OAKDALE CONCEPT PLAN

PROJECT APPLICATION NO 1
CENTRAL PRECINCT BUILDINGS 1 AND 2
OLD WALLGROVE ROAD, HORSLEY PARK

ACOUSTICS AND AIR

REPORT NO. 07070-CP
VERSION D

WILKINSON MURRAY

OAKDALE CONCEPT PLAN

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CENTRAL PRECINCT BUILDINGS 1 AND 2
OLD WALLGROVE ROAD, HORSLEY PARK

REPORT NO. 07070-CP
VERSION D

MARCH 2008

PREPARED FOR

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EXECUTIVE SUMMARY

The following Part 3A Project Application Acoustic Report has been prepared in relation to the development of Buildings 1 and 2 within the Central Precinct of the Oakdale warehouse and distribution park at Horsley Park. The site is located to the south of the Sydney Water Pipeline which passes through Erskine Park.

The Oakdale Project is the subject of a Concept Plan Application which is assessed in a separate Report (No. 07070, Version A). That report provides the context for the subject report relating to the proposed Central Precinct Project.

The report sets out the design criteria and control concepts in relation to:

- Construction noise;
- Road traffic noise on the new link road; and
- Operational noise.

Construction Noise

It has been determined that there is potential for a small exceedance of construction noise criteria at residences to the north of the site at Erskine Park. As the exceedances are relatively small and occur in the daytime it is considered that this issue is manageable by adoption of best practice construction noise management.

Facility Noise

Noise from yard and loading dock activities have been predicted based on the proposed warehouse configuration and likely operating scenarios. Based on this scenario, noise levels are predicted to comply with site specific noise criteria. In addition, noise associated with reversing alarms has also been determined to comply with established sleep disturbance noise criteria.

Whilst details of building services have not been determined at this stage, a preliminary assessment of likely acoustically significant roof plant has been conducted. It has been determined that there are no exceedances of established site specific noise criteria.

Traffic Noise

Limited northern roadworks are proposed for this stage of the development. Given that there are no residential receivers in the vicinity of Old Walgrove Road between the proposed development site and the M7 Motorway the proposal is not expected to result in any road traffic noise impact.

Cumulative Noise Impact

It has been determined that there will be no cumulative noise impact associated with the simultaneous daytime operation of Buildings 1 & 2 facilities and the proposed operation of Bedford Quarry.

1 INTRODUCTION

Wilkinson Murray Pty Limited was commissioned by Goodman International Limited (Goodman) to provide the following Part 3A Project Application acoustic report for an end-user facility at Horsley Park. The following report sets out the design concepts for in relation to:

- Construction noise;
- Road traffic noise on the new link road; and
- Noise emissions from the operation of the development.

1.1 Project & Site Description

Goodman proposes to develop an integrated light industrial, logistics, service, warehousing and distribution park in Kemps Creek and Horsley Park, New South Wales. It will be located south of the Sydney Water Pipeline which passes through Erskine Park.

The site selected for the Oakdale Concept Plan comprises several rural landholdings currently used primarily for grazing and agriculture and covers an area of approximately 421 hectares. For the purposes of the concept plan, the development site has been divided into the following 'precincts':

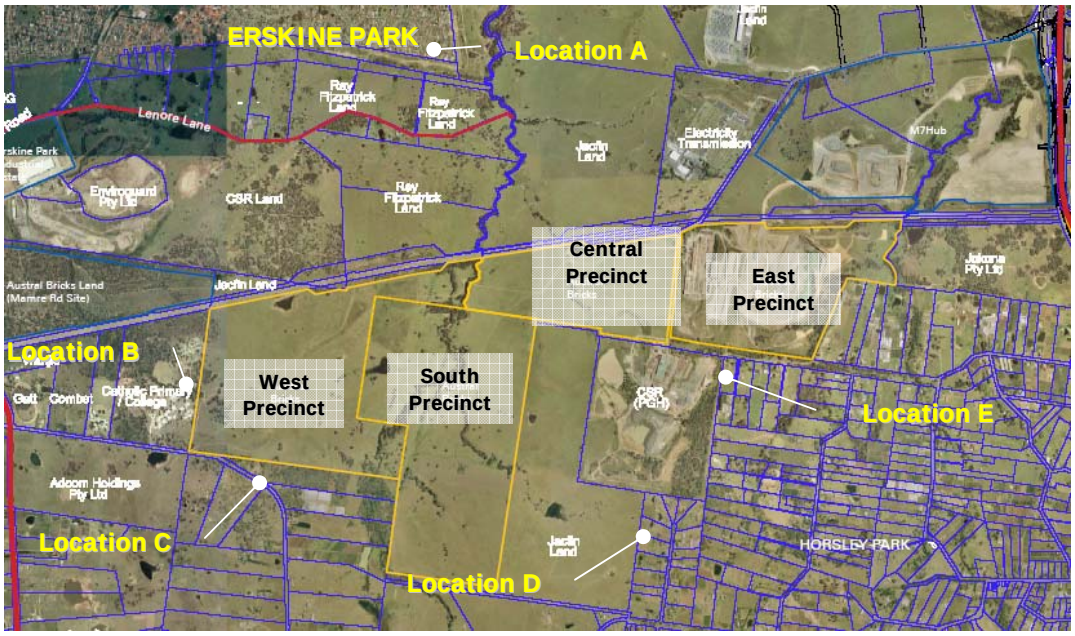
- Central Precinct – comprising Lot 2 DP 120673;
- South Precinct – comprising that part of Lot 82 DP 752041 east of Ropes Creek and Lot 87 DP 75204
- West Precinct – comprising Lot 1 DP 120673 and that part of Lot 82 DP 752041 west of Ropes Creek; and
- East Precinct – comprising Lot 1 DP 843901, which is the site of an existing Austral Bricks quarry and brick making plant.

Surrounding residential receivers have been identified as:

- Location A: North - Erskine Park Residences represented by Location A;
- Location B: West - Emmaus College and Retirement Village represented by Location B;
- Location C: South - 20 Bakers Road by Location C; and
- Location D: South - East – 27 Greenway Place and
- Location E: East - Burley Road Residences.

The site and surrounding residences are presented in Figure 1-1.

Figure 1-1 Proposed End User Site Layout Showing Surrounding Residences & Noise Measurement Locations

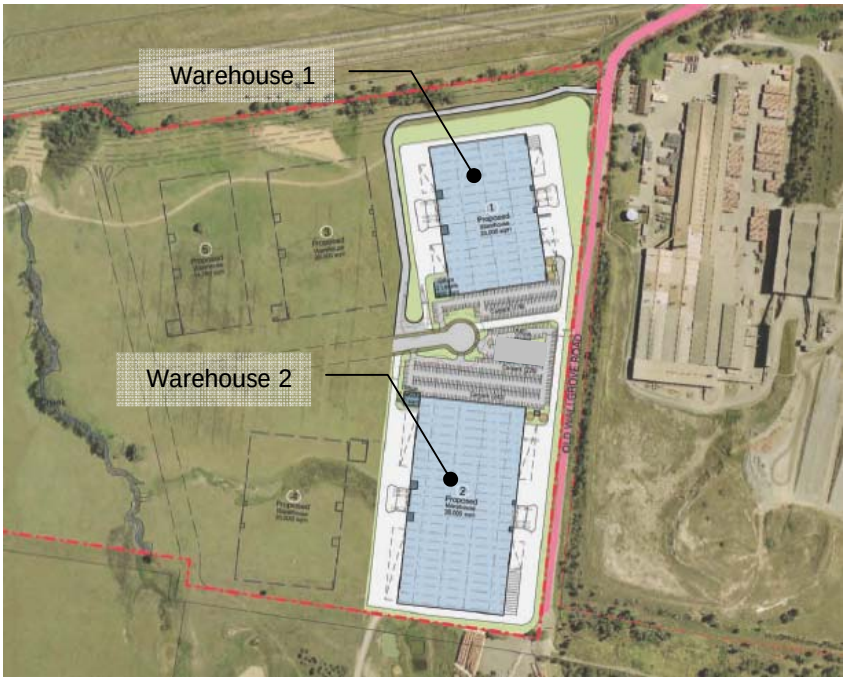


The end-user site comprises of the Central Precinct of the Oakdale development. The site itself occupies at total area of 40.4 hectares and is accessed by an extension of Old Wallgrove Road.

The proposed development comprises of two warehouses and an ancillary office as shown in Figure 1-2. The subject site is proposed to be developed in two stages, namely:

- Warehouse 1; and
- Warehouse 2.

Figure 1-2 Proposed End User Site Layout



The facility is proposed to operate 24-hours a day 7 days a week.

It is also noted that the eastern side of the Central Precinct has approval for a clay/shale extraction pit known as *"Bedford Quarry, Old Wallgrove Road Horsley Park (DA-260-8-2002)".*

Initially the quarry was proposed to operate over a 40 year period. However as a result of the development of the Oakdale employment land, the operations have been modified to reflect this change. The details of this modification are subject to a Section 96 application by Goodman International.

As a result the western side of the quarry may operate simultaneously during the day with warehouses 1 and 2. Therefore a review of potential cumulative noise impact at surrounding has been conducted.

1.2 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in Appendix B.

2 AMBIENT NOISE LEVELS

Ambient noise levels were monitored between Friday, 9 and Friday, 16 March 2007 at Locations A to D around the site. The details of these measurements are presented in the Concept Plan Report (WM Report 07070 Ver B).

Table 2-1 summarises the results, for daytime, evening and night time periods as defined in the NSW Department of Environment & Climate Change's (DECC) *NSW Industrial Noise Policy (INP)*. The summary values are:

- $L_{Aeq,Period}$ – the overall L_{Aeq} noise level measured over the assessment period; and
- RBL – Rating Background Level is a measure of typical background noise levels which are used in determining noise criteria.

Table 2-1 Summary of Measured Noise Levels

Noise Logging Site	RBL (dBA)			$L_{Aeq,Period}$ (dBA)		
	Daytime 7am-6pm	Evening 6-10pm	Night Time 10pm-7am	Daytime 7am-6pm	Evening 6-10pm	Night Time 10pm-7am
A	34	39	40	50	54	55
B	34	34	34	48	54	45
C	34	35	33	51	50	45
D	34	38	38	50	48	45

It is noted that at some locations, particularly Location A, noise levels increased during the evening and night periods. This is contrary to what might be expected for such locations and is likely to be due to sources such as crickets or the like. Therefore these levels have been discounted in our assessment. In these cases the lower daytime noise level has been adopted for the evening and night periods.

In addition we have identified an additional residential receiver area, being residences to the East on Burley Road which has been defined as Location E.

3 ACOUSTIC PERFORMANCE CRITERIA

The following section details the applicable noise criteria based on various guidelines of the DECC.

3.1 Construction Noise Criteria

The assessment of construction is dependent on the duration of construction in the vicinity of the potentially affected residential receiver. The DECC in Chapter 171 of the *Environmental Noise Control Manual (ENCM)* suggests the following noise control guidelines.

Level Restrictions

(i) Construction period of 4 weeks and under.
The L_{A10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

(ii) Construction period greater than 4 weeks and not exceeding 26 weeks.
The L_{A10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

Time Restrictions

Monday to Friday	*7am–6pm*
Saturday	*7am–1pm (if inaudible at residential premises)*
	8am–1pm (if audible at residential premises)

No construction work to take place on Sundays or Public Holidays

Silencing

All possible steps should be taken to silence construction site equipment. It is particularly important that silenced equipment should be used on road or rail works where 24 hour operation is necessary.

Where the construction period is likely to be over 26 weeks, a construction noise goal based on an intrusive noise criteria of background + 5dBA is usually adopted. Table 3-1 presents the applicable criteria.

Table 3-1 Construction Noise Criteria - dBA

Receiver	Construction Duration – (Daytime)		
	Up to 4 weeks	4 to 26 weeks	> 26 weeks
All receivers	54	44	39

3.2 Industrial Noise Criteria

The *NSW Industrial Noise Policy (INP)* recommends two criteria, "Intrusiveness" and "Amenity", both of which are relevant for the assessment of noise. In most situations, one of these is more stringent than the other and becomes the dominate noise criteria. The criteria are based on the L_{Aeq} descriptor, which is explained in Appendix C.

Table 3-2 show the relevant noise industrial noise criteria for this project based on a suburban and rural area classification.

Table 3-2 Industrial Intrusiveness & Amenity Criteria

Receiver Area	Time Period	RBL (dBA)	Intrusiveness Criterion $L_{Aeq,15min}$ (dBA)	Project-Specific Amenity Criterion
A	Daytime (7.00am–6.00pm)	34	39	55
	Evening (6.00–10.00pm)	39*	39	45
	Night time (10.00pm–7.00am)	40*	39	40
B, C, D, E	Daytime (7.00am–6.00pm)	34	39	50
	Evening (6.00–10.00pm)	34	39	45
	Night time (10.00pm–7.00am)	34	39	40

* In these cases an RBL of 34 dBA has been used to determine intrusive noise criteria.

In this case, there is insignificant industrial noise existing in the area. Whilst there are quarries around Location E no significant noise was observed during a site visit. Traffic noise levels are unlikely to reduce in the future therefore the full amenity criteria are applicable.

Zone specific noise emission criteria have been established in the concept assessment based on distances to receivers from each nominated "Noise Zone" to ensure that noise emissions from the entire site do exceed the overall noise criteria at surrounding residences. The noise zones are shown in Appendix A.

In this case the entire Central precinct corresponds to Noise Zone 1. Therefore the following operational noise criteria are applicable as detailed in Table 3-3.

Table 3-3 Central Precinct Site Specific Noise Criteria at Surrounding Receivers

Receiver Area	Operational Noise Criteria for Central Precinct Operations - $L_{Aeq,15min}$ dBA
A	35
B	20
C	24
D	34
E	34

3.2.1 Sleep Disturbance Noise Criteria

Intermittent noises due to activities such as trucks starting and loading dock activities during the night-time period are not directly addressed by the *INP*.

In order to minimise the risk of sleep disturbance from the operations during night-time operation the DECC recommends that sleep disturbance is assessed as the emergence of the $L_{A1,1min}$ level above the $L_{A90,15min}$ level at the time. Appropriate screening criteria for sleep disturbance are determined to be an $L_{A1,1min}$ level 15dBA above the Rating Background Level (RBL) for the night time period.

Based on noise logging, an RBL of 34 dBA has been established therefore giving a sleep disturbance criterion of **49 dBA**.

4 NOISE SOURCE LEVELS

Noise sources that are likely to be associated with the development are identified in the following sections.

4.1 Construction Noise Sources

Typical Sound Power Levels (SWL) of the plant likely to be used during earthworks and road building when the site is being established are identified in Table 4-1. These SWLs have recently been measured at other similar construction sites.

Table 4-1 Typical Construction Plant Sound Power Levels (SWL)

Plant	SWL (dBA)
Excavator	107
Front End - Low Loader	112
Dump Trucks	112
Tower Crane or Mobile Crane	105
Generators	95
Scrapers, Dozer	119
Graders	109
Concrete Trucks	109
Concrete Paver Roller	121
Water Truck, Vibratory Rollers	110
Concrete Plant	103
Asphalt Plant	114
Paving machine Asphalt	109

4.2 Operational Noise Sources

Plant associated with operational warehouse facilities are trucks, forklifts, mechanical plant (condensers and fans) and cars. Typical noise sources are listed in Table 4-2.

Table 4-2 Typical Plant Sound Power Levels (SWL)

Item	Operating Condition	Overall L_{Aeq} Sound Power Level (dBA)
Semi - trailer	Loading/Unloading	87
Petrol Forklift	Lifting, moving	96
Exhaust Fan	Operating	95
Reverse alarm	Operating	110
Semi-tailer	Driving through yard	104
Exhaust Fan	Roof Mounted	95

5 METEOROLOGY

At relatively large distances from a source, the received noise levels will be influenced by meteorological conditions, particularly wind and temperature gradients, and hence can vary from hour to hour and night to night. Where these factors are a feature of an area their affect on resultant noise levels are required to be taken into account.

The procedures described in the INP are directed toward finding a single set of meteorological conditions, representing generally adverse conditions for noise propagation, which should be used in noise assessment. It is Wilkinson Murray's view that for complex developments it is more appropriate to assess noise impacts under the entire range of meteorological conditions applying at the location.

However the procedures of the INP have been adopted as this is considered adequate for this project, as the site is relatively straight foreword.

5.1 Wind

Wind can increase noise at a receiver when it blows from the direction of the noise source. An increase in wind strength results in a corresponding increase in wind noise at the receiver which masks noise from the source under investigation.

The affectation of noise due to wind should be considered when wind is a feature of the area under consideration. The *INP* defines this as where wind blows at speeds up to 3m/s for more than 30% of the time in any season. In this situation wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

Twelve month weather data for the year 2006 was obtained for the DECC air quality monitoring station located at St Marys. This data was analysed to determine the frequency of occurrence of seasonal winds up to speeds of 3m/s for the daytime, evening and night periods.

Seasonal wind records indicate that westerly winds of up to 2.6 m/s are a feature of the area during the evening and night periods in the area. Appendix C presents wind roses for the site.

5.2 Temperature Inversion

Temperature inversions can increase noise levels at surrounding receivers by the reflection of sound waves from warmer upper layers of air. Temperature inversions occur predominantly at night. 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 a season, typically winter.

Inversion data was assessed for the winter night period where a frequency of 11 % was determined for F & G class stability therefore temperature inversion has not been included in the assessment.

6 CONSTRUCTION NOISE ASSESSMENT

During the initial site consolidation stage the following works are proposed:

- Sub-division of the site and associated sub-division works including construction of roads; stormwater drainage systems, sewerage and water works, utilities and services; landscaping and earthworks;
- Works for the site water management strategy;
- Remediation of the Riparian corridor on site; and
- Construction and use of buildings and associated works.

In the case of the Central Precinct the following preliminary construction program is proposed as detailed in Table 6-1.

Table 6-1 Central Precinct Construction Plan

Building	Planned Completion Date	Construction Timeframe
Warehouse 1	Qtr 3 2008	6-9 months
Warehouse 2	Qtr 4 2008	6-9 months

As construction is likely to exceed 26 weeks a construction noise goal of 39dBA is applicable at surrounding residences.

The noisiest construction period is expected to be the earthmoving phase and, with perhaps six machines including excavators, trucks, a dozer and a grader working around the site simultaneously, a total site sound power of 116dBA can be expected. Earthmoving activity is likely to occur in various sections of the development and given the size of the site it would only be that equipment that is in the vicinity of residences that would be acoustically significant.

Table 6-2 presents initial calculations at surrounding receivers based on distance attenuation and shielding from topography allowing for the noise source to be generally around the centre of each zone.

Table 6-2 Predicted L_{A10} Construction Noise Levels at Residential Receivers dBA

Receiver Location	A	B	C	D	E
Noise Level	43	25	23	26	30

These predictions show the construction noise criterion is likely to marginally exceed during the earthmoving phase at residences at Erskine Park (Location A). In the case of other receivers noise levels from construction are expected to comply with established criteria. The exceedance of the construction noise criteria triggers the requirement of a noise management plan requiring best practise noise mitigation. The noise management plan should consider the following noise mitigation measures:

- Construction activities that are likely to be audible at any residence must not occur outside the usual hours of 7.00am-6.00pm Monday to Friday and 8.00am-1.00pm on Saturday. Construction vehicles should not approach the site before 7.00am.
- Noisy activities such as earthworks in close proximity to residences should ideally be programmed to avoid early mornings and Saturdays. While this may not be always practical, consideration should be given to surrounding residential receivers when planning the construction program.
- Spoil quantities should be carefully considered to avoid truck movements to and from the site to provide additional fill or remove excess spoil.
- Diesel powered machines such as trucks, bobcats and excavators should be switched off if not required for more than a few minutes rather than left idling unnecessarily.
- Machines used on site should be maintained in good condition, particularly considering the exhaust system on diesel powered machines, to minimise noise emissions. Excessively loud machines should be repaired, modified or removed from the site. Sound pressure level measurements should be conducted on all plant prior to works beginning on-site.
- A representative from the construction contractor should be available to respond to questions and complaints from the community in a professional, considerate and timely manner.
- Reverse alarms should be controlled to the minimum sound level consistent with safety by replacing, shielding or relocating the alarm unit on noisy machines.

7 OPERATIONAL NOISE ASSESSMENT

Noise predictions associated with the operation of the proposed facilities on the surrounding residential receivers have been conducted. The noise modelling was used to predict the resultant noise emission levels at the nearby residential receivers under normal and adverse weather conditions.

Site related noise emissions were modeled using CONCAWE implemented in the "Cadna A" acoustic noise prediction software. Factors that are addressed in the modeling are:

- Equipment sound level emissions and location;
- Screening effects from buildings;
- Receiver locations;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground Absorption;
- Atmospheric absorption; and
- Directivity of roof fans.

Computation of noise emission was carried out based on calm meteorological conditions, and a wind of 2.6 m/s blowing from the west quadrant to account for possible enhancement of noise emissions. They are intended to provide an indication of the potential upper bound of impact associated with possible acoustically adverse meteorological conditions.

Noise emissions from warehouses facilities are primarily a function of truck loading / unloading activities. No major industrial processes occur on site therefore the limit of significant mechanical plant noise is associated with roof mounted ventilations fans.

Our assessment has reviewed both these noise sources and their combined potential affect at surrounding receivers.

7.1 Operational Noise

Operational site noise will be mainly associated with truck movements and associated dock activities. These activities are proposed to occur on a 24 hour basis. Accordingly assessments of typical operating scenarios have been conducted. The assessment is based on previous measurements conducted at similar facilities.

7.1.1 Noise Model Scenarios

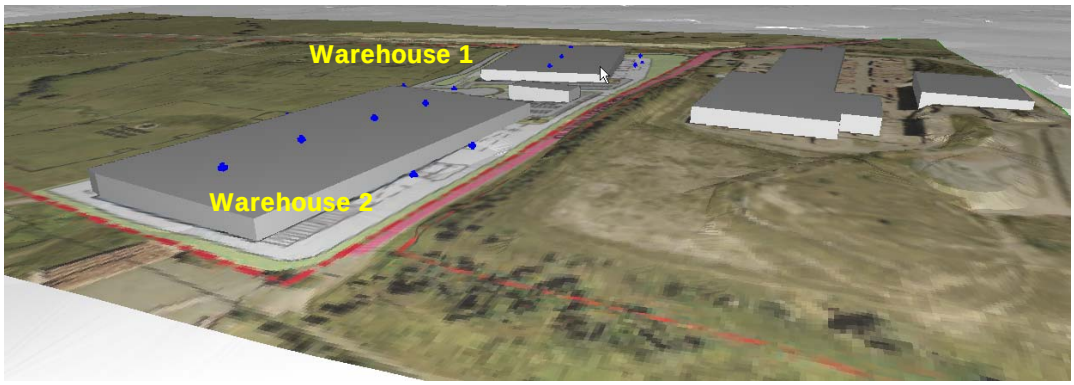
Noise emanating from loading and unloading yard activities associated with the facilities was modelled based on the proposed building layout and a number of assumed truck locations spread throughout the development as presented in Figure 7-1.

The modelled noise levels are considered representative of a busy period which would typically occur during the night-time period (i.e. 10.00pm-7.00am). Table 7-1 presents the loading area operational scenario of the each warehouse used in the noise model.

Table 7-1 Warehouse Operating Scenario (15 minute period)

Plant / Equipment Type	No. of Items	Description of Modelled Industrial Operations
Semi Trailer	1	Loading/Unloading each operating for a period of 5 minutes.
Forklift	1	Operating for the entire 15 minute period.
Semi Trailer	1	Trucks entering and leaving the site (2 minutes duration each)
Semi Trailer	1	Truck turning (1 minutes duration)
Roof Fans	7 - 8	7 fans on Warehouse 1 and 8 on Warehouse 2

Figure 7-1 Warehouse Noise Modelling *



* Noise sources shown in blue

Mechanical plant associated with the proposed industrial development can also have the potential to impact on surrounding residential properties. At this stage of the project, the selection of the type and location of mechanical plant associated with the proposed development has not yet been finalised.

However for the purposes of endeavouring to quantify their potential impact it has been assumed that each warehouse will have four large exhaust fan located in the ridge of each warehouse.

Based on the noise levels presented in Table 4-2, noise predictions for the various yard, fan and dock equipment have been conducted. The noise emission levels are based on typical 15-minute operational cycles.

7.1.2 Predicted Operational Noise

Table 7-2 presents the predicted noise levels at adjacent residences due to operational night time scenario.

The lower intrusive criterion has been adopted based on the assumption that the scenarios continuously occur throughout the night period. As a result, the assessment is based on a **worst case** situation.

Table 7-2 Predicted Noise Levels at Residences due to Warehouse Operating Scenario

Receiver Location	Predicted Noise Level - dBA		Noise Criteria -dBA
	Calm Conditions	Adverse Condition	
A – Erskine Park Residences	10	8	35
B - Emmaus College and Retirement Village	<10	<10	20
C - 20 Bakers Road	<10	<10	24
D- 27 Greenway Place	11	11	34
E - Burley Road Residences	14	18	34

A review of the results indicated that compliance is indicated at all receivers even under adverse conditions.

7.2 Sleep Disturbance

In the case of noise from events such as reversing alarms, the potential for sleep disturbance from areas that potentially operate in the night period. A review of predicted noise levels presented in Table 7-3 indicates no exceedance of sleep disturbance criteria at residences.

Table 7-3 Predicted Truck Reversing Alarm Noise Levels at Residences - dBA

Receiver Location	Predicted Noise Level - dBA		Noise Criteria
	Neutral Condition	Adverse Condition	
A – Erskine Park Residences	15	12	49
B - Emmaus College and Retirement Village	<10	<10	49
C - 20 Bakers Road	10	<10	49
D- 27 Greenway Place	20	20	49
E - Burley Road Residences	29	34	49

7.3 Quarry Operational Cumulative Impact.

A noise assessment of the operation of the proposed quarry has been conducted by Heggies Australia (Heggies Report No 526/08 “Clay / Shale Extraction – Horsley Park, Lot 82, DP752041 “Oakdale”) in 2002. Predicted quarry daytime noise levels at surrounding residences are presented in the report.

Predicted noise levels of Quarry operations have been conducted by Heggies at locations equivalent to Locations A, B, C and E under neutral weather conditions. Table 7-4 summarises

predicted daytime quarry noise levels along with cumulative noise levels at surrounding residential receivers.

Table 7-4 Predicted Cumulative Noise Levels at Surrounding Residences - dBA

Receiver Location	Predicted Noise Level - dBA		Cumulative Noise Level
	Buildings 1 & 2	Quarry Noise	
A – Erskine Park Residences	10	31	31
B - Emmaus College and Retirement Village	<10	24	24
C - 20 Bakers Road	<10	24	24
D- 27 Greenway Place	11	Not Predicted	-
E - Burley Road Residences	14	38	38

A review of cumulative noise levels indicates that noise at residences will not increase as a result of the operation of Buildings 1 & 2 as resultant noise from Quarry operations will be significantly higher.

Under adverse conditions a 4 dBA increase in noise levels is predicted at Burley Road residences due to operation of Buildings 1 & 2. However this will not result in an increase in overall resultant noise levels at residences as Quarry operational noise will still be significantly higher in level.

Therefore it can be concluded that the operation of Buildings 1 & 2 will not result in a cumulative noise impact at surrounding residences whilst the quarry is operating.

8 TRAFFIC NOISE ASSESSMENT

8.1 Traffic Noise Criteria

Criteria for assessment of road traffic noise are set out in the NSW Government's *Environmental Criteria for Road Traffic Noise (ECRTN)*. Under the definitions in that document, the new Link Road associated with this project would be described as a "*New collector road corridor*".

Table 3-3 shows the relevant noise criteria for this case. The criteria in columns 2 and 3 of the table are referred to as "base" criteria. These should be met in all cases, where possible. Criteria in the fourth column of the table are referred to as "allowance" criteria. The "existing" noise levels referred to here represent traffic noise levels in the year of opening of the project. In this report, these levels are predicted based on traffic volumes for the year 2007. Noise levels for comparison with these criteria should be for a time 10 years after opening of the project, and in this report, predicted traffic volumes for the year 2017 are used in noise assessment.

In summary the noise level goals at the residential receivers, for this project, based on the *ECRTN* are:

- $L_{Aeq,1hr}$ = 60dBA;
- $L_{Aeq,1hr}$ = 55dBA; or
- where base criteria are already exceeded, *ECRTN* allowance criteria (existing +0.5dBA) applies.

Table 8-1 Traffic noise criteria extracted from the NSW *ECRTN*

TYPE OF DEVELOPMENT	CRITERIA		
	DAY (7AM-10PM) dB(A)	NIGHT (10PM-7AM) dB(A)	WHERE CRITERIA ARE ALREADY EXCEEDED
New collector road corridor	$L_{Aeq,1hr}$ 60	$L_{Aeq,1hr}$ 55	The new road should be designed so as not to increase noise levels by more than 0.5 dBA Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria. In some instances this may be only achievable through long term planning strategies, such as improved planning, design and construction of adjoining land use developments, reduced vehicle emission levels through new vehicle standards and the regulation of in-service vehicles; greater use of public transport; and alternative methods of freight haulage.

Accordingly all residences potentially affected by traffic noise will be assessed with respect to the above criteria.

8.2 Traffic Noise Impact

Operation of the Central Precinct will require the construction of a section of road between Old Wallgrove Road and the Central Precinct. Therefore there will be no through link road construction associated with this application.

As such there are no residences in close proximity to this section of road that would be potentially affected by traffic noise. Given this fact and the findings of the Concept Plan acoustic assessment the traffic noise associated with this proposal will be acceptable.

9 CONCLUSION

This assessment assesses noise potential noise emissions of the proposed end user facility for the Central Precinct at the Oakdale Concept Site. The assessment is based on site specific noise criteria that were established in the Concept Master Plan assessment.

It has been determined that there is potential for a small exceedance of construction noise criteria at residences to the north of the site at Erskine Park. As the exceedances are relatively small and occur in the daytime it is considered that this issue is manageable by adoption of best practice construction noise management.

Noise from yard and loading dock activities have been predicted based on the proposed warehouse configuration and a likely operating scenario. Based on this scenario noise levels are predicted to comply with site specific noise criteria. In addition noise associated with reversing alarms has also been determined to comply with established sleep disturbance noise criteria.

Limited northern road works are proposed for this stage of the development whereby a connection between Old Wallgrove Road and the northern end of the Central Precinct will be the sole access to the site. As such there are no residences in the vicinity of this section of read that will be affected by traffic noise.

A review of cumulative noise levels indicates that noise at residences will not increase as a result of the operation of the proposed development as resultant noise from Quarry operations will be significantly higher than predicted Buildings 1, & 2 operational noises.

10 REFERENCES

- Wilkinson Murray Report No. 07070 Version A, July 2007 – *Oakdale Concept Plan – Masterplan Noise Assessment*.
- MASTERPLAN NOISE ASSESSMENT
- NSW Department of Environment & Climate Change (DECC), 2001 – *NSW Industrial Noise Policy*
- NSW Department of Environment & Climate Change (DECC), 1999 – *Environmental Criteria for Road Traffic Noise*
- Langgons D, 2001 *Noise Control Planning for New Industrial Estates*, Australian Acoustical Society Annual Conference 2001
- Heggies Australia Pty Ltd *Clay / Shale Extraction – Horsley Park, Lot 82, DP752041 "Oakdale,* Report No 526/08 " 2002

Note

All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2000 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

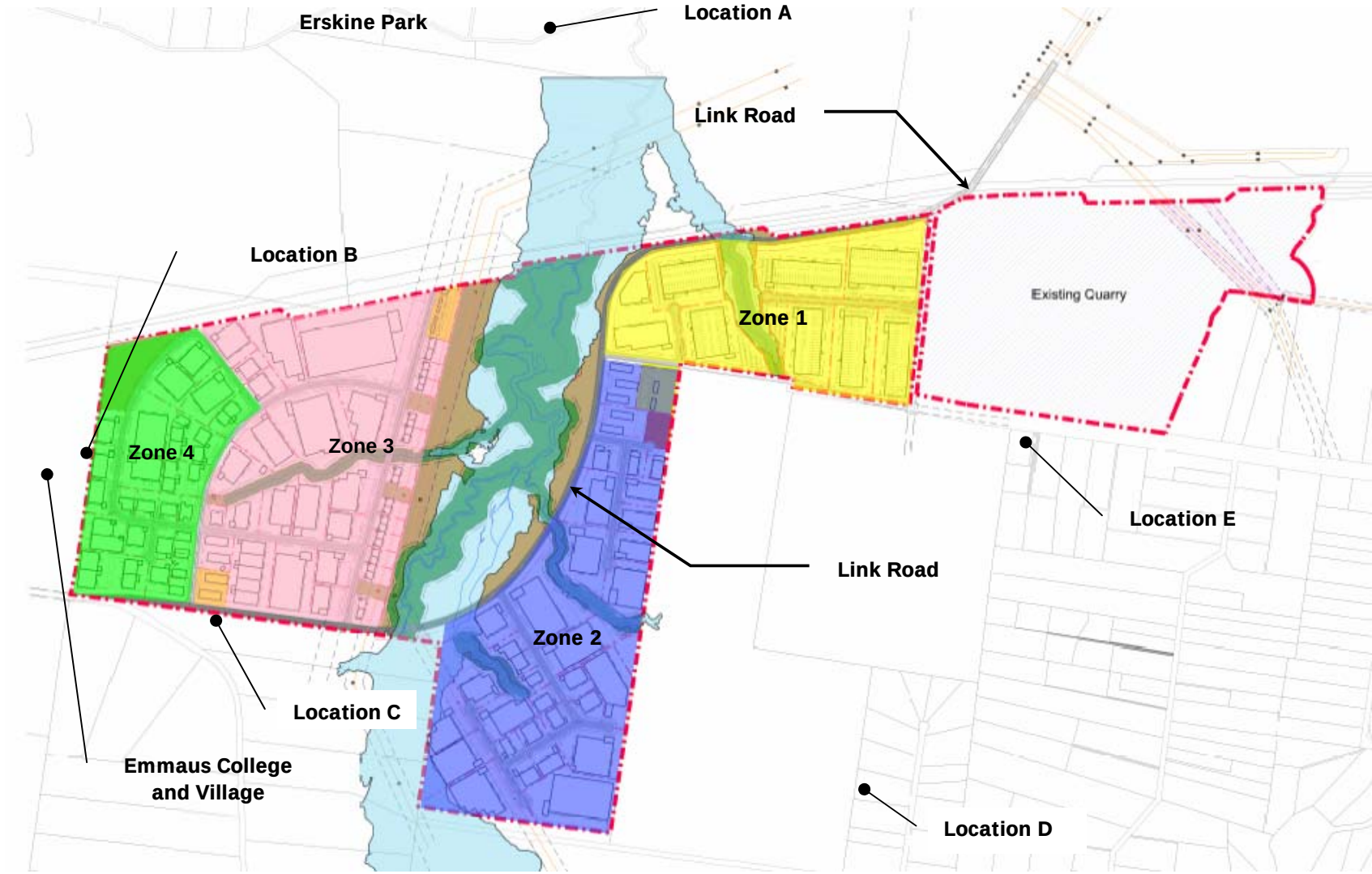
AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Status	Date	Prepared by	Checked by
D	Final	10 March 2008	Brian Clarke	John Wasserman

APPENDIX A

NOISE ZONES


Erskine Park
Location A
Link Road
Location B
Existing Quarry
Zone 1
Zone 4
Zone 3
Location E
Link Road
Zone 2
Location C
Emmaus College
and Village
Location D

APPENDIX B

GLOSSARY OF TERMS

GLOSSARY

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph overleaf, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

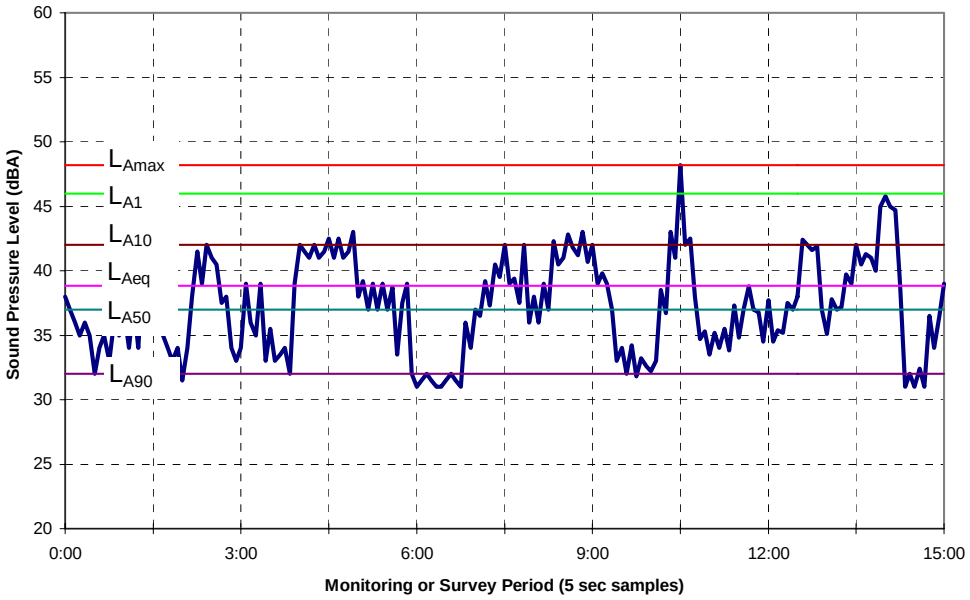
ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10^{th} percentile (lowest 10^{th} percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period **–** daytime, evening and night time.

DECC – NSW Department of Environment & Climate Change

INP – NSW Industrial Noise Policy

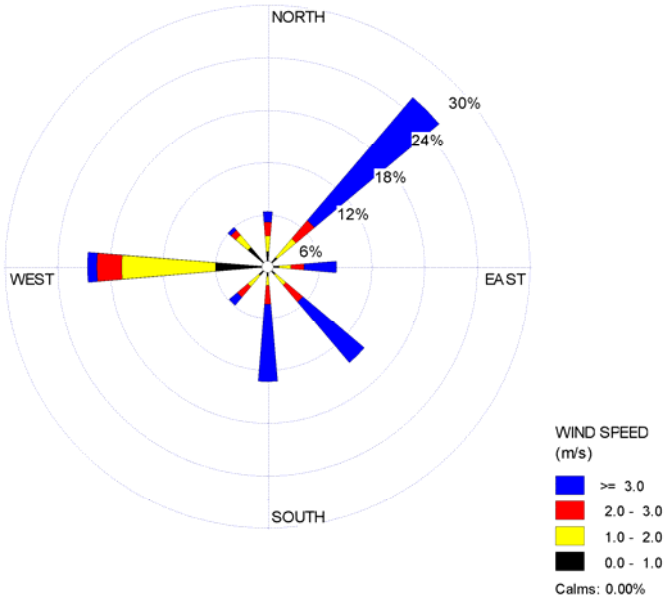
ECRTN – Environmental Criteria for Road Traffic Noise


60
55
50
45
40
35
30
25
20
Sound Pressure Level (dBA)
LAmax
LA1
LA10
LAeq
LA50
LA90
0:00
3:00
6:00
9:00
12:00
15:00
Monitoring or Survey Period (5 sec samples)

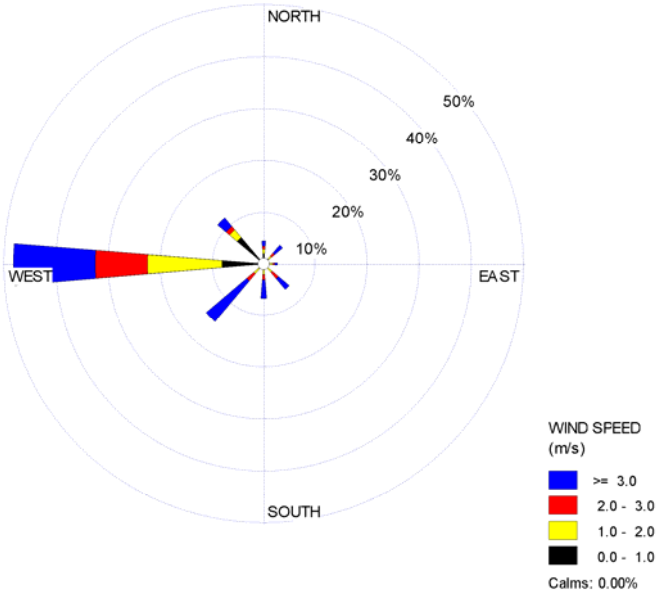
APPENDIX C

WIND ROSES

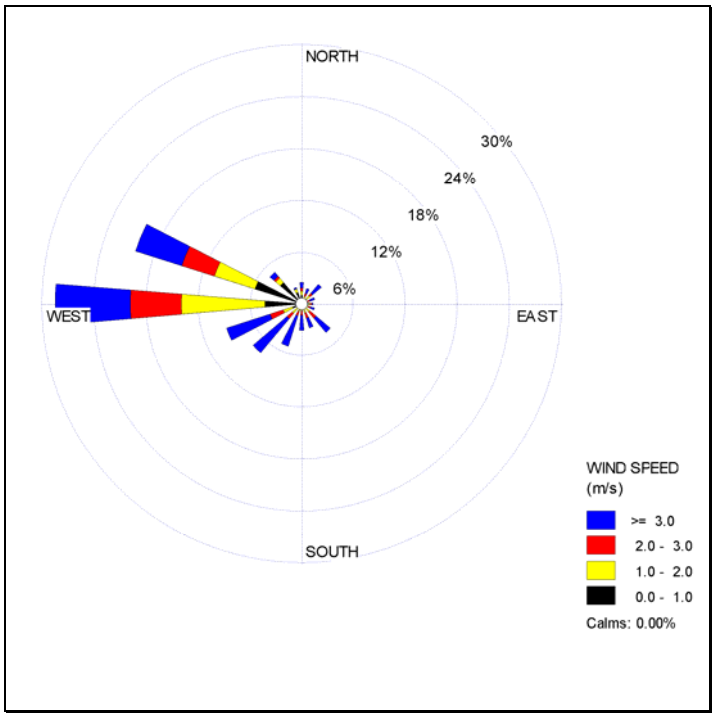
Summer



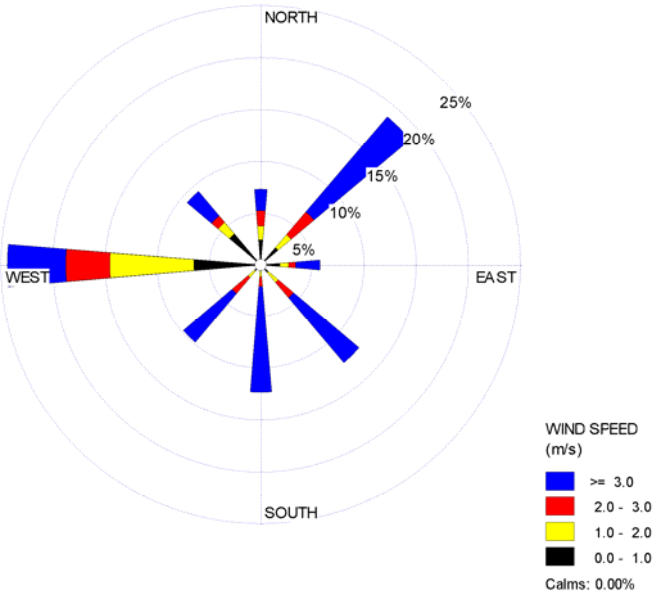
Autumn Winds



Winter Winds



Spring Winds



Yearly Winds