



Postal Address  
P.O. Box 432  
Gladesville  
N.S.W. 1675  
AUSTRALIA  
A.C.N. 068 727 195  
A.B.N. 19 068 727 195  
Telephone: 02 9879 4544  
Fax: 02 9879 4810  
Email: [AtkinsAcoustics@bigpond.com.au](mailto:AtkinsAcoustics@bigpond.com.au)

**Atkins Acoustics and Associates Pty Ltd.**

Consulting Acoustical & Vibration Engineers

**NOISE PLANNING ASSESSMENT  
INDUSTRIAL LAND STUDY  
BOMEN. WAGGA WAGGA**

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**Rev 01**

**Prepared for:** Willana Associates  
P.O. Box 170.  
**RANDWICK NSW 2031**

**Prepared by:** Atkins Acoustics & Associates Pty Ltd.  
8-10 Wharf Road  
**GLADESVILLE NSW 2111**

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## EXECUTIVE SUMMARY

*Atkins Acoustics* was commissioned by *Wagga Wagga City Council (Council)* to prepare an environmental planning assessment to address noise issues associated with the possible redevelopment of land identified at Bomen for rezoning (*Figure 1*).

The existing industrial land at Bomen is currently zoned "Zone 1 Rural" and "Zone 5 Special Uses - Abattoir) and the proposed land use category for the rezoning proposal is "Industrial.

Existing industrial development at Bomen is in varying proximity to residential and rural residential areas and it is important that *Council's* planning takes a considered view on compatibility of existing and possible future land use. Of particular interest to *Council* is the relationship between Cartwrights Hill, Brucedale and isolated residential/rural development to Bomen.

The subject Bomen land is partly developed and operated as industrial land. Land uses immediately surrounding the site are either developed with single and multiple residential dwellings or undeveloped.

This report presents findings from site investigations and identifies issues that could be considered for assessing and controlling possible noise impacts arising from the rezoning. The planning strategies adopted for the assessment are based on guidelines published by the *DECC* and amenity noise goals recommended for sensitive land use developments. The approach described in the report has been prepared to assist with developing a long-term acoustic planning strategy for the area, assessing areas exposed to the *LFR* and to provide an equitable and predictable strategy for planning authorities, land use planners and acoustic planning options.

Site investigations have revealed that at present, noise from the existing industrial uses is audible at the closest residential properties identified on the northern hill at Cartwrights Hill and to the south of the industrial land (Byrnes Road and Bavin Street). Other noise

sources identified in the study area included rail traffic on the Main Southern Railway and road traffic. The envisaged noise sources that would be generated from the site would be similar to those found on most industrial estates and would include process manufacturing plant, fans, conveyors, compressors, cooling towers, roof mounted exhaust fans, extraction fans, etc. Site mobile plant of acoustic significance would include forklift trucks, trucks and trains.

For the purpose of noise assessment and possible land-use planning options including the residential areas of Cartwright Hill and Brucedale, land exposed to the assessment area would be described (*INP Section 2.2.1*) as "existing suburban" or "future suburban". Referenced to the *INP* "suburban" is described as an area that has local traffic with characteristically intermittent traffic flows or some limited commerce or industry. Suburban areas *INP* may be located in either a rural, rural-residential or residential zoned areas. Considering the existing ambient noise levels and the existing planned land uses *Table 5* presents a summary of the calculated RBL's, the ambient  $L_{Aeq}$  noise levels and recommended assessment goals for the study area.

For the purpose of modelling and assessment it was assumed that the *INP* amenity noise goals would be assessed at the boundary of the industrial precinct (to contain noise impacts within the precinct land) and a five hundred (500) metre low risk separation zone would be created along exposed *LFR* boundaries. Within the separation zone it was assumed that development could occur in a three (300) metre zone. The development in this zone could include, but not necessary limited to, daytime use commercial/warehouse/light industrial premises.

Within the principal industrial precinct the total area was divided into zones, sub-zones and finally hectares per sub-zone. The allowable calculated sound pressure level contribution from each sub-zone assumed the noise source at the center of the area, hemispherical sound propagation and no other noise attenuation. The assumptions (without excess attenuation from interposed structures) are considered as conservative in terms of noise modelling and provide a safety margin in terms of noise prediction and modelling. The report presents a strategy and allowable noise levels contributions for

assessing and controlling noise from likely future development. The strategy was developed with a vision to:

- ❑ Avoid rapid and uncontrolled build up of ambient noise levels (noise creep);
- ❑ Provide uniform requirements to all proponents;
- ❑ Promote uniform planning strategy for local and state planning authorities;
- ❑ Provide design goals without repetitive background noise measurement;
- ❑ Allow for incremental/staged redevelopment overtime;
- ❑ Seizure of market opportunities when they become available;
- ❑ Fostering/cultivating new market opportunities;
- ❑ Capitalise on value-adding activities;
- ❑ Integrate with regional strategies;
- ❑ Integration with nearby urban release area planning;
- ❑ Integrate with/capitalise on heavy rail network planning and development;
- ❑ Catalyst for multi-stakeholder commitments to sub-regional transport infrastructure;
- ❑ Foster natural systems corridor linkages with off-site corridors; and
- ❑ enhanced levels of Precinct sustainability.

The results of preliminary noise modelling for envisaged development that would be likely to occur in the *LFR* have shown that with appropriate planning, management and effective engineering controls noise emissions from the likely industrial development could be controlled and satisfy the recommended amenity goals.

Noise modelling has shown that with appropriate planning, noise from intermittent nighttime transient activities could be controlled to satisfy the recommended disturbance assessment goals. Albeit, future development should be planned such to maximise distance separation to existing and future residential development.

Meteorological conditions such as wind and temperature inversions can increase the level of noise at a receptor location. The effects of wind can also reduce noise when the wind is blowing away from the receptor and towards the source. For the purpose of assessing

future industrial development within the *LFR* the effects of meteorological conditions should be considered in accordance with *INP* procedures.

During the early phases of the *LFR* development, road traffic noise from Bomen Road and Byrnes Road is predicted to satisfy the *ECRTN* traffic noise objectives. Albeit, an alternative heavy vehicle route to service future industrial development is recommended to reduce traffic noise from Bomen Road for existing and potential future residential properties in the vicinity of Cartwrights Hill.

Train movements on the Main Southern Rail Line and the existing spur lines are expected to satisfy the existing *DECC* licence conditions.

Without appropriate planning controls and undertakings, environmental noise throughout the study area would be unchecked and likely result in uncontrolled *noise creep* for the area and potential unacceptable noise impacts for competing land uses.

The recommendations presented in this report are not intended to form part of any project approval. It is recognised that detailed planning, management and engineering noise control design would be required for the redevelopment of the *LFR* land if and when rezoning approval is granted.

## 1.0 INTRODUCTION

On 18 December 2006 Wagga Wagga City Council (*Council*) decided to prepare a draft local environmental plan (DLEP) for the local government area (LGA). Upon gazettal the draft plan will comprise the new Principal Local Environmental Plan (LEP) for the LGA. The draft plan is intended to implement the strategic planning undertaken in the Wagga Wagga Spatial Plan 2007.

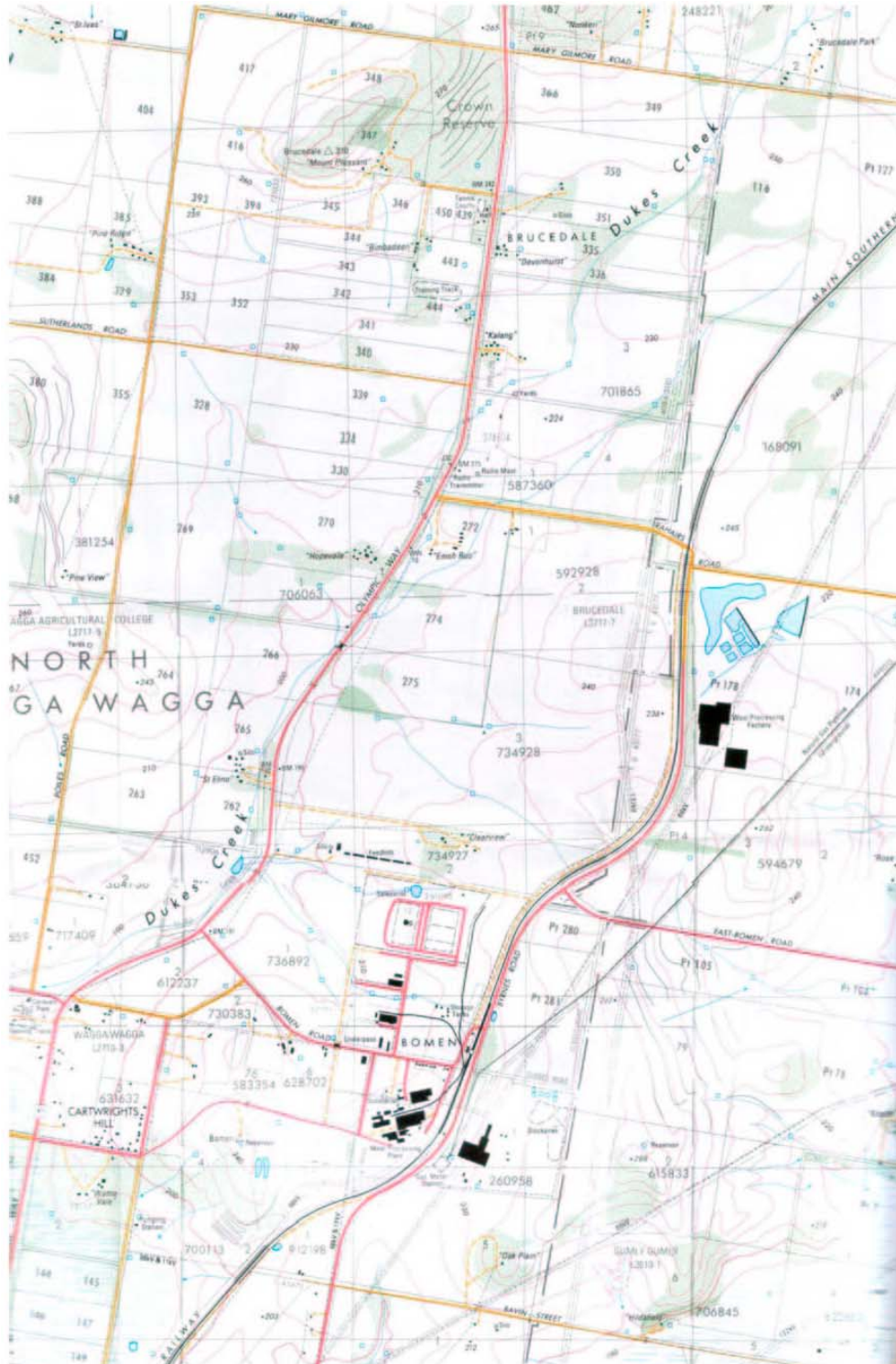
Willana Associates was commissioned by *Council* to provide services relating to the coordination of Local Environmental Studies that will support the proposed LEP. As part of the LEP process, *Council* requires specialist advice in regard to planning issues associated with the Bomen Industrial Area. *Council* is proposing to increase industrial land available within the LGA, including the industrial precinct at Bomen. Industrial development at Bomen is in varying proximity to residential and rural residential areas and it is important that *Council's* planning takes a considered view on compatibility of existing and possible future land use. Of particular interest to *Council* is the relationship between Cartwrights Hill, Brucedale and isolated residential/rural development to Bomen. Bomen is currently zoned "Zone 1 Rural" and "Zone 5 Special Uses - Abattoir) and the proposed land use category for the rezoning proposal site is "Industrial".

*Atkins Acoustics* was commissioned by *Williana Associates* to conduct an analysis of potential noise impacts from land identified at Bomen for rezoning for industrial related use and sensitive surrounding land uses including Cartwrights Hill and Brucedale (*Figure 1*).

The purpose of the noise assessment was to identify and assess possible land uses and investigate possible strategies to accommodate future compatible urban growth. The assessment includes planning principles that may be considered for incorporation into strategy policies that could be used for planning and assessing future development.



**Figure 1. Bomen Area**



This report presents a summary of findings from site investigations and issues identified during the assessment. The planning strategies recommended in the report are based on guidelines published by the *DECC* and other Government agencies. The approach described in this report has been prepared to assist with developing a long-term acoustic planning strategy for Bomen, assessing areas exposed to the envisaged land uses and to provide an equitable and predictable strategy for planning authorities and land use planners.

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The findings and recommendations presented in this report are based on:

- ❑ procedures normally referred to for assessing noise impacts;
- ❑ the identification of possible noise sensitive receptors;
- ❑ ambient noise measured at representative receptor locations in the area;
- ❑ assessment procedures referenced in the Department of Environment and Climate Change (*DECC*), Industrial Noise Policy (*INP*), Environmental Noise Control Manual (*ENCM*) and the Environmental Criteria for Road Traffic Noise (*ECRTN*);
- ❑ noise data established from similar urban release areas and industrial developments; and
- ❑ computer noise modelling.

It is recognised that detailed planning, management and engineering noise control design would be required for individual sites within the study area, if and when rezoning approval is granted. Individual site controls would be dependent on detailed investigations, environmental studies, statutory approval and pending conditions.

## 2.0 DESCRIPTION OF EXISTING SITE AND ACTIVITIES

The land identified and considered in this assessment for potential rezoning includes the Bomen Industrial Precinct (*BIP*). The land identified as the "study area" (*Figure 2*) has an area of approximately 3402 ha. The total land being considered in this study for rezoning has an area of 2386 ha. Land presently developed and known as the Bomen Industrial Precinct (*BIP*) comprises approximately 282 ha. Land being considered for rezoning (*Figure 2*) is identified as "Industrial 1" with approximately 1557ha, and "Industrial 2 (light industry)" with approximately 273ha. The surplus land is described as "Rural Transition" and "Conservation 1"

The study area is irregular in shape, with Holloways Road to the north and Bavin Road to the south. State Rail's Main South railway line provides a connection for freight services with Sydney and Melbourne and bisects the site north to south. The Olympic Highway forms the site's western boundary.

Other than to the south-east and south-west the land is undulating and rises from the Murrumbidgee plain in the south to sloping hills to the north.

Much of the land in the study area *is* presently used for agriculture. Albeit the zoning that applies to the land has allowed the development of a number of industrial uses associated with agriculture, such as wool and meat processing. The area to the south and west of Bomen Station has come to form an industrial precinct. Industries developed within the existing precinct include abattoirs, meat and food processing, agricultural machinery, oil, petroleum and gas, manufacturing, wool broking, waste management, transport and logistics and livestock trading.

**Figure 2. Study Area**



The Council's *Wagga Wagga Industrial Lands Study* found that most of the industrial sites in Bomen have "B Double" truck access to the Olympic Highway. It also found that some sites have rail sidings, or the proximity required to be linked to the railway line.

## 2.1 Existing Development

The existing Bomen Industrial Area (*Figure 2*) has a number of local, national and multinational companies, including:

- ❑ Cargill Foods Australia, a major export abattoir headquartered in Wagga Wagga;
- ❑ Chargeurs/Riverina Wool Combers, the largest wool top manufacturing facility in the Southern Hemisphere; and
- ❑ meat products exporter Heinz-Watties.

Other Bomen developments include, but are not limited to the following:

- ❑ Southern Oil
- ❑ Tankmaster
- ❑ Austrak
- ❑ Vinindex
- ❑ Pioneer Asphalt
- ❑ Bidgeebong Wines
- ❑ Bomen Agricultural Machinery
- ❑ Buckman Laboratories
- ❑ Caltex Oil Refineries
- ❑ Koth's Pipe & Steel
- ❑ Linpac-Polytank
- ❑ Lyon's Wool Broking
- ❑ NuFarm
- ❑ Pacific Waste Management
- ❑ Patricks
- ❑ Rodney's Transport
- ❑ Riverina Engineering

- ❑ Riverina Investments
- ❑ Roche Chemicals
- ❑ Wagga Wagga Livestock Marketing Centre

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## 2.2 Infrastructure

Current approved and developed infrastructure that services the existing industries include road and rail transport.

### 2.2.1 Road Transport

The existing road networks are shown in *Figure 3* and summarised below:-

- ❑ Olympic Way: A two-lane carriageway, which is a B-double classified route with a posted speed limit of 100 km/hr.
- ❑ Trahairs Road: An unsealed road connecting Olympic Way to Byrnes Road, which currently carries low traffic volumes.
- ❑ Byrnes Road: A two-lane sealed road approved for use by B-doubles with a posted speed limit of 80 km/hr.
- ❑ Bomen Road: The primary access to Bomen comprising a two lane sealed road approved for B-doubles. It has a posted speed limit of 80 km/hr, which drops to 50 km/h as the road approaches Bomen
- ❑ Hampden Avenue: Provides sealed road access to the Wagga CBD with a posted speed limit of 50 km/hr.

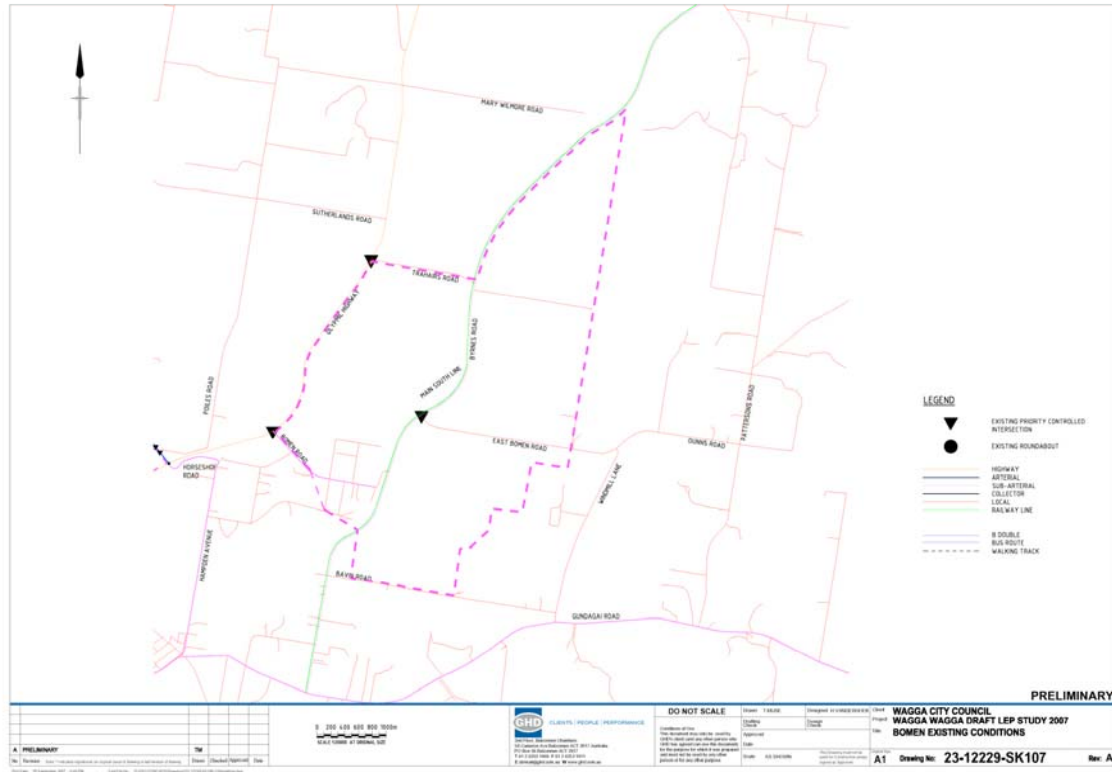
*Table 1* summarises existing estimated two-way traffic volumes.

**Table 1: Two-way Traffic Volumes.**

Road	Current volume (vehicles per day)
Olympic Way	3,700 (25% heavy or commercial vehicles).
Hampden Avenue	6,500 (at crossing of Murrumbidgee River)
Bomen Road	1,300 (at railway crossing)
Horseshoe Road	1,200
Trahairs Road	150
Byrnes Road	500

\* Reference report for Wagga Planning Studies - Traffic Management- Bomen. September 2007

**Figure 3. Existing Road Network**



**2.2.2 Rail Transport**

State Rail’s Main South railway line provides a connection for freight services with Sydney and Melbourne. The now disused Bomen Station stands on the Main South line in the southern part of the site. Some industrial sites have rail sidings or the proximity to be linked to the rail line.

### 3.0 PROPOSAL OVERVIEW

#### 3.1 The Vision

The owners/occupiers of the land identified as the land for rezoning (*LFR*) see the comprehensive redevelopment of the precinct overtime with a clear industry/transport focus and their ongoing presence in enhanced facilities. *Council* is conscious that land nearby to and/or potential exposed to the *LFR* includes residential uses and that the compatibility of the existing and potential future land uses should be addressed in terms of planning and managing noise impacts.

The vision for the *LFR* has as a central focus, which includes the receipt, handling and transshipment of materials and value adding activities. The industry focus is, however, not considered to be to the detriment of the broader base of manufacturing and light industrial activities and support facilities and services.

#### 3.2 Project Objectives

The realisation of the vision described above includes pursuit of the following objectives:

- Avoid rapid and uncontrolled build up of ambient noise levels (noise creep);
- Provide uniform requirements to all proponents;
- Promote uniform planning strategy for local and state planning authorities;
- Provide design goals without repetitive background noise measurement;
- Allow for incremental/staged redevelopment overtime;
- Seizure of market opportunities when they become available;
- Fostering/cultivating new market opportunities;
- Capitalise on value-adding activities;
- Integrate with regional strategies;
- Integration with nearby urban release area planning;
- Integrate with/capitalise on heavy rail network planning and development;
- Catalyst for multi-stakeholder commitments to sub-regional transport infrastructure;
- Foster natural systems corridor linkages with off-site corridors; and
- Enhanced levels of Precinct sustainability.



### **3.3 Overview**

Existing land use developments in the study area include industrial/commercial uses, residential/rural development, transportation (road and rail), services (gas, electric substations and sewage treatment)

#### **3.3.1 Industrial Development**

In addition to the consolidation and enhancement of the current approved activities, it is proposed to attract a range of new and support industrial activities. These new activities are envisaged to be of a nature which rely upon the access to the rail network, proximity to the arterial road network and market opportunities.

Targeted activities would include but not be limited to:

##### **Intermodal train operations**

- Marshalling and servicing of trains;
- Servicing and provisioning of locomotives;
- Maintenance work on both locomotives and wagons and reconfiguration of trains operating on the corridor

##### **Bulk Materials Handling**

- Receipt and handling of bulk materials from regional areas by road and rail;
- Redistribution to markets by road and rail.

##### **Container Handling and Storage**

- Intermodal facility for loading and unloading containers from rail services to articulated vehicles and distribution;
- On-site storage and maintenance of containers;
- On-site warehousing facilities to assist with freight distribution.

##### **Manufacturing Development**

- Manufacturing operations focused upon treatment of bulk materials;
- Related value adding activities (vertical and horizontal integration).

##### **Distribution Centres**

- Distribution of goods received from interstate and intrastate (regional NSW) by road or rail to local and metropolitan markets.

### **Concrete/Asphalt Batching**

- Establishment of a concrete batching plant for off-site distribution;
- Manufacture of concrete based products.

### **Warehousing and Logistics**

- Warehousing and general transport services.

### **3.3.2 Residential/Rural Development**

Residential areas in the vicinity of the study area include Cartwrights Hill and Brucedale (*Figure 1*). Other isolated residential dwellings are located to the west of the Olympic Way and the north and south of the *LFR* land. It is understood that existing dwellings on the *LFR* land would be demolished and/or converted to industrial premises in the future.

The *DECC* recognise that there is potential conflict between existing residential uses outside the *LFR* and the existing and likely future industrial/transport uses and recommended that where practical and feasible existing and future residential development be buffered from incompatibility land uses and adverse impacts.

It is understood that the *DECC* and Council have worked with the existing industry to minimise impacts from industrial development upon the local environment and amenity and that this undertaking would continue with any future development of the area.

The *DECC* and Council recognise that the Bomen Industrial Area has recently experienced an expansion phase with the establishment of several 'scheduled' (*ie activities requiring an Environmental Protection Licence*) and 'non scheduled' industries. It is the opinion of the *DECC* that further encroachment of residences on the industrial land would very likely compromise future development and place added burden on the existing industry with the need for future control. The *DECC* and *Council* consider it important that future growth be planned and managed to ensure both a viable industrial precinct and amenity for existing and future residents. It was the *DECC* recommendation that *Council* review the buffers around the *LFR* in particular the land zoned residential on Cartwrights Hill (*Figure 1*).

### **3.4 Road Transport**

Hampden Avenue connects with Fitzmaurice Street and Bayliss Street to link Bomen with the Wagga CBD. These roads pass through North Wagga and a study prepared by *GHD* concludes that, as the route is circuitous, it may not be appropriate to promote it for use by industrial traffic. The *GHD* study concludes that Bomen Road provides a direct link to Olympic Way and is the route most likely to attract traffic as development grows in south Bomen south and that it should be adopted as a principle route to the study area, should rezoning take place.

Should industrial uses intensify and expand across Bomen, Byrnes Road could serve as a supplementary route to the highway for traffic travelling between Wagga Wagga and Junee. Byrnes Road also links Bomen with destinations to the west of Wagga via Mill Street, Hampden Avenue and Travers Street and to the east of Wagga via Gundagai Road.

Trahairs Road is currently unsealed and carries a low volume of traffic, but could form a link to central and north Bomen.

### **3.5 Rail Transport**

The precinct is currently serviced with rail sidings leading from the Main Southern Railway. The sidings are developed with forks (approximately 300 m long each) onto a master siding approximately 340m long.

### **3.6 Operating Hours**

The Bomen Industrial Area provides for and would continue to provide for industrial development that could operate twenty-four (24) hour per day, seven (7) days activities.

#### 4.0 EXISTING AMBIENT NOISE ENVIRONMENT

For the purpose of developing a planning strategy for the *LFR*, site audits and noise monitoring was conducted during October 2007. Both short-term attended and unattended noise monitoring was undertaken. The attended audits were undertaken to assist with the identification of sources influencing the noise environment. *It is noted that the noise audits were not undertaken and should not be used for the purpose of assessing noise compliance status for existing development.* Noise compliance audits for existing development would require detailed site specific audits and measurements.

Prevailing weather information during the October assessment period was noted. Wind speed and rainfall during the period were reviewed and noise data recorded during periods of any rain and/or wind speeds in excess of 5m/sec disregarded.

#### 4.1 Reference Measurement Locations

The measurement locations selected for non-attended ambient noise monitoring are identified on *Figure 4*. *Table 2* provides a brief description of the measurement locations and noise sources identified.

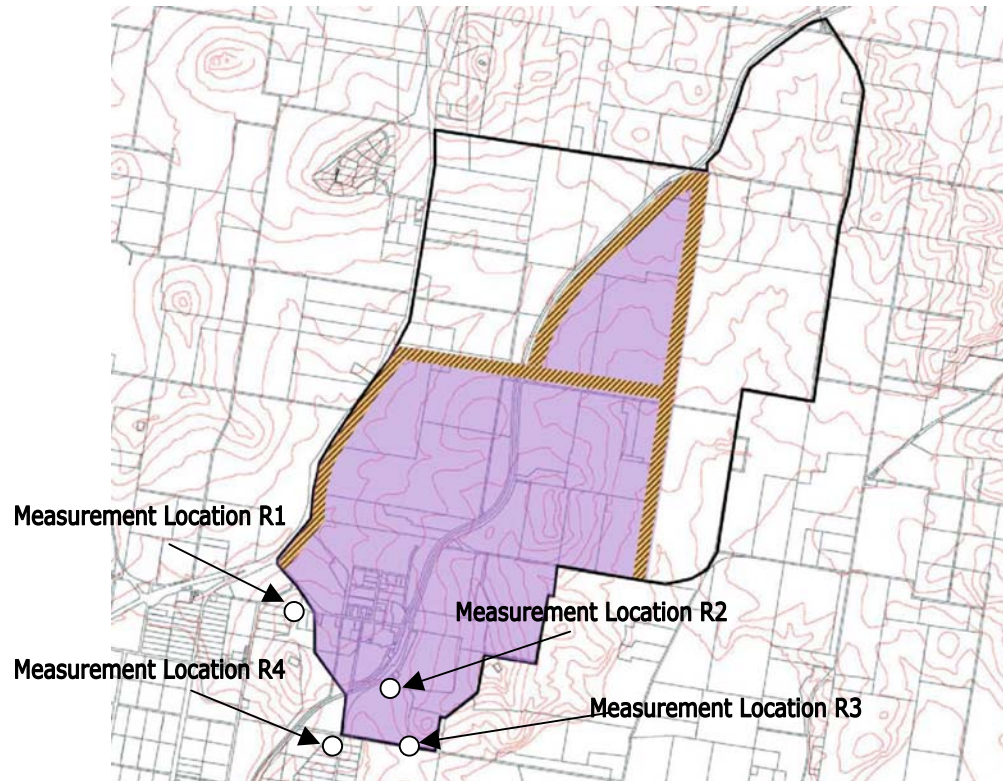
**Table 2: Description of Reference Measurement Locations**

Reference Location	Description	Receiver Type	Measurement Location	Noise Sources
R1	Bomen Road	Residence	approx. 160m from Bomen Road	Industrial and road traffic
R2	Byrnes Road	Vacant Land	approx. 35m from Byrnes Road	Industrial, road and rail traffic
R3	Bavin Street	Residence	approx. 30 m from Bavin Street	Road traffic, distant industrial, rural
R4	Byrnes Road	Residence	approx. 130m from Byrnes Road	Road traffic, rail traffic, distant industrial

#### 4.2 Instrumentation

The instrumentation selected for noise monitoring comprised RTA Technology Environmental Noise Loggers. The reference level of each instrument was checked prior to and after the measurements with a NATA calibrated Bruel & Kjaer Sound Level Calibrator Type 4230, with no significant drift recorded. The sound logging meters were set to A-weighting, fast response and fifteen (15) minute sampling periods.

**Figure 4. Reference Measurement Locations**



### 4.3 Noise Descriptors

The ambient noise levels were measured and assessed as percentile A-weighted sound levels. The parameters regarded as being the most important amongst these, are the “ $L_{A90}$ ”, the level exceeded for 90% of the sample period or the “background noise level”, and the “ $L_{Aeq}$ ”, which is the A-weighted energy equivalent continuous level.

From procedures documented in the *DECC*, “Industrial Noise Policy” (*INP*), the Rating Background Level (*RBL*) and ambient  $L_{Aeq}$  noise levels have been established. The *RBL* is the median of the tenth percentile background levels for each assessment period over the seven (7) day measurement period. The  $L_{Aeq}$  level represents the energy averaged noise level for each assessment period.

### 4.4 Ambient Noise Measurement Results

Table 3 presents a summary of the measured daytime, evening and nighttime noise levels, the calculated *RBL*'s and  $L_{Aeq}$  levels. A graphical representation of the measured noise

levels is presented in *Appendix 1*.

**Table 3: Measured RBL and  $L_{Aeq}$  Noise Levels**  
*dB(A) re:  $20 \times 10^{-6}$  Pa*

Date	Assessment Background Level $L_{A90}$			Equivalent Continuous Level $L_{Aeq}$		
	Day	Evening	Night	Day	Evening	Night
<b>Location R1: 80 Bomen Road</b>						
Thursday 11 Oct	-	37.0	29.9	-	47.2	44.1
Friday 12 Oct	35.0	38.2	29.9	51.2	48.9	44.4
Saturday 13 Oct	34.3	32.2	28.6	47.6	44.2	40.1
Sunday 14 Oct	33.1	36.9	35.0	44.2	50.1	45.9
Monday 15 Oct	37.0	39.3	35.3	48.4	50.9	48.7
Tuesday 16 Oct	42.4	38.0	35.4	54.9	46.0	45.6
Wednesday 17 Oct	39.9	45.3	40.4	49.9	53.7	51.6
Thursday 18 Oct	44.0	43.6	40.0	54.4	53.3	51.2
Friday 19 Oct	39.3	-	-	50.0	-	-
<b>RBL</b>	<b>38.2</b>	<b>38.1</b>	<b>35.1</b>			
<b>Ambient <math>L_{Aeq}</math></b>				<b>51.3</b>	<b>50.4</b>	<b>47.9</b>
<b>Location R2: Road Side Byrnes Road</b>						
Thursday 11 Oct	-	56.9	51.2	-	63.3	63.0
Friday 12 Oct	52.1	52.9	45.3	61.4	61.2	63.5
Saturday 13 Oct	43.3	43.2	45.0	57.5	60.2	57.2
Sunday 14 Oct	42.0	46.6	47.6	56.3	60.7	58.0
Monday 15 Oct	48.3	55.7	52.6	60.2	62.2	62.8
Tuesday 16 Oct	51.5	54.5	51.0	59.5	63.1	63.1
Wednesday 17 Oct	44.5	57.1	52.8	59.4	63.7	61.8
Thursday 18 Oct	51.3	55.6	52.7	60.9	64.9	62.7
Friday 19 Oct	50.7	52.0	51.1	58.9	62.1	62.0
Saturday 20 Oct	48.8	57.1	47.6	59.7	61.7	61.3
Sunday 21 October	43.2	47.7	-	55.4	59.2	-
<b>RBL</b>	<b>48.5</b>	<b>54.5</b>	<b>51.0</b>			
<b>Ambient <math>L_{Aeq}</math></b>				<b>59.3</b>	<b>62.3</b>	<b>61.9</b>
<b>Location R3: 78 Bavin Street</b>						
Thursday 11 Oct	-	32.1	28.6	-	41.0	43.2
Friday 12 Oct	42.7	35.3	29.9	51.8	44.9	42.7
Saturday 13 Oct	35.4	28.2	26.1	46.4	37.6	40.1
Sunday 14 Oct	34.3	30.4	26.7	45.5	41.2	42.6
Monday 15 Oct	34.3	37.2	39.1	45.3	43.2	45.8
Tuesday 16 Oct	43.7	33.2	27.2	52.3	44.1	42.6
Wednesday 17 Oct	29.1	26.5	30.2	47.4	39.1	45.6
Thursday 18 Oct	35.3	37.4	36.7	47.1	50.0	45.6
Friday 19 Oct	38.6	29.7	26.5	49.8	40.3	43.3
Saturday 20 Oct	32.0	-	-	45.5	-	-
<b>RBL</b>	<b>35.3</b>	<b>32.1</b>	<b>28.6</b>			
<b>Ambient <math>L_{Aeq}</math></b>				<b>48.7</b>	<b>44.0</b>	<b>43.8</b>
<b>Location R4: 171 Byrnes Road</b>						
Thursday 11 Oct	-	32.9	31.1	-	48.4	49.5
Friday 12 Oct	44.0	39.7	32.8	55.0	50.2	50.6
Saturday 13 Oct	36.9	32.2	30.9	48.7	48.6	47.9
Sunday 14 Oct	33.7	33.8	31.8	51.4	49.8	50.4
Monday 15 Oct	37.0	38.8	41.8	49.6	50.7	53.3
Tuesday 16 Oct	46.0	38.4	33.2	55.5	48.2	51.1
Wednesday 17 Oct	34.5	39.3	42.4	46.2	56.9	54.1
Thursday 18 Oct	45.7	42.8	42.7	55.8	54.3	53.1
Friday 19 Oct	37.7	31.2	30.5	54.1	47.6	50.2
<b>RBL</b>	<b>37.3</b>	<b>38.4</b>	<b>32.8</b>			
<b>Ambient <math>L_{Aeq}</math></b>				<b>53.2</b>	<b>51.8</b>	<b>51.5</b>

**NOTE:** Daytime: (7.00am to 6.00pm); Evening: (6.00pm to 10.00pm); Night: (10.00pm to 7.00am)  
Noise level in Italics were excluded due to extraneous noise

## 5.0 NOISE ASSESSMENT GOALS

Guidelines for assessing industrial noise exposure for residential properties are published in the Department of Environment and Climate Change (*DECC*) Industrial Noise Policy (*INP*) (*January 2000*). Guidelines for assessing road traffic noise are published in the *DECC*, Environmental Criteria for Road Traffic Noise (*ECRTN*). Rail traffic noise is regulated by licence conditions issued by the *DECC*.

### 5.1 DECC Industrial Noise Policy (*INP*)

The primary noise objectives of the *INP* are:

- to establish criteria to protect the community and preserved noise amenity;
- provide guidelines to derive project specific noise assessment criteria;
- provide guidelines for modelling, measurement and evaluate noise impacts; and
- provide a formal process for evaluating noise impacts and assessing feasible and reasonable noise control amelioration options.

The *INP* provides guidelines for assessing intrusive noise and noise amenity. The intrusiveness of a noise source is considered to be acceptable if the  $L_{Aeq, 15 \text{ minute}}$  noise level does not exceed the *RBL* by more than 5dB(A). In order to determine amenity noise goals, the maximum ambient  $L_{Aeq}$  noise levels from the development should not exceed recommended acceptable noise levels (*Table 4*). Where existing  $L_{Aeq}$  levels approach or exceed the recommended acceptable levels, the noise goals are normally set below the existing  $L_{Aeq}$  in order to limit any further increase or “noise creep”.

**Table 4: DECC Noise Policy Amenity Goals**

Receiver Description	Indicative Noise Amenity Area	Time of Day	Recommended L <sub>Aeq</sub> Noise Level dB(A)	
			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 (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
Passive recreation areas	All	When in use	50	55
Active recreation areas	All	When in use	55	60
Commercial	All	When in use	65	70
Industrial	All	When in use	70	75

**NOTES:** Daytime: (7.00am to 6.00pm)  
Evening: (6.00pm to 10.00pm)  
Night-time: (10.00pm to 7.00am)

- (1) Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristics:
  - decreasing noise levels in the evening period (1800-2200; and/or
  - evening ambient noise levels defined by the natural environment and infrequent human activity.
 This area may be located in either a rural, rural-residential or residential zone, as defined or other planning instrument.
- (2) Urban - an area with an acoustical environment that:
  - is dominated by 'urban hum' or industrial source noise
  - has through traffic with characteristically heavy and continuous traffic flows during peak periods
  - is near commercial districts or industrial districts
  - has any combination of the above
  - where 'urban hum' means the aggregate sound of many unidentifiable, mostly traffic related sound sources.
 This area may be located in either a rural, rural-residential or residential zone, as defined or other planning instrument, and also includes mixed land-use zones such as mixed commercial and residential uses.
- (3) Urban/industrial interface - an area defined as for 'urban' above that is in close proximity to industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5dB. Beyond this region the amenity criteria for the 'urban' category applies.
- (4) Areas reserved for passive recreation 50/55dB(A) (when in use).
- (5) Active recreation areas 55/60dB(A) (when in use).

For the purpose of noise assessment and developing possible land-use planning options including the residential areas of Cartwright Hill and Brucedale, residential land exposed to the *LFR* would be described (*INP Section 2.2.1*) as "existing suburban " or "future suburban". Referenced to the *INP* "suburban" is described as an area that has local traffic with characteristically intermittent traffic flows or some limited commerce or industry and may be located in either a rural, rural-residential or residential zoned areas. Considering the existing ambient noise levels and the existing planned land uses *Table 5* presents a summary of the calculated *RBL*'s, the ambient L<sub>Aeq</sub> noise levels and recommended assessment goals for the Bomen area.



**Table 5: Calculated RBL and Ambient  $L_{Aeq}$  Noise Levels for Noise Sensitive Locations**  
*dB(A) re:  $20 \times 10^{-6}$  Pa*

Period	Recommended $L_{Aeq}$ Noise Level	Measured RBL	Measured $L_{Aeq}$	Intrusive Criterion $L_{Aeq}$	Amenity Criterion $L_{Aeq}$
<b>Location R1: 80 Bomen Road</b>					
Day	55	38.2	51.3	43	55
Evening	45	38.1	50.4	43	45
Night	40	35.1	47.9	40	40
<b>Location R3: 78 Bavin Street</b>					
Day	55	35.3	48.7	40	55
Evening	45	32.1	44.0	37	45
Night	40	28.6	43.8	34	40
<b>Location R4: 171 Byrnes Road</b>					
Day	55	37.3	53.2	42	55
Evening	45	38.4	51.8	43	45
Night	40	32.8	51.5	38	40

The principles underpinning the establishment of noise goals (*INP. Section 2*) are best regarded as planning tools, ‘*They are not mandatory, and an application for a noise-producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development. The criteria help to determine consent/licence conditions because they provide information on the likely effect of any environmental noise associated with the development.*’

## 5.2 Modifying Factor Adjustments

Where the character of noise of the noise source from a development is assessed as tonal, low frequency, impulsive or intermittent

## 5.3 Intermittent Night-Time Activities

Referenced to the *ENCM* <sup>(Chapter 19)</sup> intermittent noise from night-time transient activities (10.00pm and 7.00am) should not exceed the  $L_{A90}$  (or RBL) background noise level by more than 15dB(A). ie.,

*“The  $L_{A1,1min}$  level of any specific noise source should not exceed the background noise level ( $L_{A90}$ ) by more than 15dB(A) when measured outside the bedroom window”.*

Table 6 presents a summary of assessment noise limits developed from the background noise measurements conducted during October 2007. Where the background noise level is

less than 30dB(A) the *DECC* recommend that a level of 30dB(A) be adopted for the purpose of assessment. Albeit, it is recognised that as the *LFR* develops the ambient noise levels will increase to the amenity planning levels. Accordingly for the purpose of planning strategy the "acceptable" planning level of 40dB(A) was adopted for developing guidelines for assessing intermittent noise sources.

**Table 6: Intermittent Noise Assessment Goals**  
*dB(A) re: 20 x 10<sup>-6</sup> Pa*

Reference Location	Description	Measured RBL	Present Assessment Goals	Planning Assessment Goals
		L <sub>A90</sub>	L <sub>A1,1min</sub>	L <sub>A1,1min</sub>
R1	80 Bomen Road	35.0	50	55
R3	78 Bavin Street	28.6	45	55
R4	171 Byrnes Road	32.8	48	55

#### 5.4 Road Traffic Noise

Procedures for assessing road traffic noise from new land use developments are documented in the *ECRTN* and are summarised in *Table 7*.

**Table 7. Road Traffic Noise Goals**

Land Use Development	Traffic Noise Assessment Goals		Where Criteria is already Exceeded
	Daytime (7.00am to 10.00pm)	Nighttime (10.00pm to 7.00am)	
Land use developments with potential to create additional traffic on local roads	L <sub>Aeq, 1 hour</sub> 55	L <sub>Aeq, 1 hour</sub> 50	In all cases, the redevelopment should not increase existing noise levels by more than 2dB(A)  Where feasible and reasonable noise levels from existing roads should be reduced to meet the noise criteria. In many instances this may be achievable only through long-term strategies.
Land use developments with potential to create additional traffic on collector roads	L <sub>Aeq, 1 hour</sub> 60	L <sub>Aeq, 1 hour</sub> 55	
Land use developments with potential to create additional road traffic on existing freeways/arterial roads	L <sub>Aeq, 15 hour</sub> 60	L <sub>Aeq, 9 hour</sub> 55	

For the purpose of assessing likely future road traffic noise from the *LFR* at residential dwellings, the L<sub>Aeq, 15hour</sub> 60dB(A) (daytime) and L<sub>Aeq, 9hour</sub> 55dB(A) (nighttime) assessment goals have been adopted.

The *ECRTN* suggests that there is no clear procedure or guideline for assessing sleep arousal from road traffic noise. Albeit, the *ECRTN* supports the finding that external passby traffic noise levels of between 60dB(A) and 65dB(A) are unlikely to cause awakening reactions.

#### **5.4 Rail Traffic Noise**

Rail traffic noise is controlled by the *ARTC* and regulated by licences issued by the *DECC*. As part of licence conditions the *DECC* is progressively incorporating requirements for implementation of Pollution Reduction Programs. The implementation of these programs is the responsibility of the *ARTC*.

The noise goals set by the *DECC* are  $L_{Aeq, 9 \text{ hour}}$  60dB(A) (nighttime),  $L_{Aeq, 15 \text{ hour}}$  65dB(A) (daytime, and  $L_{Amax}$  85dB(A) when assessed at the facade of exposed residential dwellings.

## 6.0 LOCAL METEOROLOGICAL CONDITIONS

The DECC, *Industrial Noise Policy* has published guidelines (*INP*) and minimum standards for assessing environmental noise impacts. The standards include the effects of wind and temperature inversions. Meteorological conditions such as source to receptor winds and temperature inversions can increase the level of noise at a receptor location. The effects of wind can also reduce noise when the wind is blowing from the receptor towards the source.

If the evaluation of meteorological conditions for the specific study area show that the occurrence of the wind in any segment with speeds up to 3m/sec is greater than 30%, wind for that segment should be included in the noise modelling and impact assessment. Similarly, if the occurrences of temperature inversion conditions are greater than 30%, the effects of temperature inversions should be included in the noise assessment.

### 6.1 Wind Velocity

A summary of wind rose data provided by Holmes Air Sciences for the Wagga Wagga area is presented in *Appendix 2*. The annual wind data shows that the predominate winds during daytime hours (0700 to 1800 hours) includes westerly and west-south-westerly winds; during evening hours (1800 -2200 hours) westerly and west-south-westerly winds are predominate, and during night time hours (2200 - 0700 hours) the predominant wind is from the east-south-east. *Table 8* provides a summary of the source data and identifies the predominant wind directions and percentage occurrence greater than 10%.

The meteorological data (*Table 8*) shows that during day and evening hours the occurrence of the wind speeds up to 3m/sec in any one segment is less than 30%. During the nighttime hours the predominant wind (less than 3m/sec) is from the east and the calculated percentage occurrence is 30%. From the data evaluated both calm and easterly wind conditions have been assumed to prevail in the area during nighttime hours and should be included in noise modelling.

**Table 8: Predominant Wind Direction and Percentage Occurrence**  
*Holmes Air Sciences*

Period	Annual	Summer	Autumn	Winter	Spring
Day	W±45°-16% WSW±45°-17% SE±45°-16%	W±45°-12% WSW±45°-15% ENE±45°-13% SE±45°-13%	W±45°-16% WSW±45°-20% SE±45°-21% SSE±45°-16%	W±45°-16% WSW±45°-17% ESE±45°-24% SE±45°-23%	W±45°-16% WSW±45°-17% SE±45°-17% SSE±45°-20%
Evening	W±45°-21% WSW±45°-17% ENE±45°-14% SE±45°-13%	W±45°-26% WSW±45°-12% ENE±45°-15%	WNW±45°-21% W±45°-24% WSW±45°-24% ENE±45°-11% SE±45°-11%	NW±45°-11% WNW±45°-24% ESE±45°-19%	WSW±45°-16% W±45°-11% WNW±45°-15% NE±45°-16% E±45°-16% SE±45°-16%
Night	WNW±45°-13% ESE±45°-22%	ENE±45°-20% E±45°-30% ESE±45°-25% SE±45°-21%	E±45°-11% SE±45°-16% W±45°-13% NW±45°-14%	ESE±45°-20% WNW±45°-11%	W±45°-11% WNW±45°-16% E±45°-17% ESE±45°-24% SE±45°-20%

## 6.2 Atmospheric Stability and Estimated Temperature Lapse Rates

A summary of the predominant seasonal frequency of occurrence of the atmospheric stability classes for calm and wind speed classes less than 3m/sec. together with the corresponding estimated Environmental Lapse Rates (*ELR*) are summarised in *Table 9*. Stability class conditions E, F and G typically occur on calm clear nights.

**Table 9: Frequency of Atmospheric Stability Conditions**

Stability Class	Percentage Frequency	Estimated ELR <sup>1</sup> °C/100 m	Qualitative Description
A	0 %	< -1.9	Lapse
B	0 %	-1.9 to -1.7	Lapse
C	0 %	-1.7 to -1.5	Lapse
D	22.8%	-1.5 to -0.5	Neutral
E	15.1%	-0.5 to 1.5	Weak inversion
F	62.1%	1.5 to <4	Moderate inversion
G	-	> 4	Strong inversion

Note 1: *ELR (Environmental Lapse Rate)*

Referenced to the *INP*, where the frequency of occurrence of atmospheric stability classes F and G is greater than 30%, hence, temperature inversion should be included in noise modelling.

## 7.0 STRATEGIES FOR NOISE CONTROL PLANNING

With respect to what is considered to represent the current best practice for assessing industrial noise, the main aims are to limit continuing increases in ambient noise (*noise creep*) from industrial sources and to maintain noise levels such not to exceed acceptable levels as recommended in *Table 4. (INP Table 2.1)*. Meeting the *INP* acceptable levels (*Table 4*) would normally (*DECC, INP*) protect against noise impacts such as speech interference, community annoyance and, to some extent, sleep disturbance.

For the purpose of controlling and assessing environmental noise impacts in developing areas, the *INP* recommends that the acceptable levels (*INP. Tables 2.1 and 2.2*) represent the ideal total level of noise from industry that should be met by any further development of the area. The *INP* recommends that *"In most instances where a number of industrial developments are proposed for an area, the amenity criteria which set a "cap" for the cumulative noise from industry, will be more stringent than intrusive criteria. Thus project-specific noise levels for individual development is derived from the amenity criteria.*

*Where several developments are proposed for an area, these are to be assessed as a group. This holistic approach allows project specific noise levels to be set for a proposed industrial development, so that the total impact from all proposed and potential industrial developments does not cause amenity to deteriorate. In addition, this approach provides an equitable distribution in the burden of meeting the noise criteria.*

*Implementation of this "holistic" approach involves the following steps in relation to impacts at the most sensitive receivers:*

- 1. Determine the number of development proposals to be assessed.*
- 2. Determine the amenity level according to Table 2.1 and 2.2.*
- 3. Determine the project-specific noise levels to be achieved by each development at the receiver from each development, so that, when added logarithmically, the resultant total level of noise from industry at any affected receiver will meet the amenity level identified at Step 2."*

## 7.1 Determination of Allowable Industrial Noise Limits

Due to unknown factors such as the type of future industries, layout of the subdivision, building location and design, etc. it is recognised that the calculate the noise level contributions determined and discussed in this assessment are based on a number of assumptions, Hence it is recommended that as the *LFR* develops periodically noise surveys be undertaken to evaluate trends with respect to background noise levels and need to impose more or less stringent noise limits.

For the purpose of noise modelling and assessment it was assumed that the *INP* amenity goals would be assessed at the boundary of the *LFR* (to manage potential noise impacts) and a five hundred (500) metre low risk separation zone would be created along exposed *LFR* boundaries (*Figure 2*). Within the separation zone it was assumed that development could occur in the three hundred (300) metre zone and the two (200) metre zone would be set aside as a buffer. It has been assumed for the purpose of this assessment that Development within the three hundred (300) metre zone could include, but not necessary limited to, daytime use commercial/warehouse premises.

Within the *LFR* the total area (1830 ha) was divided into ten (10) zones (*Figure 1*) and each zone into ten (10) sub-zones comprising approximately 18ha per sub-zone. The allowable calculated sound pressure level contribution from each sub-zone assumed the noise source at the centre of each area, hemispherical sound propagation and no other noise attenuation. The assumptions (without excess attenuation from interposed structures) are considered as conservative in terms of noise modelling and provide a safety margin in terms of noise prediction and modelling.

In terms of meteorological effects 3m/sec. easterly wind conditions were assumed for nighttime and calm wind with 3°/100m temperature inversion conditions.

For operational conditions it was assumed that during evening hours (6.00pm to 10.00pm) 50% of industries would not operate and during nighttime hours (10.00pm to 7.00am) 70% of the industries would not operate.

## **7.2 Conceptual Precinct Development**

For the purpose of modelling it was assumed that non-restricted twenty four (24) hour industry could develop to the north of the existing developed areas and that low risk perimeter development would be encouraged and develop in the controlled separation zone (site boundaries).

### **7.2.1 Non-restricted Core Development**

The types of industries that could be developed in the non-restricted zone, include but not limited to:

#### **Intermodal train operations**

- Marshalling and servicing of trains;
- Servicing and provisioning of locomotives;
- Maintenance work on both locomotives and wagons and reconfiguration of trains operating on the corridor

#### **Bulk Materials Handling**

- Receipt and handling of bulk materials from regional areas by road and rail;
- Redistribution to markets by road and rail.

#### **Container Handling and Storage**

- Intermodal facility for loading and unloading containers from rail services to articulated vehicles and distribution;
- On-site storage and maintenance of containers;
- On-site warehousing facilities to assist with freight distribution.

#### **Manufacturing Development**

- Manufacturing operations focused upon treatment of bulk materials;
- Related value-adding activities (vertical and horizontal integration).

#### **Distribution Centres**

- Distribution of goods received from interstate and intrastate (regional NSW) by road or rail to local and metropolitan markets.

#### **Concrete/Asphalt Batching**

- Batching plants for off-site distribution;
- Manufacture of concrete based products.



### **7.2.2 Low Risk Separation Zone Development**

Within the low risk separation zone the envisaged types of development would most likely be restricted to daytime hours, enclosed within buildings with opening orientated away from the *LFR* perimeter boundaries and include, but not limited to:

#### **Manufacturing Development**

- Light industrial activities, including services industries.

#### **Distribution Centres**

- Bulky goods storage and distribution

## 8.0 OPERATIONAL NOISE SOURCES

For the purpose of planning and assessment, noise modelling was undertaken to establish attenuation parameters for the *LFR* and adjoining environs, base sound power emission levels for each sub-zone were established for the total site to evaluate options for planning and controlling noise impacts.

The purpose of this exercise was to:

- demonstrate compliance with the project amenity goals;
- provide uniform procedures for evaluating noise new development within the *LFR*;
- provide uniform requirements for all proponents; and
- to promote a uniform planning strategy for the relevant planning authorities.

### 7.1 Operational Noise Sources

The envisaged noise sources that would be generated from the *LFR* would be similar to those found on most industrial estates and could include process manufacturing plant, fans, conveyors, compressors, cooling towers, roof mounted exhaust fans, extraction fans, etc. Site mobile plant of acoustic significance would include forklift trucks, trucks and trains.

### 7.2 Intermittent Transient Noise Sources

The primary intermittent transient noise sources identified and associated with the envisaged site activities include trains, forklifts and trucks. Considering a sound power level of 120dB(A) from envisaged activities, including on-site train activities, the predicted future nighttime background noise goal of 40dB(A), and the *DECC* sleep arousal level goal of background plus 15dB(A) (40+15dB(A)) at a residential building facade of 55dB(A), future rail siding and associated activities set backs should not be less than 1000 metres from existing and likely future residential development.

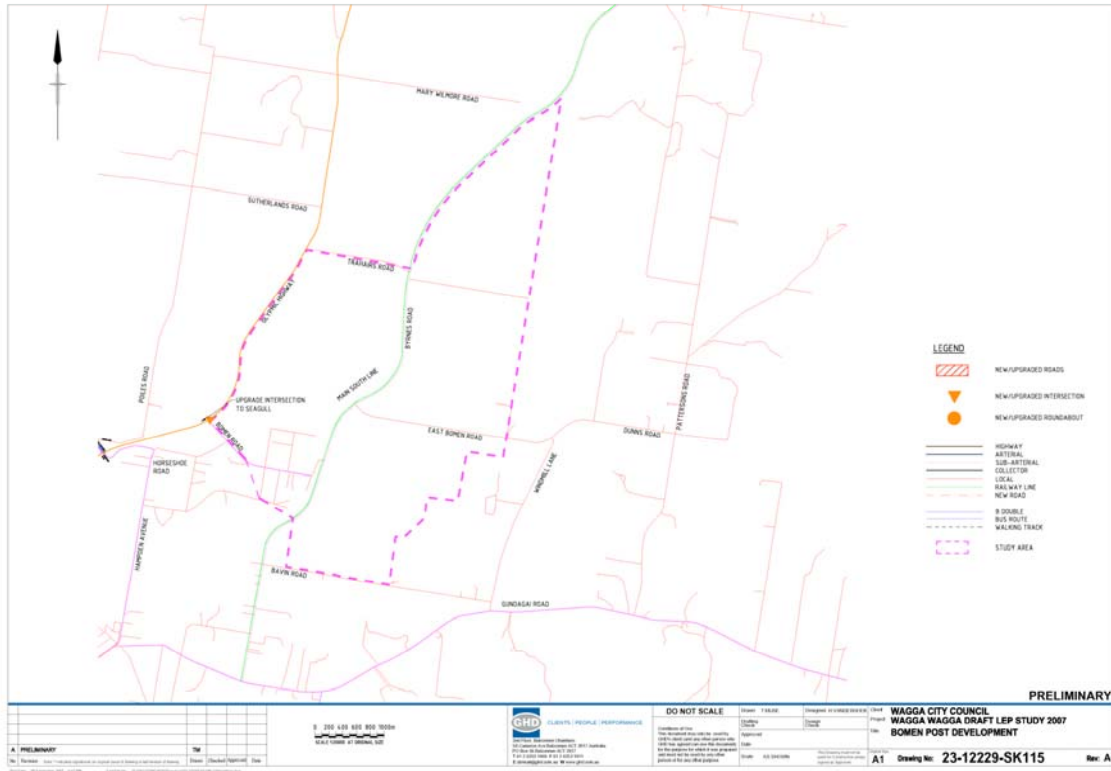
### **7.3 Road Traffic**

Considering the existing vehicle counts (*Table 1*) reported by Council it is not envisaged that during the early stages of the development, traffic noise from Bomen Road and Byrnes Road would exceed the *ECRTN* noise goals. In the long-term, it is understood that an alternative arterial road could be constructed to provide direct road access to Olympic Way (*Figure 5*). An alternative heavy vehicle route would be a preferred option for the control and reduction of potential road traffic noise from Bomen Road to the Cartwright Hill residential properties. With respect to any new road connection to Olympic Way consideration would need to be given to noise impacts from truck exhaust brakes, trucks accelerating, etc and existing residential development on Olympic Way. At that time consideration would be given to the location of the intersection and compliance with the *ECRTN* traffic noise requirements at residential building facades.

### **7.4 Rail Traffic**

The Main Southern Railway provides for freight trains movements between Sydney and Melbourne. It is not envisaged that the *LFR* proposal would generate a noticeable increase in train movements on the main rail line, albeit additional onsite activities would occur within the *LFR*.

Figure 5. Conceptual Future Road Network



## 8.0 OPERATIONAL SITE NOISE PREDICTIONS

For the purpose of noise modelling and the establishment of emission allocations (dB per hectare), it was assumed that the *LFR* is 1830 ha, 282ha is developed and that the surplus land available for development is 1548ha. 50% of the precinct would operate during the evening hours and 30% at night. Assuming the 50% evening operating scenario a 3dB(A) correction was applied to the daytime allowance, similarly for the night period a 5dB(A) correction was applied. *Table 10* presents a summary of the noise level contribution allowances predicted for each zone, sub-zone and dB/hectare within each zone.

**Table 10. Assessment Noise Limit Allowances (LAeq)**

Assessment Period	Amenity Assessment Limit	Noise Limit Allowance per Zone	Noise Limit Allowance per Sub-zone	Noise Limit Allowance per Hectare
Day	55	45	35	23
Evening	45	35	25	16
Night	40	30	20	13

For the determination of the noise limit allowance for large sites (greater than one (1) hectare) the corrected combined hectare allowance can be calculated by adding 10 log (Site Area) to the hectare allowance. For example for a two (2) hectare site 3dB(A) should be added, for ten (10) hectares the corrections is 10dB(A).

For the purpose of assessment, the noise level allowances shall be satisfied under the following meteorological conditions:

- Day “*Calm*”- 20°C air temperature, 50% relative humidity,
- Evening “*Calm*”- 20°C air temperature, 50% relative humidity,
- Night - “*Calm*” – 20°C air temperature, 50% relative humidity,
- Night “*Wind*” - 20°C air temperature, 50% relative humidity, 3m/sec wind east,
- Night - “*Temperature Inversion*” 20°C air temperature, 50% relative humidity and 3°C/100m temperature gradient.

## 9.0 OPERATIONAL NOISE ASSESSMENT

Site investigations have identified that the principle sources contributing to the cumulative noise from the envisaged rezoning and development of the Bomen Industrial Precinct would be associated with industrial activities, road traffic and trains.

The assessment has shown that meteorological conditions such as wind and temperature inversions can increase the level of noise at a receptor location. The effects of wind can also reduce noise when the wind is blowing away from the receptor and towards the source. For the purpose of assessing future industrial development within the *LFR* the effects of meteorological conditions should be considered in accordance with *INP* procedures.

For the purpose of developing an acoustic planning strategy it was assumed that the *INP* amenity noise goals would be assessed at the boundary of the *LFR* (to contain noise impacts within the precinct land) and a five hundred (500) metre low risk separation zone would be created along exposed industrial precinct boundaries. It was assumed that non-restricted twenty four (24) hour industry could develop to the north of the existing developed industrial areas and that low risk perimeter development would be encouraged and develop in the controlled separation zone (300 metre zone). Within the separation zone it was assumed that daytime use commercial/warehouse/light industrial premises could be developed.

The results of preliminary noise modelling for envisaged development that would be likely to occur in *LFR* have shown that with appropriate planning, management and effective engineering controls:

- (i) noise emissions from the likely industrial development could be controlled and satisfy the recommended amenity goals developed from procedures recommended by the *DECC* and discussed in the report;

- (ii) with appropriate planning noise from intermittent night-time transient activities could be controlled to satisfy the recommended disturbance assessment goals;
- (iii) during the early phases of the *LFR* development, road traffic noise from Bomen Road and Byrnes Road would satisfy the *ECRTN* traffic noise objectives. Albeit, an alternative heavy vehicle route to service future industrial development is recommended to reduce traffic noise from Bomen Road; and
- (iv) with respect to on-site transient activities associated with trains, trucks and fork lift trucks, etc. noise levels are predicted to satisfy the planning goals. Albeit, future development should be planned such to maximise distance separation to existing and future residential development.

Development within the *LFR* would include both "schedule" (*ie activities requiring an Environmental Protection Licence*) and "non-scheduled" premises. To ensure that the *LFR* develops in a manner that would allow for the management and control noise impacts it is essential that both the *DECC* and *Council* consider all future planning and development applications in accordance with the guidelines and procedures discussed in this planning report.

Without a joint commitment between the *DECC* and *Council* the management and control of noise impacts from the *LFR* will be unchecked. To assist with the management and control of noise from the *LFR* it is recommended that a joint assessment panel be formed to assess all new (scheduled and non-scheduled) development applications, the ongoing effectiveness of controlling "*noise creep*" and the effectiveness of compliance with the recommended planning goals. New development applications presented to *DECC* and *Council* should be accompanied with an acoustic report that demonstrates compliance with the planning goals recommended in this report.

## 9.1 Noise Control Recommendations

In addition to the planning and noise goals recommended presented in this report the following site and engineering controls should be adopted were practical and feasible and incorporated into future planning and assessment requirements

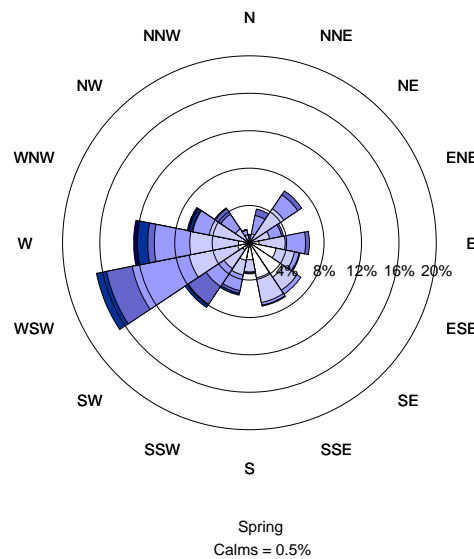
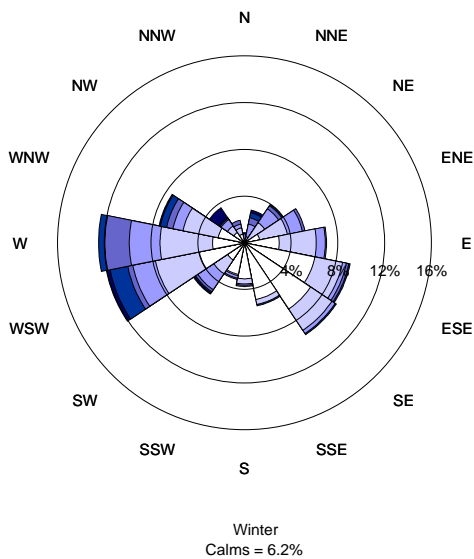
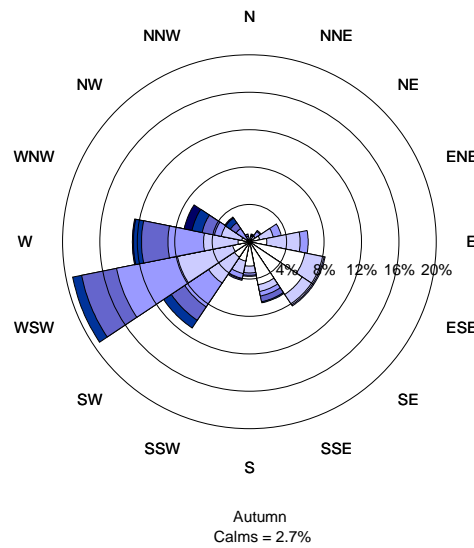
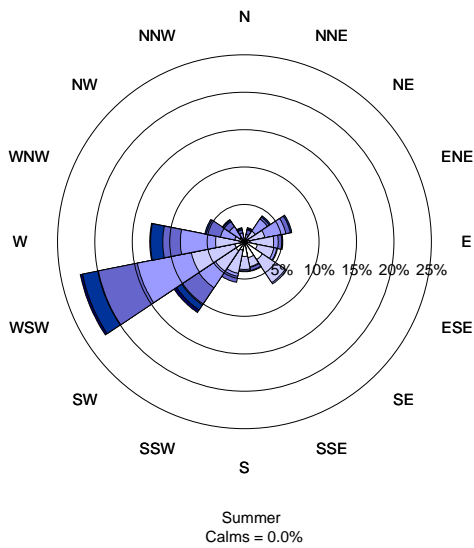
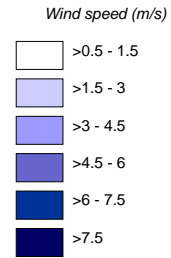
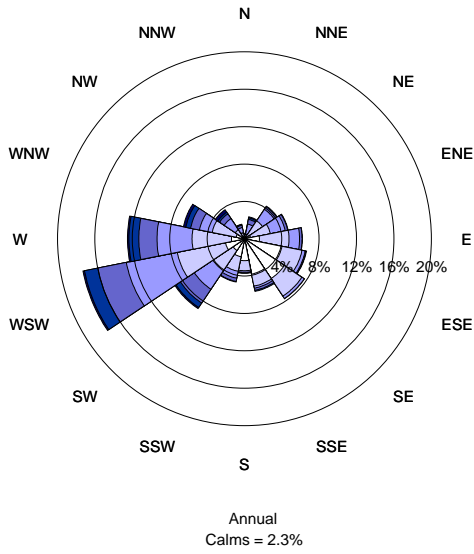
- new transport terminals should not be permitted within the controlled separation zone (500 metres from *LFR* site boundaries);
- all external service plant and equipment should be selected and located on acoustic performance;
- single line push-pull rail sidings should be discouraged and rail loops encouraged.
- at grade railway crossing should be discouraged;
- "*narrow frequency band*" vehicle reversing alarms and fixed site warning alarms should be discouraged and replaced with "*multi-frequency broad band*" alarms;
- loading docks and open doorways should be orientated away from residential development where practical;
- design of new development should be encouraged to provide self-shielding to the Cartwrights Hill and Brucedale residential precincts;
- a periodic noise monitoring program should be implemented to evaluate trends with respect to background noise levels and assess the need to impose more or less stringent noise limits on development.



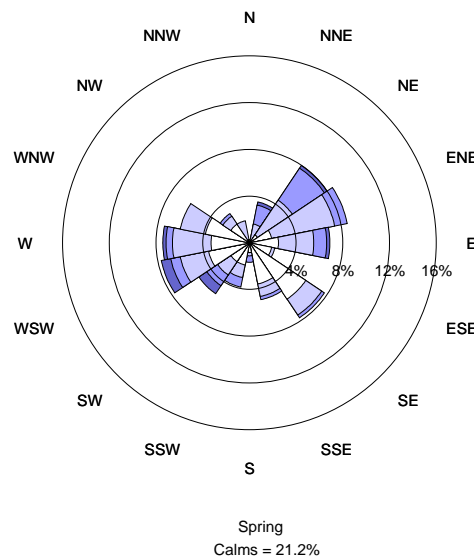
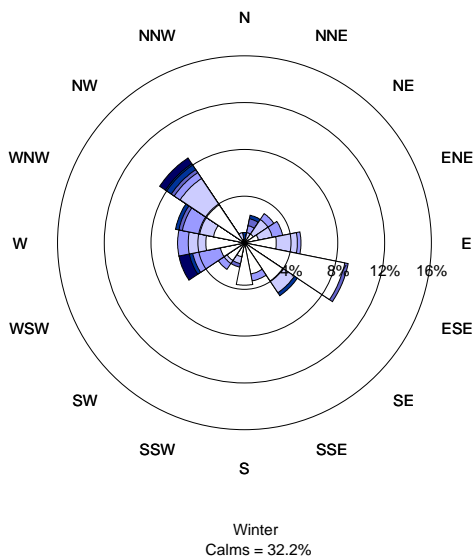
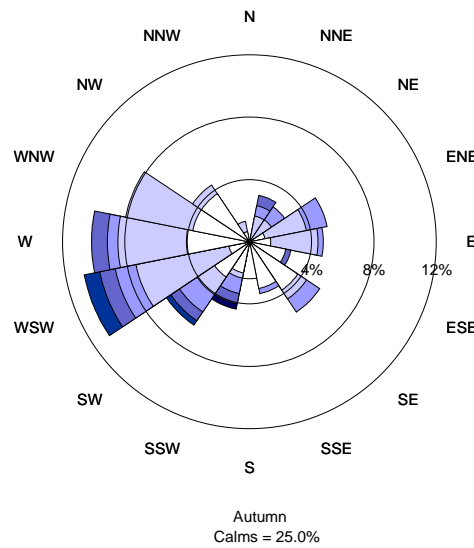
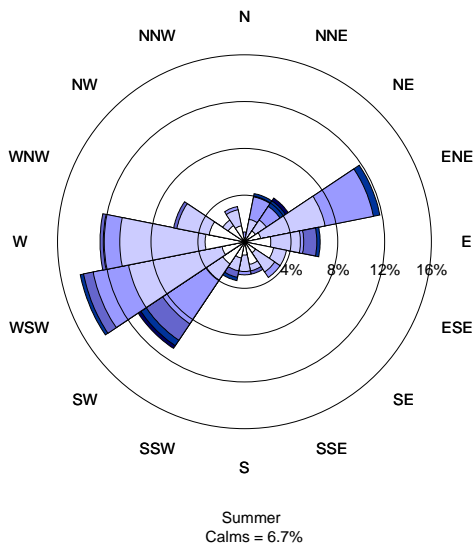
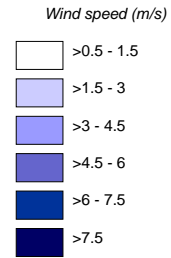
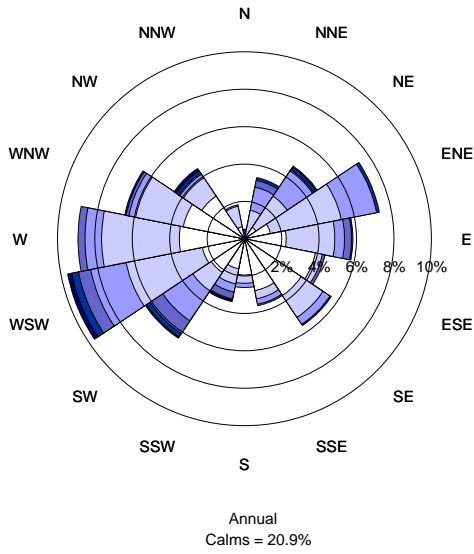
## **APPENDIX 1: AMBIENT NOISE MEASUREMENT RESULTS**

## **APPENDIX 2: SEASONAL WIND ROSES**

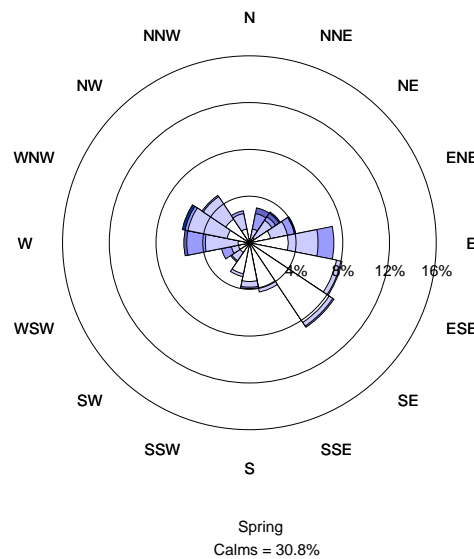
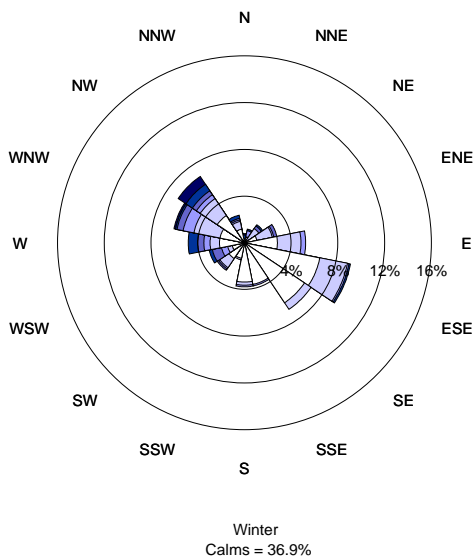
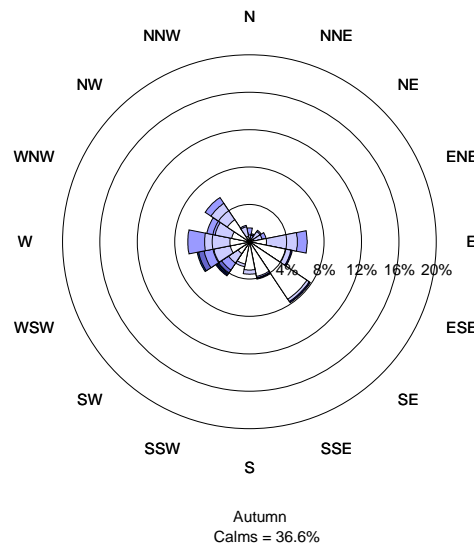
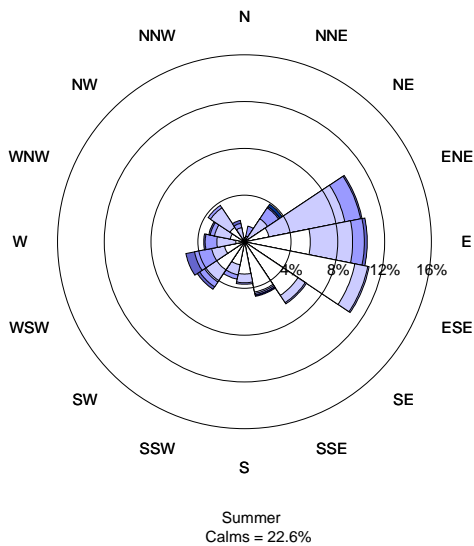
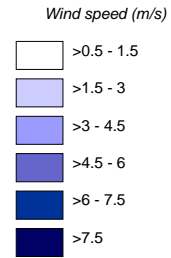
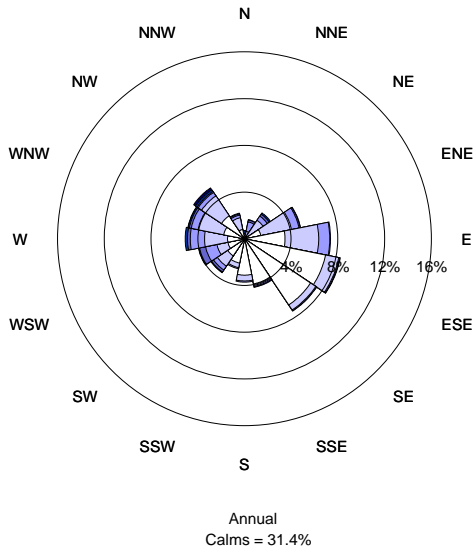
**Annual and seasonal windroses for  
 Wagga Wagga 1998  
 7am to 6pm**



### Annual and seasonal windroses for Wagga Wagga 1998 6pm to 10pm



**Annual and seasonal windroses for  
 Wagga Wagga 1998  
 10pm to 7am**



## APPENDIX 3: DEFINITION OF TERMS

**A-Weighted:** See dB(A)

**Adverse weather:** Weather effects that enhance noise (that is, wind and temperature inversion) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

**Ambient noise:** The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.

**Assessment background level (ABL):** The single figure background level representing each assessment period-day, evening and night (that is, three assessment background levels are determined for each 24-h period of the monitoring period). Its determination is by the tenth percentile method.

**Assessment period:** The period in a day over which assessments are made: day (0700-0800h), evening (1800 to 2200h) or night (2200 to 0700h).

**Background Noise:** The underlying level of noise present in the ambient noise, excluding the noise source under extraneous noise is removed. This is described using the  $L_{A90}$  descriptor.

**Cumulative noise level:** Refers to the total level of noise from all sources.

**Day:** The period between 0700 and 1800hrs (Monday-Saturday) and 0800-1800 (Sunday and Public Holidays).

**dB:** Abbreviation for decibel-a unit of sound measurement. Given sound pressure to a reference pressure.

**dB(A):** Unit used to measure “A-weighted” sound pressure levels. A-weighting is an adjustment made to sound level measurement to approximate the response of the human ear.

A change of 1dB(A) or dB(A) in the level of a sound is difficult to detect, whilst a 3dB(A) to 5dB(A) change corresponds to a small but noticeable change in loudness. A 10dB(A) change corresponds to an approximate doubling or halving in loudness.

The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Very noisy
110	Grinding on steel	
100	Loud car hone at 3m	Noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or TV	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quite
30	Inside bedroom	
20	Unoccupied recording studio	Almost silent

**Default parameters:** In assessing meteorological enhancement of noise, refers to set values for weather parameters, such as wind speeds and temperature gradients, to be used in predicting source noise levels.

**Equivalent Continuous Noise Levels:** The level of noise equivalent to the energy average of noise levels occurring over a measurement period.

**Evening:** Refers to the period between 1800-2200hrs.

**Extraneous Noise:** Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.

**Feasible and reasonable measures:**

Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:

- noise mitigation benefits (amount of noise reduction provided, number of people protected)
- cost of mitigation (cost of mitigation versus benefits provided)
- community views (aesthetic impacts and community wishes)
- noise levels for affected land uses (existing and future levels, and changes in noise levels).

**Fluctuating Noise:** Noise that varies continuously and to an appreciable extent over the period of observation.

**Greenfield site:** Undeveloped land.

**Impulsive Noise:** Noise having a high peak of short duration, or a sequence of such peaks. A sequence of such peaks. A sequence of such impulses in rapid succession is termed 'repetitive impulsive noise'.

**Intrusive Noise:** refers to noise that intrudes above the background level by more than 5 decibels.

**$L_{A90}$ :** The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise.

**$L_{Aeq}$ :** The equivalent continuous noise level – the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

**Long-term annoyance:** Prolonged annoyance over months and years.

**Median:** The middle value in a number of values sorted in ascending or descending order. Hence, for an odd number of values, the value of the median is simply the middle value. If there is an even number of values the median is the arithmetic average of the two middle values.

**Meteorological conditions:** wind and temperature inversion conditions.

**Most-affected locations(s):** Locations that experience (or will experience) offensive noise from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source locations(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver.

**Negotiated agreement:** An agreement involving the negotiation of an achievable noise limit in cases where the project specific noise levels cannot be met. The agreement is negotiated between the proponent and the DEC or the proponent and the community. Such an agreement is reached through balancing the merits of a development, the feasibility and reasonableness of available mitigation measures and the noise impacts produced.

**Night:** The period between 2200 and 0700 (Monday-Saturday) and 2200-0800 (Sunday and Public Holidays)

**Noise criteria:** The general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5dB) and loss of amenity (for example, noise levels for various land uses).

**Non-mandatory:** With reference to the proposed policy, means not required by legislation. The proposed policy specifies criteria to be strived for, but the legislation does not make these criteria compulsory. However, the policy will be used as a guide to setting statutory (legally enforceable) limits for licences and consents.

**Performed-based goals:** Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.

**Rating Background Level (RBL):** the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24-h period used for the assessment background level). This is the level used for assessment purposes. It is defined as the median value of:

- all the day assessment background levels over the monitoring period for the day
- all the evening assessment background levels over the monitoring period for the evening; or
- all the night assessment background levels over the monitoring period for the night.

**Receiver:** The noise-sensitive land at which noise from a development can be heard.

**Stationary noise sources:** Sources that do not generally move from place to place, eg. industrial or commercial sources. In general, these include:

*Individual stationary sources such as:*

- heating, ventilating and air conditioning (HVAC) equipment,
- rotating machinery,
- impacting mechanical sources,
- other mechanical equipment and machinery such as conveyors.

*Mobile sources confined to particular location such as draglines and haul trucks.*

*Facilities, usually comprising many sources of sound, including:*

- industrial premises,
- extractive industries,
- commercial premises,
- warehousing facilities,
- maintenance and repair facilities.

(In this case, the stationary source is understood to encompass all the activities taking place within the property boundary of the facility).

**Temperature inversion:** An atmospheric condition where temperature increases with height above the ground.