Evening	38	47
17-18/11/09	Night	32	44
18/11/09	Day	40	51
18/11/09	Evening	40	47
18-19/11/09	Night	38	46
19/11/09	Day	42	54
19/11/09	Evening	41	48
19-20/11/09	Night	40	48
20/11/09	Day	40	54
20/11/09	Evening	44	52
20-21/11/09	Night	41	46
21/11/09	Day	40	50
21/11/09	Evening	39	46
21-22/11/09	Night	34	44
22/11/09	Day	42	53
22/11/09	Evening	42	48
22-23/11/09	Night	39	48
23/11/09	Day	44	51

Note - All levels rounded to the nearest whole decibel

The full statistical noise measurement results are shown in graphical form in Appendix A.

4.2 Source Noise Levels

Details are given below of the predicted levels of potential noise sources associated with the supermarket development. These are from suppliers of equipment or from 'Noise and Sound Services' database.

4.2.1 Loading Dock – Delivery Vehicle Noise

Free field measurements have been taken, at various distances, from a range of rigid refrigerated trucks when unloaded manually with a pallet jack and by a forklift used on loading docks. The reversing alarms were used throughout the operations and refrigerator motors were also running throughout. These produced the results as shown in Table 5 below.

TABLE 5 – MEASUREMENTS OF TRUCKS IN LOADING DOCKS

Truck Type (Approximate length)	Noise Level dBA ($L_{Aeq, 15 \text{ minute}}$)
	At Measurement Distance
Rigid Refrigerated Trucks (19 metres)	68 @ 8 metres
	66 @ 6 metres
Rigid Refrigerated Trucks (13 metres)	54 @ 7 metres
	59 @ 6 metres
	73 @ 3 metres
Old Isuzu Truck	64 @ 5 metres
Milk Truck	57 @ 3 metres

4.2.2 Condenser Deck Noise

Manufacturer's Sound Power Levels are given for example condenser units for the deck in Table 6 below.

TABLE 6 - SOUND POWER LEVELS MECHANICAL SYSTEMS – TYPICAL CONDENSER DECK.

Noise Source	Sound Power Level dB (re: 1 pW)							Overall ‘A’ weighted
	Octave Band Centre Frequency (Hz)							
	125	250	500	1 k	2 k	4 k	8 k	
System 1: (6 fans low speed)	94	89	85	84	82	78	70	89
System 2: (3 fans high speed)	79	65	69	72	67	60	48	75
System 3: (8 fans low speed)	95	91	86	85	83	79	72	90
System 4: (8 fans low speed)	95	91	86	85	83	79	72	90

Note: Combined sound power level is 95 dBA (from $10 \log_{10} (10^{(89/10)} + 10^{(75/10)} + 10^{(90/10)} + 10^{(90/10)})$).

4.2.3 Condenser Deck Noise

The location and specifications of the condenser deck that would be used for this potential development has not yet be finalised. However typical condenser decks are approximately 20 metres long and 8 metres wide. It is planned that the condenser deck will be located in a position where it is least visible (and hence low noise level) whilst taking into consideration the surrounding residents.

It is recommended the location of the condenser deck is at the south east part of the supermarket roof and at least 40 metres from the boundaries of any residential dwellings.

4.2.4 Other External Fan and Mechanical Equipment

It is likely that air conditioning units and kitchen and toilet exhaust fans will be the only mechanical plant to be associated with the speciality shops. However at this stage the specific makes and models of mechanical plant are not known. Section 5 below outlines the maximum sound power level not to be exceeded for this plant in order to meet the noise goals.

If any additional un-attenuated mechanical equipment is to be located on the exterior of the supermarket it is recommended that a sound power level (L_{WA}) of 74 dBA is not exceeded so as not to significantly increase accumulative noise levels.

4.2.5 On-Road Traffic Noise

The noise from road traffic vehicles entering and leaving a site depends mainly upon vehicle flow rate and the speed and distance to the receiver point. The type and condition of vehicles and driver technique has a large influence on the noise level at close distances where there are low flow rates. Road gradients and road surfaces can also influence the noise level.

A traffic and parking assessment report has previously been prepared for the potential development by '*Colston Budd Hunt & Kafes Pty Limited*' dated February 2010. The report states that "traffic flows on Corfield Road would increase from the existing afternoon peak of 680 to 1125 vehicles per hour (two way)" and "traffic flows on Braidwood Road would increase from the existing afternoon peak of 670 to 780 vehicles per hour (two way)" The roads traffic report indicates that the morning peak hour would be less significant than the afternoon peak hour flow. Traffic on Camden Valley Way would not significantly increase due to the current high traffic flows.

5. NOISE GOALS AND PREDICTIONS

This section sets out noise goals, outlines the acoustical calculations used and provides noise predictions.

5.1 On Site Activity Noise Goal

The relevant noise levels for the intrusive and amenity criteria have been determined. The noise level derived from both the intrusive and the amenity criteria for residential areas are shown in Table 7 below. The project-specific noise goals reflect the most stringent noise level requirements from the NSW Industrial Noise Policy (INP) for residential areas.

TABLE 7 – INP NOISE LEVEL GOALS FOR ALL ON-SITE ACTIVITY

Time of Day	Intrusiveness Criterion	Amenity Criterion
Day Time	47 dBA ($L_{Aeq, 15 \text{ minute}}$) (42 + 5)	55 dBA $L_{Aeq, \text{ day}}$
Evening Time	46 dBA ($L_{Aeq, 15 \text{ minute}}$) (41 + 5)	45 dBA $L_{Aeq, \text{ evening}}$
Night Time	43 dBA ($L_{Aeq, 15 \text{ minute}}$) (38 + 5)	40 dBA $L_{Aeq, \text{ night}}$

Notes: The criteria in bold apply.

5.2 Screening Test Noise Goal - Potential for Sleep Disturbance

The vehicle noise level that is exceeded for 1% of any one-minute period ($L_{AF1, 1 \text{ minute}}$) should not exceed **53 dBA** based on the measured night time background level ($L_{A90, 15 \text{ minute}}$) of 38 dBA plus 15 dB. See Section 3.2 above. This is when measured at night time outside of any neighbouring bedroom window.

5.3 Road Traffic Noise Goal

The road traffic noise goal for land use developments with potential to create additional traffic on existing local roads is shown in Table 8 below:-

TABLE 8 – ROAD TRAFFIC NOISE LEVEL GOAL AT THE NEAREST RESIDENTIAL RECEIVERS

Time of Day	Road Traffic Noise Goal
Day Time (7:00 hours until 22:00 hours)	55 dBA ($L_{Aeq, 1 \text{ hour}}$)
Night Time (22:00 hours until 7:00 hours)	50 dBA ($L_{Aeq, 1 \text{ hour}}$)

These criteria refer to additional traffic created by the development **not** to the existing traffic.

5.4 Noise Predictions

The source noise levels have been modelled using the International Standard ISO 9613-2 (1996(E)) '*Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation*'. This Standard specifies methods for the description of noise outdoors in community environments. The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of attenuation. The method allows for downwind propagation conditions namely:-

- wind direction within an angle of $\pm 45^\circ$ of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and
- wind speed between approximately 1 m/s and 5 m/s measured at a height of 3 m to 11 m above the ground.

Basic Noise Modelling Equations

The equivalent continuous downwind sound pressure level (L_{Aeq}) at each receiver point has been calculated for each point source using the equation below:-

$$L_{Aeq} = L_w + D_c - A$$

Where:

L_w	is the sound power level of the noise source;
D_c	is directivity correction; and
A	is the attenuation that occurs during the propagation from source to receiver.

The attenuation term A in the equation above is given by:-

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc}.$$

Where:

A_{div}	is the attenuation due to geometric divergence;
A_{atm}	is the attenuation due to atmospheric absorption;
A_{gr}	is the attenuation due to the ground effects;
A_{bar}	is the attenuation due to a barrier; and
A_{misc}	is the attenuation due to miscellaneous other effects.

Ground effects (A_{gr}) are significant over soft ground as is mainly applicable for farm and rural areas. Atmospheric absorption (A_{atm}) is highly frequency dependant and is significant for the high frequency components of noise sources but insignificant for low frequency components.

The noise attenuation due to barriers (A_{bar}) is a variable and is dependent upon the specific position of the plant and equipment and the barriers (e.g. fences). It

can range from zero where a direct line of sight is applicable up to 15 dB where plant is well shielded from the site.

The last term (A_{misc}) generally refers to miscellaneous propagation through foliage, industrial sites and areas of houses. In this instance, given the nature of the site and relatively close proximity of the nearest neighbouring residential premises no consideration has been given to additional attenuation.

The predicted noise levels at the nearest residential boundaries are shown in Table 9 below. The predictions take into account the specific distances from each noise source to the neighbouring properties but not the attenuation from any proposed barriers at this stage.

5.4.1 Mechanical Plant

Any mechanical plant associated with the supermarket, liquor store (e.g. freezer and cool room condensers) or speciality shops (e.g. toilet fans or a.c. condensers) should be located as far as reasonably practicable from any residential boundaries. It is important that when purchasing mechanical plant that they be specified to not exceed a noise level ($L_{Aeq, 15 \text{ minute}}$) of 40 dBA when measured at the nearest residential boundary, so as to meet the night time noise goals.

Assuming a minimum distance of 40 metres from the location of any single mechanical plant to the nearest residential boundary, units must not exceed a combined outdoor sound power level of 77 dBA in order for this to be achieved (from $40 = 77 - 20 \log_{10}(40) - 8 + 3$ dBA). The + 3 dB is for wall reflection. The recommended maximum sound power level is for all equipment combined, in the event that two units are installed close together. At a distance of 40 metres from the nearest boundary, a sound power level of 74 dBA for each unit must not be exceeded unless further noise attenuation can be provided. Additional attenuation in the form of barriers, attenuators or acoustic enclosures will be required for the condenser deck(s) which has a typical sound power level of 90 dBA to 95 dBA (see Table 6 Above). Hence a noise reduction of 16 to 21 dB will need to be designed once the final details of the condenser deck are known.

To minimise additional plant noise for the supermarket, liquor store and garbage areas a solid acoustic fence or wall e.g. masonry, lapped and capped timber or 'Colorbond' steel, at least 2.0 metres high should be constructed around the entire western (approximately 118 metres in length) and northern (approximately 130 metres in length) site boundaries.

5.4.2 Loading Dock Noise

The predicted noise level at the nearest residences to the delivery dock can be calculated based on measured data as given in section 4.2.1 above and the formula outlined in Section 5.4 above. The dock is to be located on the northern side of the supermarket with line-of-sight (excluding the boundary fence) to the rear yards of dwellings at Brooman Road at a distance of approximately 70 metres from the dock and varying distances to the front of the truck, depending on its size. This gives a predicted noise level of 45 dBA (based on measured level of 66 dBA at 6 metres (see Table 5 above) and an adjustment for distance which equals -21 dB (from $20 \log_{10} (70/6)$ dBA). Without taking the noise reduction for the boundary fence into account, this meets the day and evening noise goal (47 dBA and 45 dBA respectively). The night time goal of 40 dBA will be met at ground floor level when taking the acoustical effect of the existing timber rear yard fences of the Brooman Road dwelling into account. The night time goal is predicted to be exceeded for the upper storey at 7 Brooman Road; hence an offer of an upgrade in the glazing of the first floor rooms facing the potential subject site is recommended for this property.

The vehicle noise level that is exceeded for 1% of any one-minute period ($L_{AF1, 1 \text{ minute}}$) is typically 9 to 12 dB higher than the energy average, therefore meeting the night time energy average goal of 40 dBA will also result in the meeting of the noise goal ($L_{AF1, 1 \text{ minute}}$) of **53 dBA** when measured at night time outside of any neighbouring bedroom window (see Section 5.2 above).

5.4.3 Combined Noise Levels

Table 9 below shows the predicted noise level from the mechanical plant and loading dock based on the formula outlined above, previously measured data and the various distances from these facilities to the neighbouring properties. Table 9 below also shows the predicted combined noise level from all plant, equipment and the loading dock noise at the relevant neighbouring properties.

TABLE 9 – PREDICTED OVERALL NOISE LEVELS AT NEAREST NEIGHBOURING PROPERTIES

Noise Source	Predicted Noise Level ($L_{Aeq, 15 \text{ minute}}$) dBA	
	Brooman Street (ground level rear yards)	Weja Close and Kianga Close (Current and Future developments)
Mechanical Plant	36	40
Loading Dock	39	Negligible
Overall Combined Level	41	40

5.4.4 On-Site Traffic Noise

To minimise on-site traffic noise (in addition to mechanical plant noise) a solid acoustic fence or wall e.g. masonry, lapped and capped timber or ‘Colorbond’ steel, at least 2.0 metres high should be constructed around the entire western (approximately 118 metres in length) and northern (approximately 130 metres in length) site boundaries. A 1.8 metres high solid acoustic fence or wall is also required along the 118 metres length of the Corfield Road boundary (excluding access areas).

5.4.5 On-Road Traffic Noise

The predictions of noise levels from road traffic using the potential facilities have been calculated using basic formula as given in the Calculation of Road Traffic Noise from the UK Department of Transport and Welsh Office (1988).

Based on traffic flows as given in Section 4.2.5 above the peak hour traffic noise at Corfield Road at external residential boundaries would increase by 2 dB from 61 dBA to 63 dBA and the peak hour traffic noise at Braidwood Road would increase by 1 dB from 60 dBA to 61 dBA. Here the 55 dBA criteria are already exceeded and the traffic from the development will not lead to an increase in the existing noise levels of more than 2 dB. Hence the criteria are met.

6. ASSESSMENT AND RECOMMENDATIONS

6.1 Assessment

It can be seen from Table 9 above that, without mitigation measures, the NSW Government's Industrial Noise Policy Intrusiveness criterion for day time (47 dBA), evening time (45 dBA) and night time (40 dBA) could be exceeded at the nearest boundary positions. This can be mitigated with the use of a solid acoustic fences or walls at the adjoining site boundaries. This will also enable the screening test noise goal to indicate the potential for the likelihood of sleep disturbance to be met. The following recommendations are made for the predicted noise levels in this report to be achieved at the neighbouring properties.

6.2 Recommendations

- A solid acoustic fence or wall e.g. masonry, lapped and capped timber or '*Colorbond*' steel, at least 2.0 metres high must be constructed around the entire western (approximately 115 metres in length) and northern (approximately 115 metres in length) site boundaries;
- The existing solid timber 1.8 metres high acoustic fence opposite the site in Corfield Road (the rear boundaries of dwellings in Brooman Street) which is approximately 120 metres in length north from the public walkway between Corfield Road and 17/21 Brooman Street and is at least 12 metres along each side of the walkway, must be maintained along this entire boundary;
- All acoustic fences or walls must contain no holes or gaps including along the threshold;
- The times of operation must not exceed the times given in Section 2.2.1 above;
- Any mechanical plant associated with the development must not exceed the maximum sound power levels outlined in this report;
- Good management procedures will be required to ensure that patrons of the supermarket and other facilities do not produce undue or excessive noise particularly at night time;

7. CONCLUSIONS

The various noise emissions from a potential retail and business premises development at the corner of 1975 and 1985 Camden Valley Way and Corfield Road, Prestons, NSW 2170 have been assessed.

The NSW Government's Industrial Noise Policy 2000 intrusiveness criterion for noise arising from the use of this facility during the day time will be met at the nearest residences to the site.

Ambient noise levels in the area from existing road traffic are consistently higher than the predicted noise levels at any neighbouring properties. Therefore no significant noise impact is predicted from this development. The only exception is the night time noise levels from the loading dock which is predicted to be marginally exceeded at the upper storey at 7 Brooman Road. Therefore an offer of an upgrade in the glazing of the first floor rooms facing the potential subject site is recommended for this property.

In order for the predicted noise levels in this report to be achieved the recommendations in Section 6 of the report must be adhered to. Any mechanical plant must not exceed maximum sound power levels given in this report. Should any additional plant be required which is not mentioned in this report, an additional assessment may be requested.

The NSW Government's criteria as given in the Road Noise Policy (2011) will be met at the site.

Date	Prepared by:	Status
10 January 2012	Ken Scannell MSc MAAS MIOA	Draft
11 January 2012	Ken Scannell MSc MAAS MIOA	Final

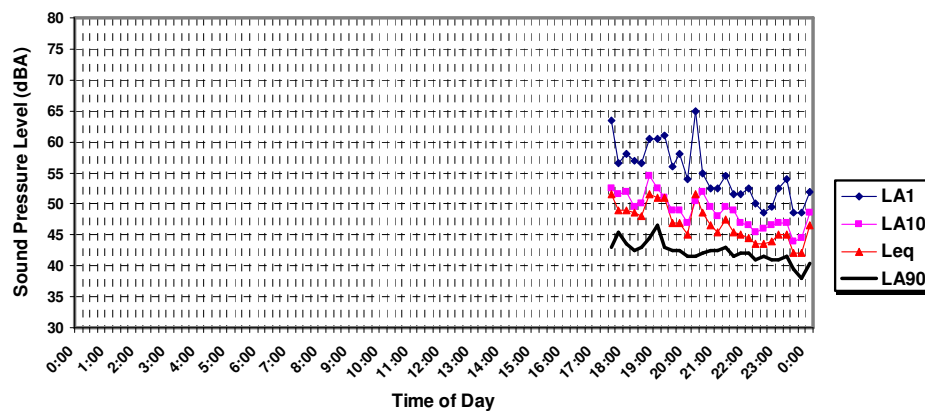
Important Note. All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as air flows, aesthetics, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, smoke, structural concerns, ventilation etc are outside of 'Noise and Sound Services' field of expertise and **must be** checked with the supplier or suitably qualified specialist before purchase.

APPENDIX A – MEASURED AMBIENT AND BACKGROUND NOISE LEVELS

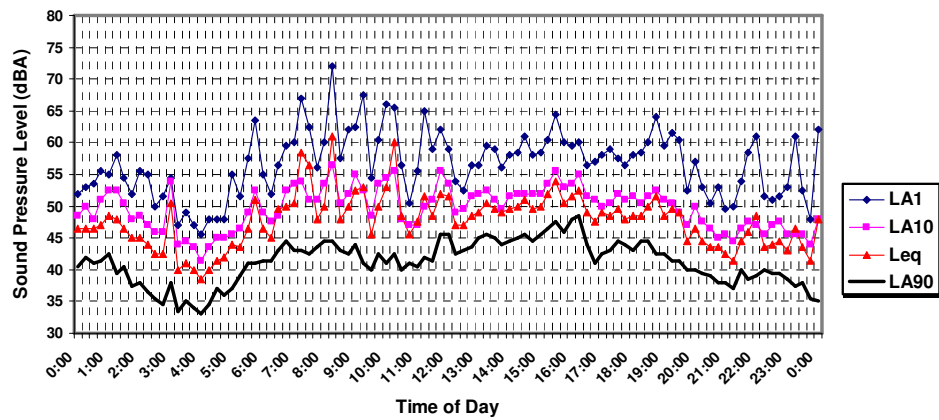
Environmental noise levels can vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF10} noise level is the level exceeded for 10% of the time, and is approximately the average maximum noise level. The L_{AF90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the average of the minimum noise level recorded. This level is often referred to as the ‘background’ noise level. The L_{Aeq} level represents the average noise energy during the measurement period. This level is often referred to as the ‘ambient’ noise level and is used to assess the source noise.

The following graphs show the long term noise logger results of the existing noise climate at the rear of 1985 Camden Valley Way, Prestons, NSW 2170.

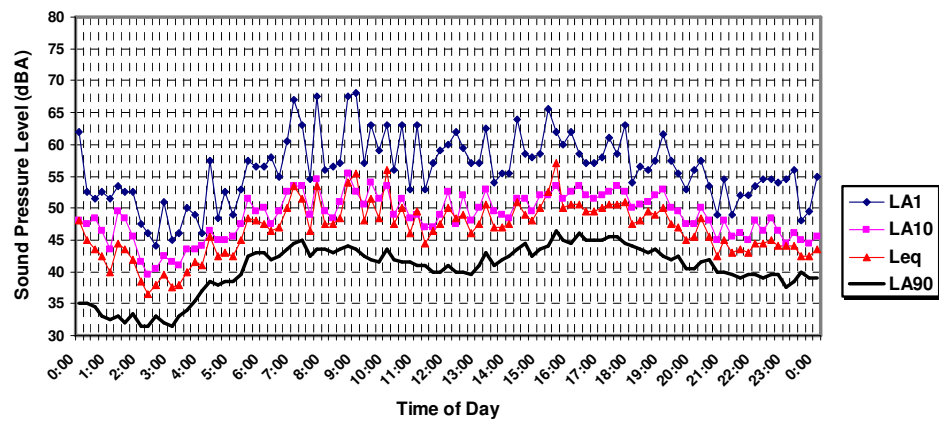
Monday 16th November 2009



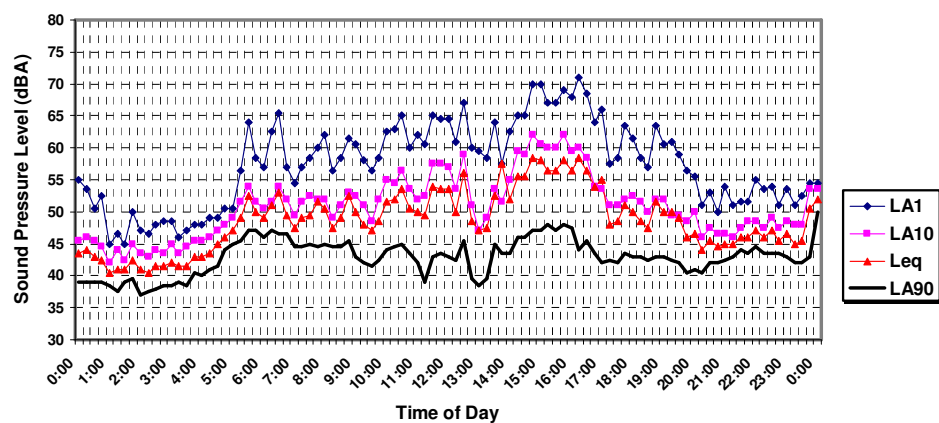
Tuesday 17th November 2009



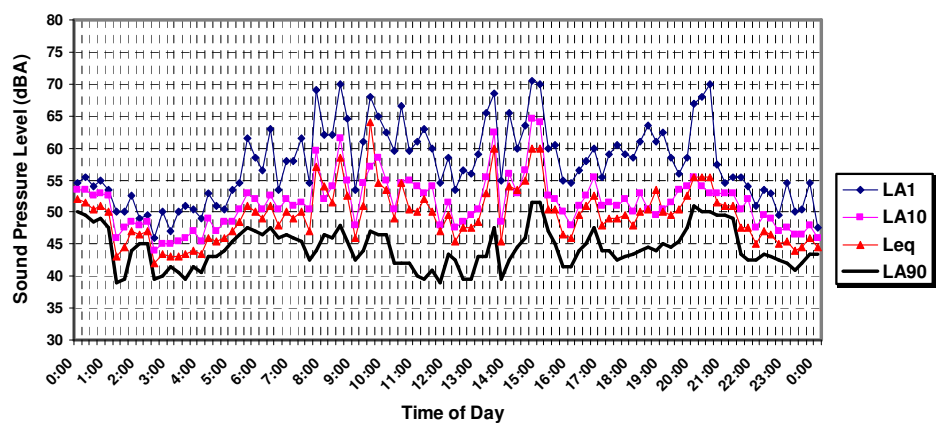
Wednesday 18th November 2009



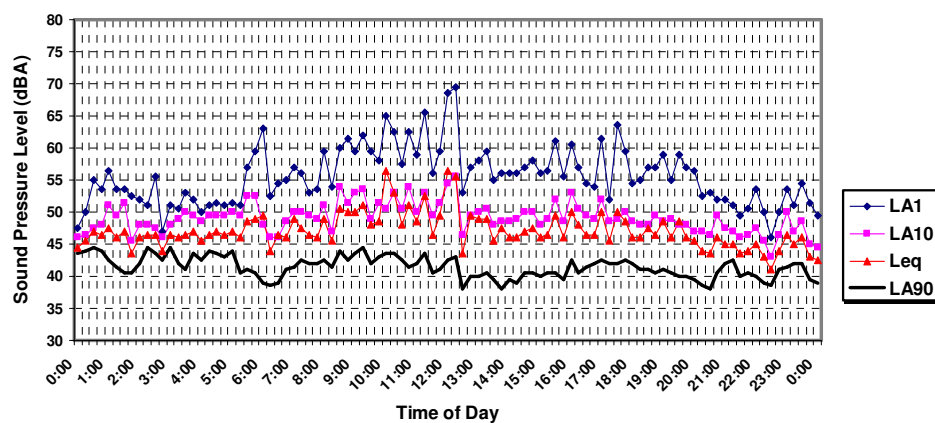
Thursday 19th November 2009



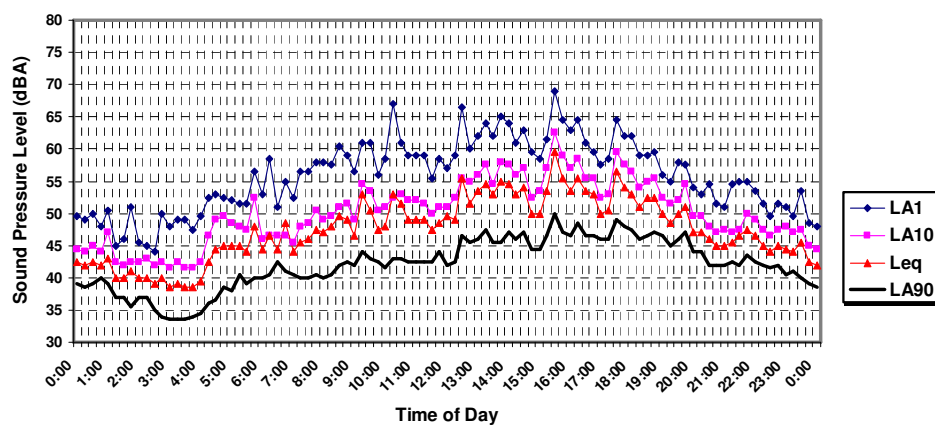
Friday 20th November 2009



Saturday 21st November 2009



Sunday 22nd November 2009



Monday 23rd November 2009

