# WIPS Management Noise Impact Report

WIPS MANAGEMENT AUSTRALIA PTY LTD –
NOISE IMPACT ASSESSMENT

- Final
- 18 December 2007

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Sinclair Knight Merz
ABN 37 001 024 095
100 Christie Street
PO Box 164
St Leonards NSW
Australia 1590
Tel: +61 2 9928 2100
Fax: +61 2 9928 2500
Web: www.skmconsulting.com

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# 1. Introduction

WIPS Management Australia Pty Ltd (WIPS Management) proposes to establish a manufacturing plant for wall and floor panels south of Kurri Kurri in NSW. The proposed plant would be part of a new major industrial estate, the Hunter Economic Zone (HEZ), as shown in **Figure 1-1**. The proposed plant would consist of a 7 ha site with a 3 ha building footprint (Justin Long Design 2006) and would produce wall sandwich panels for commercial and domestic applications.

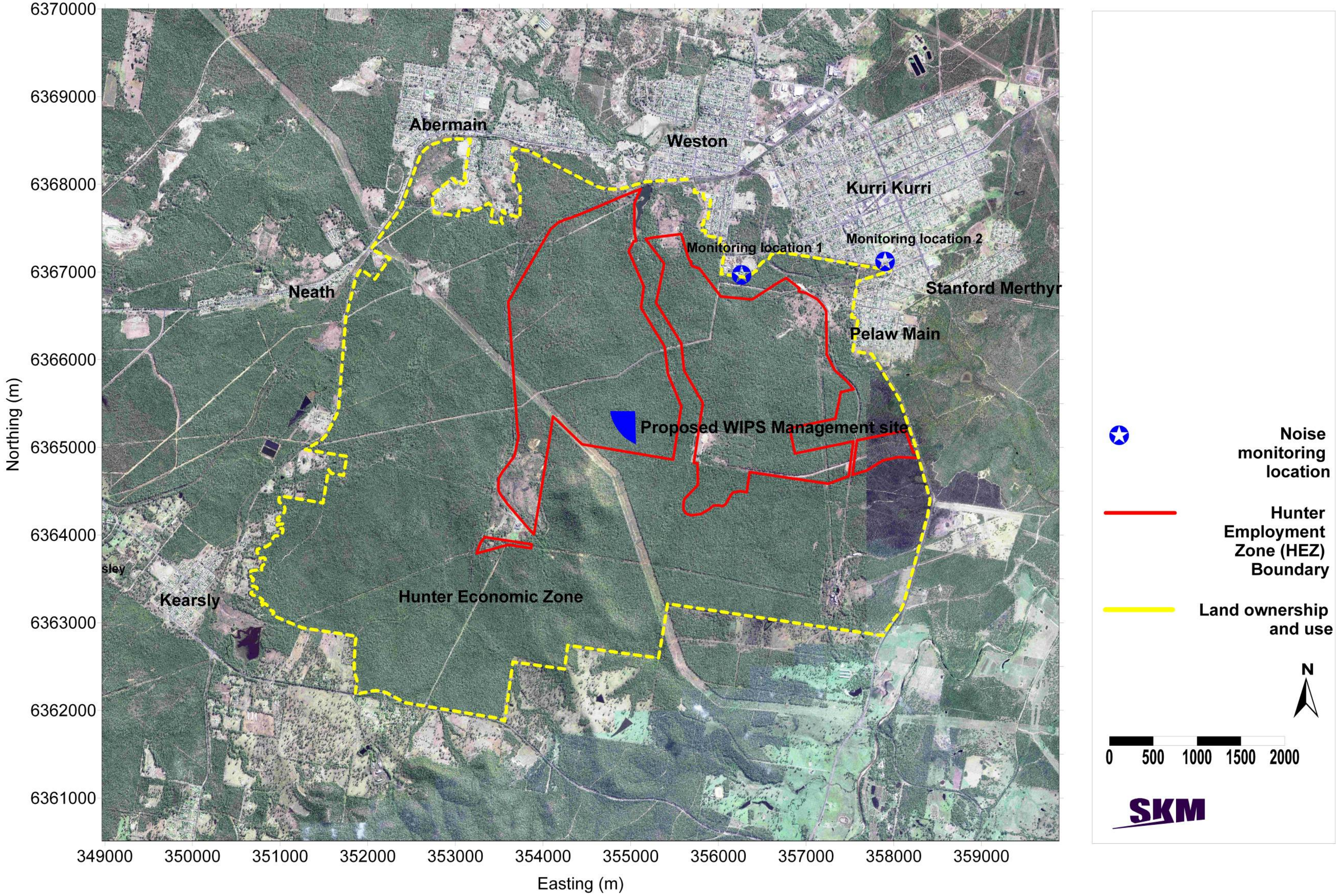
In order to proceed with the major project application, the Director-General has requested an assessment of likely noise impacts on sensitive receivers. The assessment is to be undertaken with consideration of the Lighting, Vibration, Interference and Noise Attenuation Strategy (LiVINS) (SKM 2002), which was developed to support Development Control Plan 47 (CCC 2006).

The assessment incorporates noise impacts generated by operation of the plant. Neither construction nor operational vibration is considered to be a significant impact due to the distances to sensitive receivers and the minimal vibration generated by the manufacturing process. Construction noise is also not considered to be a significant impact due to the limited duration of the construction activities and the distances to sensitive receivers; however, will be discussed qualitatively in this assessment.

The following report presents the methodology and findings of the noise impact assessment and includes the following major sections.

- Existing environment - a description of the area surrounding the HEZ in terms of topography, prevailing meteorological conditions and existing acoustical amenity.
- Assessment criteria – outline of legislation and processes used in establishing the project specific noise criteria.
- Impact assessment – methodology and findings of the noise impact assessment.
- Recommendations and conclusions.

- **Figure 1-1 Proposed WIPS Management site with the HEZ boundary.**



# 2. Existing Environment

## 2.1 Local setting

The WIPS Management plant is proposed to be constructed within the HEZ, (refer **Figure 1-1**). The topography across the HEZ ranges from approximately 30 m to 200 m AHD, with the WIPS Management site proposed to be 58 m AHD. The highest point within the HEZ is Mount Tomalpin, located toward the centre of the zone within the National Park area. A ridgeline runs south from Mount Tomalpin and extends beyond the HEZ. The National Park and State Forests have varied vegetation characteristics, including heath and open forest.

Currently undeveloped bushland, the HEZ will benefit from a substantial vegetative buffer to the south and to the west, while to the north and north east, local towns are adjacent to the Hunter Economic Zone boundary.

The WIPS Management Facility will be located within Precinct 1 of the HEZ, which consists of approximity 100 ha of developable land. It is anticipated that Precinct 1 will be divided into 49 development blocks.

## 2.2 Sensitive receivers

The Hunter Economic Zone is bounded by the residential suburbs of Abermain and Weston to the north, Kurri Kurri to the northeast, Pelaw Main to the east and Neath to the west. Elrington and Abernethy are located to the south of the HEZ and Kearsley to the southwest, beyond the National Park, as shown in **Figure 1-1**. Due to the proposed layout of the HEZ, the majority of sensitive receivers are located to the north.

For the purpose of this assessment, individual receivers considered to be representative of each town have been selected to determine the potential noise impacts resulting from operation of the WIPS Management site, the nearest of which is approximately 5 km to the north.

### 2.3 Ambient noise environment

Unattended background noise monitoring was undertaken by SKM (2002). Two locations were selected based on their proximity to the HEZ and on being representative of the surrounding area. Once a general area was identified through the use of aerial photography, monitoring locations were selected based on permission being obtained from the occupant and the security of the monitoring device. The selected locations are indicated in **Figure 1-1** and were:

- Location 1 – Rear of Kurri Kurri Hospital
- Location 2 – Coronation Street, Kurri Kurri

The noise loggers used for the survey were Acoustic Research Laboratories brand EL215. Loggers were set to A-weighted, fast-response and programmed to continuously monitor the noise environment, logging in consecutive 15-minute periods. The calibration of the noise loggers was checked before and after the monitoring period and the drift was less than 0.5 dB(A). The noise monitors were located in free-field conditions at least 5 m from any substantial reflecting surface.

A summary of monitoring results of the noise survey is presented in **Table 2-1,** with noise profile charts for each location presented in **Appendix A**. A variety of statistical indices was recorded of which the most relevant were the $L_{A10}$, $L_{A90}$ and $L_{Aeq}$ noise levels. The $L_{A10}$ and $L_{A90}$ indices are noise levels exceeded for 10% and 90% of the monitoring time respectively. The $L_{A90}$ level is commonly referred to as the background noise level. The $L_{Aeq}$ level is the equivalent continuous sound level and has the same energy over the monitoring period as the actual noise environment.

At Location 1, the long-term higher order noise indices ($L_{A10}$, and $L_{Aeq}$) were intermittently influenced by hydraulic and mechanical services and vehicle noise from a nearby car-park, whilst the background noise was influenced by wind in the trees, and mechanical services from the hospital. At Location 2, the long-term $L_{A10,}$ $L_{Aeq}$ and $L_{A90}$ indices were influenced by local traffic and the operation of air conditioning units on nearby private properties.

- **Table 2-1 Summary of ambient noise levels (SKM 2002).**

| Monitoring location | Time period | $L_{A10}$ | $L_{A90}$ | $L_{Aeq}$ (from existing industry) |
|---|---|---|---|---|
| Location 1: Rear of Kurri Kurri Hospital | Day | 42 | 30 | <30 dB(A) |
| | Evening | 41 | 31 | <30 dB(A) |
| | Night | 43 | 31 | <30 dB(A) |
| Location 2: Coronation Street | Day | 54 | 39 | <30 dB(A) |
| | Evening | 53 | 38 | <30 dB(A) |
| | Night | 44 | 30 | <30 dB(A) |

## 2.4 Climatology and Meteorology

### 2.4.1 Overview

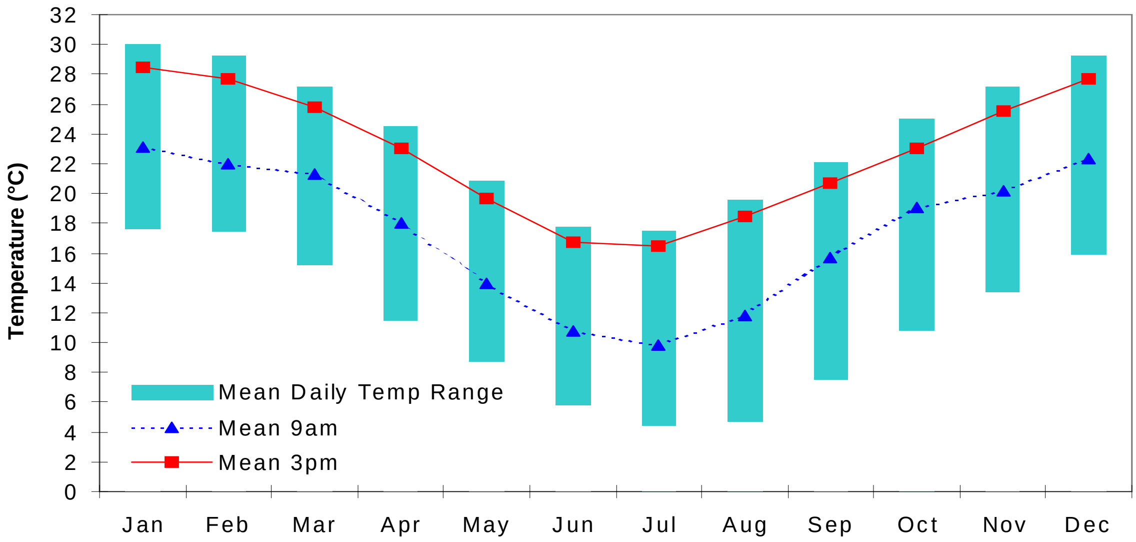
The impact on ambient noise levels that noise emissions during operation of the WIPS Management plant may have on the surrounding area is somewhat dependent on climate and dispersion meteorology, including temperature and relative humidity; wind speed and direction; and atmospheric stability.

The Australian Bureau of Meteorology (BoM) operates an automatic meteorological station (AWS) at Cessnock (Nulkaba), approximately 8 km north west of the HEZ. Data from this AWS is considered to be representative of conditions experienced within the HEZ and has been operating for over 20 years. Temperature and humidity data were taken directly from climate average data from this AWS. Wind speed and direction averages were taken from the most complete recorded year, 2004. Stability classes were calculated as described by USEPA (2000), with required calculation inputs, i.e., wind speed, solar radiation and vertical temperature gradient, obtained from the Cessnock meteorological observations.

### 2.4.2 Temperature

As shown in **Figure 2-1**, the area experiences a relatively mild climate with the 9 am mean temperature ranging between 23ºC in January and 10ºC in July. The 3 pm mean temperature range is between 28ºC in January and 16ºC in July. The warmest month of the year is January, experiencing a mean daily maximum temperature of 30ºC, while July is the coolest month experiencing a mean daily maximum temperature of 18ºC.

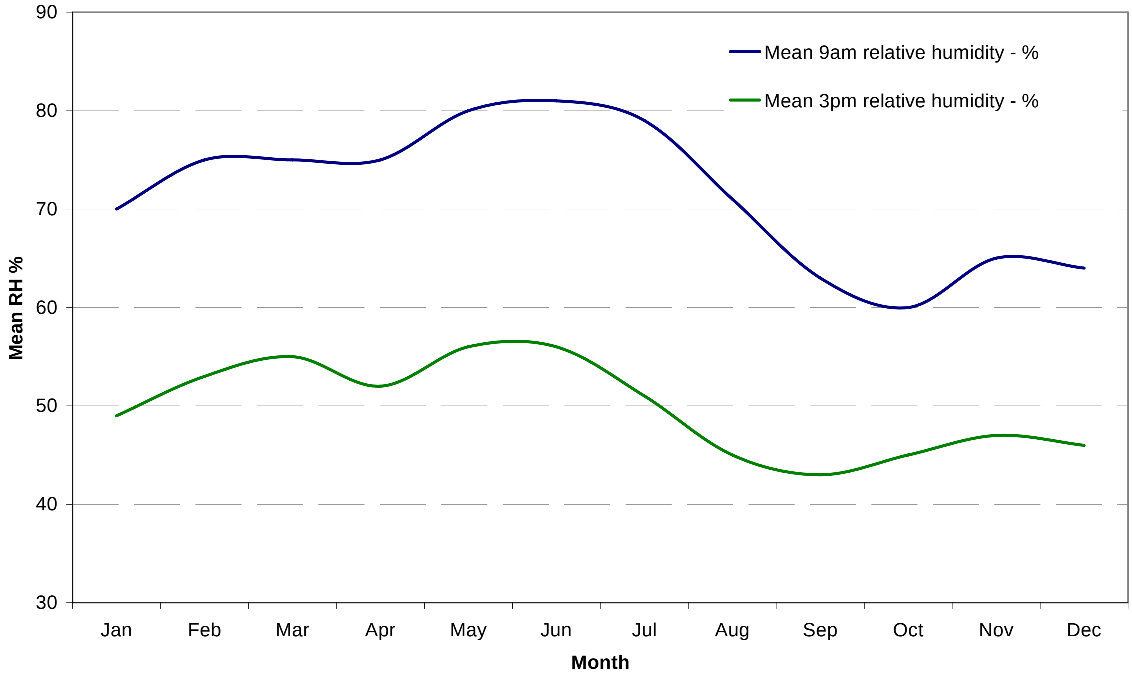
- **Figure 2-1 Mean Monthly Temperature Range, Cessnock – Nulkaba (BoM 2006).**



### 2.4.3 Relative Humidity

A summary of 9 am relative humidity recorded at the Nulkaba AWS is shown in **Figure 2-2.** RH is lowest during the warmer months and highest during the cooler months, ranging from 58% in October to 81% in May. 3 pm RH is significantly lower than at 9 am, exhibiting a range of 42% in August to 56% in May.

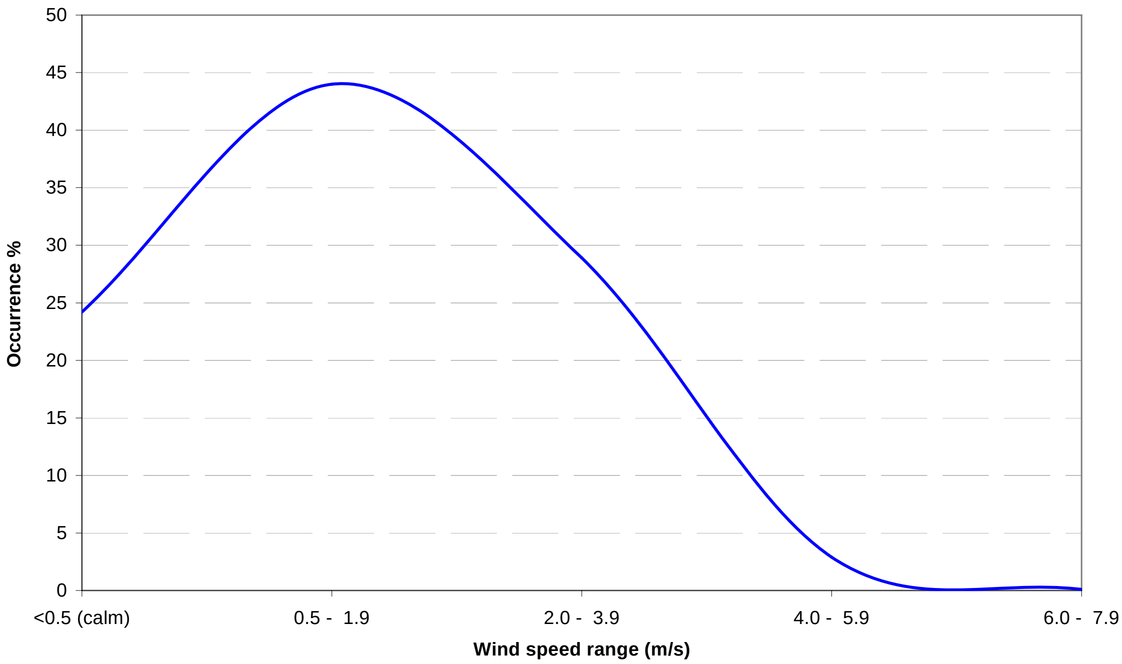
- **Figure 2-2 Monthly Average Relative Humidity, Cessnock–Nulkaba (BoM 2006).**




### 2.4.4 Wind speed and direction

The DEC (2000) specifies wind effects must be included in an assessment when they are a feature of the area. That is, when source to receiver wind speeds of 3 m/s or less occur for 30% of the time or more in any assessment period. Windspeed data from the Cessnock AWS indicate that the majority of wind is light with greater than 50% occurrence of winds at less than 3 m/s, with an average speed of 1.5 m/s, as summarised in **Figure 2-3**. Calm conditions are present for approximately 24% of the time.

- **Figure 2-3 Wind speed averages for Cessnock.**




The general wind flow patterns for the HEZ have been described using surface wind roses and wind frequency data based on 1-hourly data for 2004 obtained from the HEZ meteorological site. Wind roses are provided in **Appendix B** and the labels on the petals of the wind rose indicate the frequency of winds recorded as blowing from that direction at the HEZ site. The topographical features within the HEZ, especially the ridgeline running south from Mount Tomalpin, most likely influence the wind flows at the site.

Analysis of surface wind observations during 2004 illustrates the seasonal pattern of winds at the HEZ meteorological site. During summer, the HEZ site experiences a dominance of winds from the southeast. These winds blow from the south-west and north west during autumn and north westerly winds dominate and strengthen during winter.

During the morning hours of autumn light winds from a southerly direction dominate. These light southerly winds turn to stronger north westerly winds towards the end of Autumn and continue throughout winter and the beginning of Spring. During late Spring these north westerly winds are less dominant, with a higher frequency of lighter winds from the southern sector.

### 2.4.5 Drainage flows

Drainage flows, or katabatic winds, typically occur early in the night period and result from colder, denser air flowing down an incline such as a hill or mountain, particularly during the cooler months. *The Hunter Valley Meteorological Study* (MUSES 1982) presented a detailed description of atmospheric drainage flows and temperature inversions in the Hunter Valley. The study reported that northwest to southeast flows are dominant within the Hunter Valley region, with the main north westerly drainage flows being are light, ranging between 1.5 and 1.9 m/s.

The Kurri Kurri area, located immediately to the north of the HEZ, was found to experience a sub-regional drainage flow within the main drainage flow, from the south, with a slightly lower wind speed than the regional northwest to southeast flow. The significant topography of Mt Tomalpin, located to the south of Kurri Kurri in the HEZ, most likely is responsible for the drainage flows identified.

Night time cold air drainage flows are described by the surface wind roses using 1-hourly data for 2004, obtained from the HEZ meteorological site. These wind roses show night time drainage flows generally from the south in summer and west-north-west to south-south-west in winter.

### 2.4.6 Stability

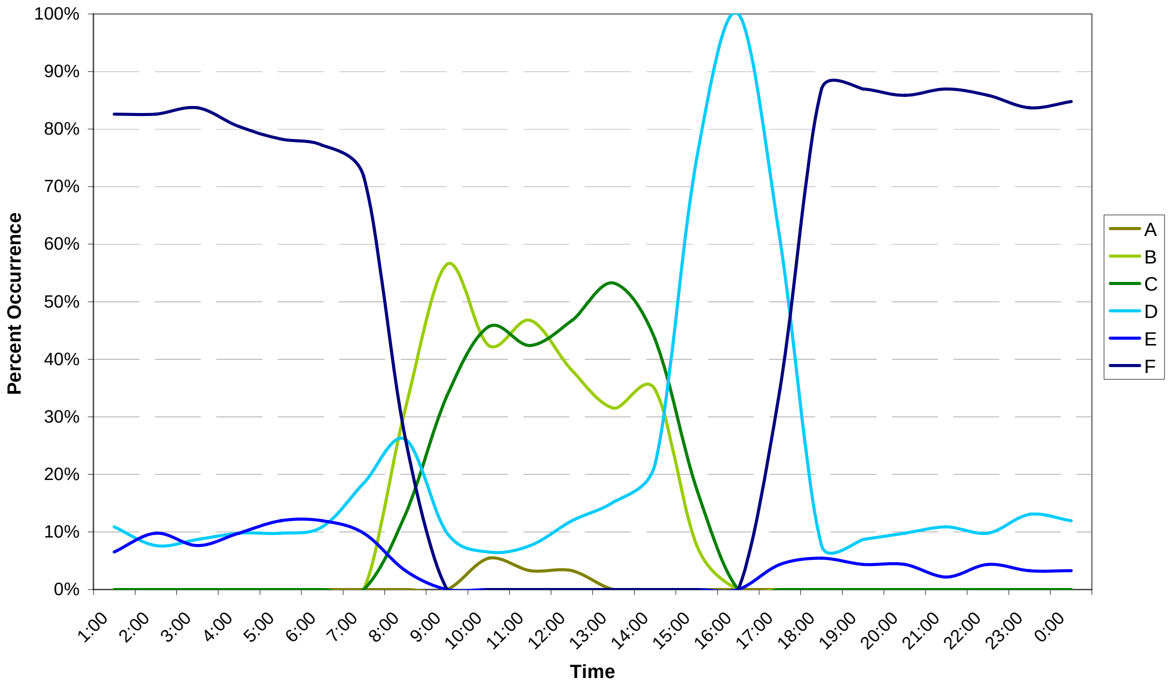
There are seven distinct classes used to represent atmospheric stability (i.e. vertical temperature gradient). These are termed Pasquill-Gifford Stability Classes and range from Class A to Class G. Each of these Classes represents a differing ability of sound to propagate across terrain and may be considered neutral, favourable or adverse meteorological conditions.

- Neutral conditions are considered to be non-enhancing in terms of noise propagation. Including Classes C and D, neutral conditions involve little or no wind and no temperature inversion.
- Favourable conditions are considered to reduce the impact of noise emissions on sensitive receivers. Including Classes A and B, favourable conditions may involve high wind speeds, which increase the background noise level, or unstable atmospheric conditions (a large temperature decrease with height) and wind from sensitive receiver to the source.
- Adverse meteorological conditions, including Classes E to G, are considered to enhance the propagation of noise from source to receiver. Adverse conditions may include a light wind from noise source to sensitive receiver and a temperature inversion.

The Pasquill-Gifford stability classes are presented in **Figure 2-4**, as defined by surface-layer wind speed (measured at 10 m) in combination with measurements of total solar radiation during the day and a low-level vertical temperature difference (i.e. at 2 m and 10 m) at night, as per USEPA (2000).

The *HVMS* (MUSES 1982) also determined that nocturnal radiation inversions within the Hunter Valley are common occurring on most nights with clear skies and calm or low wind speed conditions

▪ **Figure 2-4 Average stability class for each hour of the day during winter.**




An occurrence of 30% of the total night time during winter (June, July, August) has been selected by DEC (2000) as representing a significant noise impact. An inversion is considered by DEC (2000) to occur during times of F-Class stability, which are typified by a 3ºC/100 m temperature inversion. As shown in **Figure 2-4**, F-Class stability is present for the majority of winter nights, with A and B Classes predominant during the day.

### 2.4.7 Meteorology summary

Meteorological conditions such as wind speed, direction and stability in the HEZ are likely to assist noise propagation from the proposed plant to sensitive receivers, particularly during cold winter nights. Therefore, these parameters have been incorporated into the noise impact assessment.

# 3. Legislative Framework

## 3.1 Industrial estate noise control planning

In January 2000, the Department of Environment and Climate Change (DECC) released the Industrial Noise Policy (INP) (DECC 2000), which provides a framework for deriving project specific noise limits for consents and licences for particular projects. Where several developments are proposed for an area, as is the case for the HEZ, the INP (DECC 2000) recommends that these developments should be assessed as a group by setting project specific noise levels for the entire industrial estate so that the total impact from all proposed or potential developments does not cause the amenity to deteriorate.

DEC analysed several approaches to distributing the available noise emissions from industrial developments in its technical paper, *Noise Control Planning for Industrial Estates* (DECC 2001). Various industrial estate development case studies were investigated, each of which intended to provide an equitable and manageable method to distribute noise limits and avoid cumulative noise impacts on the surrounding community.

Following review by CCC, LiVINS (SKM 2002) for the HEZ incorporated a noise limit distribution approach modelled on that adopted by the Greystanes Industrial Estate development. This approach divides the industrial estate into a number of major zones and allocates a noise limit to each zone, such that the cumulative noise of the entire estate does not exceed the amenity criteria for the relevant sensitive receivers. Each of these major zones could contain a number of separate industries, with noise from all these industries contributing to that zone's allowance.

The Greystanes approach aims at minimising the potential for exceedances of the amenity goals whilst providing greater flexibility for development. However there is a risk that the initial sites within a major zone may use the entire allowable zone limit. Careful planning and the withholding of 1 dB(A) - 2 dB(A) from each zone would minimising this risk.

Compliance with both the amenity and intrusiveness criteria should be achieved for each zone; these are discussed in the following sections.

### 3.1.1 Intrusive noise criteria

The intrusive criteria relate to the difference between the noise under assessment and the RBL (or long-term background noise level. A noise source is considered to be non-intrusive if the $L_{Aeq,15minute}$ level does not exceed the RBL by more than 5 dB(A) for each of the day, evening and night periods, and does not contain tonal, impulsive, or other modifying factors as detailed in Chapter 4 of the INP (DECC 2000).

### 3.1.2 Amenity noise criteria

The amenity criteria are based on zoning and landuses of receiver locations and the extent of existing industrial noise in the area. The relevant noise amenity criteria for this project are for a suburban area and acceptable noise levels for these areas are summarised in **Table 3-1.** Once background noise is measured, if existing industrial noise in an area approaches the criterion value for the landuse in that area, recommended noise levels from a new industry would be modified so that the cumulative effect does not produce noise levels that would significantly exceed the criterion.

There is often a fine distinction between *rural* and *suburban* residences, particularly on the outskirts of smaller towns. However, DECC conservatively assumes the evening and night-time amenity criteria for suburban environments are the same as for a rural area.

- **Table 3-1 Amenity criteria (DECC 2000).**

| Type of receiver | Indicative noise amenity area | Time of day | Recommended $L_{Aeq}$ noise level, dB(A) | |
|---|---|---|---|---|
| | | | Acceptable noise level (ANL) | Recommended maximum |
| Residence | Suburban | Day | 55 | 60 |
| | | Evening | 45 | 50 |
| | | Night | 40 | 45 |

### 3.1.3 Sleep Disturbance Criteria

The ENCM (DECC 1994) provides guidance in assessing the likelihood of sleep arousal due to industrial noise impacts. The assessment of sleep disturbance varies between studies however it is commonly acknowledged that not all people are affected to the same degree or by the same noise exposure. Findings from studies of sleep disturbance measured by an awakening, change in sleep state or after-effects, reflect the considerable variation in peoples' response to noise. Suggested peak permitted noise levels vary from 45 to 68 dB(A), depending on ambient noise, and disturbance is related to both the number and maximum level of noise events. Appropriate internal design noise levels are detailed in the Australian Standard AS 2107-2000 (Standards Australia 2000).

For assessment purposes, the ENCM uses criteria based on $L_{A1}$ noise level of the source being no more than 15 dB(A) above the $L_{A90}$ (background) noise level, when measured outside a bedroom window. Based on measured RBL values, this criterion would be 45 dB(A). Given this is not the most stringent of the noise assessment criteria; it shall not be used as such in this assessment.

### 3.1.4 Project-specific noise limits

For the purpose of assessing the impact of WIPS Management's development on the nearest sensitive receivers, project-specific noise limits have been determined. Ideally, these limits would be applicable to all developments within the HEZ as discussed above; however, designation of the major HEZ zones and undertaking sufficient background monitoring to quantify existing noise levels in order to set a noise limit for each zone are beyond the scope of this assessment.

Background monitoring undertaken in 2001 (SKM 2002) at the nearest sensitive receiver (Location 1 – Rear of Kurri Kurri Hospital) indicated that there is no significant industrial activity contributing to existing noise levels in areas surrounding the HEZ. Therefore, no modification to recommended $L_{Aeq}$ noise level for the area is required. Based on $L_{A90}$ measurements, however, the intrusiveness criteria would be the most stringent and should be applied in this case as highlighted in bold in **Table 3-2**.

- **Table 3-2 Project-specific noise limits.**

| Time period | Amenity Criteria (dB(A)) | Intrusiveness criteria (dB(A)) |
|---|---|---|
| Day | 55 | **30 + 5 = 35** |
| Evening | 45 | **31 + 5 = 36** |
| Night | 40 | **31 + 5 = 36** |

### 3.1.5 Road traffic noise

The EPA's *Environmental Criteria for Road Traffic Noise* (ECRTN) (DECC 1999) establishes criteria that define acceptable traffic noise levels for different types of developments. In this instance, the following criteria would apply (**Table 3-3**). In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2dB(A).

- **Table 3-3 Road Traffic Noise Criteria (DECC 1999).**

| Type of Development | Criteria dB(A) | |
|---|---|---|
| | Day (0700-2200) | Night (2200-0700) |
| Land use developments with potential to create additional traffic on local roads | $L_{Aeq(15hr)}$55 | $L_{Aeq(9hr)}$50 |
| Land use developments with potential to create additional traffic on collector road | $L_{Aeq(15hr)}$60 | $L_{Aeq(9hr)}$55 |
| Land use developments with potential to create additional traffic on existing freeways/arterials | $L_{Aeq(15hr)}$60 | $L_{Aeq(9hr)}$55 |

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### 3.2 Construction Noise Control

The DECC (2000) document *NSW Industrial Noise Policy* specifically excludes construction noise sources. As such, noise objectives documented in the DECC's *Environmental Noise Control Manual* (DECC 1994), *Chapter 171 Construction Site Noise*, are used for assessing potential construction noise impacts. The noise criteria are dependent on the existing background noise levels and the expected duration of the works. The conditions of operation (for construction activity) are expressed in terms of $L_{A10}$ noise levels above the nominated background $L_{A90}$ level and are detailed in **Table 3-4**.

- **Table 3-4 DECC construction Noise Criteria**

| No. | Duration Of Works | DEC $L_{A10}$ Guidelines |
|---|---|---|
| 1 | 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). |
| 2 | 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). |
| 3 | Construction period greater than 26 weeks | The EPA does not provide noise control guidelines for construction periods greater than 26 weeks duration, however, it is generally accepted that provided $L_{A10}$ noise levels from the construction area do not exceed a level of 5 dB(A) above background, then adverse (intrusive) noise impacts are not likely to be experienced at nearest sensitive receptor locations. |

Restrictions are also placed on the hours of construction to ensure that the amenity of the closest residences is protected. Typical hours of operation for construction works are listed below.

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- No construction work will take place on Sundays or Public Holidays

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# 4. Impact assessment

## 4.1 Overview

Impacts from noise emissions generated by the operational WIPS Management plant and associated road traffic are assessed in this section. Noise emission data were incorporated into an acoustic modelling package to predict the likely noise levels at sensitive receivers. Resulting noise levels were then compared with the project specific noise assessment criteria to determine the impact.

Additionally, noise impacts associated with the construction of the WIPS Management facility are also discussed in this section.

## 4.2 WIPS Management operational noise impacts

### 4.2.1 Plant noise sources

The WIPS Management manufacturing process will be predominantly located indoors, with many manufacturing areas operating at less than 83 dB(A) at 1 m (WIPS Management 2006a). Processes or equipment with higher noise levels would most likely be enclosed in insulated, and noise/fire rated enclosures. Exceptions to this would be the bulk chemical delivery unloading pumps, which would be located outside. A summary of the manufacturing process and associated noise sources and their approximate sound pressure levels as provided by WIPS Management (2006a) is provided in **Table 4-1**.

- **Table 4-1 WIPS Management manufacturing process and noise sources (WIPS Management 2006a).**

| Process | Noise source(s) | Approximate sound pressure level (dB(A)) at 1 m. |
|---|---|---|
| Material delivery and storage | Various pumps | 83 – 87 |
| Recycled panel in-feed | Conveyors | < 83 |
| Unroll flexible facings | Conveyor and pinch rollers | < 83 |
| Hot melt adhesive coating | Adhesive coater and transfer manifold | < 83 |
| Lamination | Rotary laminator | < 83 |
| Metering | High and low pressure pumps and two chillers located in enclosed plant room. | 85 – 87 |
| Foam lay down | High speed gantry head and high pressure mixing valves in insulated room. | 83 – 85 |
| Liquid acoustic and fire barrier coating | Coating machine | 83 – 85 |
| Curing | Curing oven, conveyors and circulation fans | < 83 |
| Cutting | High speed circular saw inside purpose built sound and dust enclosure. | < 83 (outside enclosure) |
| Dust extraction | Fan | 83 – 85 |

| Process | Noise source(s) | Approximate sound pressure level (dB(A)) at 1 m. |
|---|---|---|
| Dust collection | Fans | 85 – 87 |
| Transfers and stacking | Conveyors, gantry, vacuum pumps | 83 – 85 |
| Machining | Routing machines | 85 – 87 |
| Waste shredding | Panel granulator | 83 – 85 |
| Off-cuts | Band saw (not enclosed) | 85 – 87 |
| Reveal and sill fabrication | Docking saws, conveyors | < 83 |
| Render coating, paint coating, curing | Conveyors, rollers, fans and ovens | < 83 |
| Loading | Gantry cranes, tow vehicle | < 83 |

### 4.2.2 Noise prediction modelling

In accordance with the INP (DECC 2000) and requirements of the HEZ Environmental Management Strategy, the noise impacts on sensitive receivers from operation of the WIPS Management plant have been assessed by employing an acoustic modelling package to predict likely noise levels in these locations.

The model was developed using SoundPLAN V6.3, a package that is accepted and endorsed by numerous agencies nationally and internationally, including DECC. The CONCAWE prediction algorithm is most appropriate for industrial noise in this situation and was applied. This assessment method takes into account attenuation due to distance, atmospheric absorption, structural and topographical barriers, the effect of intervening ground types and weather conditions.

Drawings of the proposed layout and location of the site (Justin Long Design 2006) were incorporated into the model together with topographical and cadastral data. Based on the internal sound pressure levels specified by WIPS Management (2006a), and the proposed construction material (walls: 150 mm tilt-up panels; roof: minimum 0.42 mm colorbond steel cladding), façade noise levels were incorporated into the model, as summarised in **Table 4-2**.

Tilt-up panels were assumed to provide a transmission loss of up to 52 dB(A) (National Precaster 2001) and steel cladding was assumed to provide up to 16 dB(A) transmission loss. Where external roller doors would be located, the total façade was assumed to be comprised of steel cladding. A 3-D representation of the acoustic model is presented in **Figure 4-1**.

Few external noise sources would be installed and would be limited to unloading pumps and idling trucks. No roof-mounted extraction fans would be used, with all fans mounted within the building (WIPS Management 2006a).

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**Table 4-2 Façade sound power levels used in model.**

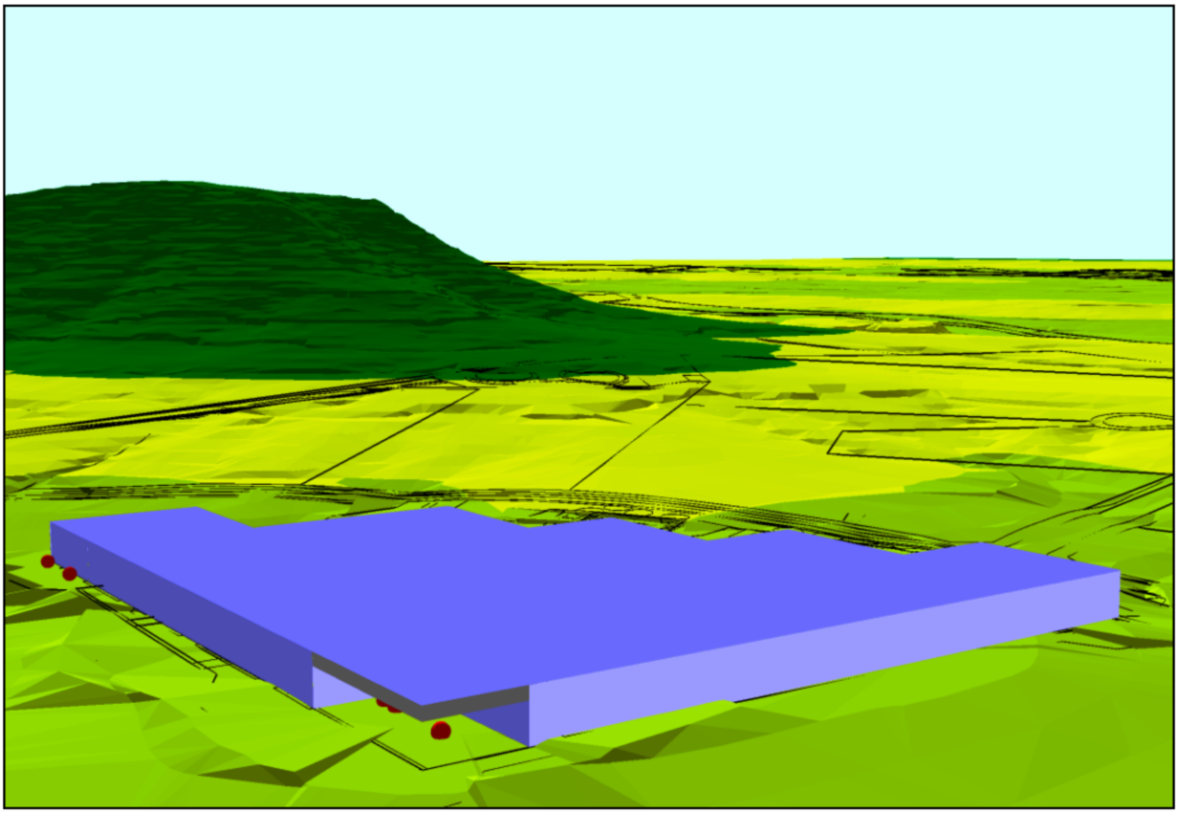
| Plant area | Façade | Façade Sound Power Level (dB(A)) |
|---|---|---|
| Foaming and recycling | North | 65 |
| | East | 55 |
| | West | 39 |
| | South | 72 |
| | Roof | 92 |
| Detailing assembly / external coatings | West | 42 |
| | South | 74 |
| | Roof | 94 |
| Component store | West | 37 |
| | South | 70 |
| | Roof | 82 |
| Warehouse | West | 35 |
| | South | 69 |
| | Roof | 79 |
| Logistics | North | 31 |
| | East | 45 |
| | Roof | 83 |
| Dispatch | East | 71 |
| | South | 35 |
| | West | 71 |
| | Roof | 79 |

Since the plant is proposed to operate on a 24 hour basis, meteorological conditions representative of night and day time conditions were included in the model. A summary of these conditions is provided in **Table 4-3**.

**Table 4-3 Meteorological parameters used in model.**

| Period | Relative Humidity % | Wind speed (m/s) | Stability Class |
|---|---|---|---|
| Day | 70 | 3 | D |
| Night | 50 | 3 | F |

- **Figure 4-1 3D representation of WIPS Management plant with Mt Tomalpin in background (looking to the south west).**



### 4.2.3 Modelling results

Noise emissions from the WIPS Management plant are expected to be low, considering the plant construction materials and generally low internal noise levels. Given the distance to sensitive receivers, this noise would be inaudible to residents of neighbouring towns. **Table 4-4** shows the predicted noise levels at each modelled sensitive receiver location.

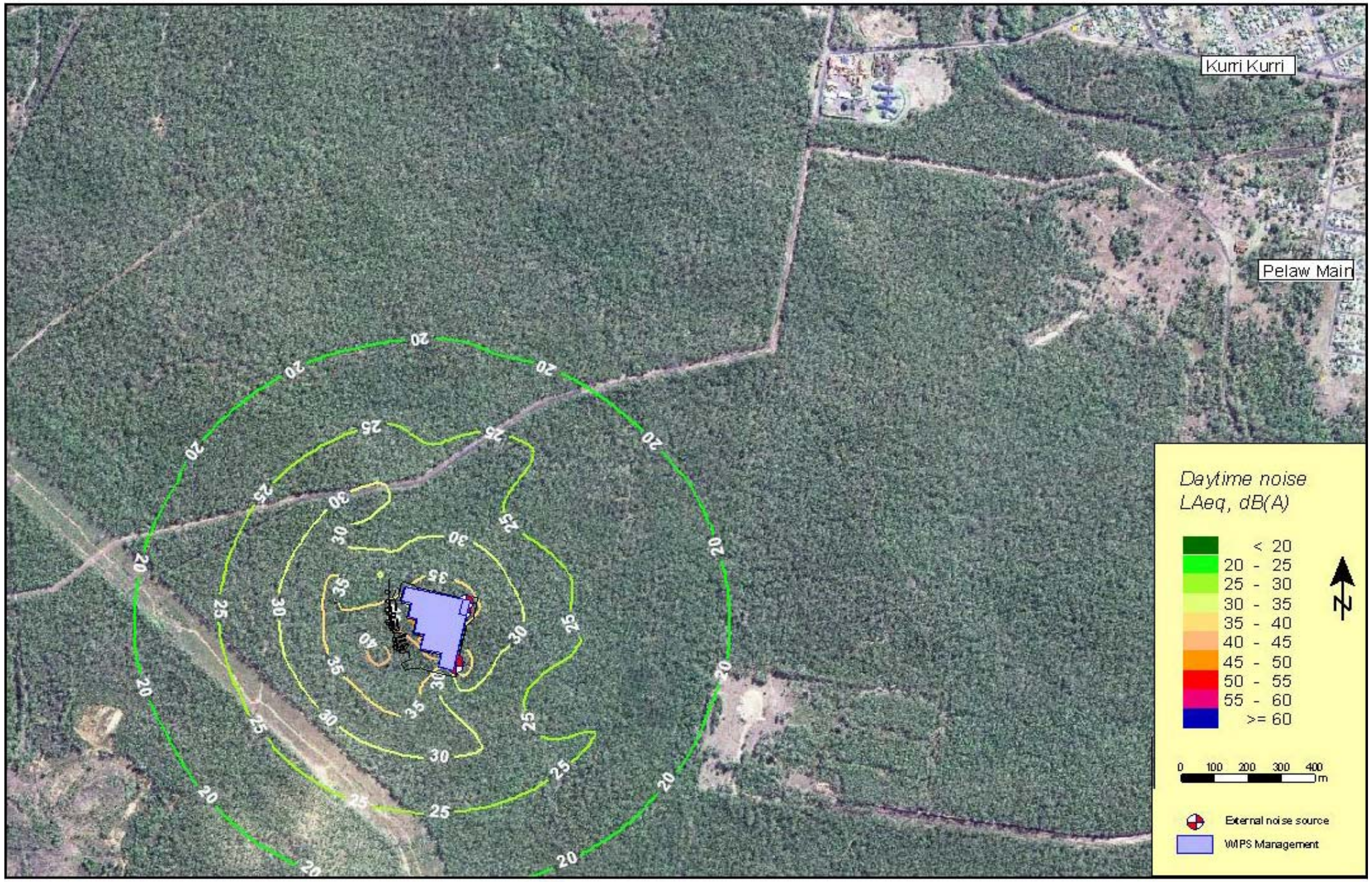
- **Table 4-4 Predicted noise levels at nominated sensitive receivers ($L_{Aeq}$ (dB(A))).**

| Receiver | Day (7 am – 6 pm) | Evening (6 pm – 10 pm) | Night (10 pm – 7 am) |
|---|---|---|---|
| Abermain | < 25 | < 25 | < 25 |
| Weston | < 25 | < 25 | < 25 |
| Kurri Kurri | < 25 | < 25 | < 25 |
| Pelaw main | < 25 | < 25 | < 25 |
| Stanford Methyr | < 25 | < 25 | < 25 |
| Neath | < 25 | < 25 | < 25 |
| Kearsley | < 25 | < 25 | < 25 |
| **Noise criteria** | **35** | **36** | **36** |

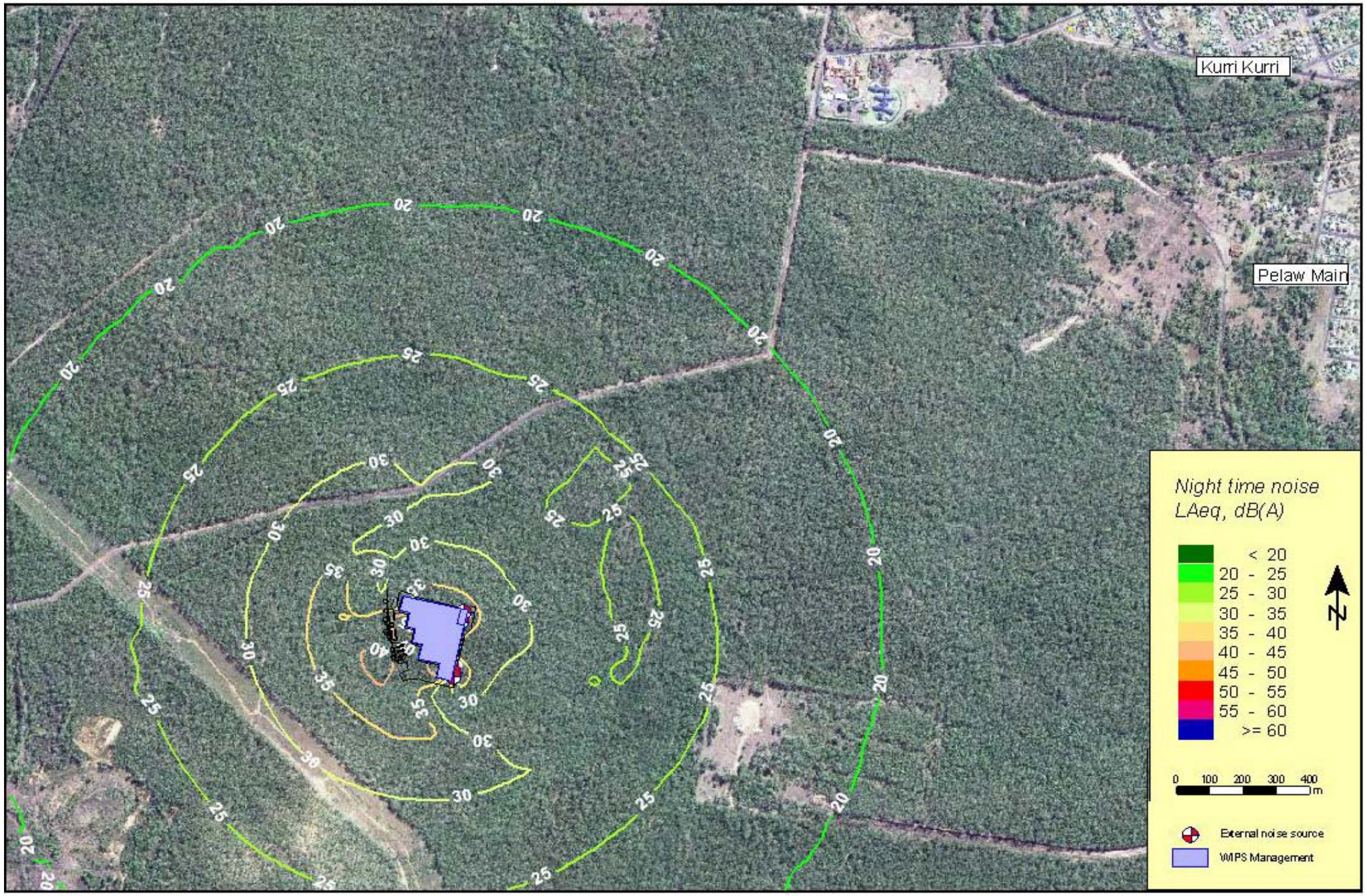
Predicted noise contours for the day and night periods are presented in **Figure 4-2** and **Figure 4-3.** The contours demonstrate that operational noise levels would rapidly decrease with distance from the WIPS Management Plant, and that the noise criteria satisfied within a short distance.  In less than approximately 1 km, noise from the HEZ would likely be inaudible over background noise, with no sensitive receivers within this distance from the plant.

The predicted day and night time noise levels incorporated meteorological factors such as temperature, humidity and stability.  Since the night time conditions were more conducive to noise propagation, the night time noise contours extend a greater distance.  However, levels would still be inaudible at sensitive receivers.

- **Figure 4-2 Predicted noise contours for the day period – day time assessment criteria: 35 dB(A).**



- **Figure 4-3 Predicted noise contours for the night period.**



### 4.3 Traffic noise impact

Each new development at the HEZ will gradually increase traffic on the surrounding road network. Once partially completed (Stages 1 to 4), peak hourly vehicle movements are expected to amount to approximately 4300, whilst the final stages are likely to increase this value by approximately 5600 vph (WIPS Management 2006b).

WIPS Management (2006b) estimates the majority of traffic generated will be during shift changes, with approximately 98 traffic movements between 5 pm and 6 pm, including two 7 m truck and trailer movements. Other traffic during the day would be minimal and would include up to 4 semi-trailer movements each day as well as visitors.

WIPS Management traffic would enter and leave the site via the proposed Spine Road before meeting the existing MR195. Sydney-bound traffic will turn right on MR195 and meet the Sydney-Newcastle Freeway. Newcastle traffic is expected to depart and arrive via the John Renshaw Drive, whilst Kurri Kurri, Cessnock and Maitland traffic will travel into Kurri Kurri via Stanford Street. When the proposed Station Street access is constructed car and light vehicle traffic for Cessnock and Kurri Kurri will use this route as well.

Based on traffic volume data for the Hunter region (RTA 2004), Stanford Street currently experiences up to approximately 7000 vpd and Mitchell Avenue and Victoria Street 16000 vpd. As described above, the majority of WIPS Management traffic is generated during shift changes, with limited traffic expected to be generated during other times. Hence, on a daily basis, the increase in traffic on any local road would be low, especially considering the variety of possible routes and destinations.

Conservatively assuming peak traffic generation occurs for each hour of day and vehicles travel to the same destination, a maximum traffic volume increase of 33% may be experienced on Stanford Street and up to 15% on Mitchell Avenue and Victoria Street. These increases translate into an increase in noise of approximately 1.1 dB(A) and 0.6 dB(A) respectively.

It is generally accepted that a change of less than 2 dB(A) in noise level is undetectable to the human ear (Heggies 2006) and also satisfies the noise assessment criteria (refer **Section 3.1.5**). Therefore, it is not anticipated that there will be an adverse impact on residents due to WIPS Management-generated traffic.

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### 4.4 Construction Noise Impact

The WIPS Management facility will be constructed in an area close to the centre of the HEZ (refer to **Figure 1-1**). As such there is unlikely to be an intrusive noise impact at the nearest sensitive receivers, resultant from construction works.

The closest residential receivers will be in excess of 5 km from the WIPS Management construction site. The large distance identified between the noise source and receivers will ensure that an adverse noise impact during construction is unlikely.

Typical construction equipment generates a sound power level in the order of 100 – 110 dB(A). On this basis, with several items of machinery operation at once; and considering measured background noise levels of over 30 dB(A) during the daytime construction hours; construction noise at the nearest sensitive receiver up to 5 km from the source would likely be below audible levels.

# 5. Discussion and recommendations

The WIPS Management site is a considerable distance from any sensitive receiver, with the closest dwelling being approximately 5 km to the north. Based on noise emission data provided by WIPS Management (2006a) and the proposed layout and construction materials of the plant, it is very unlikely emissions from the plant would be audible at sensitive receivers.

Therefore, considering the proposed distribution of noise limits over major zones within the HEZ, the contribution from WIPS Management would be minor and would not exceed the contribution limit for any assessment period.

However, prior to further substantial development within the HEZ, the major zones should be established and applicable noise limits determined in order to permit advanced noise planning for additional developments. Zone noise limits should be based on measured background noise levels in a number of locations as well as the actual contribution of each zone to sensitive receivers' noise levels considering noise propagation factors such as distance, topography, prevailing weather conditions and natural and man-made barriers.

A summary of noise mitigation measures, in addition to those already incorporated into WIPS Management's designs, is provided in **Table 5-1**.

- **Table 5-1 Summary of design and operational noise mitigation measures.**

| Heading | Heading |
|---|---|
| **Equipment selection** | Selected equipment should be the quietest reasonably available. |
| | Noisy equipment such as outdoor pumps should be accommodated behind structures, which act as barriers, or inside enclosures. |
| | To minimise wear and reduce direct and regenerated noise emissions from vibrating equipment, it should be appropriately mounted so as to prevent vibrations translating to the building structure and floor and should be regularly maintained. |
| **Building design** | By introducing sound absorbing materials on large reflective surfaces such as ceilings, reverberation and indoor noise levels would be reduced, minimising occupational noise exposure and environmental noise emissions. |
| | The locations, size and type of openings such as doors, windows and vents should be considered during design. |
| | Acoustic louvres should be provided where ventilation is required on facades which face sensitive receivers. |
| | Where possible, doors and windows should be located on façades that do not face sensitive receivers. |
| **Equipment maintenance** | Equipment should be regularly and effectively maintained. |

# 6. Conclusions

WIPS Management Australia Pty Ltd (WIPS Management) proposes to establish a manufacturing plant for wall and floor panels south of Kurri Kurri in NSW. The proposed plant would be part of a new major industrial estate, the Hunter Economic Zone (HEZ).

In order to proceed with a major project application, the Director-General has requested an assessment of likely noise impacts on sensitive receivers, which is to be undertaken with consideration of the Environmental Management Strategy for Noise.

Project specific noise limits were based on intrusiveness criteria recommended by the DEC. Ideally a single set of noise criteria would apply to all major zones and developments within the HEZ. However, designation of the major zones and undertaking sufficient background noise monitoring to determine noise limits was outside the scope of this assessment.

The WIPS Management plant would be constructed using tilt-up concrete panels with a steel cladding roof. The majority of noise sources such as conveyors, saws and extraction fans would be located inside the building, with a small number of pumps outside. Based on equipment noise levels provided by WIPS Management, sound power emissions from each façade of the building were calculated.

In accordance with the INP and requirements of the HEZ Environmental Management Strategy, the noise impacts on sensitive receivers from operation of the WIPS Management plant were assessed by employing SoundPLAN V6.3, an acoustic modelling package, to predict likely noise levels in these locations.

The WIPS Management site is a considerable distance from any sensitive receiver, with the closest dwelling being approximately 5 km to the north. It is very unlikely emissions from the plant would be audible at sensitive receivers. Therefore, considering the proposed distribution of noise limits across major zones within the HEZ, the contribution from WIPS Management would be minor and would not exceed its zone's contribution limit for any assessment period.

In the context of current traffic volumes and the HEZ as a whole, the WIPS Management development will not significantly increase light or heavy traffic. Hence the increase in traffic noise levels at sensitive receivers is not likely to be significant.

Prior to further substantial development within the HEZ, the major zones should be established and applicable noise limits determined in order to permit advanced noise planning for additional developments.

# 7. References

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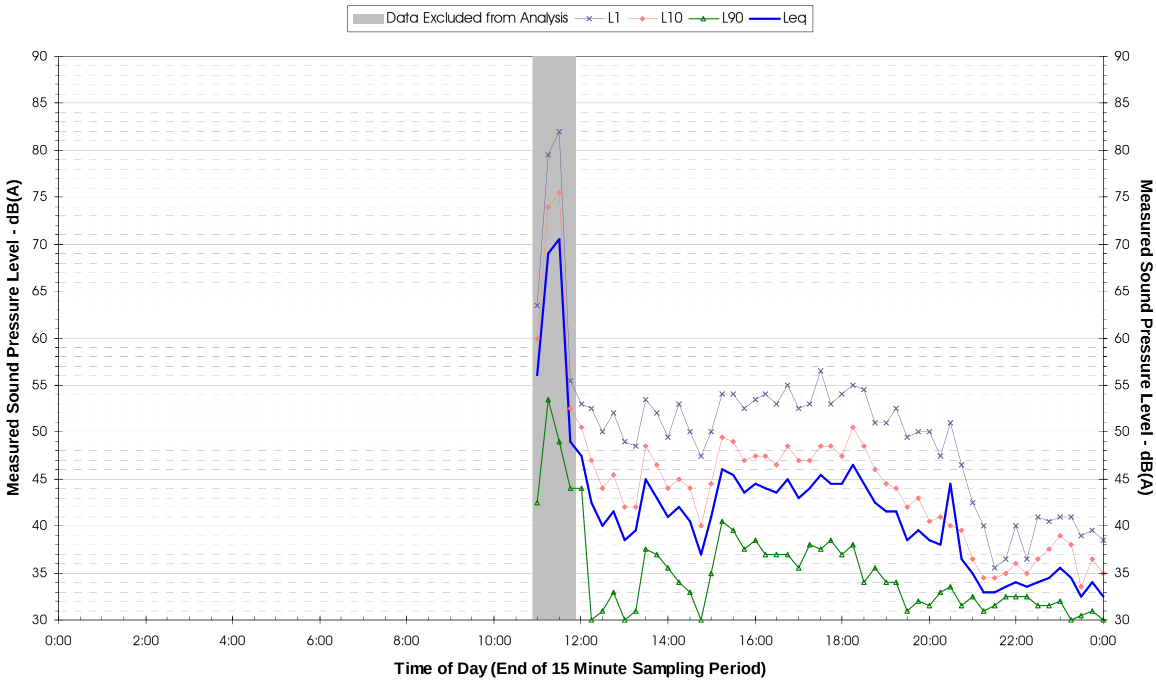
WIPS Management 2006b, Road network impact statement, WIPS Management Australia Pty Ltd.

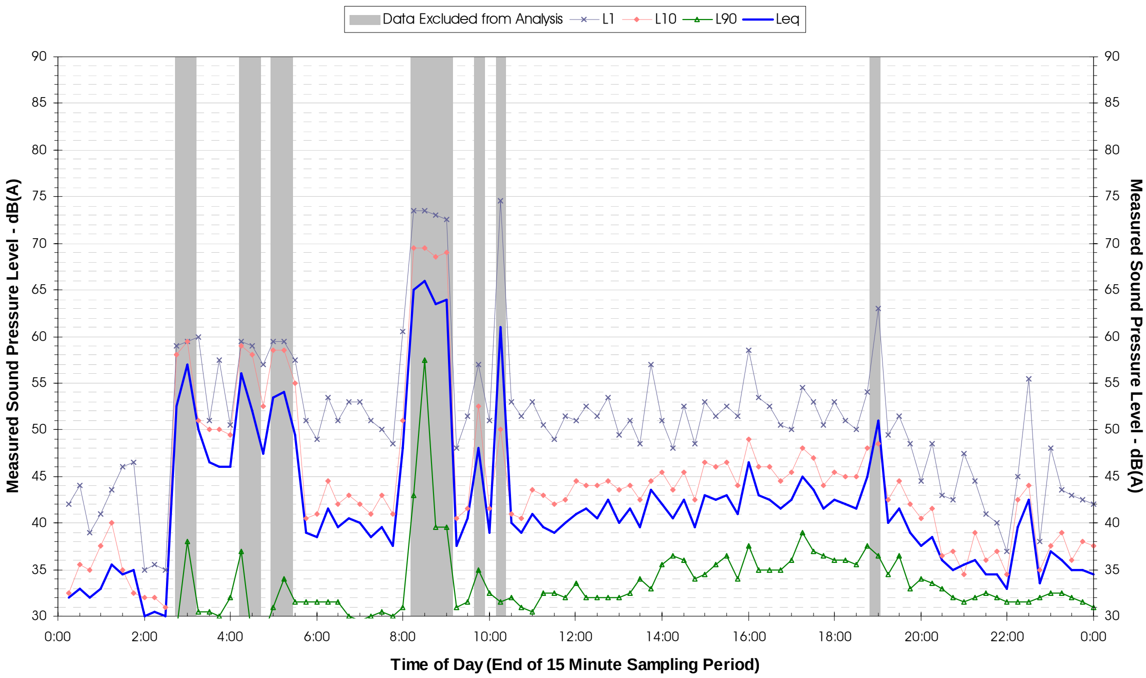
# Appendix A Ambient noise monitoring results

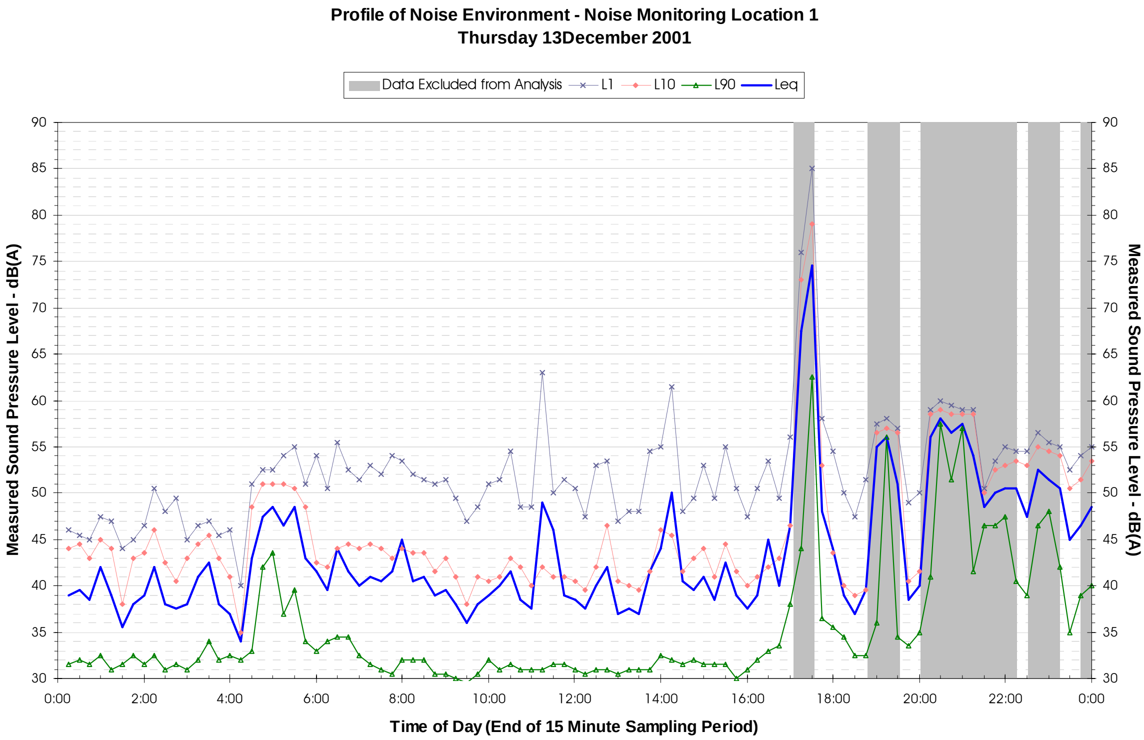
## A.1 Location 1

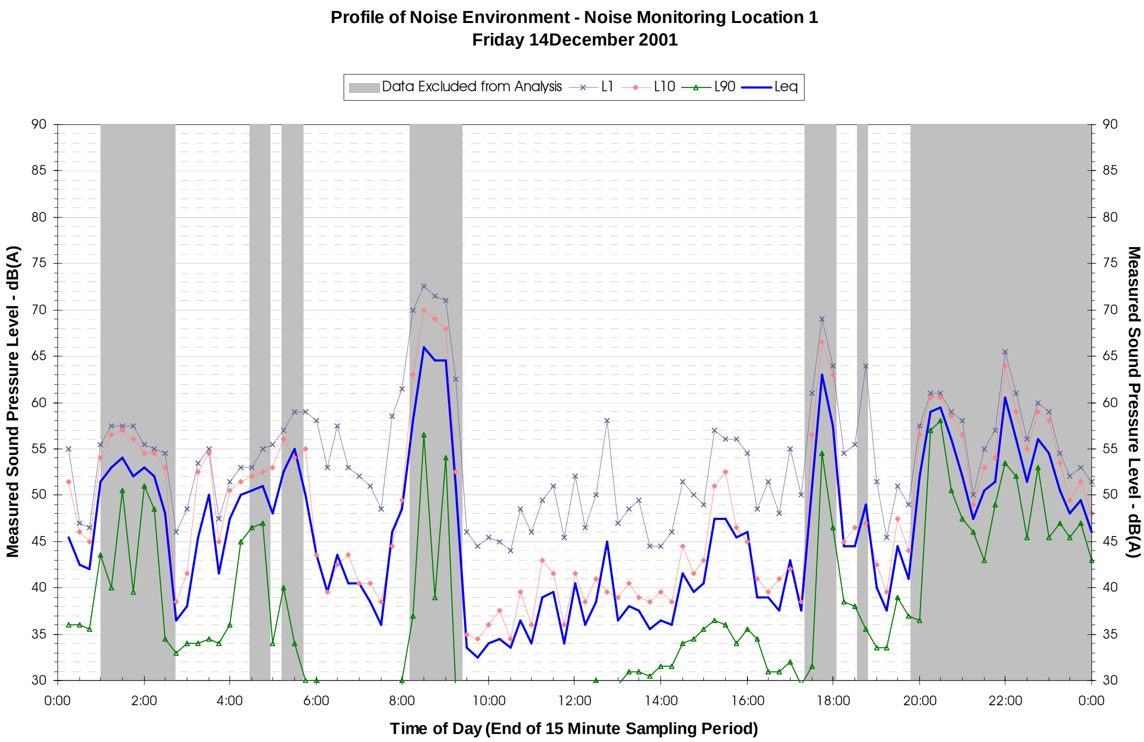
**Profile of Noise Environment - Noise Monitoring Location 1**
**Tuesday 11December 2001**



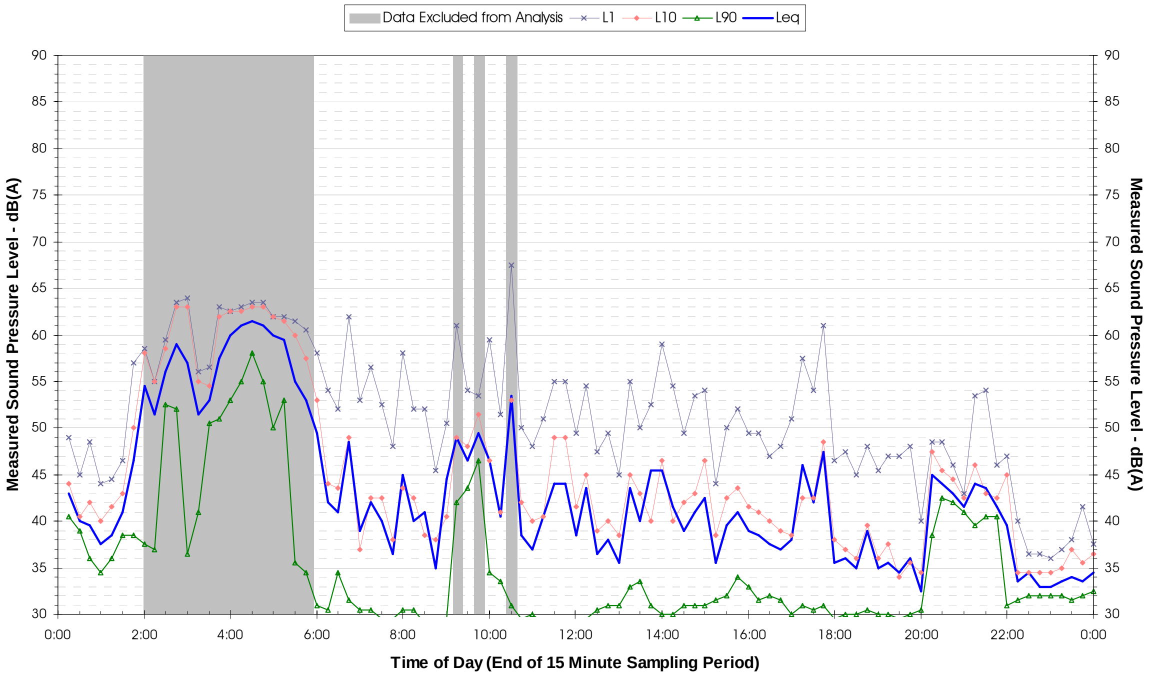

**Profile of Noise Environment - Noise Monitoring Location 1**
**Wednesday 12December 2001**



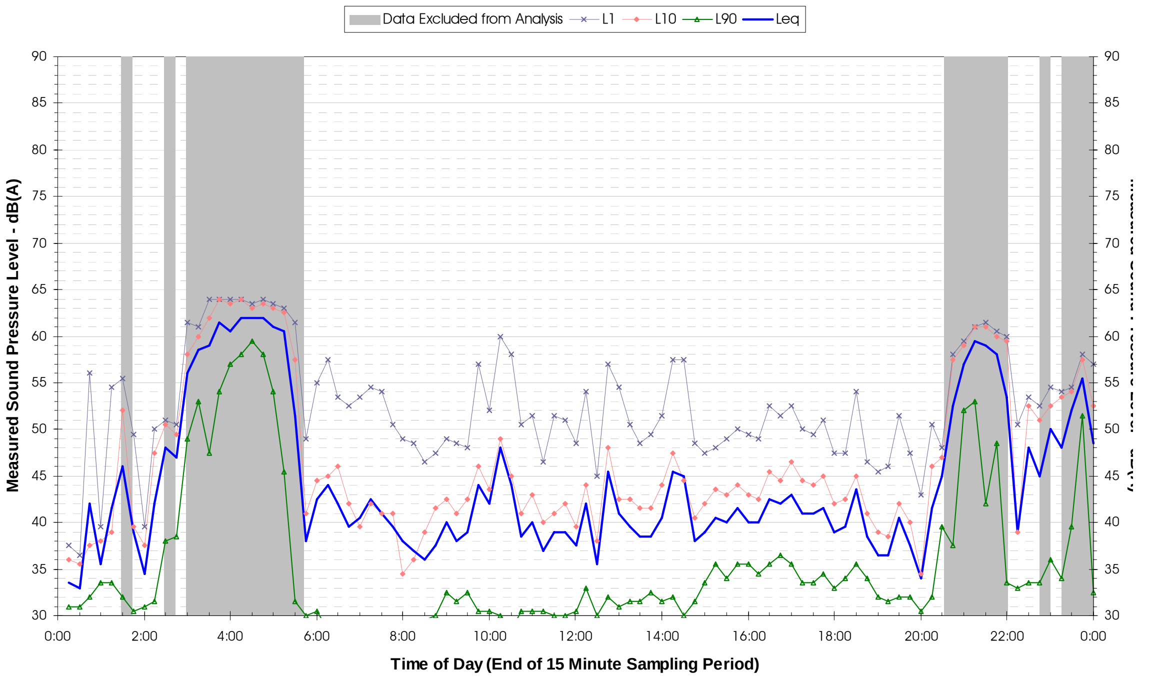

Profile of Noise Environment - Noise Monitoring Location 1
Thursday 13December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Noise Monitoring Location 1
Friday 14December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

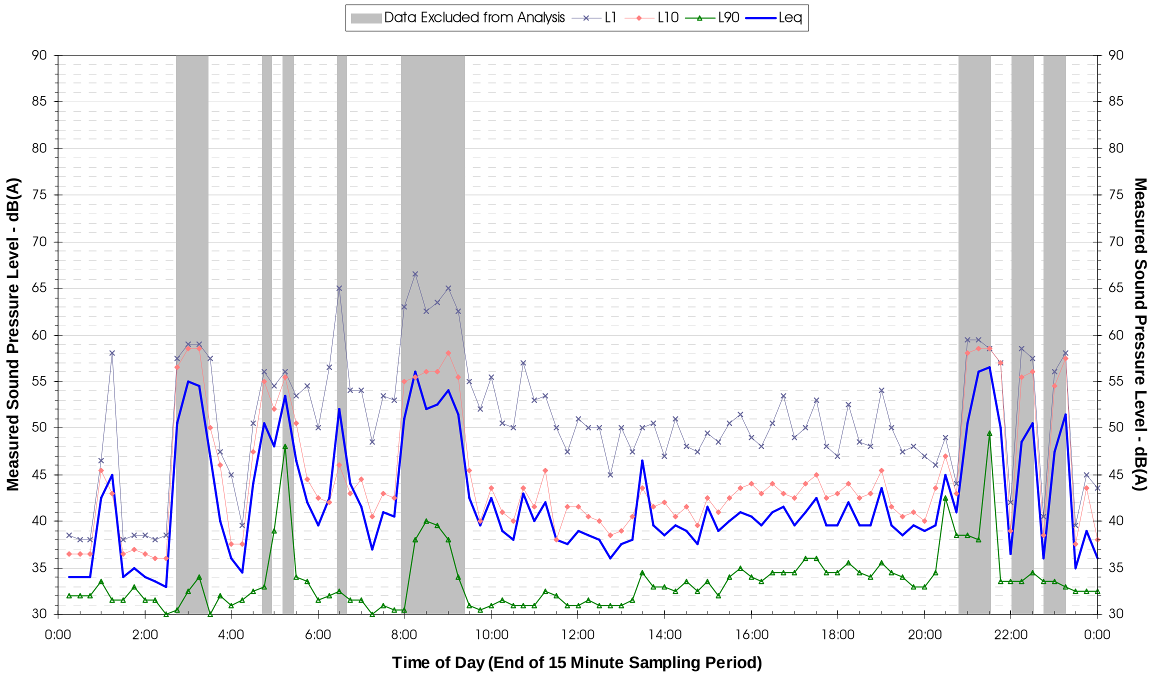
**Profile of Noise Environment - Noise Monitoring Location 1**
**Saturday 15December 2001**



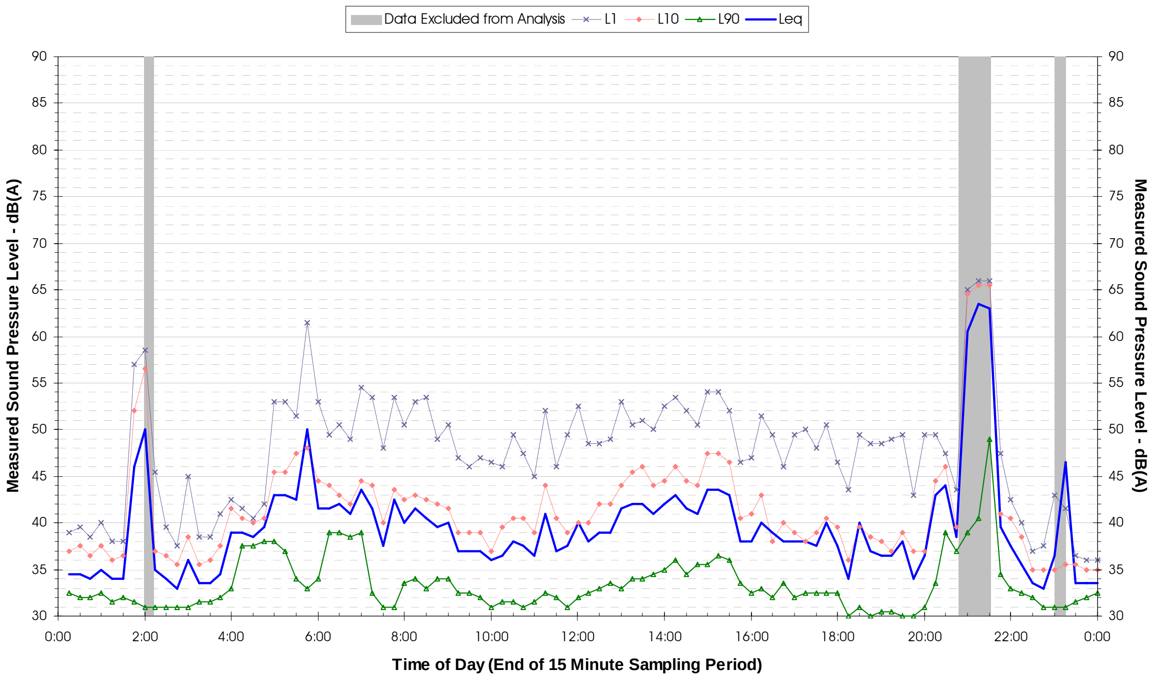

**Profile of Noise Environment - Noise Monitoring Location 1**
**Sunday 16December 2001**

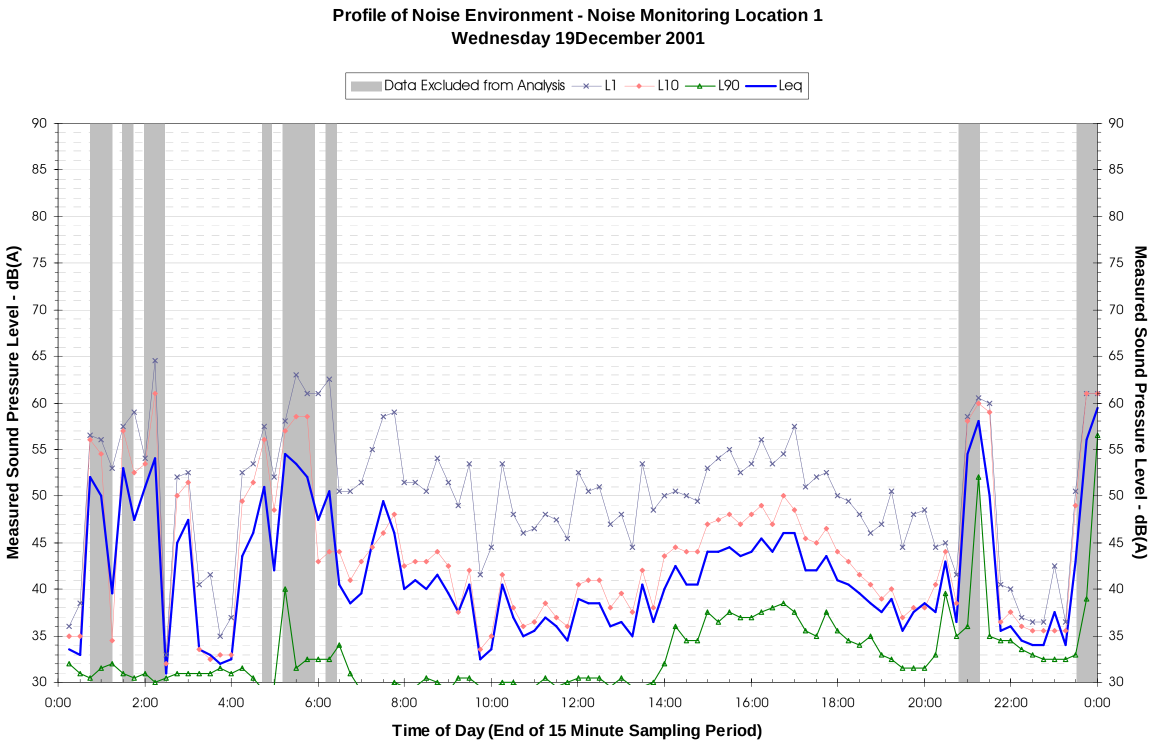


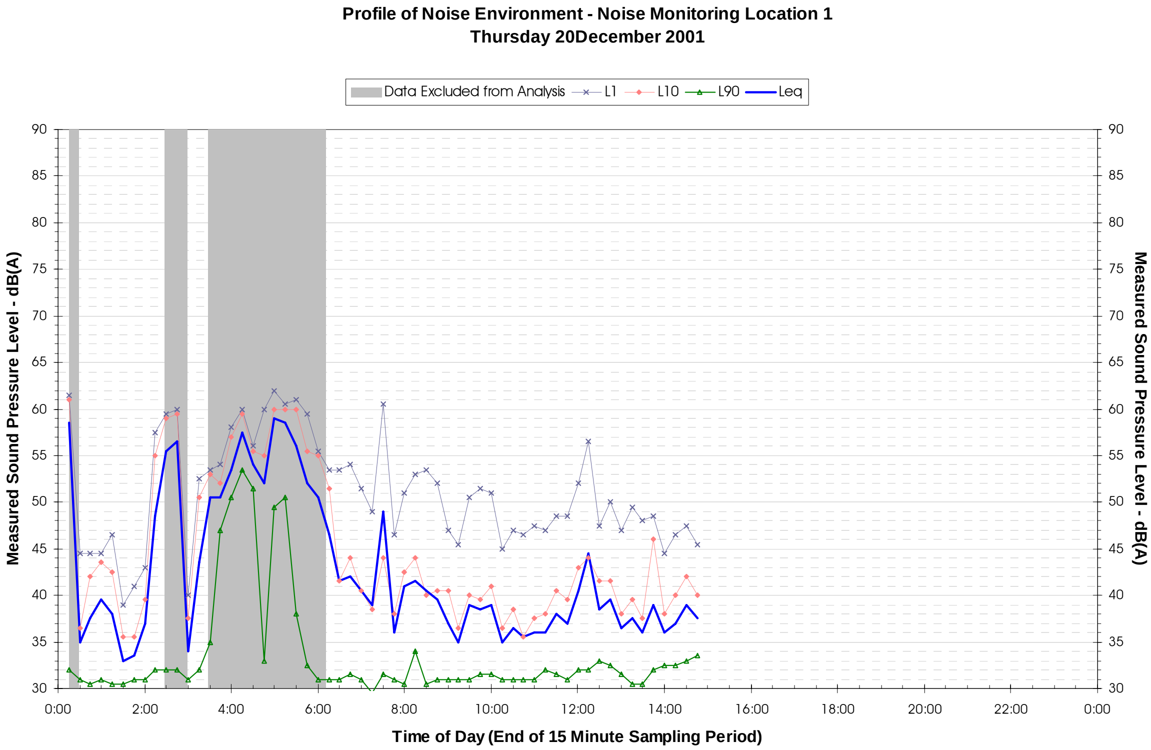
**Profile of Noise Environment - Noise Monitoring Location 1**
**Monday 17December 2001**



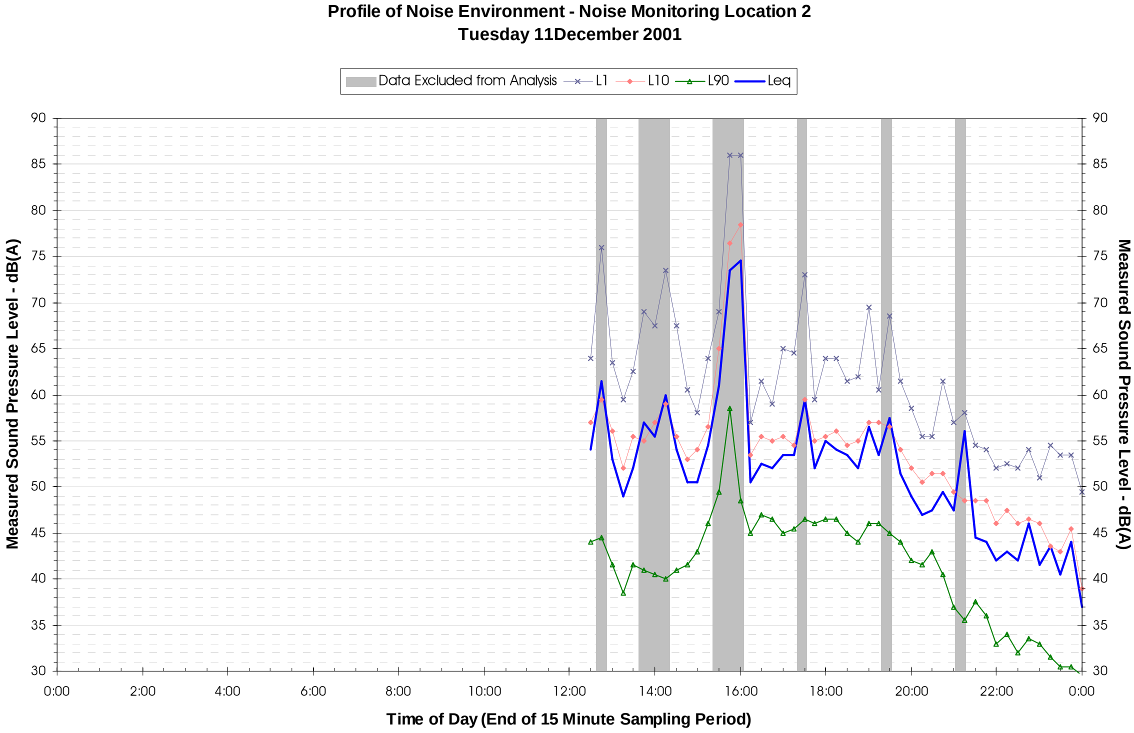

**Profile of Noise Environment - Noise Monitoring Location 1**
**Tuesday 18December 2001**

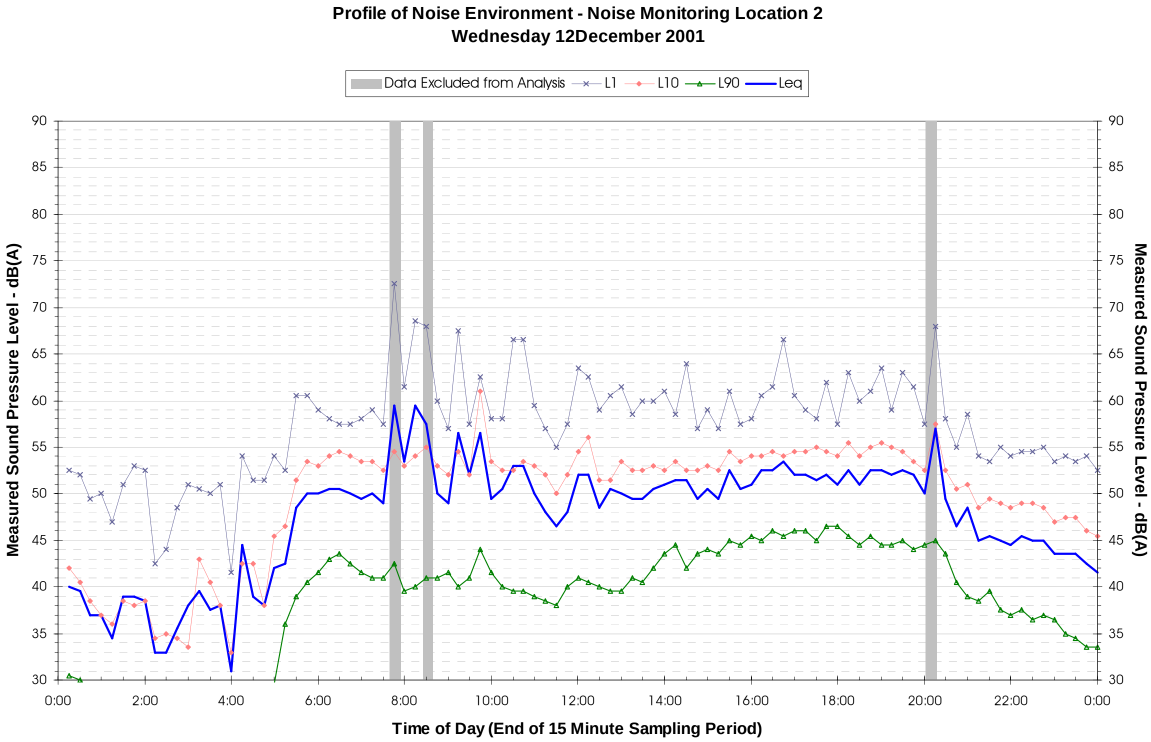


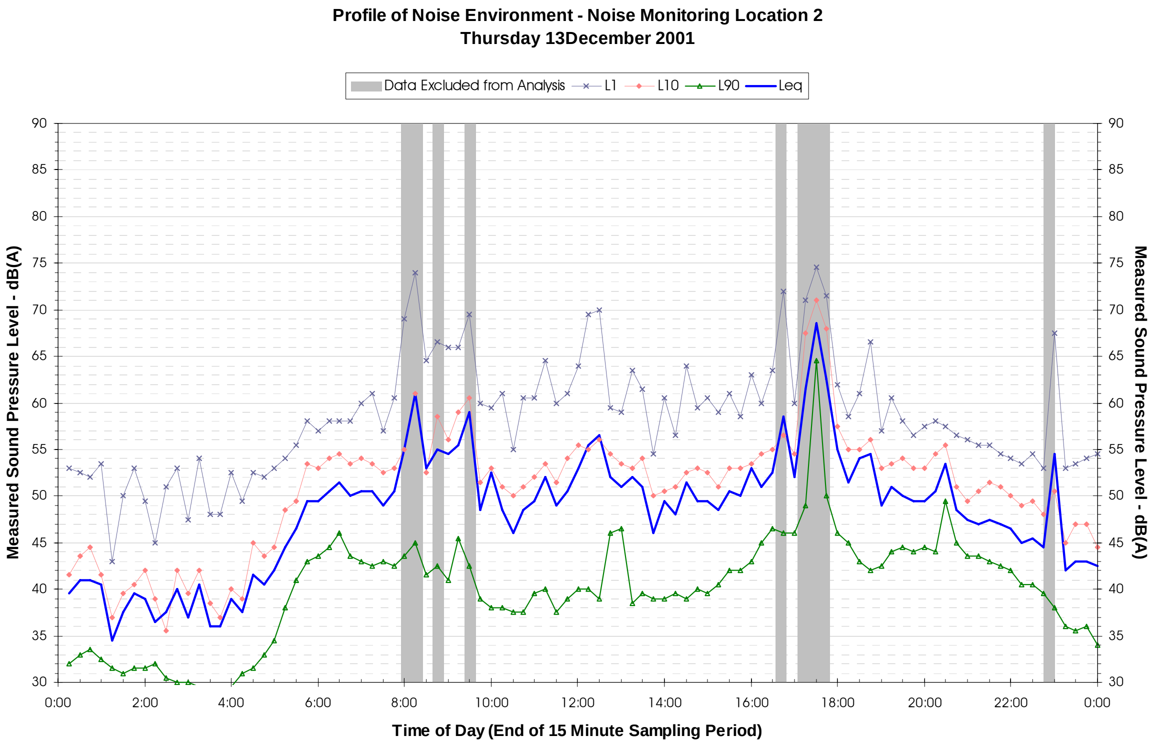

Profile of Noise Environment - Noise Monitoring Location 1
Wednesday 19December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)
30
35
40
45
50
55
60
65
70
75
80
85
90
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00

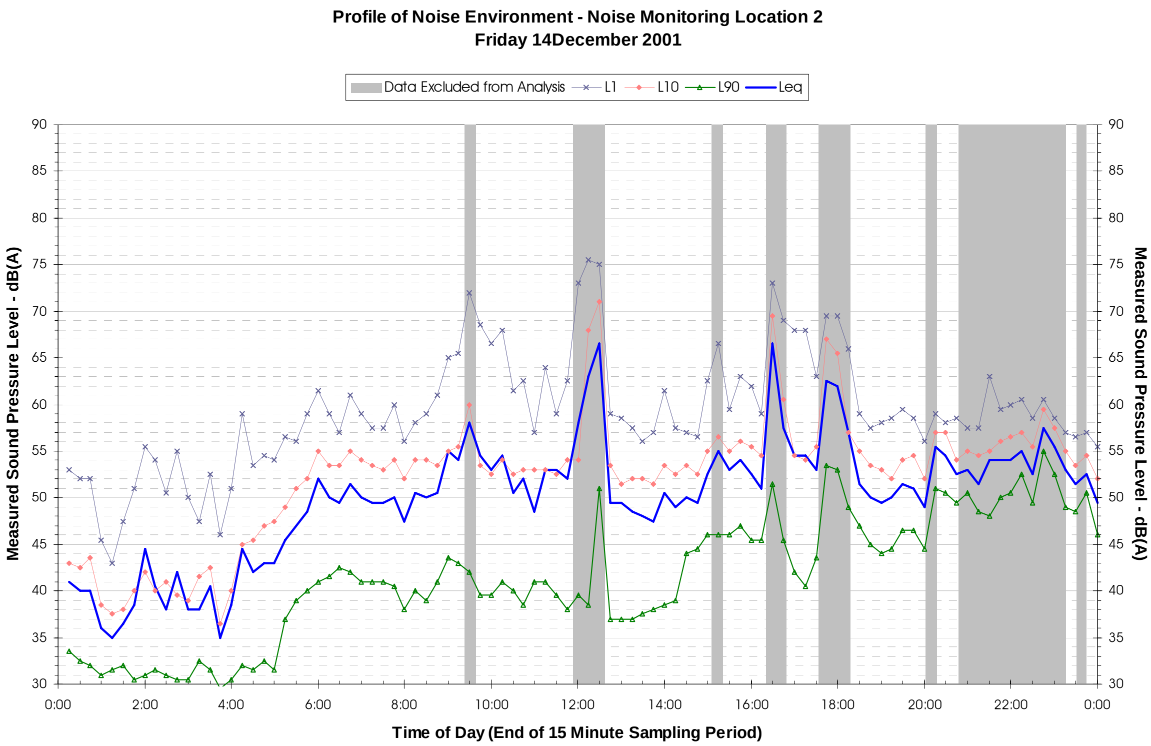

Profile of Noise Environment - Noise Monitoring Location 1
Thursday 20December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)
30
35
40
45
50
55
60
65
70
75
80
85
90
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00

## A.2 Location 2

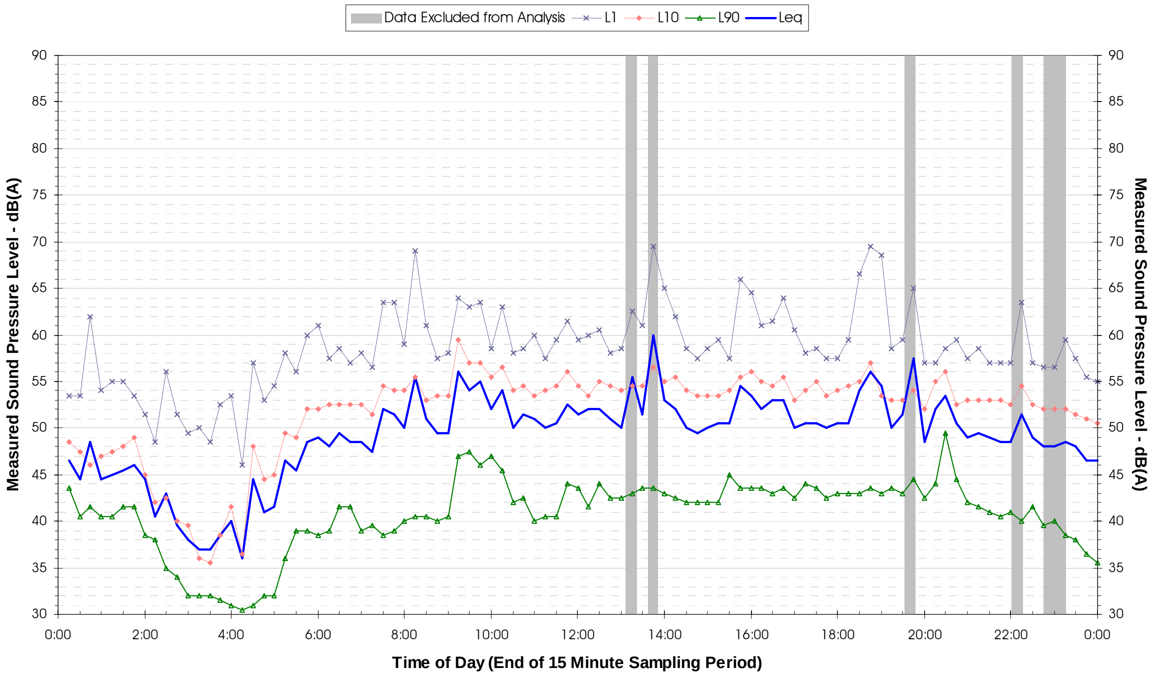


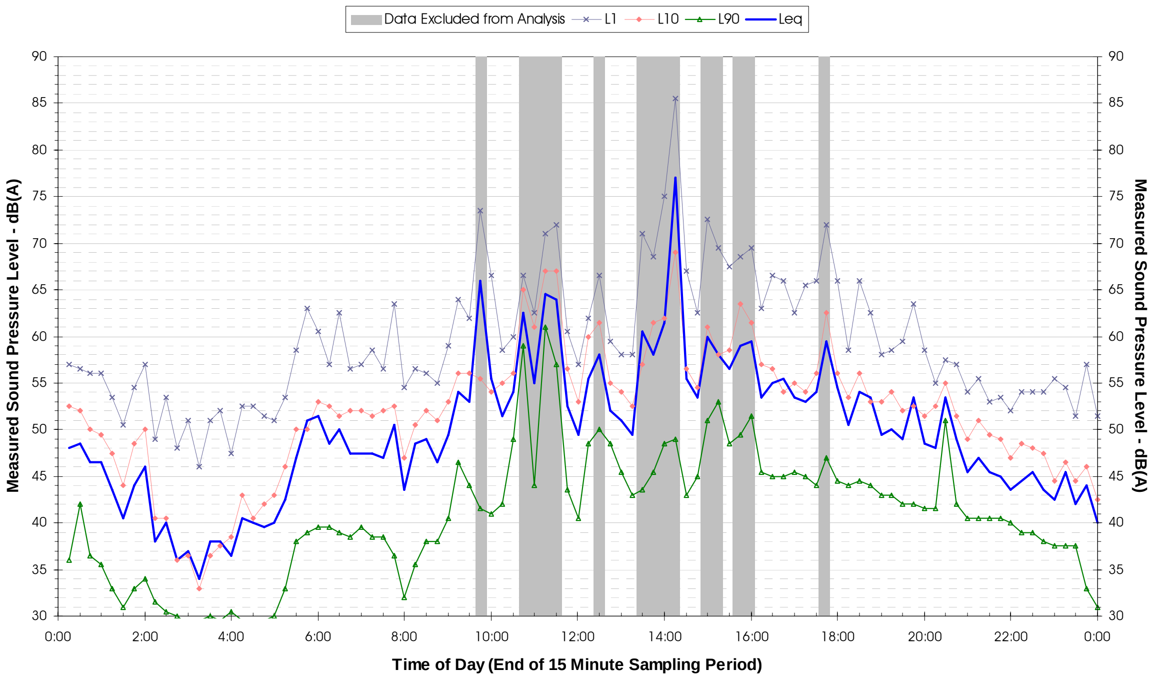

Profile of Noise Environment - Noise Monitoring Location 2
Thursday 13December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

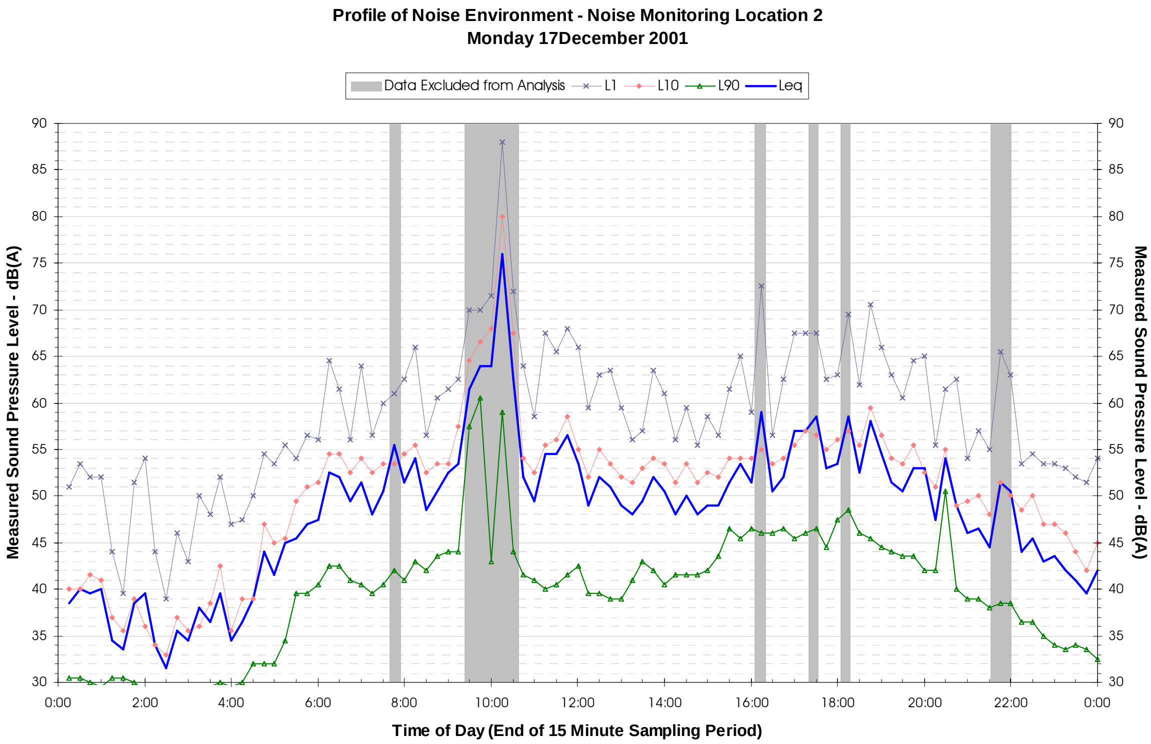

Profile of Noise Environment - Noise Monitoring Location 2
Friday 14December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

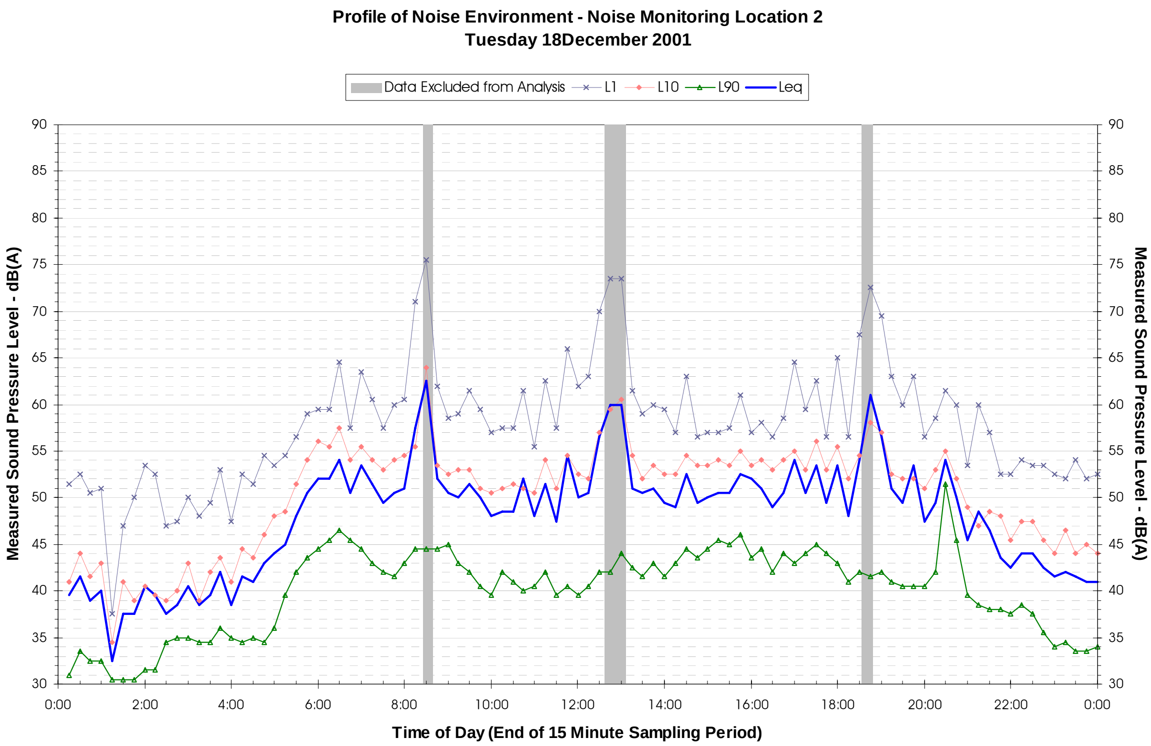
**Profile of Noise Environment - Noise Monitoring Location 2**
**Saturday 15December 2001**




**Profile of Noise Environment - Noise Monitoring Location 2b**
**Sunday 16December 2001**




Profile of Noise Environment - Noise Monitoring Location 2
Monday 17December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)


Profile of Noise Environment - Noise Monitoring Location 2
Tuesday 18December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

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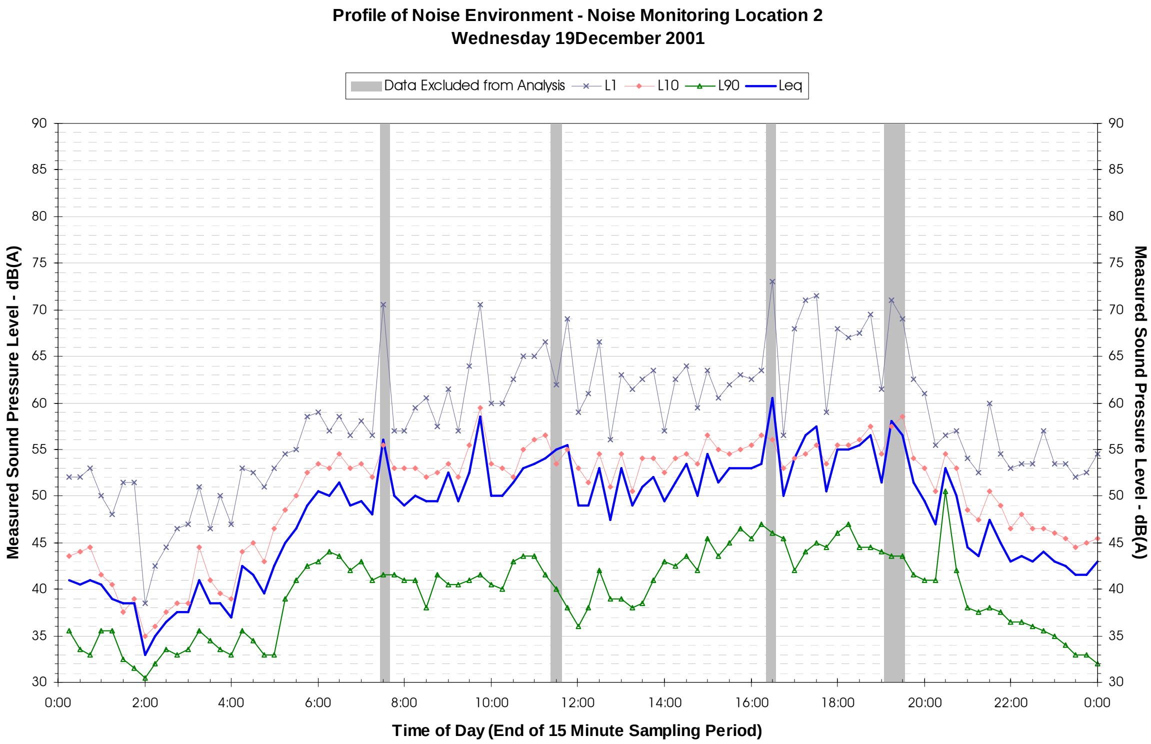
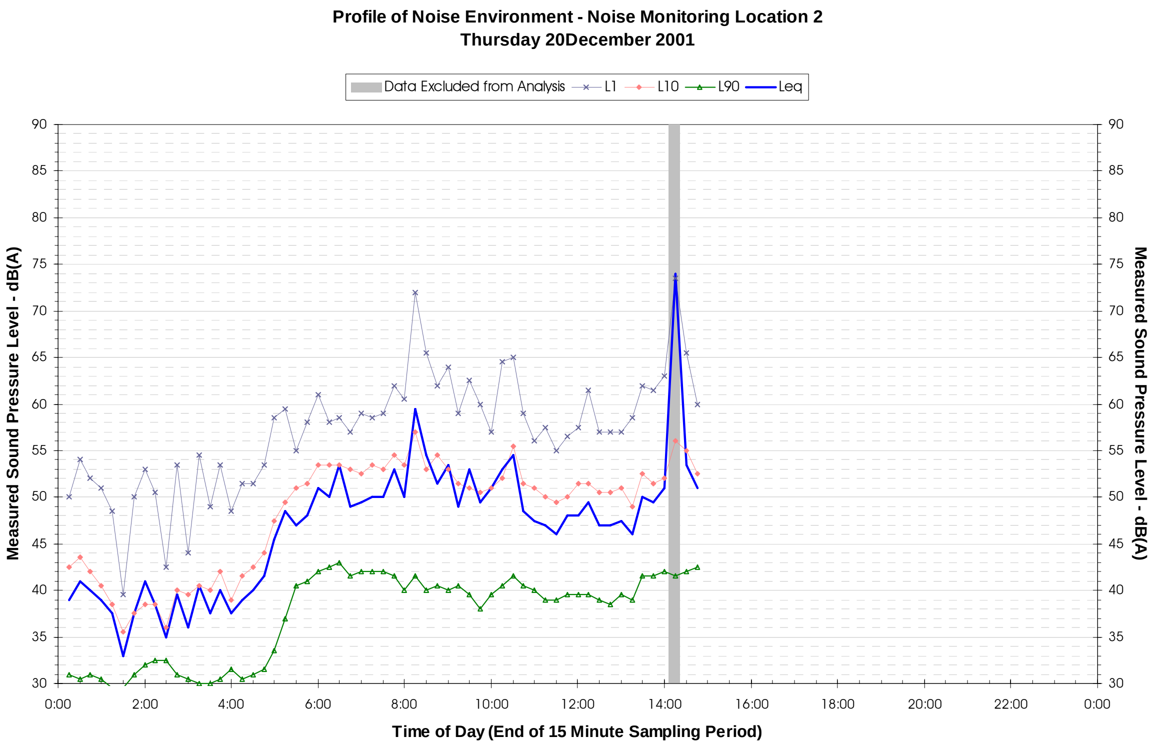


Profile of Noise Environment - Noise Monitoring Location 2
Wednesday 19December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

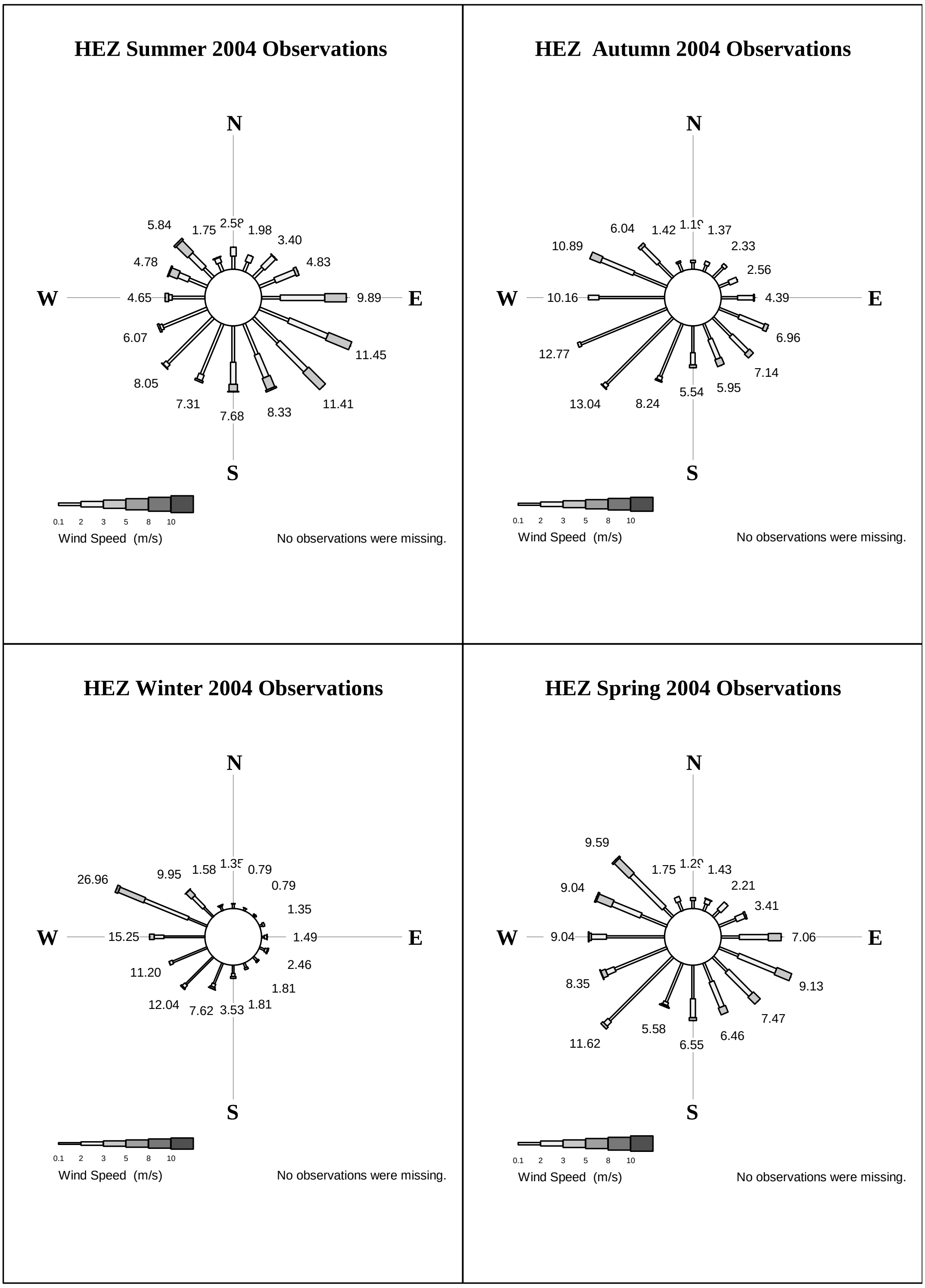



Profile of Noise Environment - Noise Monitoring Location 2
Thursday 20December 2001
Data Excluded from Analysis
L1
L10
L90
Leq
Measured Sound Pressure Level - dB(A)
Time of Day (End of 15 Minute Sampling Period)

SKM

# Appendix B HEZ wind roses

- **Figure B-7-1 HEZ seasonal wind roses 2004 observations.**



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- **Figure B-7-2 HEZ Night time Seasonal Wind Roses 2004 Observations**