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Oakdale Central Lots 1C, 2B and 3

Building Works and Operation

Acoustic Assessment for DA

Report Number 670.10585_Noise_R1

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Goodman Limited (Goodman) to conduct a Noise Impact Assessment (NIA) for the proposed development at Lots 1C, 2B and 3. This NIA covers the both the building works (construction stage) and the operation of the facilities upon construction completion and commissioning.

The objectives of this assessment are to identify the potential impacts of noise from the proposed works and development at the sites and provide effective mitigation strategies where necessary.

The NIA has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with NSW Industrial Noise Policy (INP), Interim Construction Noise Guideline (ICNG) and the Road Noise Policy (RNP).

2 PROJECT DESCRIPTION

The site location is shown in **Figure 1**. The current proposal covers lots 1C, 2Band 3 as indicated in **Figure 2**. These lots form the central and western portion of the entire Oakdale Central site. The earthworks and fill importation to these sites form a separate stage and assessment and are therefore not addressed in this assessment.

Figure 1 Locality Map

Figure 2 Site General Arrangement

3 RECEIVER LOCATIONS

The site is situated on Old Wallgrove Road in the suburb of Horsley Park located west of Campbelltown. The warehouse site is bounded primarily by industrial land areas to the east and south and Crown land areas to the north and west.

The area around the proposed site is sparsely populated with residences. The nearest sensitive receivers potentially affected by the proposed development are:

- Location 1: Residences located on Burley Road, Horsley Park (approximately 890 m east of the site).
- Location 2: Residence on Lenore Lane Erskine Park (approximately 2.4 km north-west of the site).
- Location 3: Emmaus College located at Erskine Park (approximately 2.8 km west of the site).
- Location 4: Residences located on Aldington Road, Kemps Creek (approximately 2.6 km west of the site).

Figure 3 illustrates the locality of the proposed development in relation to the nearest sensitive receivers.

Figure 3 Receiver Locations

4 NOISE IMPACT ASSESSMENT PROCEDURES

4.1 General Objectives - Industrial Noise Policy

The INP was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licences that enables the EPA to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997. The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

The INP provides two forms of noise criteria with the aim of achieving environmental noise objectives; one to account for intrusive noise which involves setting a noise goal relative to the existing acoustic environment and the other to protect the amenity of particular land uses.

For assessing intrusiveness, the background noise needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level of the source over any 15 minute period ($L_{Aeq(15minute)}$) should not be more than five (5) decibels above the measured background level (L_{A90}).

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. An extract from the INP that relates to the amenity criteria is given in **Table 1**.

Table 1 Amenity Criteria – Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq(Period)}$ Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq(Period)}$ Noise Level (dBA)	
			Acceptable	Recommended Maximum
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards	All	Noisiest 1 hour period		
- internal			35	40
- external			50	55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am, On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

If the measured existing noise level from industry approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. In this case, the amenity criteria provided in **Table 1** would need to be adjusted in accordance with the INP as per **Table 2**.

Table 2 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing L_{Aeq} noise level from Industrial Noise Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from **Table 1**

4.2 INP Project Specific Criteria

The INP Project Specific Noise Criteria are the more stringent of either the amenity or intrusive criteria. The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

Table 3 provides the methodology for the noise impact assessment for the Project's intrusive and amenity assessment criteria.

Table 3 Noise Impact Assessment Methodology

Assessment Criteria	Project Specific Criteria	Noise Management Zone	Noise Affectation Zone
Intrusive	Rating background level plus 5 dBA	≤ 5 dBA above Project specific criteria	> 5 dBA above Project specific criteria
Amenity	INP based on existing industrial level	≤ 5 dBA above Project specific criteria	> 5 dBA above Project specific criteria

For the purposes of assessing the potential noise impacts the Project specific, management and affectation criteria are further defined as follows.

4.2.1 Project Specific Criteria

Most people in the broader community would generally consider exposure to noise levels corresponding to this zone acceptable.

4.2.2 Noise Management Zone

Depending on the degree of exceedance of the Project specific criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is recommended that management procedures be implemented including:

- prompt response to any community issues of concern;
- noise monitoring on site and within the community;
- refinement of on-site noise mitigation measures and plant operating procedures where practical;
- consideration of acoustical mitigation at receivers; and
- consideration of negotiated agreements with property holders.

4.2.3 Noise Affectation Zone

Exposure to noise levels exceeding the Project specific criteria by more than 5 dB(A) may be considered unacceptable by some property holders and the INP recommends that the proponent explore the following:

- discussions with relevant property holders to assess concerns and provide solutions;
- implementation of acoustical mitigation at receivers; and
- negotiated agreements with property holders, where required.

4.3 Assessing Sleep Disturbance

The EPA's current approach to assessing potential sleep disturbance is to apply an initial screening criterion of background plus 15 dBA (as described in the Application Notes to the INP), and to undertake further detailed analysis if the screening criterion cannot be achieved. The sleep disturbance screening criterion applies outside bedroom windows during the night-time period.

Where the screening criterion cannot be met, the additional analysis should consider the number of potential sleep disturbance events during the night, the level of exceedance and noise from other events. It may also be appropriate to consider other guidelines including the EPA's Road Noise Policy (RNP, 2009) which contains additional guidance relating to the potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- "Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions."
- "One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly."

It is generally accepted that internal noise levels in a dwelling, with the windows open, are 10 dBA lower than external noise levels. Based on this assumption, the first conclusion above suggests that short term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

4.4 Assessing Construction Noise

The EPA released the ICNG in July 2009. The guideline sets out noise management levels, in relation to construction type activities, for sensitive receivers and how they are to be applied. The guideline suggests restriction to the hours of construction that applies to activities that generate noise at noise-sensitive receivers above the 'highly affected' noise management level. A summary of the noise management levels relevant to residential locations from the Guideline is contained in **Table 4** and **Table 5**.

Table 4 Interim Construction Noise Guideline (Residences)

Time of day	Management level $L_{Aeq(15minute)}$	How to apply
Recommended standard hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. - Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Time of day	Management level $L_{Aeq(15minute)}$	How to apply
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. - Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

Table 5 Interim Construction Noise Guideline at Sensitive Land Uses (other than residences)

Land Use	Management Level $L_{Aeq(15minute)}$ (applies when properties are being used)
Classrooms at schools and other educational institutions	Internal Noise Level 65 dBA

4.5 Road Traffic Noise

The EPA released the RNP in 2011. The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

5 EXISTING ACOUSTICAL AND METEOROLOGICAL ENVIRONMENT

5.1 Background Noise Level

A background monitoring survey was conducted prior to development of Oakdale Central (refer Heggies Report 30-1864 30-100R1 dated 25 January 2008). The aim of the survey was to measure $L_{A90(15minute)}$ and $L_{Aeq(15\ minute)}$ noise levels at the nearest potentially affected receivers during proposed operational periods to determine the intrusiveness and amenity criteria for the development.

A summary of the results of the unattended continuous noise monitoring is given in **Table 6**.

Table 6 Summary of Ambient Noise Levels prior to Oakdale Central Development

Location	Period	RBL, Background L_{A90} Noise Level (dBA)	$L_{Aeq(15minute)}$ Noise Level
Location1 315-321 Burley Road	Daytime	37	52
	Evening	37	54
	Night	37	44
Location 2 Lenore Lane	Daytime	36	53
	Evening	33	53
	Night	30	52
Location 3 Emmaus College	Daytime	37	47
	Evening	35	47
	Night	32	49
Location 4 32 Aldington Road	Day	33	55
	Evening	33	53
	Night	33	49

Notes For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.

The LA90 represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.

The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

5.2 INP Assessment of Prevailing Weather Conditions

5.2.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration. The INP states that where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

In order to determine the prevailing conditions for the subject site, 12 months of weather data was obtained from a Bureau of Meteorology automatic weather station at Horsley Park, approximately 6 km south of the subject site.

This data was analysed to determine the frequency of occurrence of winds of speeds up to 3 m/s in each season during the day, evening and night time periods. The results of the wind analysis for daytime, evening, and night-time winds are presented in **Table 7**, **Table 8** and **Table 9**, respectively. In each table, the wind directions and percentage occurrence are those dominant during each season.

Table 7 Seasonal Frequency of Occurrence of Wind Speed Intervals – Daytime

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	2.0%	N±45	4.4%	6.6%	10.9%
Autumn	4.8%	NNW±45	8.2%	7.8%	16.0%
Winter	10.7%	NW±45	8.1%	7.1%	15.2%
Spring	2.2%	N±45	3.4%	5.5%	8.9%

Table 8 Seasonal Frequency of Occurrence of Wind Speed Intervals – Evening

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	6.4%	SE±45	4.8%	9.4%	14.2%
Autumn	16.4%	SW±45	7.7%	9.8%	17.5%
Winter	17.6%	WSW±45	7.1%	11.2%	18.3%
Spring	10.5%	E±45	5.3%	7.7%	13.0%

Table 9 Seasonal Frequency of Occurrence of Wind Speed Intervals – Night-time

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	21.2%	SSW±45	10.0%	15.2%	25.2%
Autumn	24.4%	WSW±45	12.1%	15.8%	27.9%
Winter	19.7%	W±45	11.0%	9.7%	20.7%
Spring	23.9%	SW±45	9.7%	9.2%	18.9%

From the analysis of the weather data wind, of speeds of up to 3 m/s, did not exceed the 30% threshold during any period in any season. Therefore, prevailing wind was not considered as part of this assessment.

5.2.2 Temperature Inversion

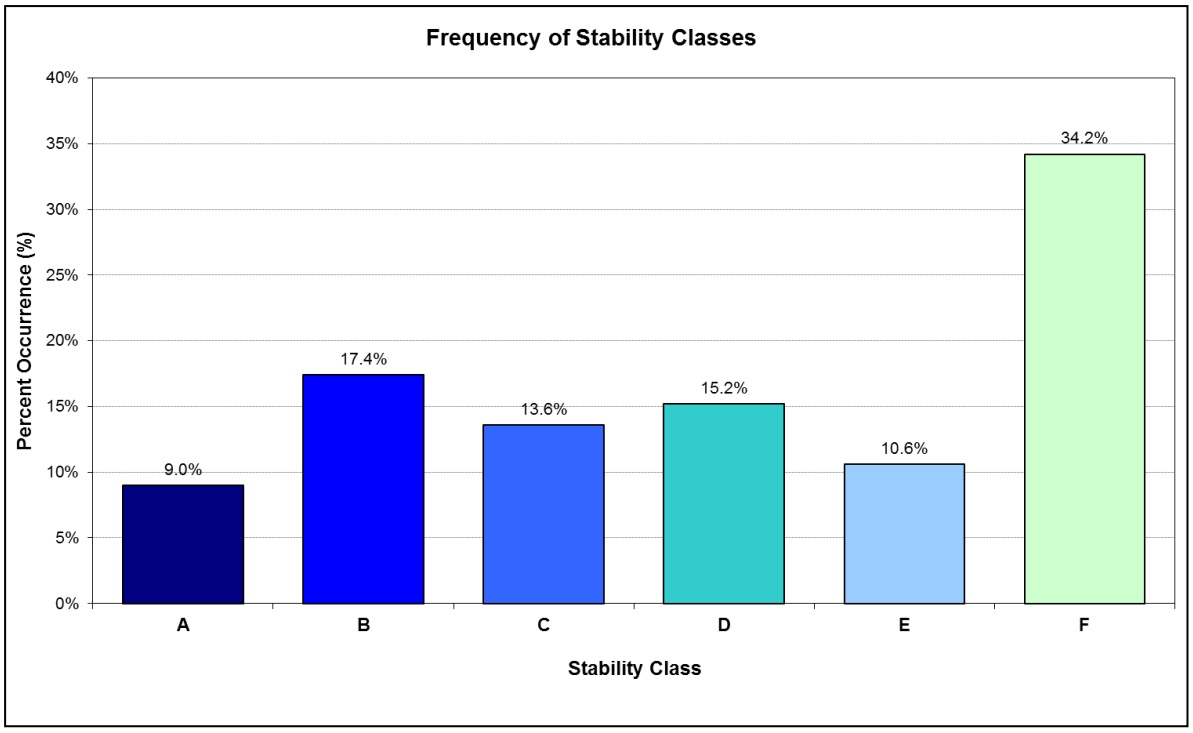
Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter, or about two nights per week.

The Pasquill-Turner assignment scheme identifies six Stability Classes, A to F, to categorise the degree of atmospheric stability (see **Table 10**). The frequency of each stability class at the Project Site during 2011 is presented in **Figure 4**. The results indicate a high frequency (>30%) of conditions typical to Stability Class F.

Table 10 Description of Atmospheric Stability Classes

Atmospheric stability class	Category description
A	Very unstable low wind, clear skies, hot daytime conditions
B	Unstable clear skies, daytime conditions
C	Moderately unstable Moderate wind, slightly overcast daytime conditions
D	Neutral high winds or cloudy days and nights
E	Stable moderate wind, slightly overcast night-time conditions
F	Very stable low winds, clear skies, cold night-time conditions

Figure 4 Stability Class Distribution for the Project Site (2011)



The INP states that temperature inversions need only be considered for the night-time noise assessment period (10:00 pm to 7:00 am). Therefore, in accordance with the INP, operational noise levels representing a worst case scenario of class F temperature inversion were modelled for the night-time period (10:00 pm – 7:00 am).

6 PROJECT SPECIFIC NOISE CRITERIA

6.1 Operational Noise Criteria

The noise emission design criteria for the proposed development have been established with reference to the INP.

The amenity criteria have been established using the results of ambient noise measurements. The acoustical environment at Location 1 (refer to **Section 3**) due to its relatively close proximity to the M7 Motorway, with heavy and continuous traffic flows, typifies an urban acoustic environment. Location 2 and location 4 being more remote from the M7 Motorway, have an acoustic environment which is more typical of a suburban receiver.

The resulting operational project specific noise criteria for the proposed development are shown in **Table 11.** Since the noise emissions associated with the operation of proposed facility are considered to be continuous, the $L_{Aeq(15minute)}$ and the $L_{Aeq(period)}$ noise criteria are directly comparable parameters and the more stringent of the intrusiveness or the amenity criteria sets the project specific noise criteria.

Table 11 Project Specific Noise Criteria

Location	Period	Intrusiveness Criteria $L_{Aeq(15minute)}$	Acceptable Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria $L_{Aeq(15minute)}$
Location1 315-321 Burley Road	Daytime	42	60	42
	Evening	42	50	42
	Night	42	45	42
Location 2 Lenore Lane	Daytime	41	55	41
	Evening	38	45	38
	Night	35	40	35
Location 3 Emmaus College	When in use	N/A	45 (35 internal)	45
Location 4 32 Aldington Road	Daytime	38	55	38
	Evening	38	45	38
	Night	38	40	38

6.2 Sleep Disturbance Noise Goals

Night-time sleep disturbance noise goals have been set with reference to the INP Application Notes are presented in **Table 12.** These noise goals have been determined based RBL noise level recorded at the nearest residential receivers during the night-time over the noise monitoring period.

Table 12 Sleep Disturbance Noise Goals

Location	Period	Sleep Disturbance $L_{A1(1minute)}$ Noise Goal
Location1 315-321 Burley Road	Night-time (10 pm – 7 am)	52
Location 2 Lenore Lane		45
Location 3 Emmaus College		N/A
Location 4 32 Aldington Road		48

6.3 Construction Noise Criteria

It is understood that all proposed construction activities will only occur during the standard hours i.e. day time only, as recommended by the ICNG (**Section 4.4**). The daytime background noise level (L_{A90}) has been determined at the most potentially affected residential locations. The project specific construction noise goals are presented in **Table 13** and would be applicable for the proposed development.

Table 13 Construction Noise Goals – Potentially Affected Residential Areas

Location	Construction $L_{Aeq(15minute)}$ Noise Goal (dBA)	
	Noise Affected	Highly Noise Affected
Location1 315-321 Burley Road	47	75
Location 2 Lenore Lane	46	
Location 3 Emmaus College	55 (45 internal)	
Location 2 32 Aldington Road	43	

Note: Recommended standard hours: Monday to Friday 7am to 6pm, Saturday 8am to 1pm and no work Sundays or public holidays

6.4 Road Traffic Noise Criteria

The site is located on land to the west of the M7 on Old Wallgrove Road see (**Figure 1**)

Traffic accessing the site will use Old Wallgrove Road and Wallgrove Road via the M7.

These roadways fall in the category of "Freeway/arterial" road in the RNP and hence the noise criteria outlined in **Table 14** have been adopted.

Table 14 Road Noise Policy

Type of Development	Descriptor	Traffic Noise Goal
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) Daytime LAeq(9hour) Night-time	60 dBA 55 dBA

6.5 Concept Plan Approval

As part of the Concept Plan Approval for Oakdale Central noise limits were established as given below:

NOISE LIMITS

6. The proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1.

Table 1: Project Noise Limits (dB(A))

Location	Day		Evening		Night		
	L_{Aeq}	L_{Aeq} (15 min)	L_{Aeq}	L_{Aeq} (15 min)	L_{Aeq}	L_{Aeq} (15 min)	L_{Aeq} (1 min)
A	55	39	45	39	40	39	49
B, C, D and E	50	39	45	39	40	39	49

Notes:

- *Noise emission limits apply under meteorological conditions of wind speeds up to 3 m/s at 10 metres above ground level or temperature inversions conditions of 3°C/100m and wind speed up to 2 m/s at 10 metres above the ground. To determine compliance with this condition, noise from the development must be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary.*
- *However, where it can be demonstrated that direct measurement of noise from the development is impractical, the EPA may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner of lands within these locations to generate higher noise levels and the Proponent has advised the Department in writing of the terms of this agreement.*

Table 2: Location of Sensitive Receiver

Location	Address
A	North – Erskine Park Residents
B	West – Emmaus College and Retirement Village, Bakers Lane, Kemps Creek
C	South – 20 Bakers Road, Kemp Creek
D	South-East – 27 Greenway Place, Horsley Park
E	East – Burley Road Residents, Horsley Park

6.6 Project Specific Noise Criteria

As a conservative approach, it is intended to use the more stringent of the project specific noise criteria and those contained within the Concept Plan Approval for this assessment. The limiting noise criteria are contained with **Table 15** for the nearest affected receivers.

Table 15 Project Specific Noise Criteria

Location	Period	Construction Stage	Operational Stage	
		$L_{Aeq(15minute)}$	Limiting Noise Criteria $L_{Aeq(15minute)}$	Sleep Disturbance $L_{A1(1minute)}$ Noise Goal
Location1 315-321 Burley Road	Daytime	47	39	N/A
	Evening	N/A	39	N/A
	Night	N/A	39	49
Location 2 Lenore Lane	Daytime	46	39	N/A
	Evening	N/A	38	N/A
	Night	N/A	35	45
Location 3 Emmaus College	When in use	55 (45 internal)	45 (35 internal)	N/A
Location 4 32 Aldington Road	Daytime	43	38	N/A
	Evening	N/A	38	N/A
	Night	N/A	38	48

7 NOISE IMPACT ASSESSMENT

7.1 Noise Modelling Parameters

A computer model was used to predict noise emissions from the proposed development. SoundPLAN V7.1 with CONCAWE algorithm has been used to calculate the noise emissions from the subject development. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. The model used the following parameters to predict noise levels at the nearest potentially affected receivers:

- The topographic map and ground cover,
- Shielding by barriers and/or adjacent buildings, and
- Atmospheric information. Prediction of operational noise under calm and prevailing meteorological condition (temperature inversion) was conducted.
- Atmospheric parameters under which noise predictions were made are given in **Table 16**.

Table 16 Meteorological Parameters for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction	Temperature Gradient
Calm (all Periods)	20^0C	70%	N/A	N/A	N/A
Temperature inversion	10^0C	90%	N/A	N/A	3^oC/100 m

7.1.1 Modelled Scenarios

The following scenarios were set up in predicting noise levels from the proposed development:

- Scenario 1 – Building works on Lot 1C.
- Scenario 2 – Building works on Lot 2B.
- Scenario 3 – Building works on Lot 3.
- Scenario 4 – Operation of warehouse/distribution centre of Lots 1C, 2B and 3.

The type and number of equipment associated with these scenarios are presented in **Table 17** and **Table 18**. For assessment purposes, it has been assumed that all the listed plants/equipment will be operating all the time during one 15-minute period. Sound power levels for acoustically significant items of plant and equipment have been obtained from SLR noise source database of similar equipment.

Table 17 Type, Number of Equipment (per 15-minute period) and Associated Sound Power Levels for Scenario 1 to Scenario 3 – Building Works (Construction Stage)

Plant and Equipment	Number of Units	L_{Aeq} Sound Power Level (dBA re 10^{-12} W)
Concrete agitators	1	111 per unit
Concrete boom pump	1	107 per unit
Cranes	1	104 per unit
Various hand tools	N/A	104 cumulatively
Delivery trucks	4	92 per unit
Genset	1	107 per unit

Table 18 Type, Number of Equipment and Associated Sound Power Levels for Scenario 4 – Operation (per 15-minute period)

Plant and Equipment	Number of Units	L_{Aeq} Sound Power Level (dBA re 10^{-12} W)	L_{Amax} Sound Power Level (dBA re 10^{-12} W)
Lot 1C			
Truck arrival/departure (at each proposed dock)	8	92 per unit	102 per unit
Gas powered forklifts (loading/unloading trucks)	8	95 per unit	105 per unit
Compressor units (sprinkler system)	4	92 per unit	102 per unit
Outdoor packaged units associated with air conditioning system	8 (2 at each façade)	65 per unit	75 per unit
Outdoor units associated with commercial chillers and freezers for food storage	4	75 per unit	85 per unit
Lot 2B			
Truck arrival/departure (at each proposed dock)	31	92 per unit	102 per unit
Gas powered forklifts (loading/unloading trucks)	31	95 per unit	105 per unit
Compressor units (sprinkler system)	4	92 per unit	102 per unit
Outdoor packaged units associated with air conditioning system	8 (2 at each façade)	65 per unit	75 per unit
Lot 3			
Truck arrival/departure (at each proposed dock)	80	92 per unit	102 per unit
Gas powered forklifts (loading/unloading trucks)	60	95 per unit	105 per unit
Compressor units (sprinkler system)	4	92 per unit	102 per unit
Outdoor packaged units associated with air conditioning system	8 (2 at each façade)	65 per unit	75 per unit

7.2 Construction Noise Assessment

7.2.1 Construction Noise Modelling Results

The noise levels from the proposed construction were predicted at the nearest potentially affected receivers. A summary of the results of these predictions are contained within **Table 19** to **Table 21**.

Table 19 Predicted Construction Noise Levels – Scenario 1 Lot 1C Building Works

Location	Period	Predicted LAeq(15minute) Noise Level	Noise Affected Construction LAeq(15minute) Design Goal (dBA)	Complies?
Location1 315-321 Burley Road	Day	37	47	Yes
Location 2 Lenore Lane	Day	<30	46	Yes
Location 3 Emmaus College	Day	<30	55 (45 internal)	Yes
Location 4 32 Aldington Road	Day	<30	43	Yes

Table 20 Predicted Construction Noise Levels – Scenario 2 Lot 2B Building Works

Location	Period	Predicted LAeq(15minute) Noise Level	Noise Affected Construction LAeq(15minute) Design Goal (dBA)	Complies?
Location1 315-321 Burley Road	Day	37	47	Yes
Location 2 Lenore Lane	Day	<30	46	Yes
Location 3 Emmaus College	Day	<30	55 (45 internal)	Yes
Location 4 32 Aldington Road	Day	<30	43	Yes

Table 21 Predicted Construction Noise Levels – Scenario 3 Lot 3 Building Works

Location	Period	Predicted LAeq(15minute) Noise Level	Noise Affected Construction LAeq(15minute) Design Goal (dBA)	Complies?
Location1 315-321 Burley Road	Day	35	47	Yes
Location 2 Lenore Lane	Day	31	46	Yes
Location 3 Emmaus College	Day	<30	55 (45 internal)	Yes
Location 4 32 Aldington Road	Day	<30	43	Yes

The construction noise prediction results contained in **Table 19** to **Table 21** show that compliance with the design goals will be achieved at all receiver locations surrounding the development.

7.3 Operational Noise Emission

7.3.1 Operational Noise Modelling Results

Operational noise emissions were predicted assuming all plant and equipment was operated simultaneously on the site over a 24 hour period. A summary of the modelling results are contained within **Table 22.**

Table 22 Operational Noise Modelling Results

Location	Period	Calm	Inversion	Project Specific Noise Criteria $L_{Aeq(15minute)}$
Location1 315-321 Burley Road	Day	38	-	39
	Evening	38	-	39
	Night	38	42	39
Location 2 Lenore Lane	Day	32	-	39
	Evening	32	-	38
	Night	32	38	35
Location 3 Emmaus College	Day	33	-	45 (35 internal)
Location 4 32 Aldington Road	Day	31	-	38
	Evening	31	-	38
	Night	31	38	38

Results contained in **Table 22** show that compliance with the noise criteria is achieved at all residential receivers and the college for all periods during calm weather conditions.

Under conditions when class F temperature inversion is occurring, the potential noise impact was predicted to exceed the night time noise limit by up to 3 dBA at 2 locations. Further discussions will be provided in **Section 8**.

7.4 Assessment of Sleep Disturbance

The maximum sound power levels of plant and equipment used on the site during the night period is contained within **Table 18**.

The predicted maximum noise level from the proposed development during the night period is contained within **Table 23**.

Table 23 Predicted Sleep Disturbance Noise Level

Location	Period	Predicted L_{Amax} noise Levels	Sleep Disturbance Noise Goal $L_{A1(1minute)}$ (dBA)
Location1 315-321 Burley Road	Night	49	49
Location 2 Lenore Lane	Night	42	45
Location 3 Emmaus College	Night	N/A	N/A
Location 4 32 Aldington Road	Night	41	48

The results contained in **Table 23** show that the predicted maximum noise levels will be at or below the sleep disturbance noise goals at all locations.

7.5 Cumulative Noise Assessment

The proposed development site is situated within a developed industrial area in Oakdale, NSW.

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for residences. Therefore, the cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the amenity levels at surrounding potentially noise sensitive areas.

7.6 Road Traffic Noise Assessment

As previously stated access to the site will be via Old Wallgrove Road, Wallgrove Road and the M7. No residential receivers are located on the route between the M7 Motorway and the Oakdale site. As a result there is no traffic noise impact between the M7 Motorway and the site. Traffic volumes along the M7 are reported to be approximately 136,000 vehicles per day (AADT 2010). Therefore, the increase in traffic noise levels from the M7 Motorway due to additional traffic from the development will be insignificant.

8 DISCUSSION

As noted in **Section 7.3.1**, noise predictions indicate that worst case noise levels associated with the operation of the project may exceed the project specific noise levels by up to 3 dBA under adverse meteorological conditions. As such these receivers would fall into the noise management zone in accordance with **Section 4.2.2**. As such, It is recommended that management procedures be implemented including:

- Prompt response to any community issues of concern;
- Noise monitoring on site and within the community;
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Preparation of a formal noise management plan including noise monitoring program.
- For equipment with enclosures (ie compressor rooms) ensure door and seals are well maintained and kept closed when not in use.
- Keep plant and equipment well maintained, regular inspection and maintenance of equipment to ensure it is good working order.
- Equipment not to be operated until it is maintained or repaired.
- Regularly train workers (ie toolbox talks) to use equipment in ways to minimise noise.
- Operate mobile plant in a quiet, efficient manner.
- Switching off vehicles and plant when not in use.
- Incorporate clear signage at the site including relevant contact numbers for community enquiries.

9 CONCLUSIONS

SLR has undertaken a noise impact assessment for the building works (construction) and the operation of the proposed Oakdale Building 1C, 2B and 3 warehouse and distribution facility.

Computer noise modelling has been carried out to predict the noise level, from the facility, at the nearest affected receiver locations.

Operational Noise Assessment

The noise emissions from the operation of the proposed facility have been assessed against noise criteria established in accordance with the INP and the Concept Plan Approval.

Noise modelling has been conducted for calm and prevailing (temperature inversion) weather conditions at the nearest affected receiver locations. Results of the noise modelling show that the proposed facility will comply with the noise criteria established for the development during calm weather condition. It was also found that the predicted potential noise impact exceed the night time noise limit at 2 assessed locations under temperature inversion condition. It was however found that these results of based on absolute worst case operating scenario of the site and such scenario is not likely to occur during the night time (refer to **Section 8**).

Also, the cumulative noise impacts have been assessed and comply with the relevant noise criteria.

Sleep Disturbance Assessment

The potential for sleep disturbance at nearby residence locations due to the noise emissions from the night-time operations of the proposed facility has been assessed. The predicted maximum noise levels from the proposed development are shown to be below the relevant sleep disturbance goals and hence noise from the site during the night-time is unlikely to cause awakening reactions at the nearest affected residence locations.

Construction Noise Assessment

Construction noise levels from the proposed development are predicted to comply with the construction noise goals established in accordance with the Interim Construction Noise Guideline.

Road Traffic Noise Assessment

No residential receivers are located on the route between the M7 Motorway and the Oakdale site. As a result there is no traffic noise impact between the M7 Motorway and the site. The increase in traffic noise levels from the M7 Motorway due to additional traffic from the development will be insignificant