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# Environmental Noise Assessment

April to June 2014

Wilpinjong Coal Mine

11 February, 2015
Rev 0 (Final)

## Report Details

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# 1. INTRODUCTION

Advitech Pty Limited was engaged by Peabody Energy Australia to collate, analyse and report on continuous environmental noise monitoring in the rural community adjacent to the Wilpinjong Coal Mine (WCM). The objective of the environmental monitoring is to assess the mining noise impacts on adjacent sensitive receivers and determine if these impacts meet consent conditions specified in the Environmental Protection Licence (EPL 12425) and Project Approval (PA 05_0021).

This report presents continuous noise data at the Wandoona, Araluen and Central Wollar monitoring locations, for the period 1 April to 30 June, 2014 (the monitoring period).

It should be noted that this report was prepared by Advitech Pty Limited for Peabody Energy Australia ("the customer") in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

## 1.1 Objectives

The objective of this report is to monitor mining noise impacts in the receiving environment and determine if these impacts generally comply with consent conditions, as specified in the Project Approval (05_0021). In accordance with provisions established in Section 5 of the WCM Noise Management Plan (NMP), WCM utilise:

- operator attended monitoring to evaluate compliance with statutory noise criteria; and
- real time unattended monitoring to assist with ongoing management of noise impacts.

Analysis of continuous monitoring data contained in this report is provided to assist with evaluation of the performance of mine noise management practices. Where this analysis identifies noise levels approaching (or exceeding) the noise criteria, supplementary operator attended monitoring would be employed to evaluate compliance with the Project Approval.

On this basis, analysis of continuous unattended noise monitoring data is not presented as an assessment of compliance.

## 1.2 Environmental Monitoring Program

Environmental noise monitoring was undertaken in the area surrounding the WCM using three SentineX continuous monitoring systems. The monitoring systems were located at the following properties as shown in **Figure 1**:

- SentineX 31- Wandoona monitoring location (1 1 April to 30 June, 2014);
- SentineX 30 – Araluen Lane (1 April to 30 June, 2014); and
- SentineX 33 - Central Wollar (1 April to 30 June, 2014).

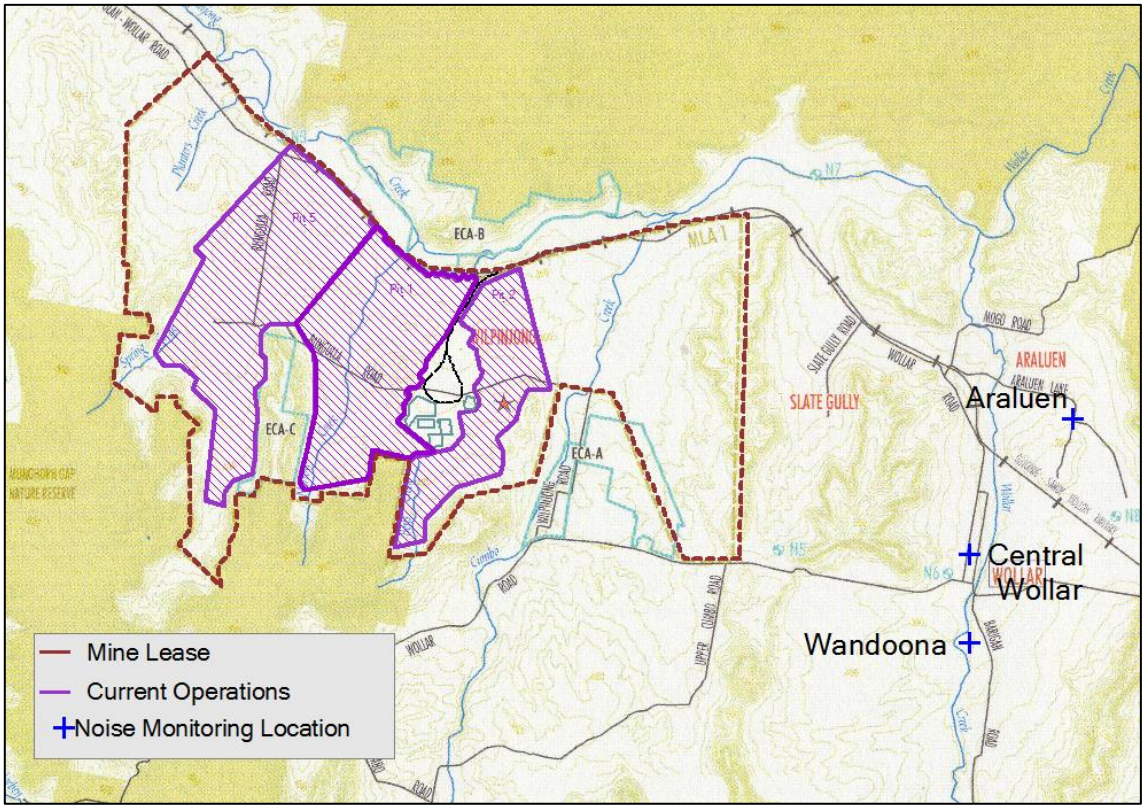


**Figure 1: Location Map**
(Source: Adapted from Wilpinjong Coal Project EIS, Appendix D, Resource Strategies)

## 1.3 Mining Operations

Mining of ROM Coal at WCM involves conventional drill and blast, truck and shovel open cut extractive methods with on-site coal handling. Approved mining operations include:

- extraction of up to 28 Mbcm of waste rock by dozer pushing or 'throw blasting', including progressive rehabilitation of mine rock waste emplacements;
- selective mining of coal and haulage to the ROM stockpile (ROM Coal Production rate of up to 15 Mtpa);
- 24 hour operation of the Coal Handling and Processing Plant (CHPP) capable of processing up to 8.5 Mtpa of ROM coal; and
- loading of product coal and transport by rail with up to a maximum of 10 laden trains per day leaving the mine along the Sandy Hollow – Gulgong railway.

# 2. NOISE MONITORING PROGRAM

## 2.1 Continuous Environmental Noise Monitoring

Noise monitoring was undertaken using three SentineX continuous monitoring systems in the receiving environment adjacent to WCM operations. The SentineX unit is a remote noise monitoring system which provides near-real time data access via a dedicated website. The noise monitoring system (including a Type 1 sound level meter) records the following parameters:

- 15 minute statistical data ($L_{A1}$, $L_{A10}$, and $L_{A90}$);
- $L_{Aeq,15minute}$ and $L_{Aeq,period}$ noise levels;
- $L_{Aeq,1minute}$ in 1/3 octave;
- $L_{Aeq,15minute}$ in the 20 to 630 Hz range ($L_{Aeq,LF}$);
- digital audio recording 24 hours per day; and
- wind direction, wind speed, temperature, humidity and rainfall.

### 2.1.1 Assessment Criteria

Wilpinjong Coal Mine (WCM) operates in accordance with conditions established in EPL 12425 and PA 05_0021. Noise criteria are designated under these instruments to ensure operations at the mine do not negatively impact on the surrounding environment with regard to noise. **Table 1** details the noise performance criteria for each monitoring location.

**Table 1: Environmental noise limits (dB(A))**

| Criteria | Central Wollar | Araluen | Wandoona |
|---|---|---|---|
| $L_{Aeq,15minute}$ | | | |
| Day | 36 | 35 | 35 |
| Evening | 35 | 35 | 35 |
| Night | 35 | 35 | 35 |
| $L_{Aeq,period}$* | | | |
| Night | 40 | 40 | 40 |
| $L_{A1.1minute}$ | 45 | 45 | 45 |

*Acceptable $L_{Aeq,night}$ noise level for Rural receiver types, as established in Section 2 of the INP.

The EPL states:

- a day is defined as the period from 7 am to 6 pm Monday to Saturday, and 8 am to 6 pm Sundays and public holidays;
- an evening is defined as the period from 6 pm to 10 pm; and
- a night is defined as the period from 10 pm to 7 am Monday to Saturday, and 10 pm to 8 am Sundays and public holidays.

The EPL also stipulates the location of the monitoring equipment. Noise from the WCM is to be measured at the most affected point on or within the residential boundary or at the most affected point within 30 metres (m) of the dwelling where the dwelling is more than 30 m from the boundary.

The EPL and Project Approval state the noise limits identified in **Table 1** apply under meteorological conditions of:

- wind speeds of up to 3 m/s at 10 m above ground level; or
- temperature inversion conditions of up to 3°C/100 m and wind speeds of up to 2 m/s at 10 m above ground level.

Direct measurement of vertical temperature gradient is used to monitor and evaluate atmospheric stability and inversion strength at WCM. The temperature lapse rate is calculated on the basis of temperature measurement data from sensors installed on a meteorological tower (at RL+2 m and RL +58 m) located within the WCM Rail Loop. For the purposes of this assessment, noise level data is also considered invalid if measured during periods of rainfall in accordance with Section 3.4 of the NSW Industrial Noise Policy (INP).

## 3. ASSESSMENT OF METEOROLOGICAL DATA

Meteorological data from the WCM meteorological station was analysed by assessment period (day, evening, and night) for wind speed, wind direction, rainfall and atmospheric stability. A summary of meteorological results is presented in **Table 2**.

**Table 2: Meteorological data summary results**

| Property | Period | Frequency |
|---|---|---|
| Data Availability | All | 100% |
| Adverse Meteorology | All | 20% |
| Rainfall | All | 3% |
| Wind, >3ms | Day | 35% |
| | Evening | 20% |
| | Night | 20% |
| Measured Lapse >+3degC/100m | Night | 6% |

### 3.1 Assessment of Wind-rose Data

Calm conditions (<0.4 m/s) were experienced for approximately 35% of the monitoring period (all periods) and 58% during the night. **Figure 2** indicates winds were observed more frequently from the east and west during all time periods. Easterly and westerly winds were also frequently observed during the night period, as shown in **Figure 3**.

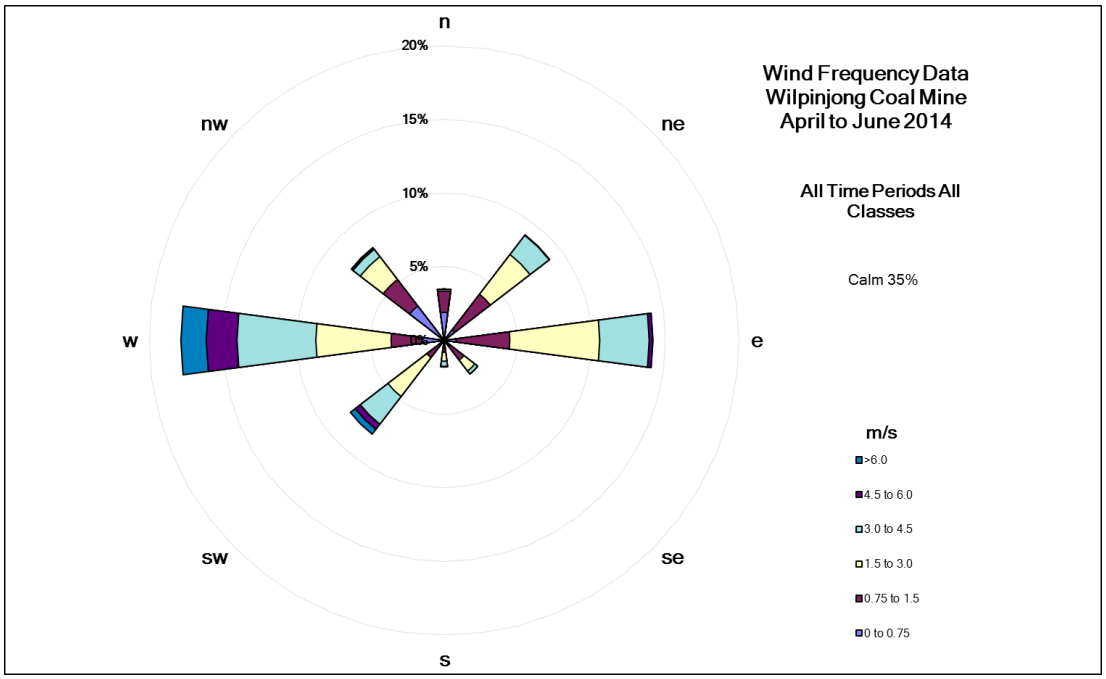


**Figure 2: Wind rose for all periods, all classes**

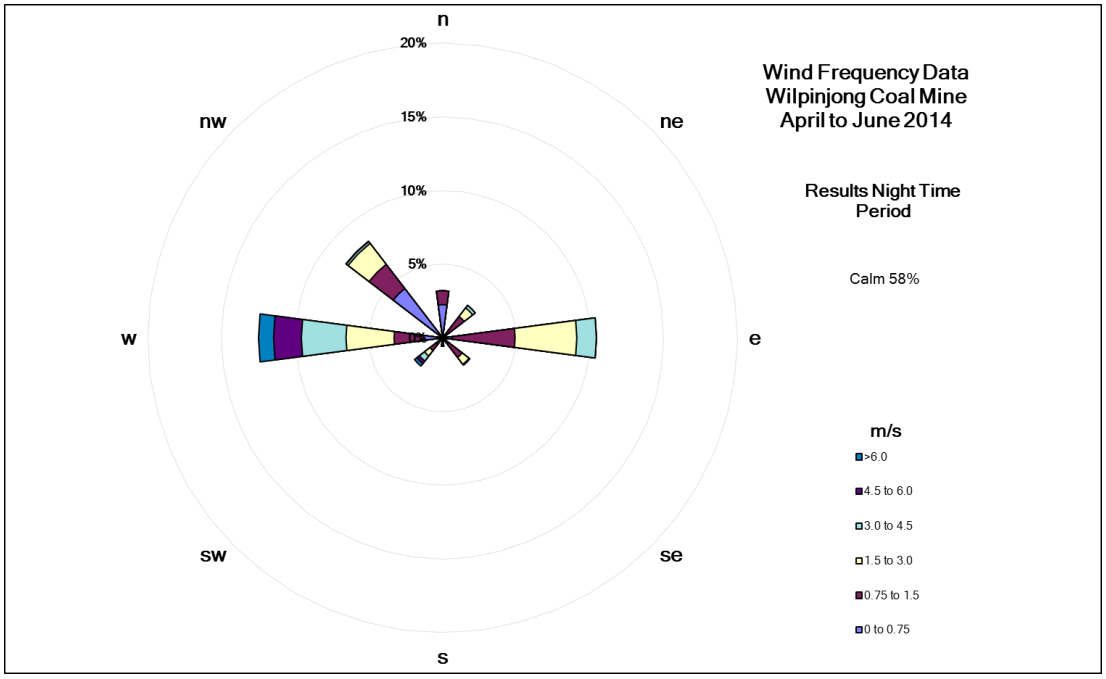


**Figure 3: Wind rose for night period, all classes**

## 3.2 Assessment of Atmospheric Stability Data

Analysis of the prevailing atmospheric stability conditions during the April to June, 2014 period is presented in **Figure 4**. Atmospheric stability classes for the period April to June, 2014, were evaluated in accordance with the sigma-theta methodology presented in Appendix E of the NSW Industrial Noise Policy. The results indicate moderate (F-class) and strong (G-class) temperature inversions (and associated potential for enhanced noise propagation) were present for approximately 8% of the night during the monitoring period.

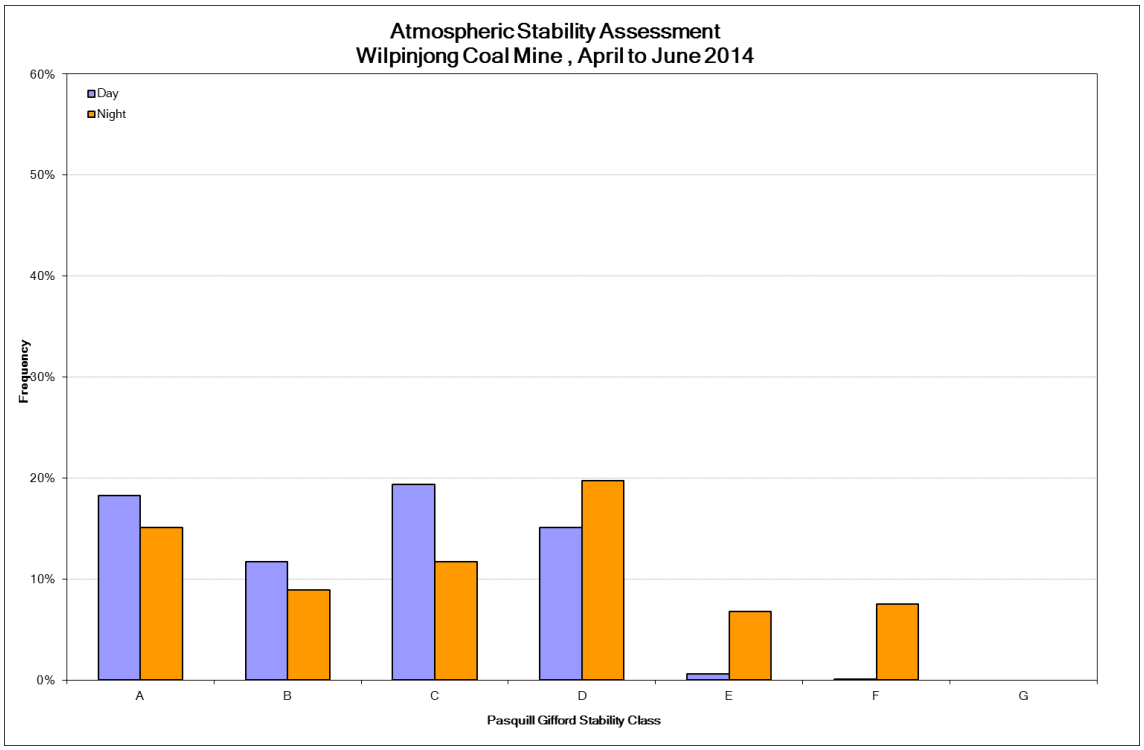


**Figure 4: Assessment of temperature inversion frequency**

Additional analysis of temperature inversion strength and frequency from direct measurement data was undertaken for the monitoring period and is presented in **Figure 5**. This analysis demonstrates that temperature inversion conditions (lapse rates > +3˚C/100m) were observed at a lower frequency than indicated by application of the sigma theta method.

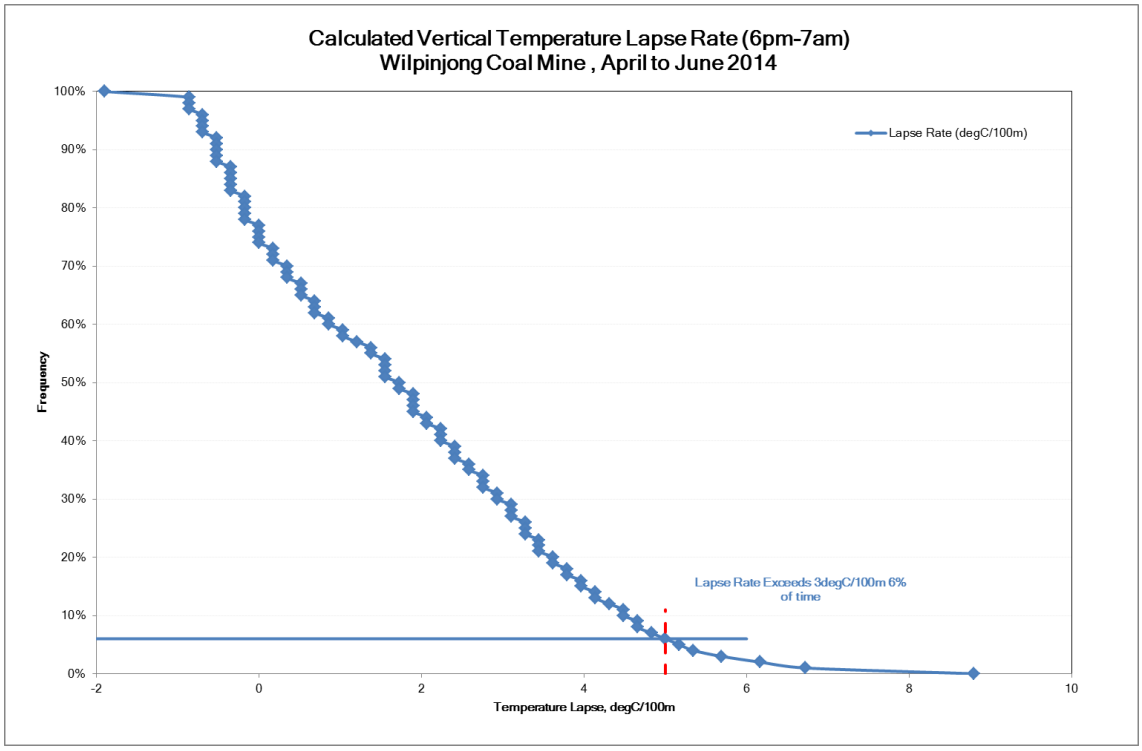


**Figure 5: Temperature lapse rates, direct measurement analysis**

# 4. CONTINUOUS NOISE MONITORING DATA

## 4.1 Data Filtering and Exclusion Rules

### 4.1.1 Meteorological Exclusions

Monitoring data is compiled as a statistical cumulative frequency distribution histogram to show the percentage of time during the monitoring period that noise limits are exceeded. When filtered to exclude data captured during periods of adverse meteorology, the cumulative distribution curves for $L_{AeqLF,15minute}$ noise levels are compared to the noise limits for that receiver specified in the EPL. Justification for the application of the $L_{AeqLF}$ descriptor is provided in **Section 4.1.2**.

The following rules are applied to exclude continuous monitoring data based on adverse meteorology:

1. 10 m wind speed greater than 3 m/s (observed at the WCM meteorological station); or
2. presence of vertical temperature lapse rates exceeding 3°C/100 m (as indicated by G-class Pasquill Gifford atmospheric stability or direct measurement data); or
3. rainfall (observed by the SentineX unit at the receiver location).

Conditions 1 and 2 are applied in accordance with Condition L6.4 of the EPL. The application of Condition 3 is not expressed in the WCM Project Approval or EPL; however, application of this exclusion rule is recommended in Section 3.4 the INP:

> *Noise monitoring should not be conducted (or the data should be excluded) when average wind speeds (over 15 minute periods or shorter) at microphone height are greater than 5 m/s, or when rainfall occurs. Exceptions to this rule are allowed, provided the proponent is able to show that the wind induced noise on the microphone, and sound levels due to rain are at least 10 dB below the noise levels (that is, background and/or ambient) under investigation.*

### 4.1.2 Application of the $L_{Aeq}$ and $L_{AeqLF}$ Descriptors

The $L_{Aeq}$ descriptor describes the energy equivalent average noise level, and is influenced by extraneous noise sources including livestock and early morning bird activity, and often represents an over-estimate of the contribution from mining operations. The low frequency noise component ($L_{AeqLF}$) comprises noise in the 20 Hz to 630 Hz range, and is considered representative of the contribution of measured noise levels associated with mining operations.

### 4.1.3 Conditional Data Exclusion

The WCM Noise Monitoring Programme (NMP) outlines additional criteria against which extraneous noise impacts may be routinely excluded from the monitoring data. These conditional exclusion rules facilitate a means of determining the impact of non-mining sources on measured noise levels and assessing the contribution of mining noise. The conditional rules are applied to the *as measured* monitoring data and exclude results if:

1. the $L_{AeqLF}$ exceeds the $L_{A90}$ by more than 5 dB; or
2. the $L_{AeqLF}$ is greater than the $L_{A10}$; or
3. the $L_{AeqLF}$ exceeds the previous $L_{AeqLF}$ by more than 7 dB.

**Condition 1** can be applied because mine related noise is considered to be continuous and would be expected to influence the $L_{A90}$. If the $L_{AeqLF}$ is elevated but the $L_{A90}$ remains low, the noise source is considered to be transient and unlikely to be related to mining operations.

**Condition 2** can be applied because the $L_{A10}$ is influenced only by short term or intermittent noises such as barking dog or traffic noise. If the $L_{AeqLF}$ exceeds the $L_{A10}$, it is likely to be a transient source located close to the monitor and unlikely to be related to mining operations.

**Condition 3** seeks to remove data associated with transient noise sources that cause a rapid increase followed by a corresponding decrease in noise levels in excess of what could be reasonably attributable to continuous mining noise.

It is important to note that analysis of noise impacts using cumulative frequency distribution curves for filtered monitoring data does not identify the source of noise; only that specified noise levels have been exceeded.

## 4.2 Measured $L_{AeqLF,15minute}$ Cumulative Noise Level Results

### 4.2.1 Assessment of Wandoona Monitoring Data

**Figure 6** shows the cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels of the day, evening and night time periods at the Wandoona monitoring location. Application of standard data exclusion rules outlined in **Section 4.1** led to the exclusion of 39 % of the continuous monitoring data (all periods). **Figure 6** indicates that 'as measured' $L_{AeqLF,15minute}$ noise levels at the Wandoona monitoring location were above the 35 dB(A) night period criteria for 6 % of the monitoring period.

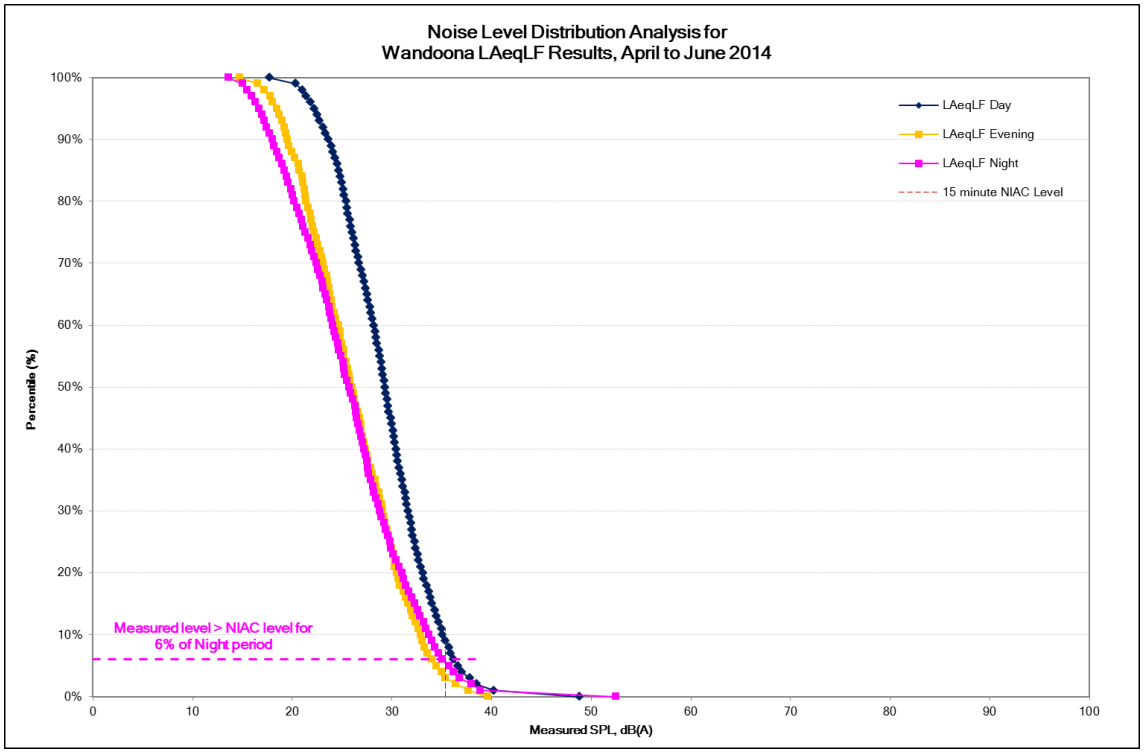


Figure 6: Day, evening and night noise levels at the Wandoona monitoring location

### 4.2.2 Assessment of Araluen Monitoring Data

**Figure 7** shows the cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels for the day, evening and night time periods at the Araluen monitoring location. Application of standard data exclusion rules outlined in **Sections 4.1.1** and **4.1.3** led to the exclusion of 45 % of the continuous monitoring data. Following exclusion of data based on standard meteorological and extraneous source impacts, **Figure 7** shows that the measured noise levels at the Araluen monitoring location were above the 35 dB(A) criteria for 5 % of the night during the monitoring period.

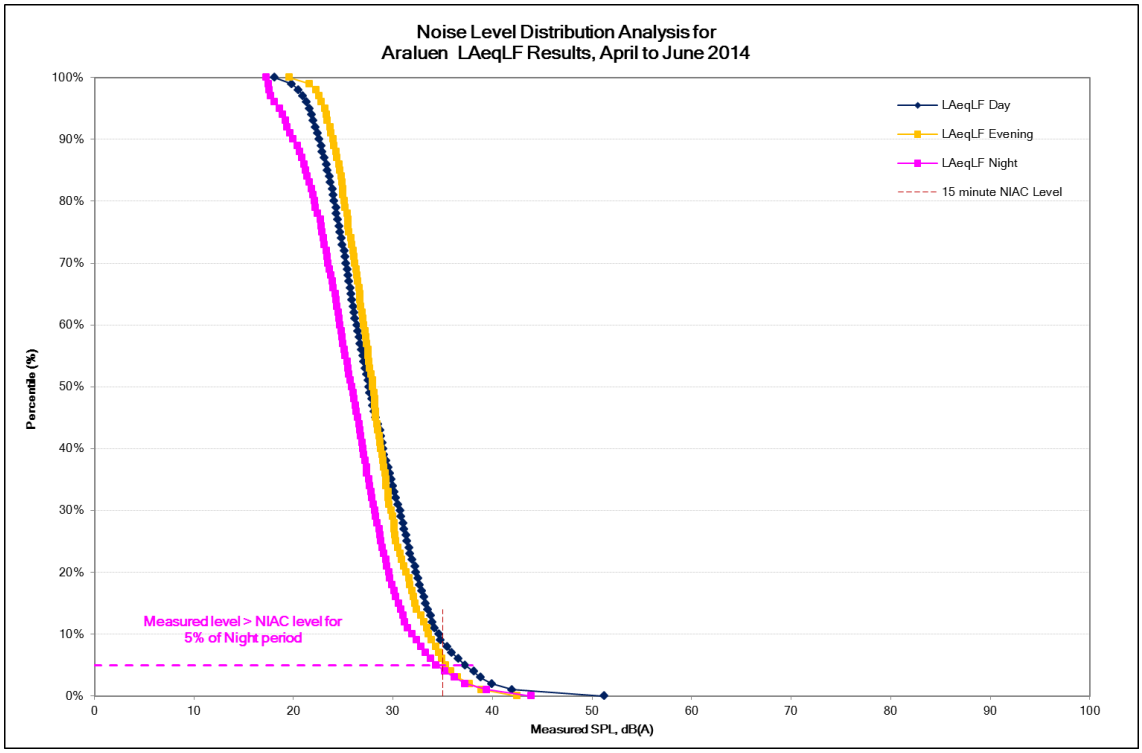


**Figure 7: Day, evening and night noise levels at the Araluen monitoring location**

### 4.2.3 Assessment of Central Wollar (SentineX33) Monitoring Data

**Figure 8** shows the cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels for the day, evening and night time periods at the Central Wollar monitoring location. Application of standard data exclusion rules outlined in **Sections 4.1.1** and **4.1.3** led to the exclusion of 49 % of the continuous monitoring data. Following exclusion of data based on standard meteorological and extraneous source impacts, **Figure 8** shows that the measured noise levels at the Central Wollar monitoring location were above the 35 dB(A) criteria for 5 % of the night during the monitoring period.

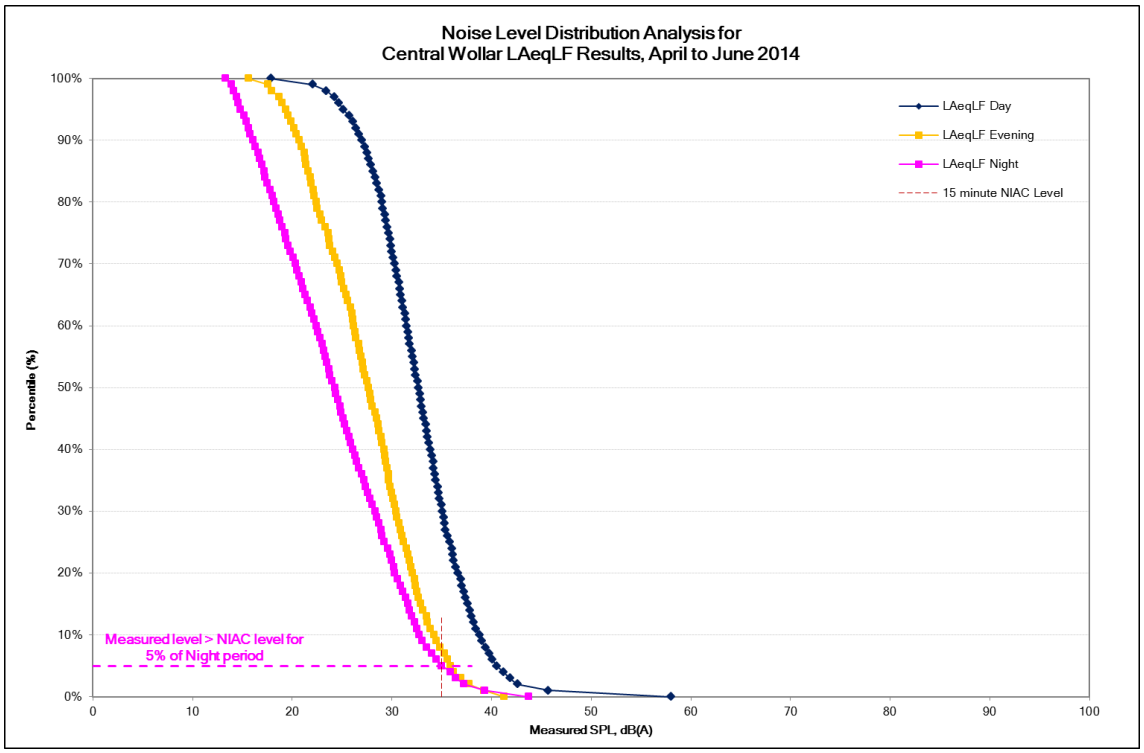


**Figure 8: Day, evening and night noise levels at the Central Wollar monitoring location**

### 4.2.4 Summary of $L_{AeqLF,15minute}$ Cumulative Noise Level Results

A summary of the cumulative distribution analysis presented in **Table 3** shows the measured exceedence rates for the monitoring period. It should be noted that this analysis provides no indication of the source of the measured noise levels.

**Table 3: Measured night-time exceedence**

| Location | Noise Criteria dB(A) | Valid Data | Measured Exceedence |
|---|---|---|---|
| Wandoona | $L_{Aeq15minute,night}$ > 35 dB(A) | 54% | 6% |
| Araluen | $L_{Aeq15minute,night}$ > 35 dB(A) | 55% | 5% |
| Central Wollar | $L_{Aeq15minute,night}$ > 35 dB(A) | 51% | 5% |

## 4.3 Assessed $L_{AeqLF,\ 15minute}$ Exceedence Rate

Following the assessment of 'as measured' noise levels presented in **Section 4.2**, review of recorded audio was undertaken for each result found to exceed the $L_{Aeq,15minute}$ criteria, to determine the source(s) that have contributed to the measured noise level. Results were excluded from the dataset where extraneous (non-mining) sources were found to dominate the noise environment.

The remaining data was reanalysed in accordance with the methods presented in **Section 4.2,** and cumulative distribution curves representative of mining impacts were produced. The 'assessed' exceedence rate is considered representative of the contribution from WCM to the receiving environment.

### 4.3.1 Assessment of Wandoona Monitoring Data

**Figure 9** shows the 'as measured' and 'assessed' cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels for the night period at the Wandoona monitoring location. The 'as measured' curve for the night period is reproduced from **Figure 6**, and is presented as a comparison to the 'assessed' impact.

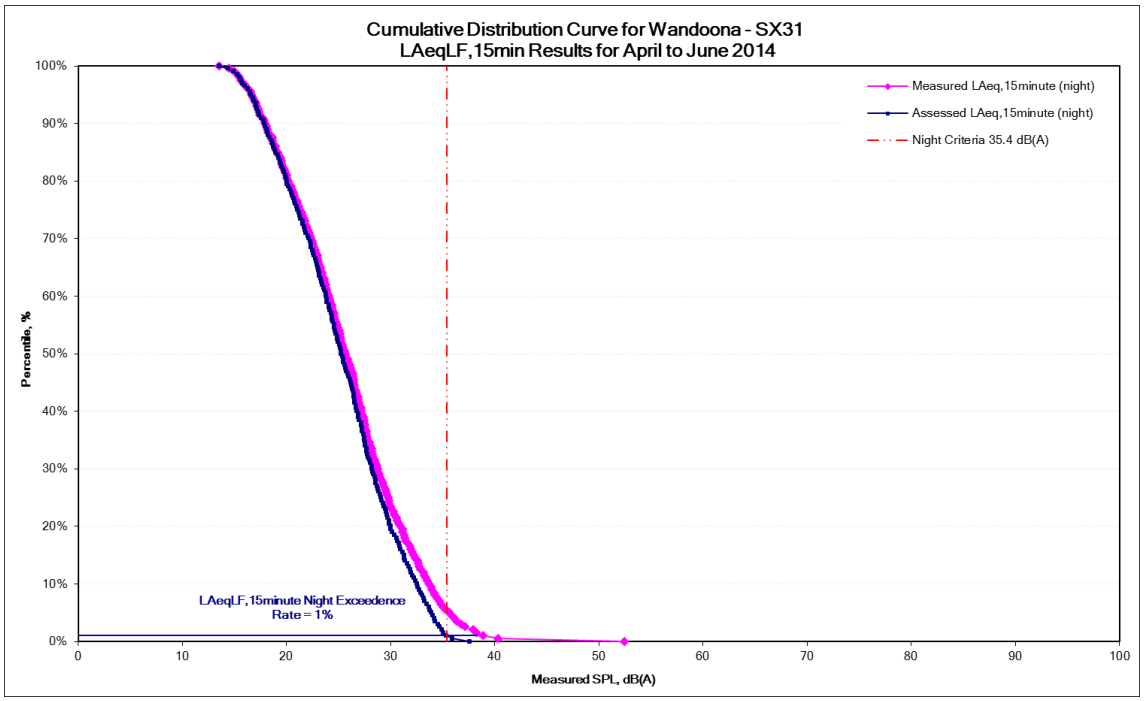


**Figure 9: Assessed night time noise levels at the Wandoona monitoring location**

**Figure 9** indicates that assessed noise levels at the Wandoona monitoring location did exceed the 35 dB(A) criteria during the night period on eighteen occasions, as shown in **Table 4**, as a result of mining related operations. The balance of 'measured' results above the NIAC level were attributed to thunder, gusting wind, birds, insects and the passage of trains on the Sandy Hollow to Gulgong railway.

Table 4: Observed exceedence events, Wandoona

| Location | Night Period |
|---|---|
| Wandoona | 11/04/2014 4:45 (35.7) |
| Wandoona | 11/04/2014 5:30 (35.8) |
| Wandoona | 26/04/2014 3:00 (37) |
| Wandoona | 26/04/2014 3:15 (36.4) |
| Wandoona | 11/05/2014 1:00 (36.8) |
| Wandoona | 11/05/2014 1:30 (35.7) |
| Wandoona | 11/05/2014 2:30 (36.8) |
| Wandoona | 11/05/2014 2:45 (36.9) |
| Wandoona | 11/05/2014 3:00 (37.6) |
| Wandoona | 11/05/2014 3:15 (35.9) |
| Wandoona | 11/05/2014 5:00 (36.4) |
| Wandoona | 23/06/2014 3:45 (35.5) |
| Wandoona | 23/06/2014 4:00 (36.2) |
| Wandoona | 23/06/2014 4:15 (35.7) |
| Wandoona | 23/06/2014 4:45 (36) |
| Wandoona | 23/06/2014 5:00 (35.8) |
| Wandoona | 23/06/2014 5:15 (35.7) |
| Wandoona | 23/06/2014 5:30 (36.3) |

### 4.3.2 Assessment of Araluen Monitoring Data

**Figure 10** shows the 'as measured' and 'assessed' cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels for the night period at the Araluen monitoring location. The 'as measured' curve for the night period is reproduced from **Figure 7**, and is presented as a comparison to the 'assessed' impact.

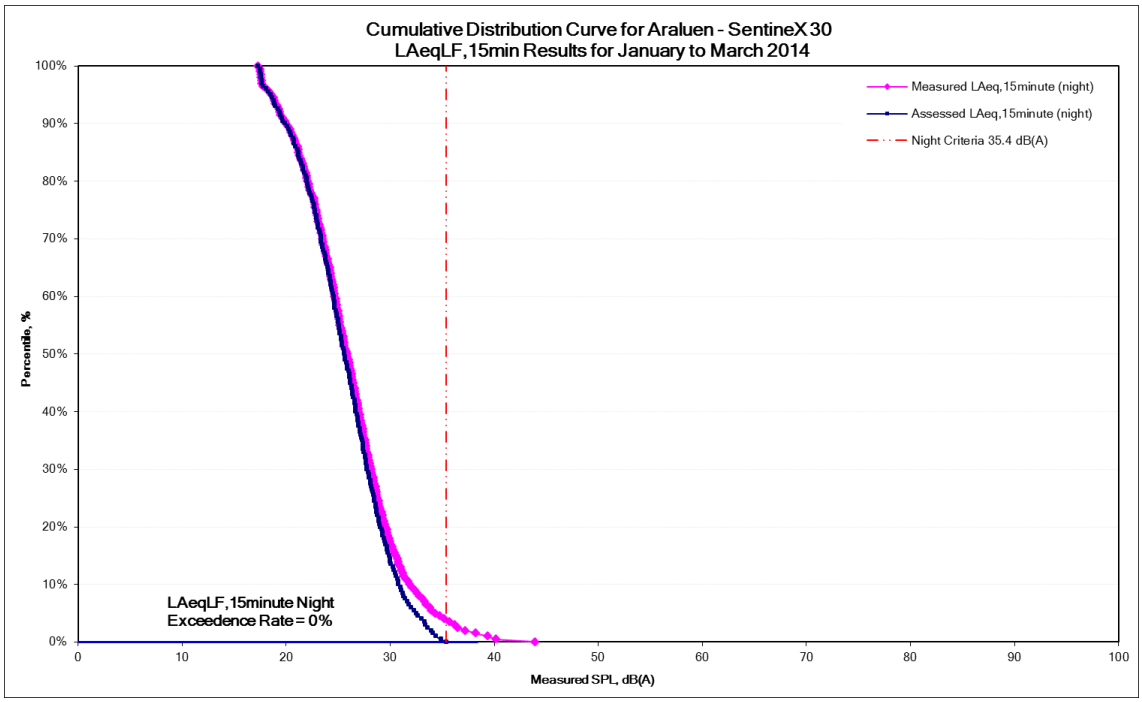


**Figure 10: Assessed night time noise levels at the Araluen monitoring location**

**Figure 10** indicates that assessed noise levels at the Araluen monitoring location did not exceed the 35 dB(A) criteria during the night period. Following audio review it was found that the noise environment at this monitoring location was dominated by extraneous noise sources including gusting wind, aircraft noise, barking dogs and the passage of trains on the Sandy Hollow to Gulgong railway.

### 4.3.3 Assessment of Central Wollar (SentineX33) Monitoring Data

**Figure 11** shows the 'as measured' and 'assessed' cumulative distribution curves for the $L_{AeqLF\ 15minute}$ noise levels for the night period at the Central Wollar monitoring location. The 'as measured' curve for the night period is reproduced from **Figure 8**, and is presented as a comparison to the 'assessed' impact.

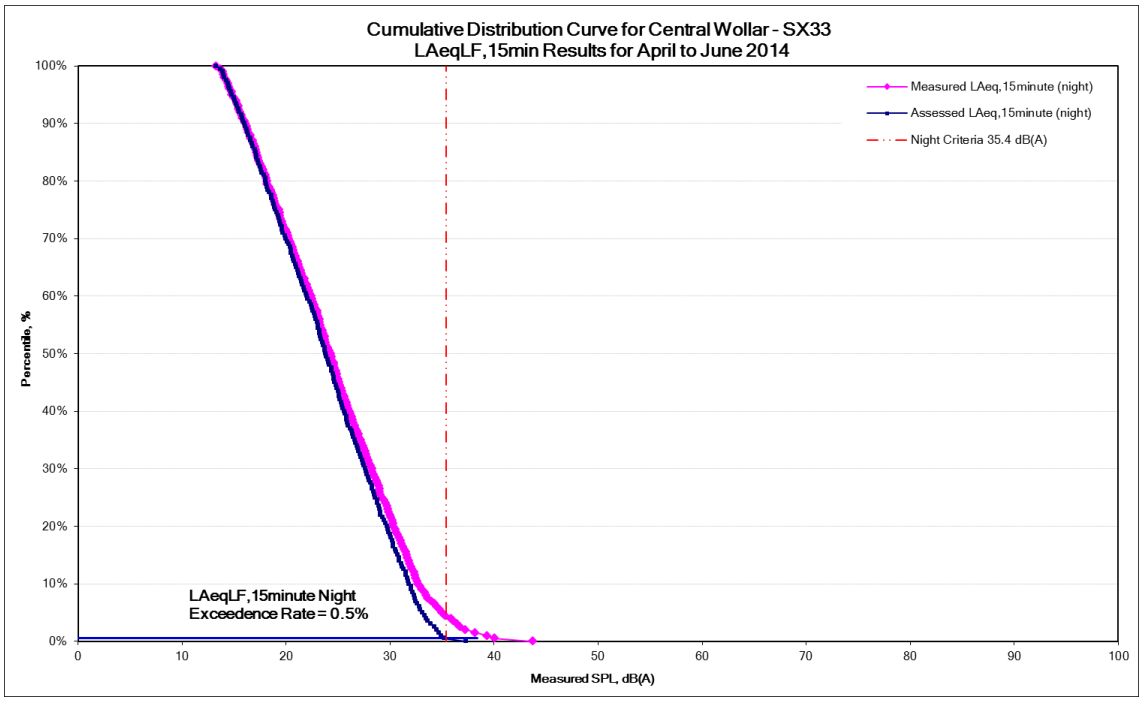


**Figure 11: Assessed night time noise levels at the Central Wollar (SentineX33) monitoring location**

**Figure 11** indicates that assessed noise levels at the Central Wollar monitoring location did exceed the 35 dB(A) criteria on two occasions during the night period, as shown in **Table 5**, as a result of mining related operations. Remaining noise impacts were attributed to extraneous noise sources including aircraft noise, birds, gusting wind, and road traffic noise.

**Table 5: Observed exceedence events, Wandoona**

| Location | Night Period |
|---|---|
| Central Wollar | 11/05/2014 2:30 (35.9) |
| Central Wollar | 11/05/2014 3:15 (37.3) |

### 4.3.4 Summary of $L_{AeqLF,15minute}$ Cumulative Noise Level Results

A summary of the cumulative distribution analysis presented in **Table 6** indicates the assessed exceedence rates for the monitoring period were lower than the measured exceedence rates. The assessed exceedence rate is based on monitoring data free of influence from extraneous noise sources.

**Table 6: Assessed Night-Time Exceedence Rates**

| Location | Noise Criteria dB(A) | Measured Exceedence | Assessed Exceedence |
|---|---|---|---|
| Wandoona | $L_{Aeq15minute,night}$ > 35 dB(A) | 5 % | 1 % |
| Araluen | $L_{Aeq15minute,night}$ > 35 dB(A) | 5 % | 0 % |
| Central Wollar | $L_{Aeq15minute,night}$ > 35 dB(A) | 5 % | 0.5 % |

## 4.4 $L_{Aeq,period}$ Cumulative Noise Results

Analysis of 15 minute average monitoring results presented in **Section 4.3** indicates that measured noise levels at the monitoring location are subject to influence from extraneous (non-mining) noise sources. To assist in identifying noise sources contributing to the amenity of the receiving environment, analysis of average night period ($L_{Aeq,night}$) noise levels is undertaken.

The $L_{Aeq,night}$ monitoring results are calculated on the basis of $L_{Aeq,15minute}$ data, and are used as a means of demonstrating the relative contribution from mining noise sources to total measured noise levels. As the reported $L_{AeqLF,period}$ noise level is calculated on the basis of previously assessed $L_{AeqLF,15minute}$ monitoring results, it is considered representative of the assessed upper limit of potential mine noise impact. To ensure recorded data is representative of the noise environment, periods with less than 2 hours of valid data due to meteorological conditions have been excluded from this analysis.

For the purposes of this analysis, the *acceptable* night period noise level of 40 dB(A) (for Rural receiver types, as established in the INP) is adopted to facilitate assessment of potential impacts. To provide feedback relating to those noise sources contributing to measured noise levels above the acceptable level in this receiving environment, review of recorded audio was undertaken where total ($L_{AeqLF}$) noise levels were observed to exceed 40 dB(A).

### 4.4.1 Assessment of Wandoona Monitoring Data

The data presented in **Figure 12** to **Figure 14** (Wandoona) is based on measured $L_{Aeq,15minute}$ noise level results following standard data exclusion as discussed in **Section 4.1** and exclusion of data influenced by non-mining sources following audio review as discussed in **Section 4.3**.

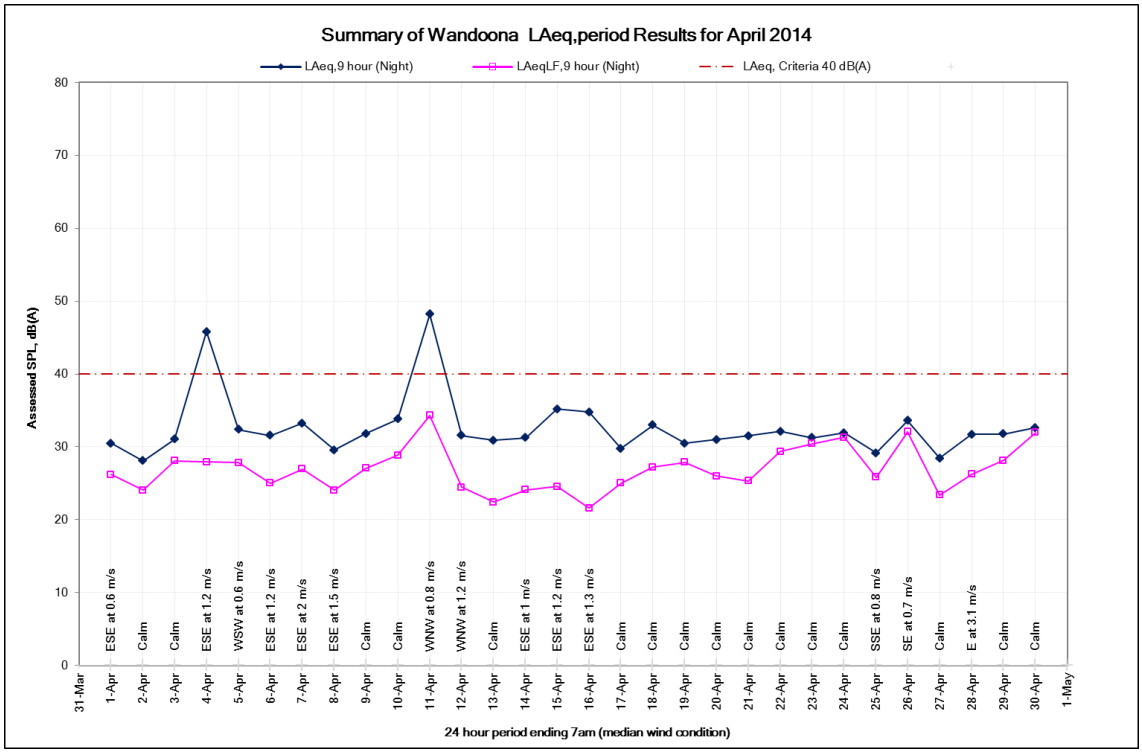


Figure 12: Night time noise levels at the Wandoona property, April 2014

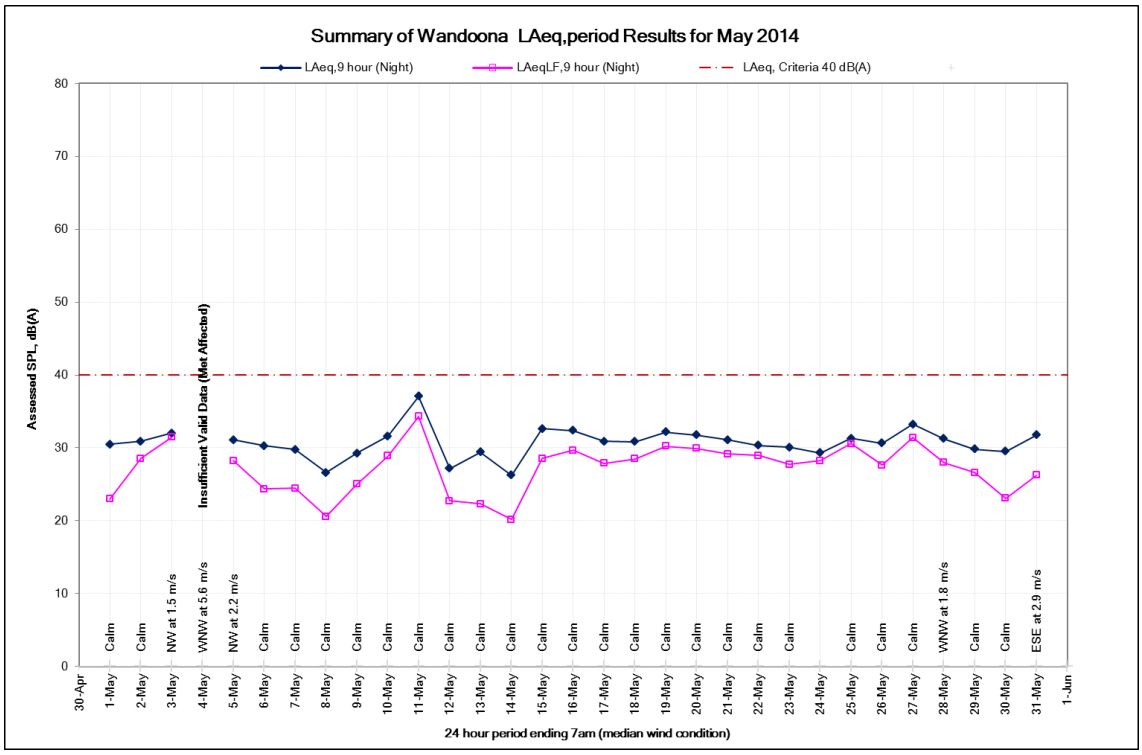


**Figure 13: Night time noise levels at the Wandoona property, May 2014**

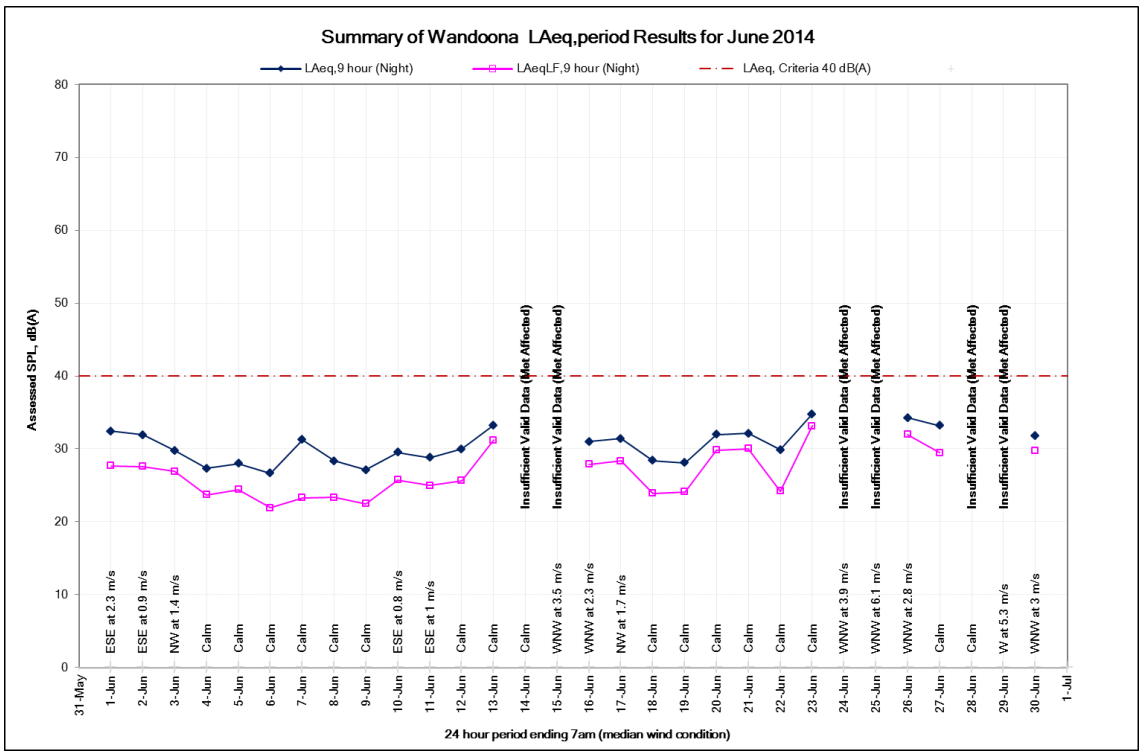


**Figure 14: Night time noise levels at the Wandoona property, June 2014**

The results presented in **Figure 12** to **Figure 14** (Wandoona) indicate that night time cumulative $L_{AeqLF,period}$ noise levels did not exceed the 40 dB(A) acceptable night period noise level during the monitoring period.

### 4.4.2 Assessment of Araluen Monitoring Data

The data presented in **Figure 15** to **Figure 17** (Araluen) is based on measured $L_{Aeq,15minute}$ noise level results following standard data exclusion as discussed in **Section 4.1,** and exclusion of data influenced by non-mining sources following audio review as discussed in **Section 4.3**.

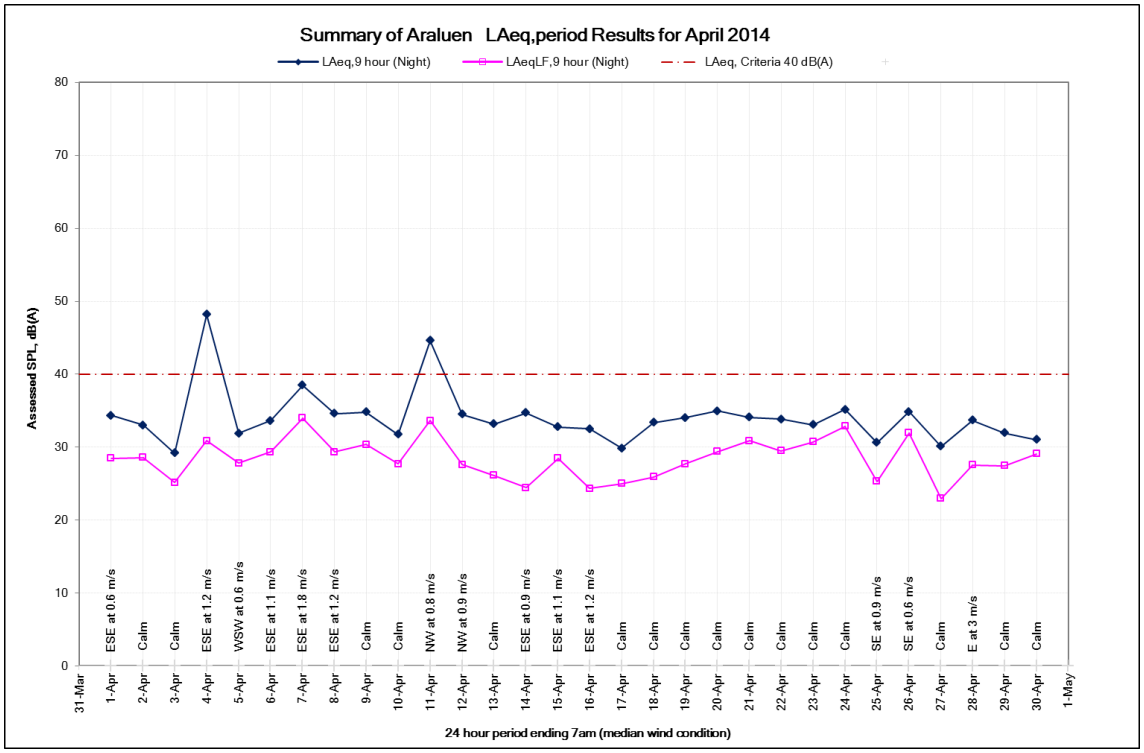


**Figure 15: Night time noise levels at the Araluen monitoring location, April 2014**

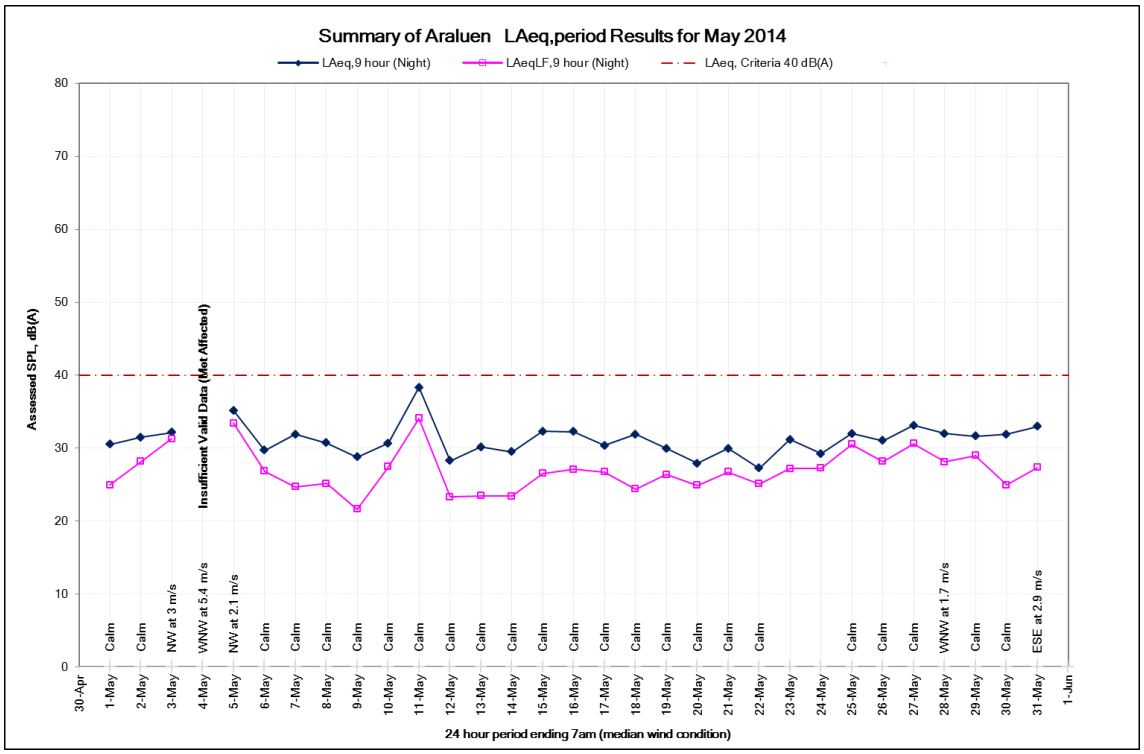


**Figure 16: Night time noise levels at the Araluen monitoring location, May 2014**

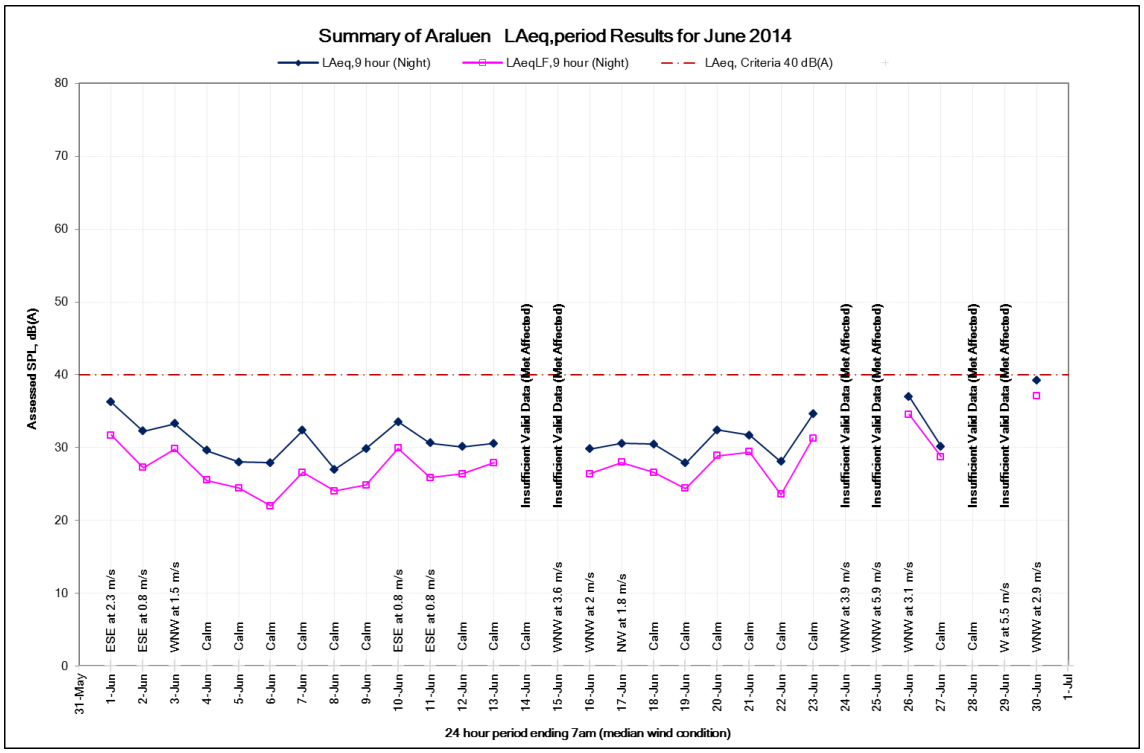


**Figure 17: Night time noise levels at the Araluen monitoring location, June 2014**

The results presented in **Figure 15** and **Figure 17** (Araluen) indicate that night time cumulative $L_{AeqLF,period}$ noise levels did not exceed the 40 dB(A) acceptable night period noise level during the monitoring period.

### 4.4.3 Assessment of Central Wollar (SentineX33) Monitoring Data

The data presented in **Figure 18** to **Figure 20** (Central Wollar) is based on measured $L_{Aeq,15minute}$ noise level results following standard data exclusion as discussed in **Section 4.1,** and exclusion of data influenced by non-mining sources following audio review as discussed in **Section 4.3**.

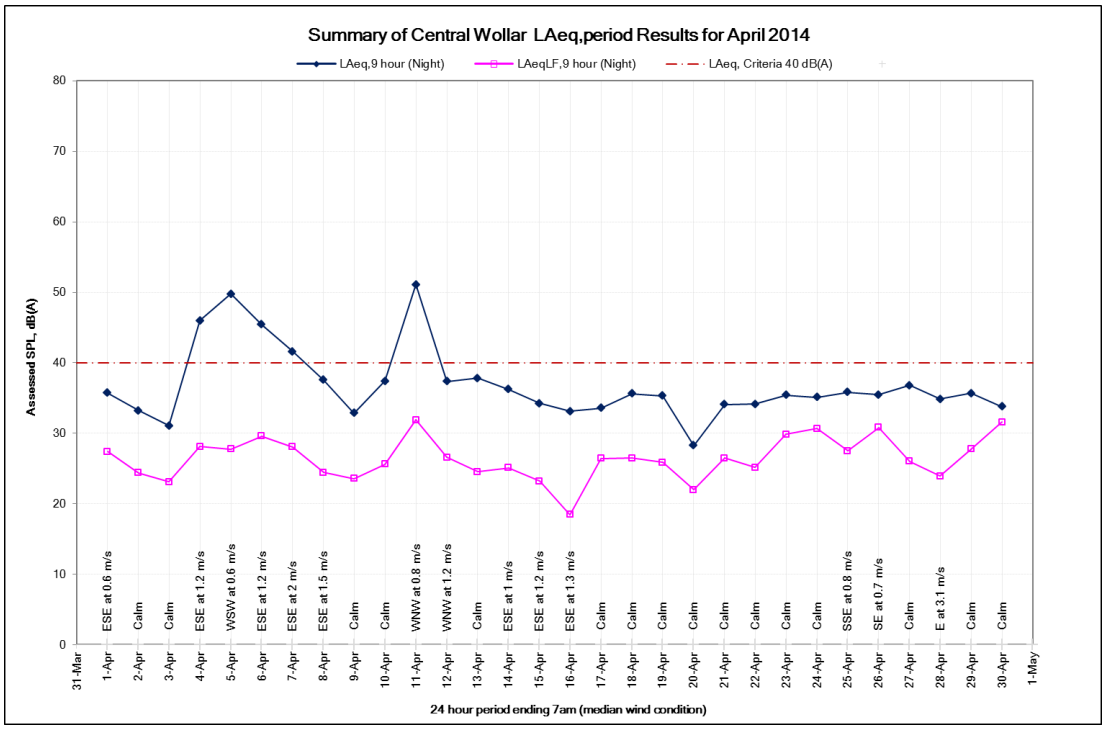


**Figure 18: Night time noise levels at the Central Wollar monitoring location, April 2014**

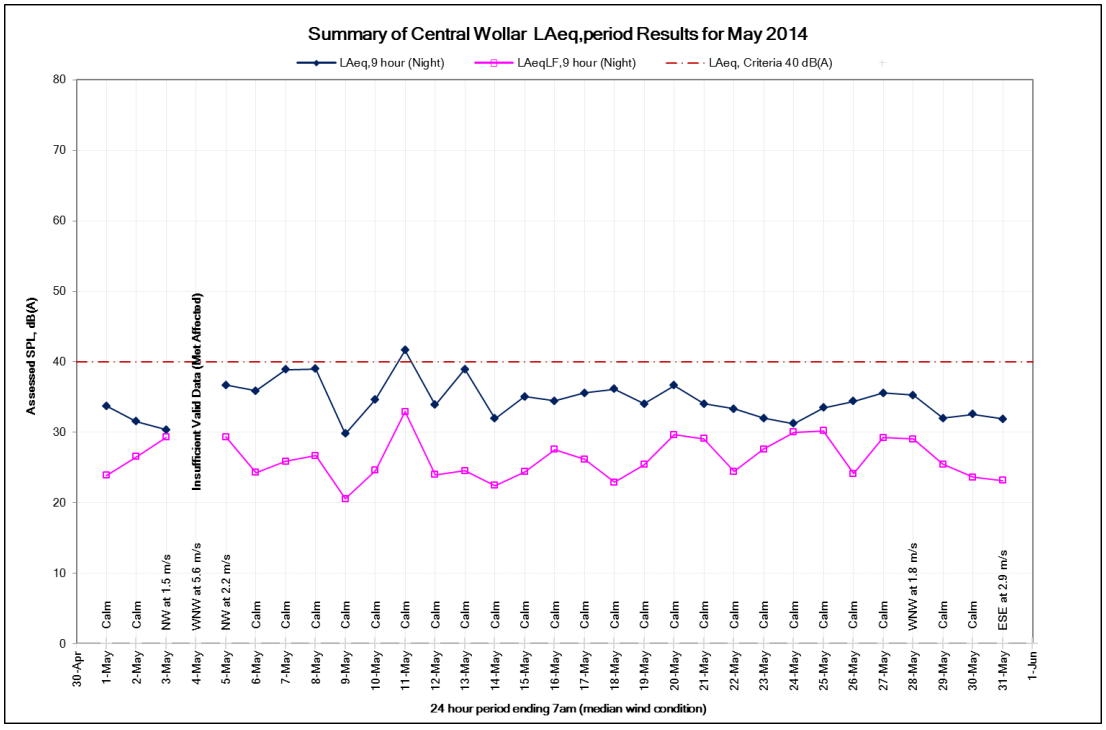


**Figure 19: Night time noise levels at the Central Wollar monitoring location, May 2014**

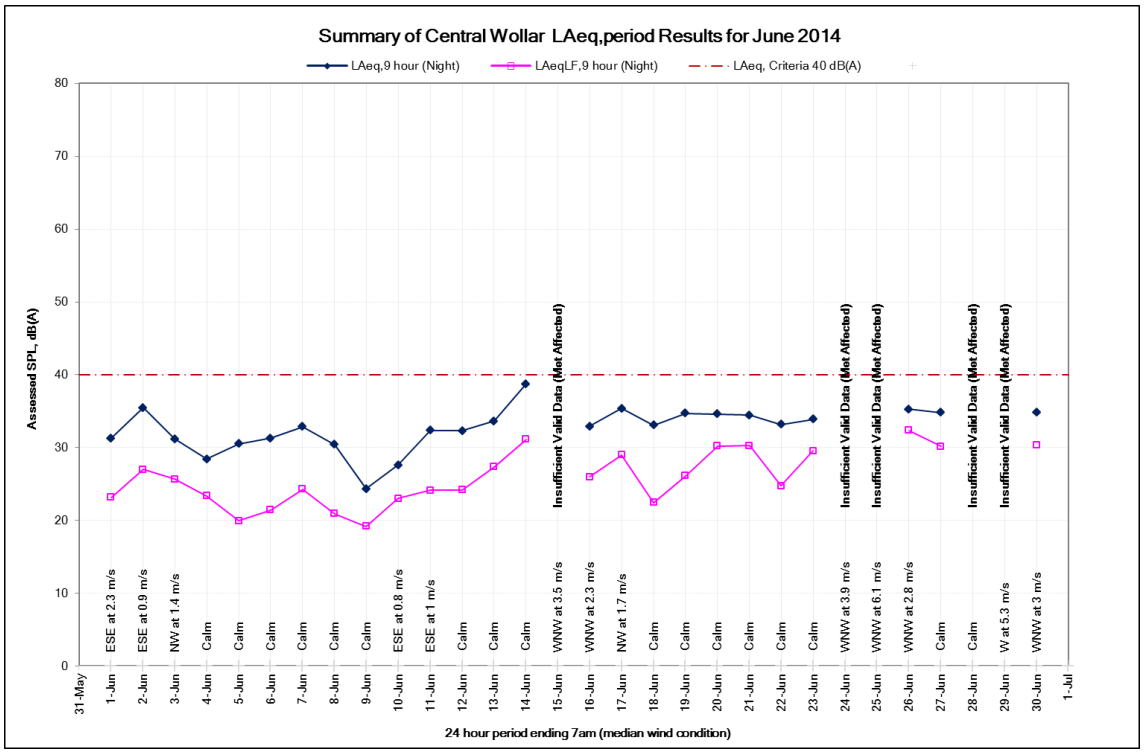


**Figure 20: Night time noise levels at the Central Wollar monitoring location, June 2014**

The results presented in **Figure 18** to **Figure 20** (Central Wollar) indicate that night time cumulative $L_{AeqLF,period}$ noise levels did not exceed the 40 dB(A) acceptable night period noise level during the monitoring period.

## 4.5 $L_{A1,1minute}$ Sleep Disturbance Results

The SentineX monitoring unit randomly selects a 15 minute period each night to measure the $L_{A1,1minute}$ noise levels. The maximum $L_{A1,1minute}$ noise level and the time it was measured is recorded with the corresponding statistical data for the interval.

The $L_{A1,1minute}$ noise level is the full spectrum noise level. It should be noted that it is potentially influenced by noise sources other than mining operations, such as barking dogs, livestock and insects. Audio review was carried out to identify active noise sources where the $L_{A1,1minute}$ was greater than the sleep disturbance criteria of 45 dB(A). The $L_{A1,1minute}$ results were filtered to exclude those measured during periods of adverse meteorology as discussed in **Section 4.1**.

### 4.5.1 Assessment of Wandoona Monitoring Data

The results presented in **Figure 21** to **Figure 23** represent the maximum $L_{A1,1minute}$ and corresponding $L_{A90,1minute}$ results for the Wandoona monitoring location.

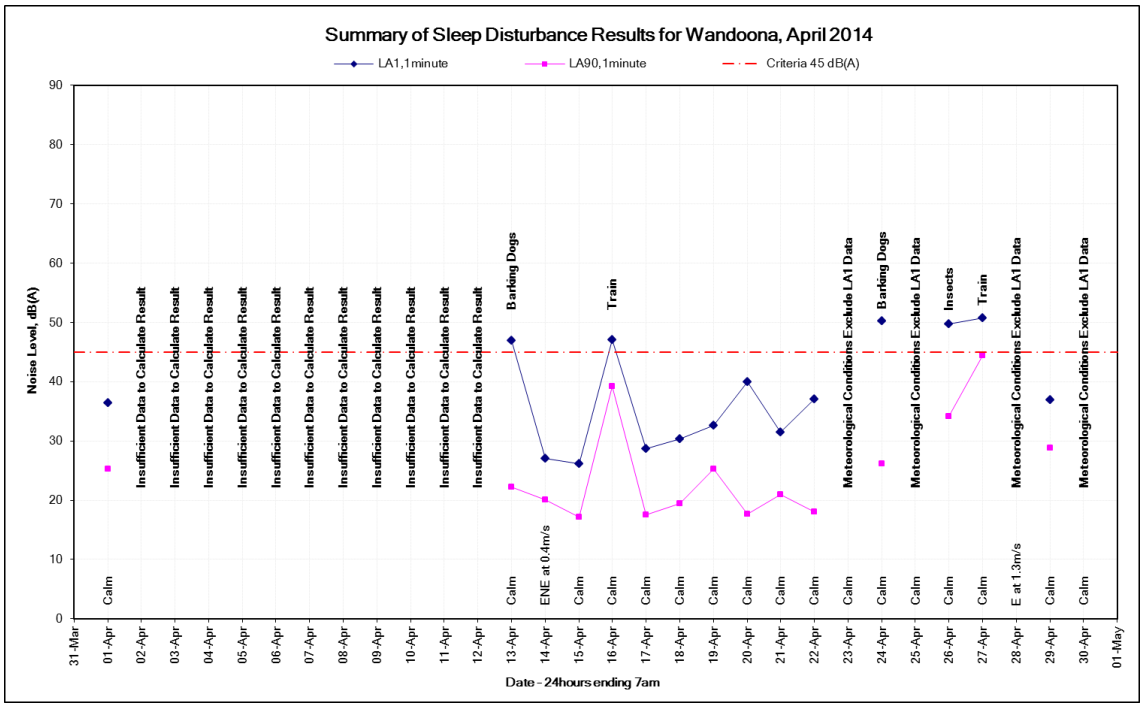


**Figure 21: $L_{A1,1minute}$ noise levels at the Wandoona monitoring location, April 2014**

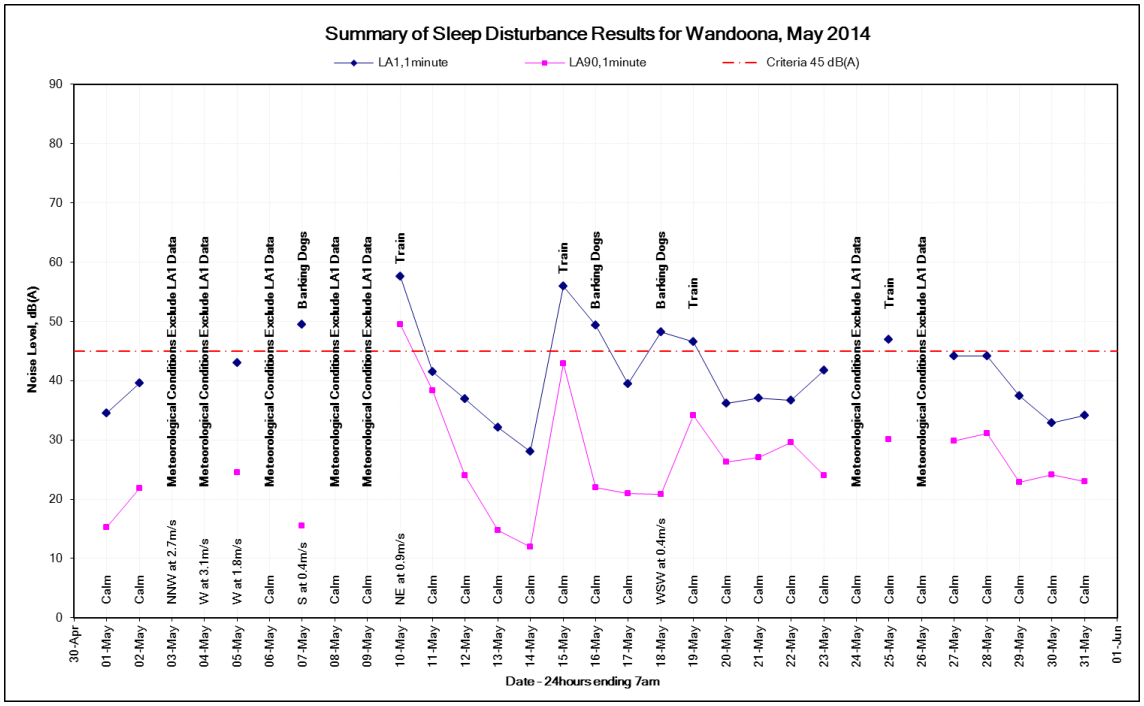


**Figure 22: $L_{A1,1minute}$ noise levels at the Wandoona monitoring location, May 2014**

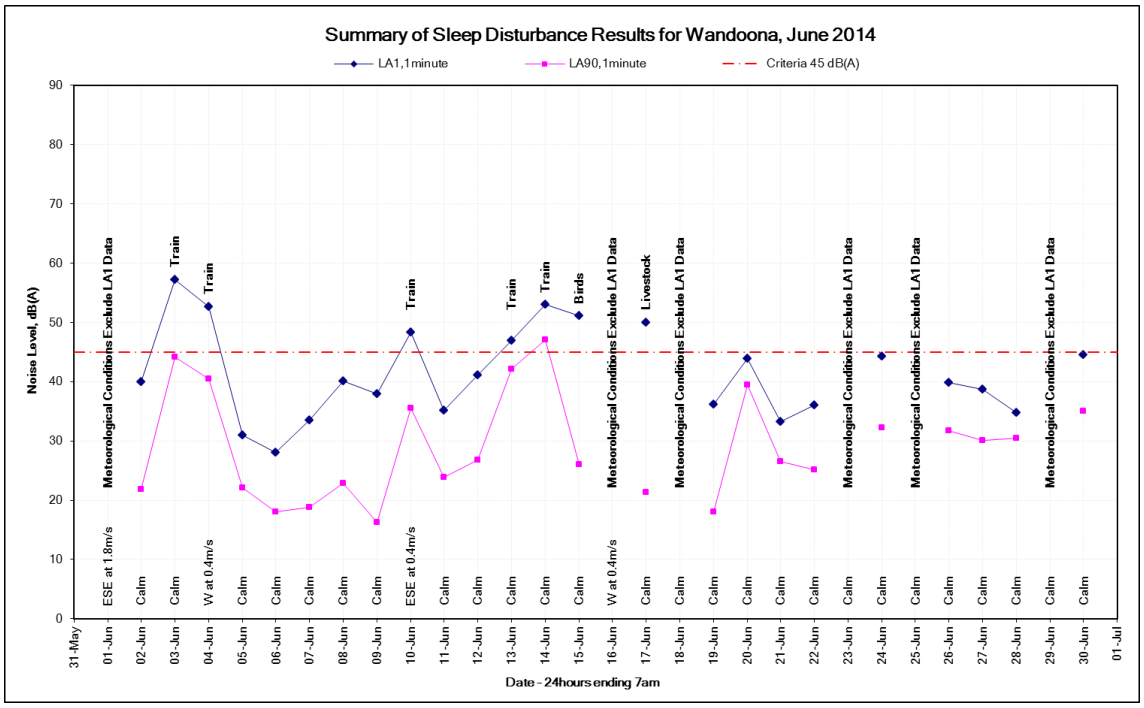


**Figure 23: $L_{A1,1minute}$ noise levels at the Wandoona monitoring location, June 2014**

The $L_{A1,1minute}$ result was excluded from the assessment on 17 occasions due to adverse meteorology. The $L_{A1,1minute}$ noise levels did exceed the 45 dB(A) criteria; however, review of recorded audio indicates that barking dogs, livestock, insect noise, bird calls and the passage of trains on the Gulgong to Sandy Hollow railway were the dominant $L_{A1}$ noise sources. Mining noise was not observed to exceed the Sleep Disturbance criteria level during the review of recorded audio.

### 4.5.2 Assessment of Araluen Monitoring Data

The results presented in **Figure 24** to **Figure 26** represents the maximum $L_{A1,1minute}$ and corresponding $L_{A90,1minute}$ results for the Araluen monitoring location.

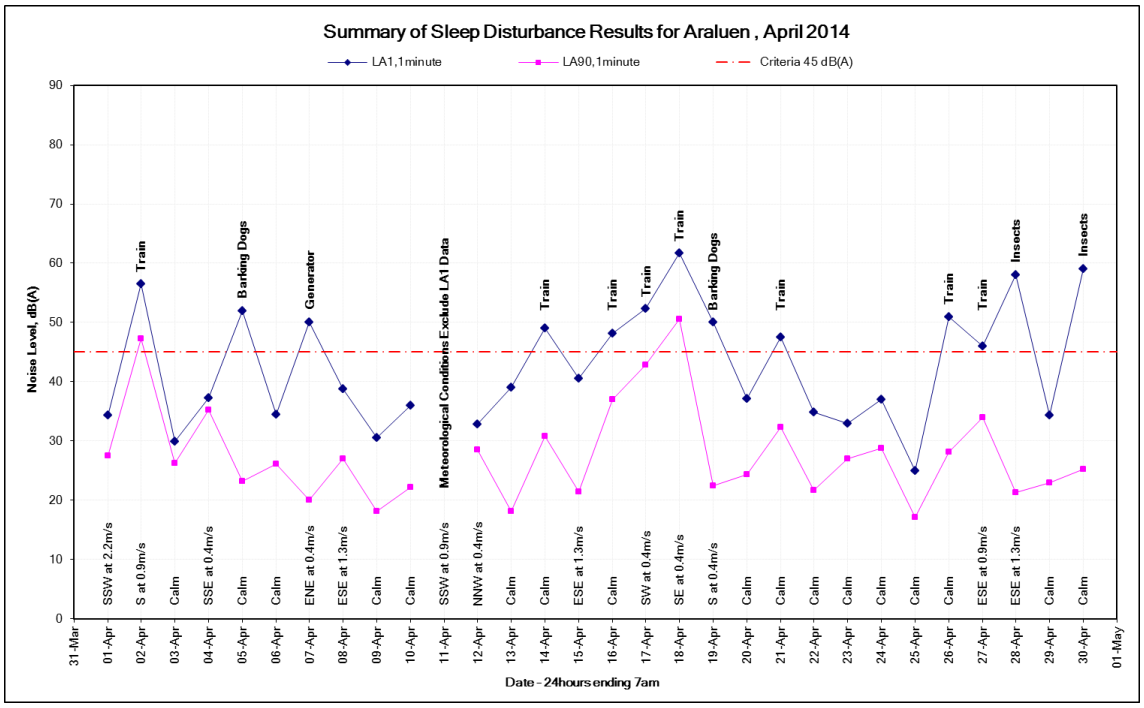


Figure 24: $L_{A1,1minute}$ noise levels at the Araluen monitoring location, April 2014

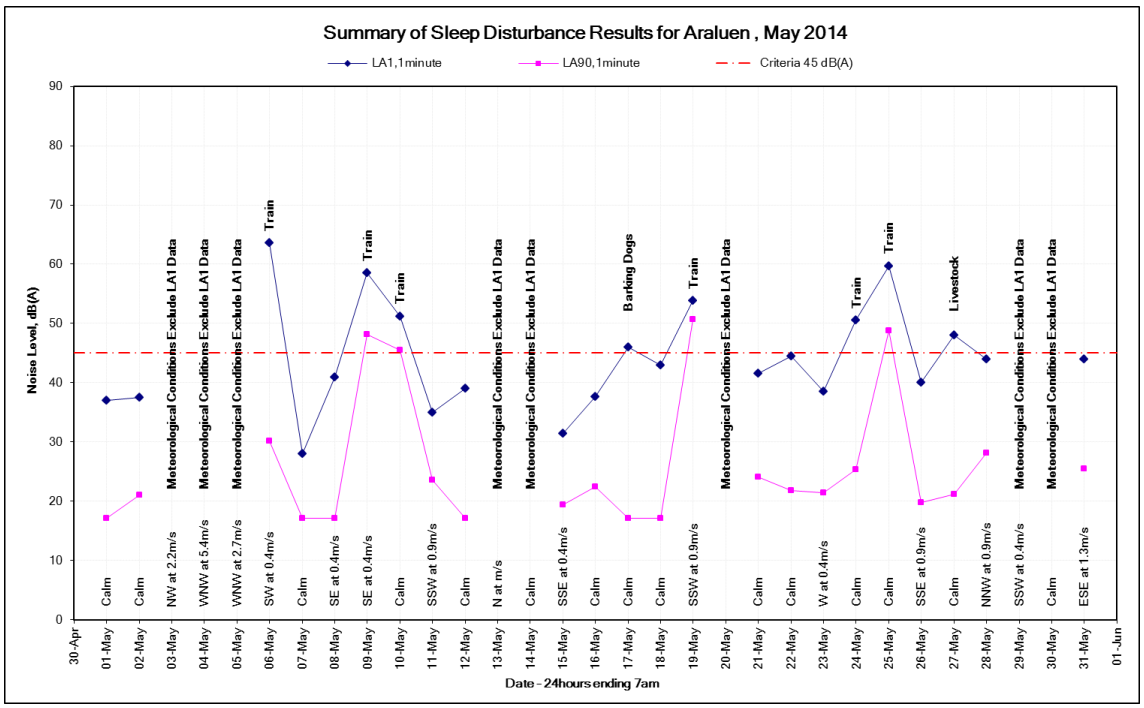


Figure 25: $L_{A1,1minute}$ noise levels at the Araluen monitoring location, May 2014

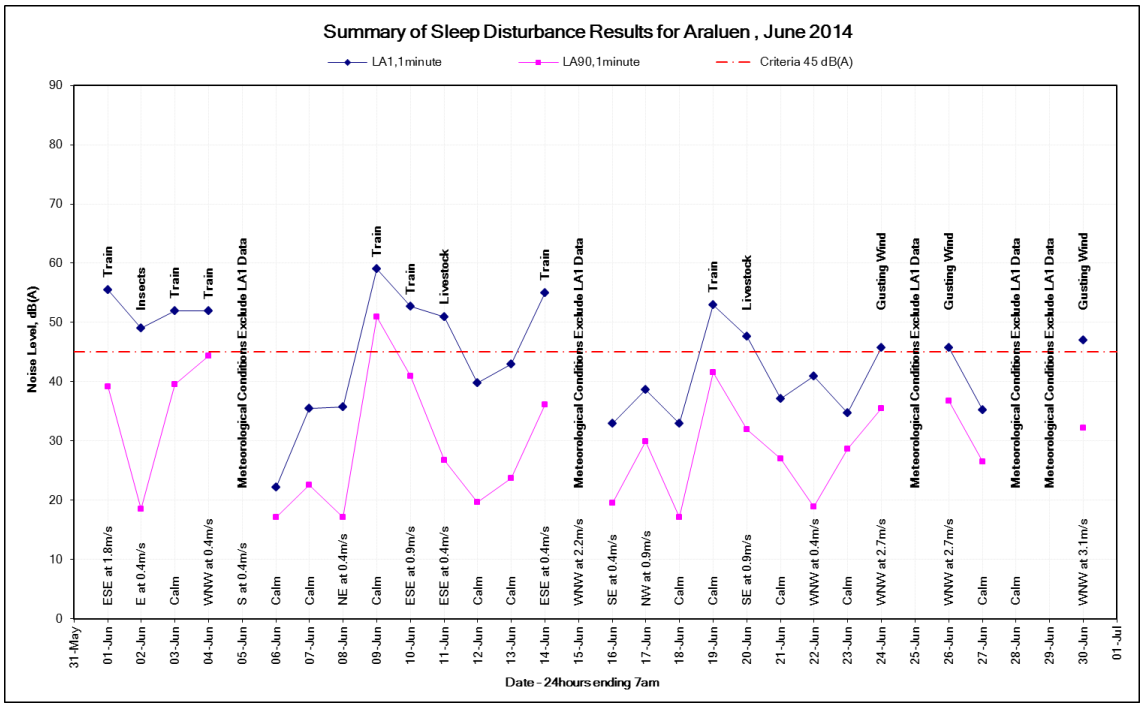


**Figure 26: $L_{A1,1minute}$ noise levels at the Araluen monitoring location, June 2014**

The $L_{A1,1minute}$ result was excluded from the assessment on 14 occasions due to adverse meteorology. The $L_{A1,1minute}$ noise levels did exceed the 45 dB(A) criteria; however, review of recorded audio indicates that the majority of exceedences were the result of environmental noise sources including barking dogs, insect noise, gusting wind and the passage of trains on the Gulgong to Sandy Hollow railway.

### 4.5.3 Assessment of Central Wollar (SentineX33) Monitoring Data

The results presented in **Figure 27** to **Figure 29** represents the maximum $L_{A1,1minute}$ and corresponding $L_{A90,1minute}$ results for the Central Wollar monitoring location during the monitoring period.

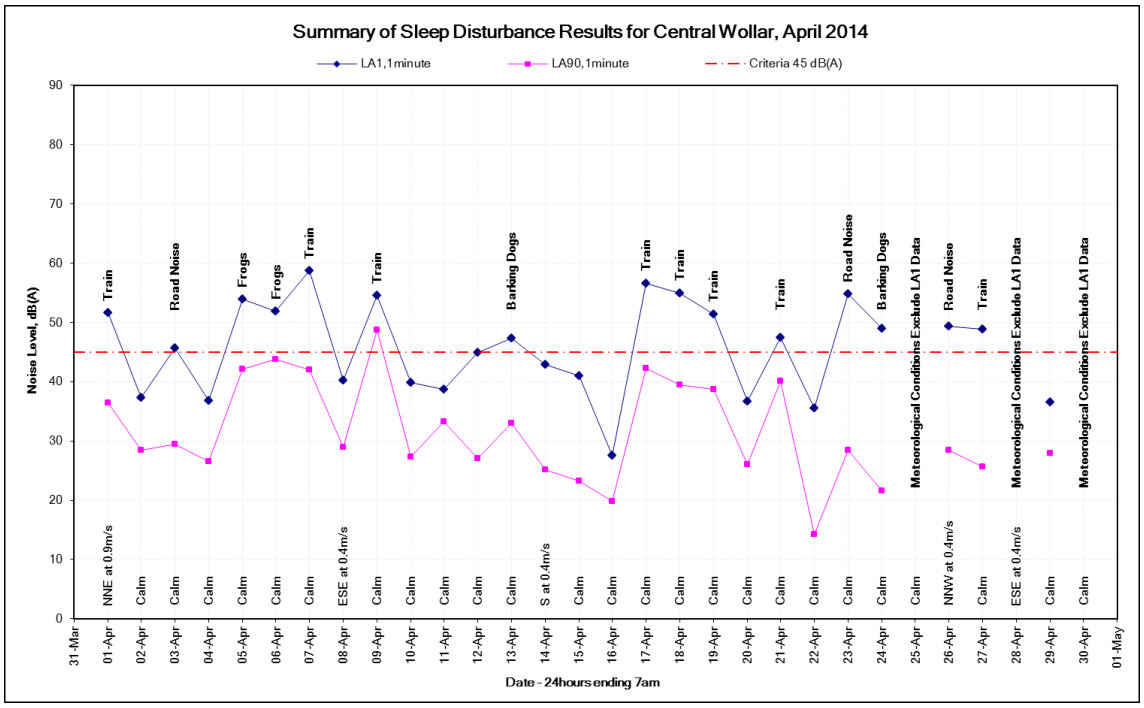


Figure 27: $L_{A1,1minute}$ noise levels at the Central Wollar monitoring location, April 2014

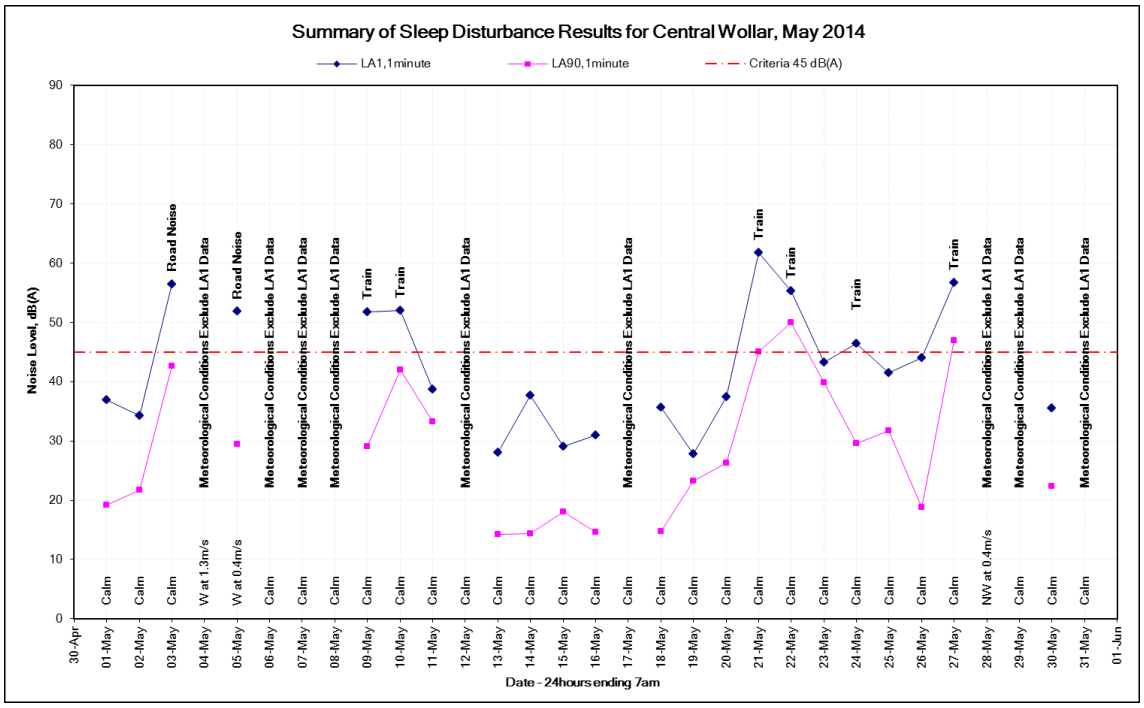


Figure 28: $L_{A1,1minute}$ noise levels at the Central Wollar monitoring location, May 2014

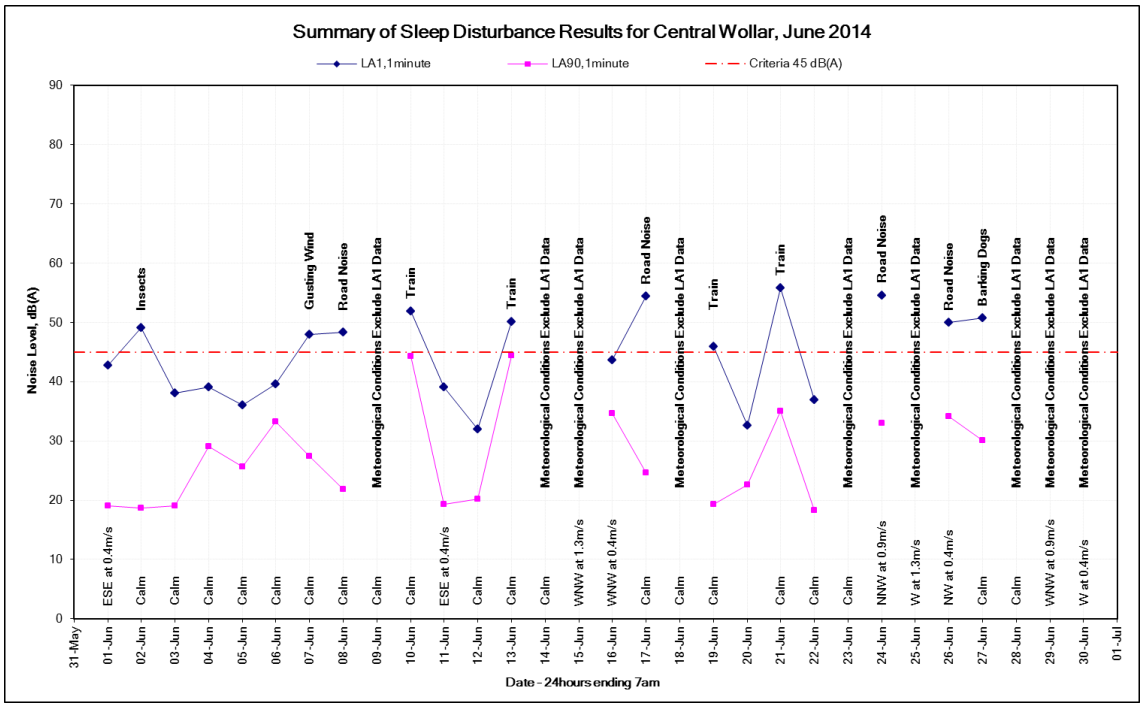


**Figure 29: $L_{A1,1minute}$ noise levels at the Central Wollar monitoring location, June 2014**

The $L_{A1,1minute}$ result was excluded from the assessment on 21 occasions due to adverse meteorology. The $L_{A1,1minute}$ noise levels did exceed the 45 dB(A) criteria; however, review of recorded audio indicates that environmental noise sources including passing road traffic, barking dogs, nearby livestock, frogs, gusting wind and the passage of trains contribute significantly to the $L_{A1}$ noise environment at this location. Mining noise was not observed at any time during audio review

# 5. DISCUSSION

Advitech Environmental was engaged by Peabody Energy Australia to collate, analyse and report on continuous environmental noise monitoring in the rural community adjacent to the Wilpinjong Coal Mine (WCM). The objective of the environmental monitoring is to assess the mining noise impacts on adjacent sensitive receivers and determine if these impacts meet consent conditions specified in the Environmental Protection Licence (EPL 12425) and Project Approval (PA 05_0021).

Assessment of noise impacts for the April to June, 2014, monitoring period indicates that mining operations contributed to noise levels above the $L_{AeqLF,15minute\ (night)}$ on eighteen occasions at the Wandoona monitoring location and on two occasions at the Araluen monitoring location. Analysis of monitoring data from the Central Wollar monitoring location indicates that this location complied with the noise level criteria prescribed in EPL 12425 and Project Approval 05-0021

The $L_{Aeq,LF,15minute}$ cumulative distribution curve shows that measured night time noise levels were below the relevant criteria 94% of the time at the Wandoona monitoring location and 95% of the time at the Araluen and Central Wollar monitoring locations.

Further assessment of monitoring data presented in **Section 4.3** resulted in the exclusion of measurement data not considered to be influenced by mining operations. The $L_{Aeq,15minute}$ night time noise level was above the criteria for 1% of the time due to mining noise at the Wandoona monitoring location and less than 1% of the time at the Araluen monitoring location. Mining noise levels at the Central Wollar monitoring location were found to be below the night period Noise Impact Assessment Criteria level during the monitoring period.

Review of $L_{AeqLF,period}$ (as specified in the INP for rural receivers) results indicate that the night time noise levels were not observed above the criteria during the monitoring period at any of the locations surveyed.

The $L_{A1,1minute}$ (applied to assess sleep disturbance) results indicate that animal noise, transportation movements and meteorological influences dominate the noise environment at all monitoring locations. Mine noise was not audible above the sleep disturbance criteria during the April to June, 2014 monitoring period.

## 6. REFERENCES

The following information was used in the preparation of this report:


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AS 2706-1984: *Numerical Values: Rounding and interpretation of limiting values.*

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Wilpinjong Coal Project (WCM) EPL (12425).