

# DURALIE COAL MINE

**Quarterly Compliance Noise Monitoring  
July 2018**

Prepared for: Duralie Coal Ltd

SLR Ref: 630.11772  
Version No: -v1.0  
August 2018



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## BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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## DOCUMENT CONTROL

| Reference          | Date           | Prepared         | Checked     | Authorised  |
|--------------------|----------------|------------------|-------------|-------------|
| 630.11772-R09-v1.0 | 17 August 2018 | Martin Davenport | Robert Hall | Robert Hall |
|                    |                |                  |             |             |
|                    |                |                  |             |             |
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# 1 Introduction

Duralie Coal Pty Limited (DCPL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct quarterly noise monitoring for the Duralie Coal Mine (DCM) operations guided by the requirements of the *Duralie Coal Mine Noise Management Plan* (NMP), Document No. NMP-R06-A, dated May 2018. This report presents the results and findings from the operator-attended noise surveys conducted between Monday 16 July 2018 and Wednesday 18 July 2018.

Coal production commenced at Duralie in 2003 using conventional open cut mining methods, operating 24 hours a day. The Duralie Extension Project (DEP) was approved under Project Approval (08\_0203) on 10 November 2011, with a maximum Run-of-Mine (ROM) coal mining rate of 3 million tonnes per annum (Mtpa). Sized Duralie ROM coal is loaded and railed to the Stratford Coal Mine (SCM) for coal washing before being transported on the North Coast Railway to the port of Newcastle.

The objectives of the noise monitoring programme for this operating period were as follows:

- Conduct three rounds of external operator-attended noise measurements at the five nominated locations listed in Project Approval, representative of receivers located in the north, west and south directions from the DCM. The monitoring locations are NM1, NM4, NM5, NM6 and the additional monitoring location WR1 which is representative of Wards River Village.

The three rounds comprise a single round within each of the day, evening and night-time periods as defined in the NSW *Industrial Noise Policy* (EPA 2000).

- Rail Noise Monitoring – Perform one round of external operator-attended noise measurements at the three nominated locations listed in Section 7.6 of the NMP, being: TN1 (Craven), TN2 (Wards River Village North) and TN3 (Wards River Village South).
- Quantify all sources of noise within each of the attended noise surveys, including measured and/or estimated contribution and maximum level of individual noise sources.
- Assess the noise emissions from the DCM and determine compliance with respect to the limits contained in the NMP.

This report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

## 2 DCM Noise Limits

### 2.1 EPL Noise Limits

The site specific noise limits of sub-section L4.1 of Section L4 *Noise Limits* of the EPA's Environment Protection Licence (EPL), EPL 11701 dated 8 November 2017, for the five nominated attended noise monitoring locations, are summarised in **Table 1**.

**Table 1 EPL Noise Limits for the Nominated Attended Noise Monitoring Locations**

| Locality                   | LAeq(15minute) |         |            | LA1(1minute) |
|----------------------------|----------------|---------|------------|--------------|
|                            | Daytime        | Evening | Night-time | Night-time   |
| NM1 Woodley                | 35             | 35      | 35         | 45           |
| NM4 Fisher-Webster         | 35             | 35      | 37         | 45           |
| NM5 Moylan                 | 35             | 35      | 35         | 45           |
| NM6 - Oleksiuk and Carmody | 35             | 35      | 39         | 45           |
| WR1 Wards River Village    | 35             | 35      | 35         | 45           |

Additional conditions relating to the noise monitoring location and applicable meteorological conditions are outlined in sub-sections L4.2 (a) and L4.8 of EPL 11701 and are summarised below.

*L4.2 (a) with the  $L_{eq}$  (15-minute) noise limits in condition 4.1, the noise measurement equipment must be located:*

*Approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or*

*Within 30 metres of a dwelling façade, but not closer than 3 m, where any dwelling on the property is situated more than 30 metres from the boundary closest to the premises.*

*Noise from the premises is to be measured at a distance within 30 metres of the locations identified in L4.1 to determine compliance with this condition.*

*L4.8 The noise limits set out in condition in L4.1 apply under all meteorological conditions except for the following:*

- a) wind speeds greater than 3 metres/second at 10 metres above ground level; or*
- b) Temperature Inversion conditions up to 3 degrees Celsius/100m and wind speeds greater than 2 metres/second at 10 metres above the ground level; or*
- c) Temperature inversion conditions greater than 3 degrees Celsius/100m.*

## 2.2 Project Approval Noise Limits

The Project approval conditions relating to the noise limits are as follows:

## NOISE

### Noise Criteria

2. Except for the land referred to in Table 1, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 2: Noise criteria dB(A)

| Location                       | Day                          | Evening                      | Night                        |                            |
|--------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|
|                                | $L_{Aeq}(15 \text{ minute})$ | $L_{Aeq}(15 \text{ minute})$ | $L_{Aeq}(15 \text{ minute})$ | $L_{A1}(1 \text{ minute})$ |
| 172 - Lyall                    | 35                           | 39                           | 40                           | 45                         |
| 126 – Hamann Pixalu PL         | 35                           | 35                           | 39                           | 45                         |
| 123 – Oleksiuk & Carmody       |                              |                              |                              |                            |
| 173 – Trigg & Holland          | 35                           | 36                           | 37                           | 45                         |
| 116 - Weismantel               |                              |                              |                              |                            |
| 127 – Fisher-Webster           | 35                           | 35                           | 37                           | 45                         |
| 131(1) - Relton                |                              |                              |                              |                            |
| 180 (1) - Thompson             | 35                           | 36                           | 36                           | 45                         |
| 95 - Smith & Ransley           | 35                           | 35                           | 36                           | 45                         |
| 144 - Wielgosinski             |                              |                              |                              |                            |
| 169 - Williams                 | 35                           | 36                           | 35                           | 45                         |
| 177 - Thompson                 |                              |                              |                              |                            |
| All other privately-owned land | 35                           | 35                           | 35                           | 45                         |

Notes:

- To identify the locations referred to in Table 2, see the figure in Appendix 3; and
- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

### Noise Acquisition Criteria

3. If the noise generated by the project exceeds the criteria in Table 3 at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner, the Proponent shall acquire the land in accordance with the procedures in Conditions 5 - 6 of Schedule 4.

Table 3: Noise acquisition criteria dB(A)  $L_{Aeq} (15min)$

| Location                 | Day | Evening | Night |
|--------------------------|-----|---------|-------|
| All privately-owned land | 40  | 40      | 40    |

Notes:

- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy; and
- For this condition to apply, the exceedences of the criteria must be systemic.

## Rail Noise

5. By the end of December 2011, or as otherwise agreed by the Director-General, the Proponent shall only use locomotives that are approved to operate on the NSW rail network in accordance with the noise limits in the ARTC's EPL (No. 3142).

## Operating Conditions

6. The Proponent shall:
  - (a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the operational, low frequency and rail noise generated by the project; and
  - (b) regularly assess the real-time noise monitoring and meteorological forecasting data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this approval, to the satisfaction of the Director-General.

## 2.3 Rail Noise Limits

For the purpose of compliance with the NSW Project Approval, the key requirement is for notification of relevant private receivers adjacent to the rail line, where DCM maximum rail pass-by noise is above the 85 dBA  $L_{Amax}$  criteria provided in Condition 4 (e), Schedule 3. Schedule 3 Condition 4(e) of the DCPL Extension Project Approval states:

*On privately owned land between the Stratford and Duralie mines where the maximum pass-by rail traffic noise from the Project exceeds 85dB(A), the Proponent shall implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner. These measures must be reasonable and feasible.*

## 2.4 Low Frequency Noise

The 'Duralie Modification Noise and Blasting Assessment' (prepared by SLR Consulting Australia dated 9 July 2014) included a low frequency analysis of C and A weighted intrusive noise levels in accordance with the NSW Industrial Noise Policy (INP) requirements. The assessment indicated that there is no dominant low-frequency content relating to noise emissions from the DCM.

Low frequency noise is assessed under the *NSW Noise Policy for Industry* (NPfI) methodology. A full  $L_{Ceq}$  minus  $L_{Aeq}$  analysis of DCM noise contributions was conducted at the following locations:

- NM1 - night
- NM5 - night

At all other locations DCM was not audible and/or significantly below the relevant noise criteria and is therefore not addressed further. The results of the operator attended noise measurements presented in **Section 4**.



## 3 Operational Noise Monitoring Methodology

### 3.1 General Requirements

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672.1 – 2004 *Electroacoustics—Sound level meters – Specifications*, AS IEC 61672.2-2004, AS IEC 61672.3-2004 and carried current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding  $\pm 0.5$  dBA.

### 3.2 Methodology - Operator-attended Noise Monitoring Locations

Noise monitoring was conducted guided by the requirements of the NMP.

Operator-attended noise measurements were conducted during the day, evening and night-time periods for a minimum of 15 minutes per period at each of the five nominated noise monitoring locations. The details of the operator-attended noise monitoring locations are contained within **Table 2** and shown in **Figure 1**. During the operator attended noise measurements, the character and relative contribution of ambient noise sources along with the mine contributions were noted.

**Table 2 DCM Operational Noise Monitoring Locations**

| Monitoring Location | Receiver Type | Resident / Owner                                    | Monitoring Location - MGA Zone 56 |              |
|---------------------|---------------|---|-----------------------------------|--------------|
|                     |               |   | Easting (m)                       | Northing (m) |
| NM1                 | Residence     | Woodley <sup>1</sup>                                | 400644                            | 6421907      |
| NM4                 | Residence     | Fisher-Webster                                      | 396790                            | 6428961      |
| NM5                 | Residence     | Moylan  | 396770                            | 6428945      |
| NM6                 | Residence     | Oleksiuk and Carmody                                | 399661                            | 6431862      |
| WR1                 | Residence     | Ward Street - Representative of Wards River Village | 399556                            | 6434229      |

Note 1: Woodley property has changed ownership but will retain the title of 'Woodley' until a License revision.

The details of the operator-attended rail noise monitoring locations are contained within **Table 3** and shown in **Figure 1**.

**Table 3 Rail Noise Monitoring Locations**

| Monitoring Location | Receiver Type | Resident / Owner          | Monitoring Location - MGA Zone 56 |              |
|---------------------|---------------|---------------------------|-----------------------------------|--------------|
|                     |               |                           | Easting (m)                       | Northing (m) |
| TN1                 | Residence     | Craven                    | 400182                            | 6441933      |
| TN2                 | Residence     | Wards River Village North | 399914                            | 6434771      |
| TN3                 | Residence     | Wards River Village South | 399765                            | 6434421      |



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The objective of the DCM operational operator-attended noise monitoring was to measure the maximum ( $L_{Amax}$ ) and the  $L_{Aeq(15minute)}$  noise level contributions at the nearest potentially affected receptors to determine the noise contribution of mining activities associated with Duralie Coal Mine operations over a 15 minute measurement period. In addition, the operator quantifies and characterises the overall levels of ambient noise in the area (i.e.  $L_{Amax}$ ,  $LA1$ ,  $LA10$ ,  $LA90$ , and  $L_{Aeq}$ ) over the 15 minute measurement interval. The objective of the rail noise monitoring was to determine maximum rail pass-by noise levels from the Duralie Shuttle.

All operator-attended noise measurements were conducted using a one-third octave integrating Brüel & Kjær Type 2270 sound level meter (s/n 2679354).

## 4 Results

### 4.1 Operator-attended Monitoring - DCM Operational Activity

Operator-attended noise measurements were conducted during the day, evening and night periods between Monday 16 July 2018 and Wednesday 18 July 2018. Results of the operator-attended noise surveys at NM1, NM4, NM5, NM6 and at the additional monitoring location WR1 are provided in **Table 4** to **Table 8**, respectively.

A summary of the results for the operator-attended noise monitoring are displayed graphically in **Appendix B**. Charts of the noise surveys show  $L_{Amax}$ ,  $L_{Aeq}$ , and  $L_{Aeq(\leq 1.25kHz)}$  in 1-second intervals throughout the monitoring survey.

Ambient noise levels presented include all noise sources such as transport (roads, rail and aircraft), fauna (insects, frogs, birds, and bats), farm animals, the natural environment (wind in trees), domestic noises, other industrial operations as well as Duralie Coal Mine noise emissions.

Weather data during the monitoring period has been obtained from the weather station located on the Duralie Coal Mine site. Where this data was not available meteorological conditions have been estimated based on observed conditions during the monitoring period.

The tables provide the following information:

- Date and start time, operator and equipment details.
- Monitoring location.
- Wind velocity (m/s) and temperature ( $^{\circ}C$ ) at the measurement location.
- Typical maximum ( $L_{Amax}$ ) and contributed  $L_{Aeq(15minute)}$  noise levels.

#### 4.1.1 Operator-attended Noise Survey Results - Monitoring Location NM1

Results of the operator-attended noise surveys at NM1 are provided in **Table 4**. Monitoring location NM1 represents residential receptors located to the south of the site. Due to access restrictions noise monitoring was conducted at the entrance to the property.

**Table 4 Operator Attended Noise Survey Results – NM1**

| Period  | Date/Start Time/<br>Weather                     | Primary Noise Descriptor dBA (15 minutes) |                 |                  |                  |                  | Description of Noise Emissions and Typical Maximum Noise Levels (dBA)  |
|---------|---|---|-----------------|------------------|------------------|------------------|--|
|         |   | L <sub>Amax</sub>                         | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>Aeq</sub> |  |
| Day     | 18/07/18<br>13:24<br>21°C<br>3 m/s WSW          | 51  | 48              | 45               | 35               | 41               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Wind in trees 34-43<br>Aeroplane 40-51<br>Birdsong 48<br>Road traffic 35-42  |
| Evening | 17/07/18<br>21:44<br>9°C<br>1.7 m/s SE          | 35  | 32              | 32               | 25               | 29               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Mechanical plant 25-31<br><b>L<sub>Aeq</sub>(15minute) contribution 28 dBA</b><br><i>Other noise events:</i><br>Road traffic 26-28<br>Insects 32-35  |
| Night   | 17/07/18<br>22:00<br>9°C<br>1.5 m/s SSE<br>0 cc | 36  | 34              | 33               | 29               | 31               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Mechanical plant 28-31<br>Engine noise 30-36<br><b>L<sub>Aeq</sub>(15minute) contribution 31 dBA</b><br><b>L<sub>Amax</sub> contribution 36 dBA</b><br><b>L<sub>Ceq</sub> - L<sub>Aeq</sub> = 13 dB</b><br><i>Other noise events:</i><br>Dog barking 30-35 |

A summary of the key findings is provided below:

- DCM operations were audible during the evening and night operator-attended noise surveys at this location from mechanical plant and engine noise.
- Noise sources at this location generally included natural noise sources such as birdsong, insects, as well as transport related noise such as aircraft flyover noise and road traffic noise.
- The DCM L<sub>Aeq</sub>(15minute) noise contribution was estimated to be 28 dBA and 31 dBA during the evening and night period, respectively.
- During the night-time noise monitoring survey, engine noise resulted in a L<sub>Amax</sub> noise level of 36 dBA.
- DCM noise contributions were not found to contain low-frequency noise as described by the NPfI.

#### 4.1.2 Operator-attended Noise Survey Results - Monitoring Location NM4

Results of the operator-attended noise surveys at NM4 are provided in **Table 5**. NM4 represents residential receptors located to the north of the site.

**Table 5 Attended Noise Survey Results – NM4**

| Period  | Date/Start Time/<br>Weather                     | Primary Noise Descriptor dBA (15 minutes) |                 |                  |                  |                  | Description of Noise Emissions and Typical Maximum Noise Levels (dBA)  |
|---------|---|---|-----------------|------------------|------------------|------------------|--|
|         |   | L <sub>Amax</sub>                         | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>Aeq</sub> |  |
| Day     | 16/07/18<br>16:09<br>15°C<br>2.3 m/s W          | 61  | 50              | 43               | 30               | 40               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Train 52<br>Livestock 61<br>Road traffic 32-44<br>Wind in trees 30-43<br>Aeroplane 42  |
| Evening | 17/07/18<br>18:26<br>15°C<br>3.0 m/s SW         | 53  | 46              | 41               | 29               | 37               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Dog barking 41-53<br>Road traffic 33-41<br>Insects 28-36   |
| Night   | 17/07/18<br>23:03<br>8°C<br>0.7 m/s ESE<br>0 cc | 49  | 42              | 35               | 20               | 31               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Engine noise 25-28<br><b>L<sub>Aeq</sub>(15minute) contribution &lt;25 dBA</b><br><b>L<sub>Amax</sub> contribution 28 dBA</b><br><i>Other noise events:</i><br>Dog barking 42-46<br>Livestock 49<br>Road traffic 34-38 |

A summary of the key findings is provided below:

- DCM operations consisting mainly of engine noise were audible during the night-time operator-attended noise surveys at this location.
- The ambient noise environment at the monitoring location during all operator-attended noise surveys generally consisted of natural noise sources such as wind, insects and birdsong as well as aircraft flyover noise, rail movements and road traffic noise.
- The DCM L<sub>Aeq</sub>(15minute) noise contribution was estimated to be <25 dBA during night period.
- During the night-time noise monitoring survey engine noise resulted in a L<sub>Amax</sub> noise level of 28 dBA.

#### 4.1.3 Operator-attended Noise Survey Results - Monitoring Location NM5

Results of the operator-attended noise surveys at NM5 are provided in **Table 6**. Monitoring location NM5 represents residential receptors located to the west of the site.

**Table 6 Attended Noise Survey Results – NM5**

| Period  | Date/Start Time/<br>Weather                        | Primary Noise Descriptor dBA (15 minutes) |                 |                  |                  |                  | Description of Noise Emissions and Typical Maximum Noise Levels (dBA)   |
|---------|--|---|-----------------|------------------|------------------|------------------|---|
|         |  | L <sub>Amax</sub>                         | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>Aeq</sub> |   |
| Day     | 16/07/18<br>15:35<br>16°C<br>2.9 m/s W             | 55  | 45              | 37               | 27               | 35               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Road traffic 31-42<br>Aeroplane 32-35<br>Residents 35-55<br>Birdsong 30-49<br>Livestock/Dog barking 37-43<br>Wind 25-39   |
| Evening | 17/07/18<br>18:52<br>14°C<br>2.6 m/s<br>ENE        | 49  | 45              | 40               | 28               | 37               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Road traffic 35-49<br>Dog barking 37  |
| Night   | 17/07/18<br>22:35<br>9°C<br>2.2 m/s<br>NNW<br>0 cc | 42  | 40              | 37               | 29               | 34               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Haul trucks 30-42<br>Dozer 23-36<br>Digger 28-33<br><b>L<sub>Aeq</sub>(15minute) contribution 34 dBA</b><br><b>L<sub>Amax</sub> contribution 42 dBA</b><br><b>L<sub>Ceq</sub> - L<sub>Aeq</sub> = 10 dB</b><br><i>Other noise events:</i><br>Road traffic 25-40 |

A summary of the key findings is provided below:

- DCM operations were audible during the night period noise surveys at this location. The DCM source identified included engine/mechanical plant noise.
- The ambient noise environment at the monitoring location during all attended noise monitoring surveys was dominated by natural noise sources and road traffic noise.
- The DCM L<sub>Aeq</sub>(15minute) noise contribution was estimated to be 34 dBA during the night period.
- During the night-time noise monitoring survey engine noise resulted in a L<sub>Amax</sub> noise level of 42 dBA.
- DCM noise contributions were not found to contain low-frequency noise as described by the NPfI.

#### 4.1.4 Operator-attended Noise Survey Results - Monitoring Location NM6

Results of the operator-attended noise surveys at NM6 are provided in **Table 7**. Monitoring location NM6 represents residential receptors located to the north of the site on Weismantels Road.

**Table 7 Attended Noise Survey Results – NM6**

| Period  | Date/Start Time/<br>Weather                   | Primary Noise Descriptor dBA (15 minutes) |                 |                  |                  |                  | Description of Noise Emissions and Typical Maximum Noise Levels (dBA)  |
|---------|---|---|-----------------|------------------|------------------|------------------|--|
|         |   | L <sub>Amax</sub>                         | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>Aeq</sub> |  |
| Day     | 16/07/18<br>16:35<br>15°C<br>2.4 m/s W        | 55  | 44              | 38               | 29               | 36               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Livestock 48<br>Road traffic 28-39<br>Birdsong 32-55<br>Dog barking 37<br>Aeroplane 37-42  |
| Evening | 17/07/18<br>18:02<br>15°C<br>2.8 m/s E        | 46  | 39              | 34               | 27               | 32               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Dog barking 33-41<br>Aeroplane 42<br>Birdsong 38<br>Road traffic 30-46<br>Wind in trees 26-34  |
| Night   | 17/07/18<br>23:28<br>8°C<br>0.6 m/s E<br>0 cc | 44  | 39              | 30               | 21               | 28               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Haul trucks 21-27<br><b>L<sub>Aeq</sub>(15minute) contribution &lt;25 dBA</b><br><b>L<sub>Amax</sub> contribution 27 dBA</b><br><i>Other noise events:</i><br>Dogs barking 30-39<br>Road traffic 31-44 |

A summary of the key findings is provided below:

- DCM operations were audible during the night operator-attended noise surveys at this location consisting of engine noise from haul trucks.
- The ambient noise environment at the monitoring location during all attended noise monitoring surveys was included natural noise sources and road traffic noise.
- The DCM L<sub>Aeq</sub>(15minute) noise contribution was estimated to be <25 dBA during the night period.
- During the night-time noise monitoring survey engine noise resulted in a L<sub>Amax</sub> noise level of 27 dBA.

#### 4.1.5 Operator-attended Noise Survey Results - Monitoring Location WR1

Results of the operator-attended noise surveys at WR1 are provided in **Table 8**. This location is representative of residential receptors located in Ward Street, Wards River.

**Table 8 Attended Noise Survey Results – WR1**

| Period  | Date/Start Time/<br>Weather                        | Primary Noise Descriptor dBA (15 minutes) |                 |                  |                  |                  | Description of Noise Emissions and Typical Maximum Noise Levels (dBA)   |
|---------|--|---|-----------------|------------------|------------------|------------------|---|
|         |  | L <sub>Amax</sub>                         | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>Aeq</sub> |   |
| Day     | 18/07/18<br>10:18<br>15°C<br>1.7 m/s E             | 68  | 62              | 47               | 36               | 48               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Inaudible</b><br><i>Other noise events:</i><br>Birdsong 43-68<br>Road traffic 38-46  |
| Evening | 16/07/18<br>21:36<br>5°C<br>0.5 m/s S              | 51  | 42              | 32               | 24               | 31               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Engine noise 24-28<br><b>L<sub>Aeq</sub>(15minute) contribution &lt;25 dBA</b><br><i>Other noise events:</i><br>Road traffic 33-51<br>Aeroplane 30-38<br>Livestock 32   |
| Night   | 16/07/18<br>22:00<br>5°C<br>0.5 m/s<br>SSW<br>0 cc | 51  | 40              | 29               | 23               | 29               | <i>Site related noise events:</i><br><b>Duralie Coal Mine: Audible</b><br>Engine noise 20-31<br><b>L<sub>Aeq</sub>(15minute) contribution &lt;25 dBA</b><br><b>L<sub>Amax</sub> contribution 31 dBA</b><br><i>Other noise events:</i><br>Road traffic 33-51<br>Aeroplane 30-38<br>Livestock 28-39 |

A summary of the key findings is provided below:

- DCM operations (engine noise) were audible during the evening and night operator-attended noise surveys at this location.
- Noise sources at this location generally included natural noise sources such as birdsong, insects, as well as transport related noise such as aircraft flyover noise and road traffic noise.
- The DCM L<sub>Aeq</sub>(15minute) noise contribution was estimated to be <25 dBA during the evening and night period.
- During the night-time noise monitoring survey engine noise resulted in a L<sub>Amax</sub> noise level of 31 dBA.



## 4.2 Operator-attended Rail Noise Monitoring

Duralie Shuttle rail pass-by noise levels are presented in **Table 9**.

**Table 9 Operator-attended Rail Noise Monitoring Results**

| Monitoring Location | Date and Time                           | L <sub>Amax</sub> (dBA) |               |
|---------------------|---|-------------------------|---------------|
|                     |   | Horn Included           | Horn Excluded |
| TN1                 | 17/7/2018 16:13 - shunting movement     | 85                      | 71            |
|                     | 17/7/2018 16:18 - shunting movement     | 87                      | 70            |
|                     | 17/7/2018 16:21 - shunting movement     | 91                      | 62            |
|                     | 17/7/2018 16:49 - to Stratford - loaded | 72                      | 72            |
| TN2                 | 18/7/2018 9:57 - to Duralie - unloaded  | 80                      | 80            |
| TN3                 | 18/7/2018 12:01 -to Stratford - loaded  | 72                      | 72            |

Maximum Duralie Shuttle rail pass-by noise levels (excluding the sounding of horns on approach to level crossings) were below 85 dBA at all monitoring locations.

## 5 Performance Assessment

### 5.1 Operational Noise

Results of the operator-attended noise measurements compared with the relevant noise criteria contained in the Project Approval and EPL 11701 are given in **Table 10**.

**Table 10 Performance Assessment – Operations**

| Location | Estimated DCM<br>L <sub>Aeq</sub> (15minute) Contribution<br>dBA |     |       | Noise Criteria L <sub>Aeq</sub> (15minute)<br>dBA |     |       | Compliance |     |       |
|----------|--|-----|-------|---|-----|-------|------------|-----|-------|
|          | Day  | Eve | Night | Day   | Eve | Night | Day        | Eve | Night |
| NM1      | I/A <sup>1</sup>   | 28  | 31    | 35  | 35  | 35    | Yes        | Yes | Yes   |
| NM4      | I/A  | I/A | <25   | 35  | 35  | 37    | Yes        | Yes | Yes   |
| NM5      | I/A  | I/A | 34    | 35  | 35  | 35    | Yes        | Yes | Yes   |
| NM6      | I/A  | I/A | <25   | 35  | 35  | 39    | Yes        | Yes | Yes   |
| WR1      | I/A <sup>1</sup>   | <25 | <25   | 35  | 35  | 35    | Yes        | Yes | Yes   |

1. I/A = Inaudible.
2. Yancoal owned property.

Results presented in **Table 10** indicate that compliance with the relevant criteria was achieved at all operator-attended noise monitoring locations at all time periods.

## 5.2 Sleep Disturbance

Results of the night period sleep disturbance measurements compared with the relevant noise criteria contained in the Project Approval and EPL 11701 are given in **Table 11**.

**Table 11 Performance Assessment – Sleep Disturbance**

| Location | DCM LA1(1minute)<br>Contribution | Noise Criteria LA1(1minute) | Compliance |
|----------|----------------------------------|-----------------------------|------------|
| NM1      | 36                               | 45                          | Yes        |
| NM4      | 28                               | 45                          | Yes        |
| NM5      | 42                               | 45                          | Yes        |
| NM6      | 27                               | 45                          | Yes        |
| WR1      | 31                               | 45                          | Yes        |

**Table 11** indicates that compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.

## 5.3 Rail Noise

Maximum Duralie Shuttle rail pass-by noise levels were below 85 dBA at all monitoring locations, excluding the sounding of horns on approach to level crossings.

## 6 Conclusion

SLR has conducted quarterly noise monitoring for the DCM guided by the requirements of the NMP.

Operator-attended noise monitoring was conducted at five locations between Monday 16 July 2018 and Wednesday 18 July 2018. The assessment against the various noise requirements within the DCM PA and EPL concluded the following:

- Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the day period.
- Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the evening period.
- Compliance with the relevant noise criteria was achieved at all noise monitoring locations during the night period.
- Based on the measured DCM noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period.
- Maximum Duralie Shuttle rail pass-by noise levels were below 85 dBA at all monitoring locations, excluding the sounding of horns on approach to level crossings.

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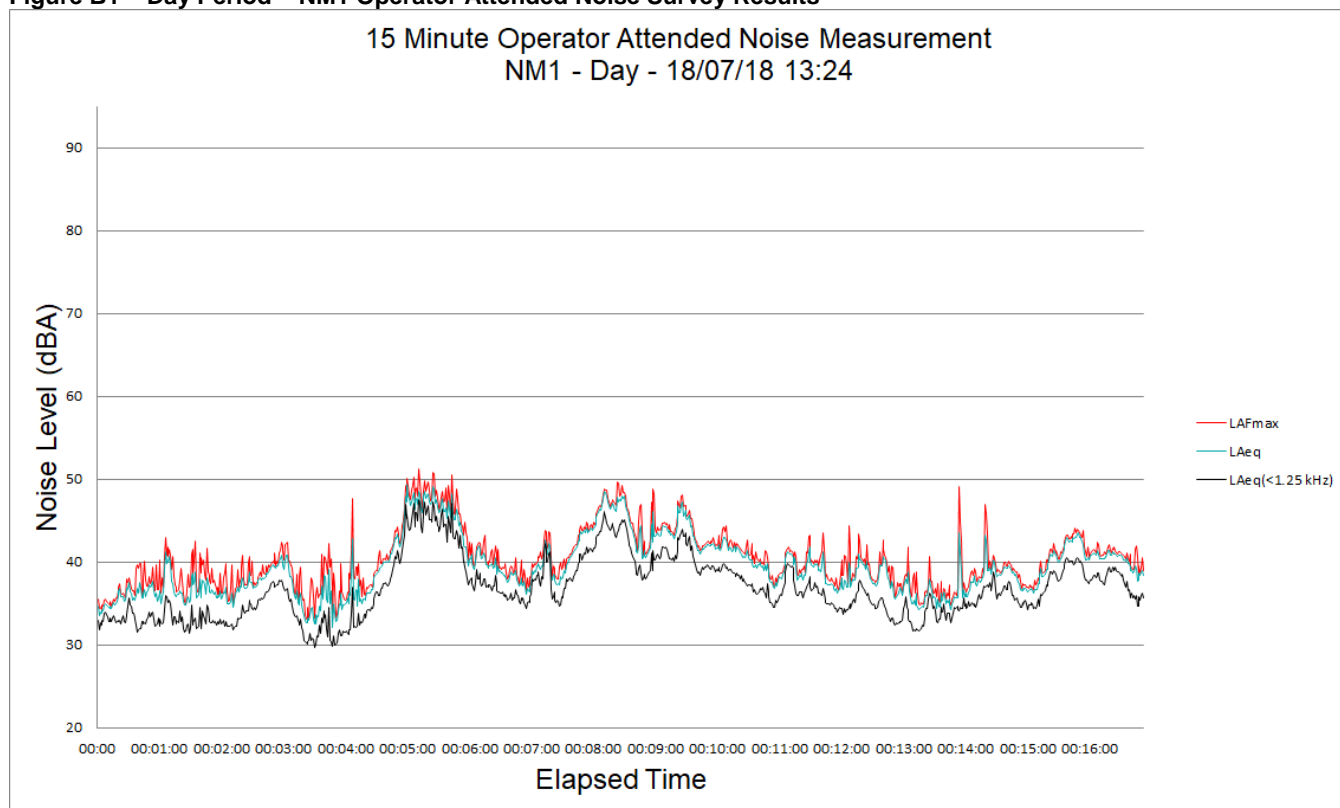
# APPENDIX A

## Acoustic Terminology

# APPENDIX B

## Operator Attended Noise Survey Charts

**Figure B1 – Day Period – NM1 Operator Attended Noise Survey Results**



**Figure B2 – Evening Period – NM1 Operator Attended Noise Survey Results**

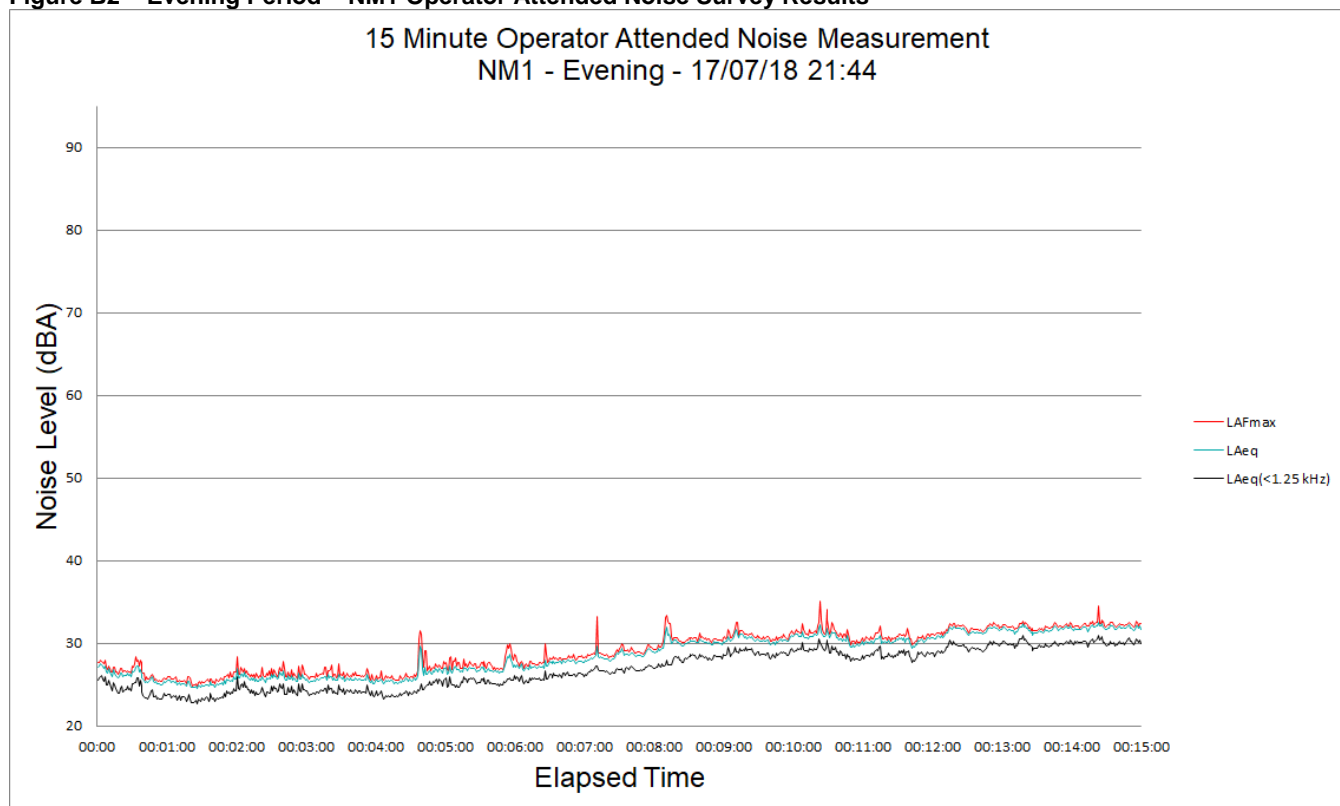


Figure B3 – Night-time Period – NM1 Operator Attended Noise Survey Results

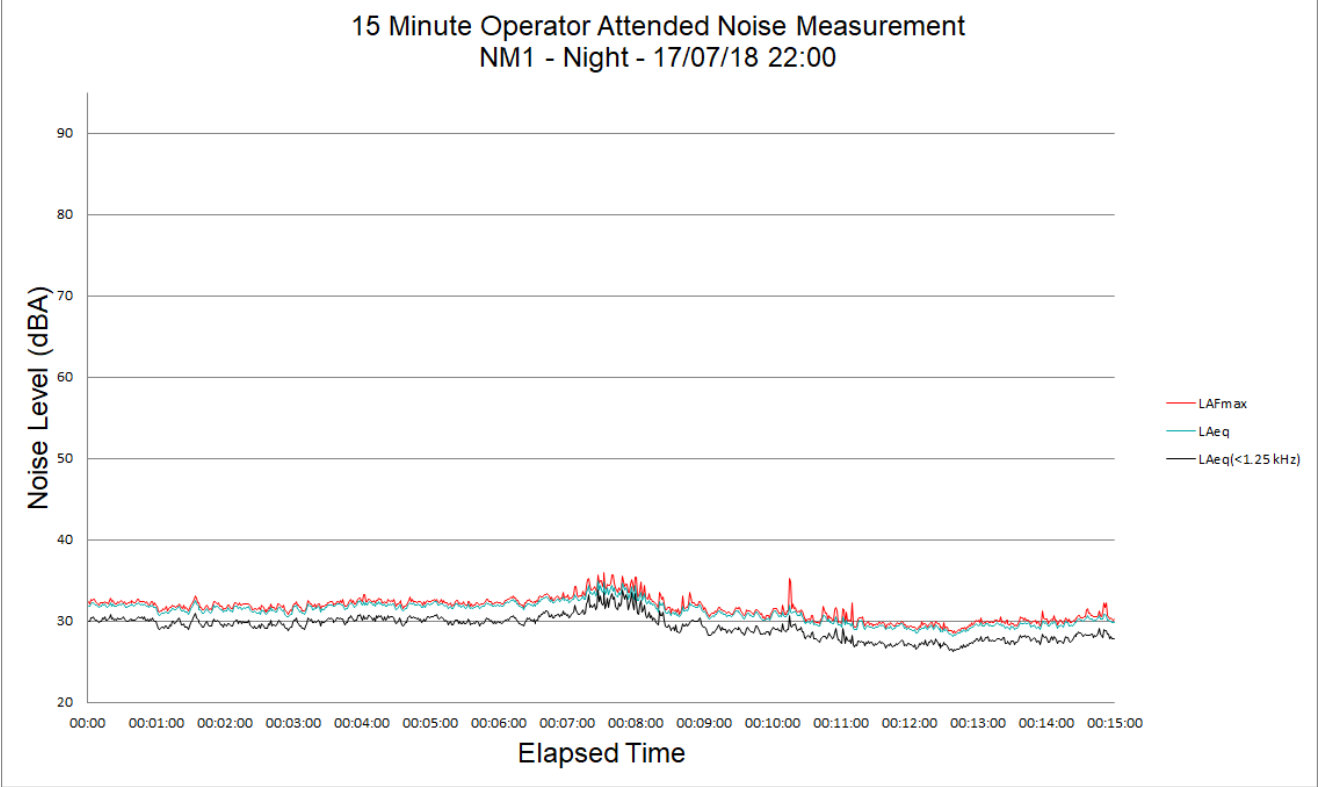


Figure B4 – Day Period – NM4 Operator Attended Noise Survey Results

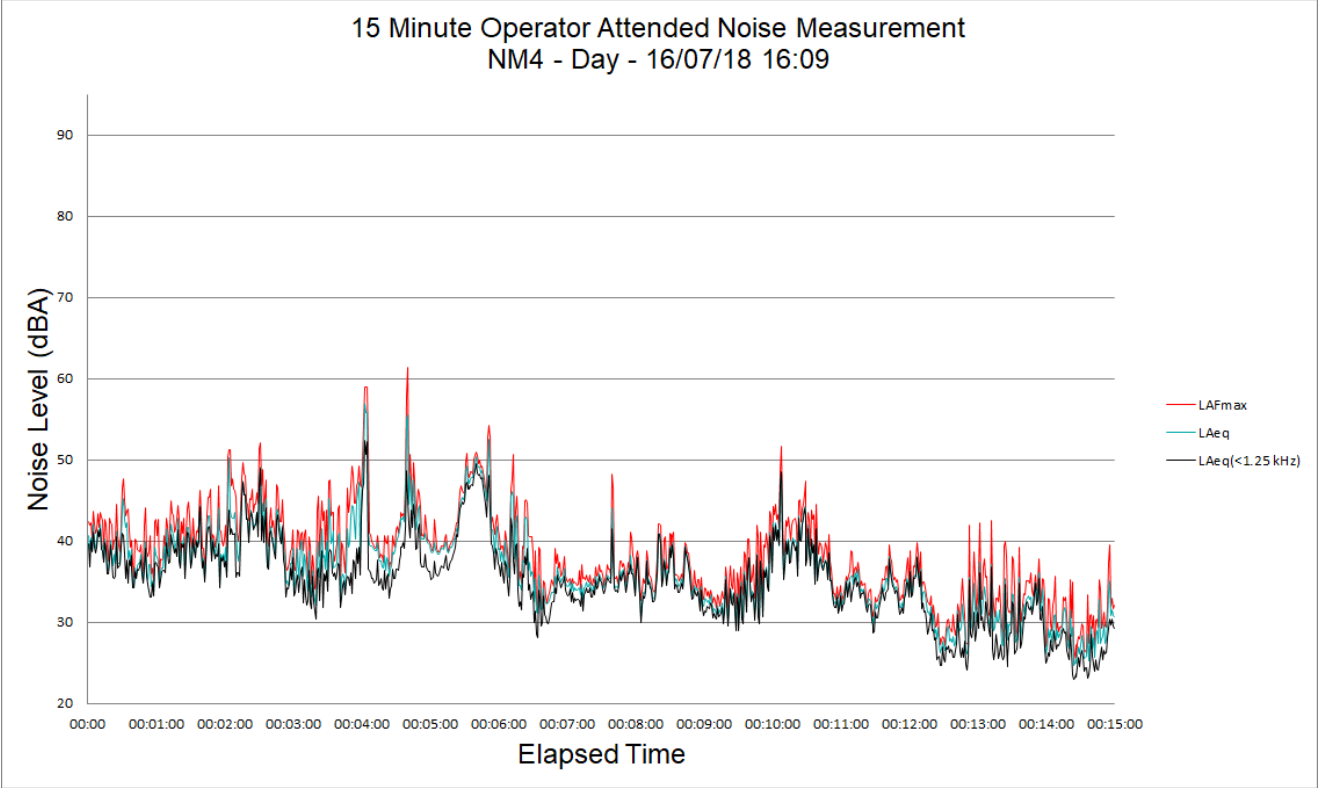


Figure B5 – Evening Period – NM4 Operator Attended Noise Survey Results

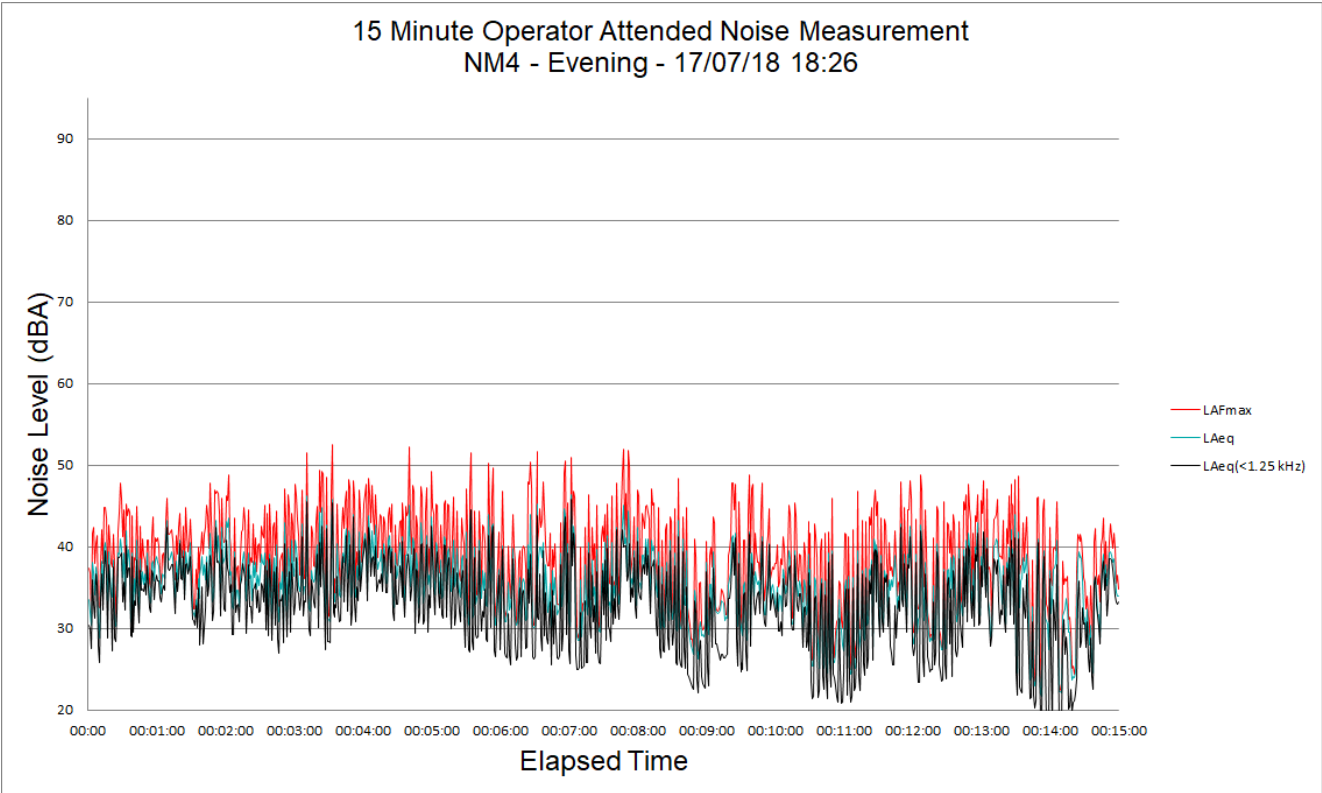


Figure B6 – Night-time Period – NM4 Operator Attended Noise Survey Results

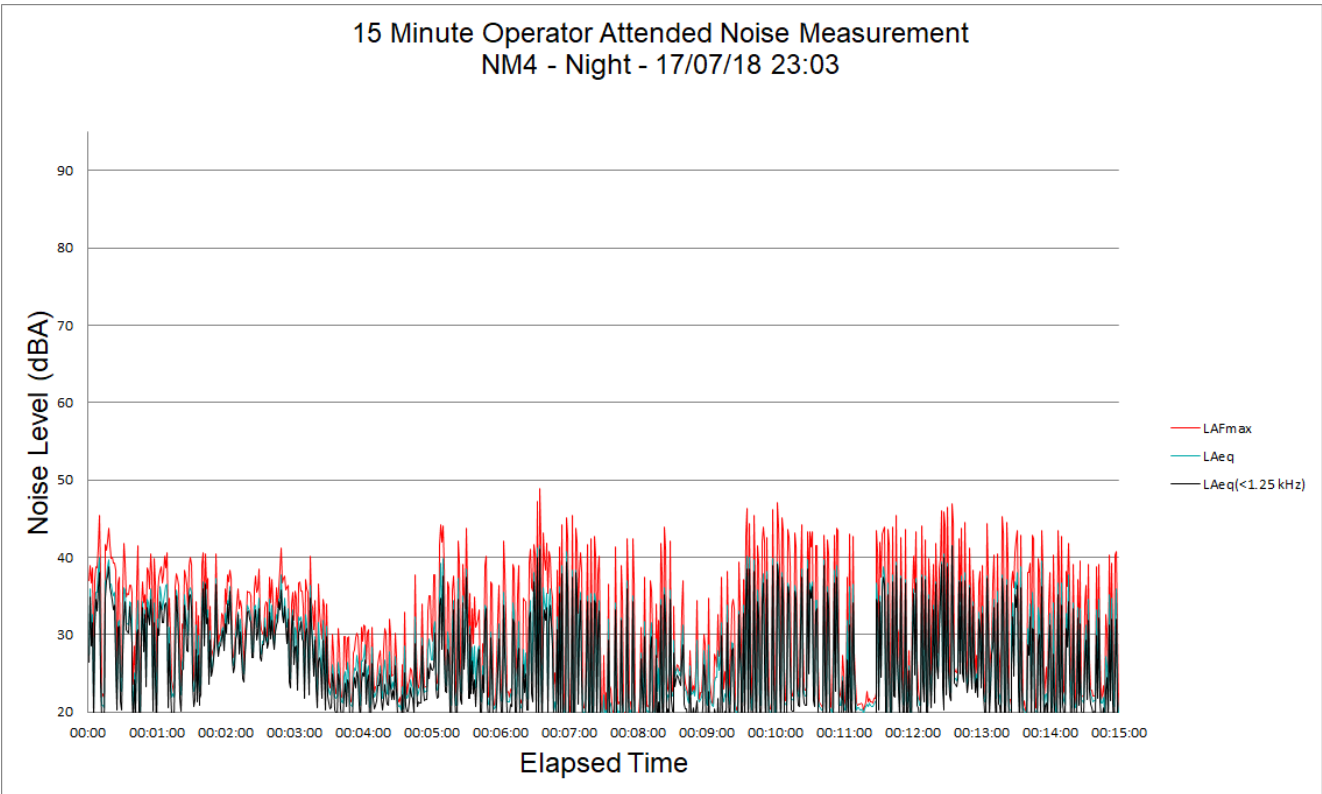


Figure B7 – Day Period – NM5 Operator Attended Noise Survey Results

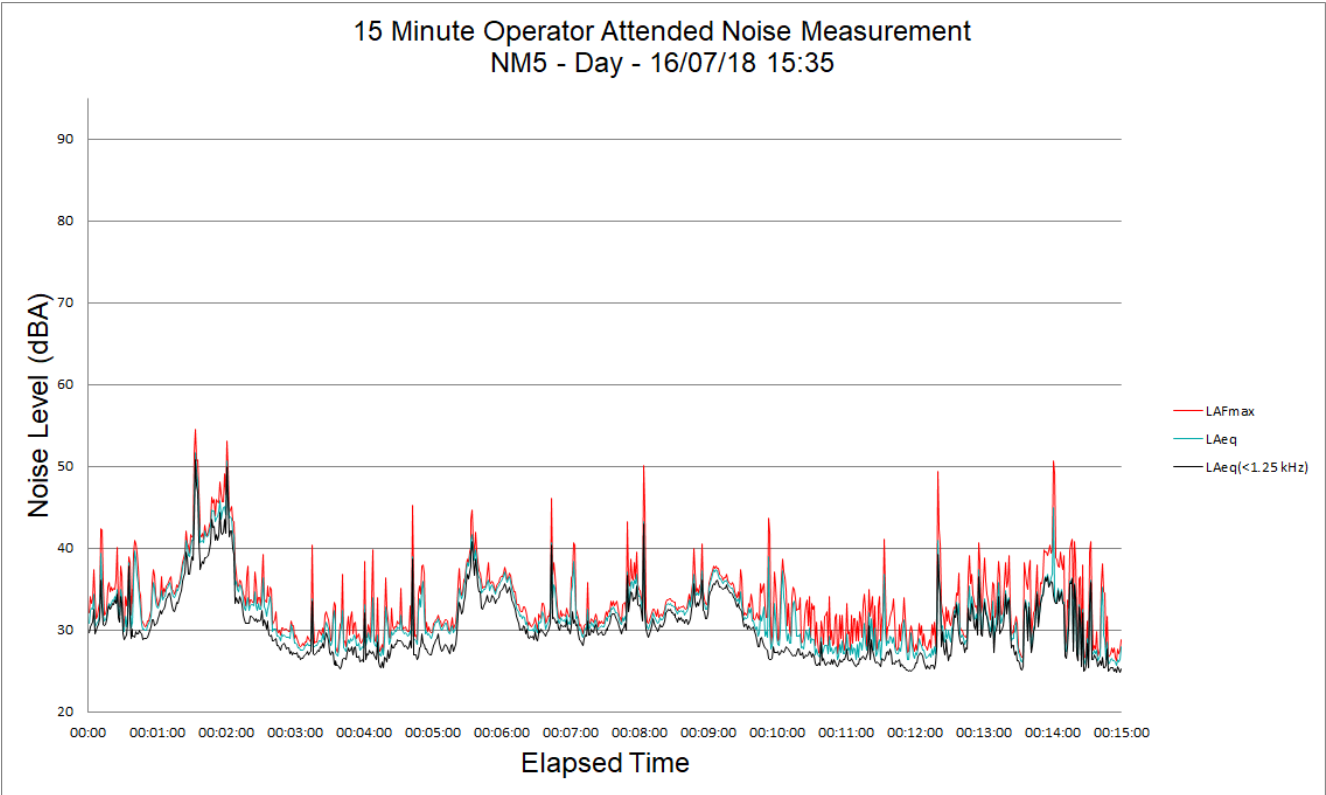


Figure B8 – Evening Period – NM5 Operator Attended Noise Survey Results

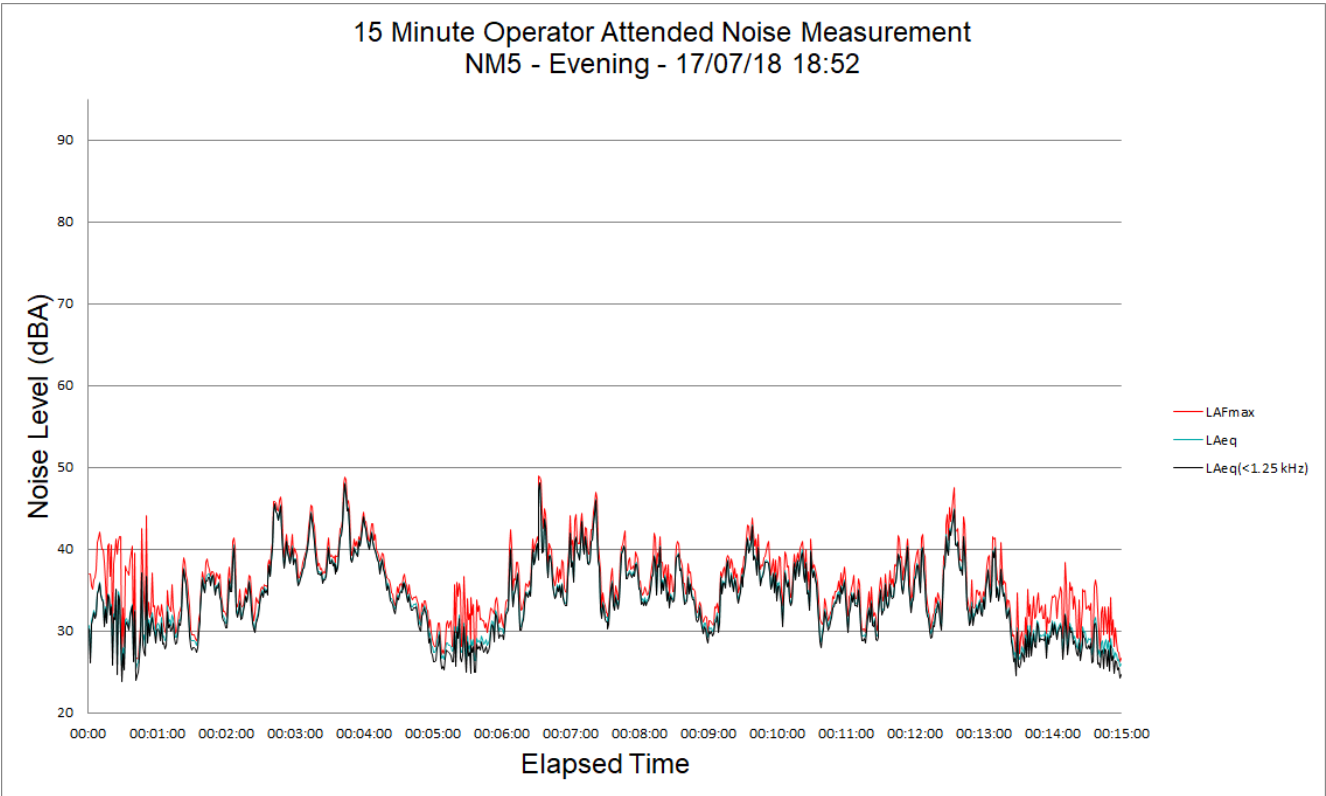




Figure B9 – Night-time Period – NM5 Operator Attended Noise Survey Results

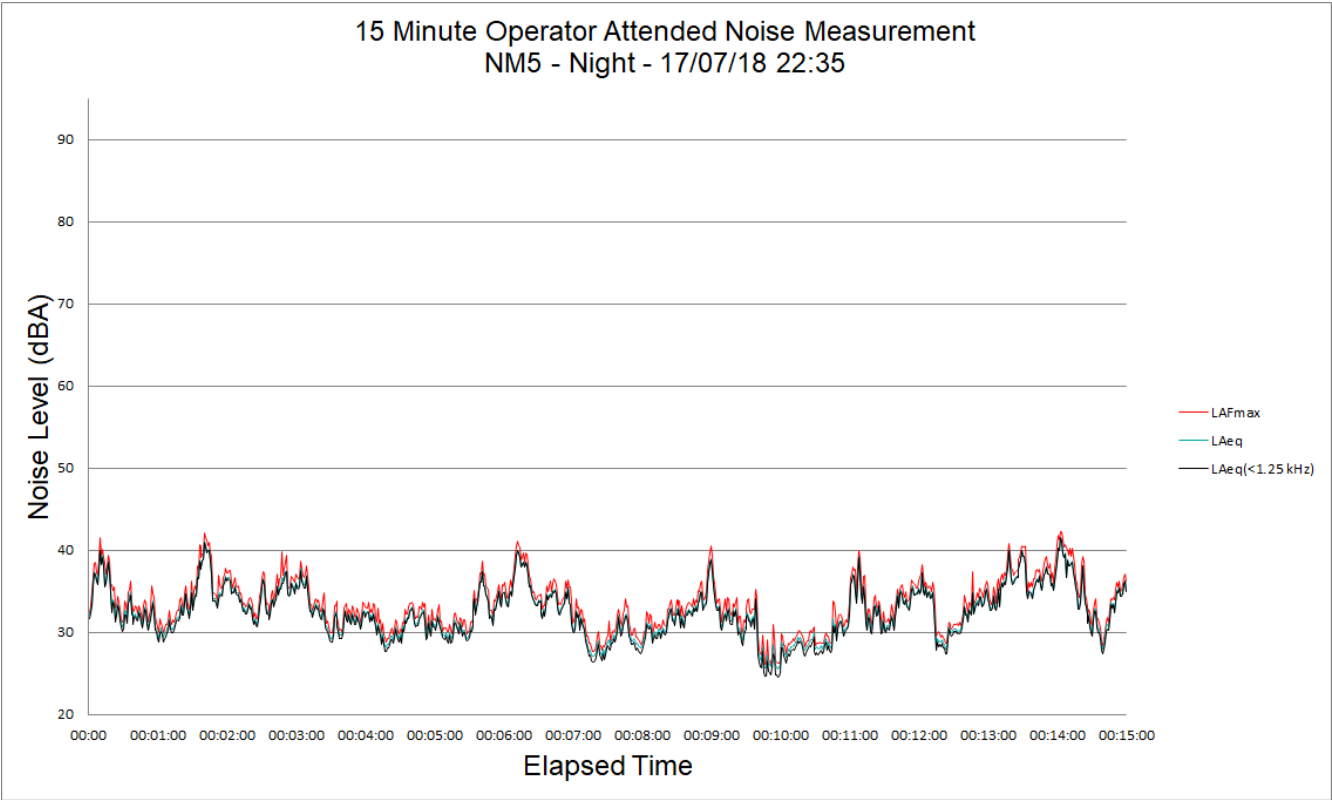


Figure B10 – Day Period – NM6 Operator Attended Noise Survey Results

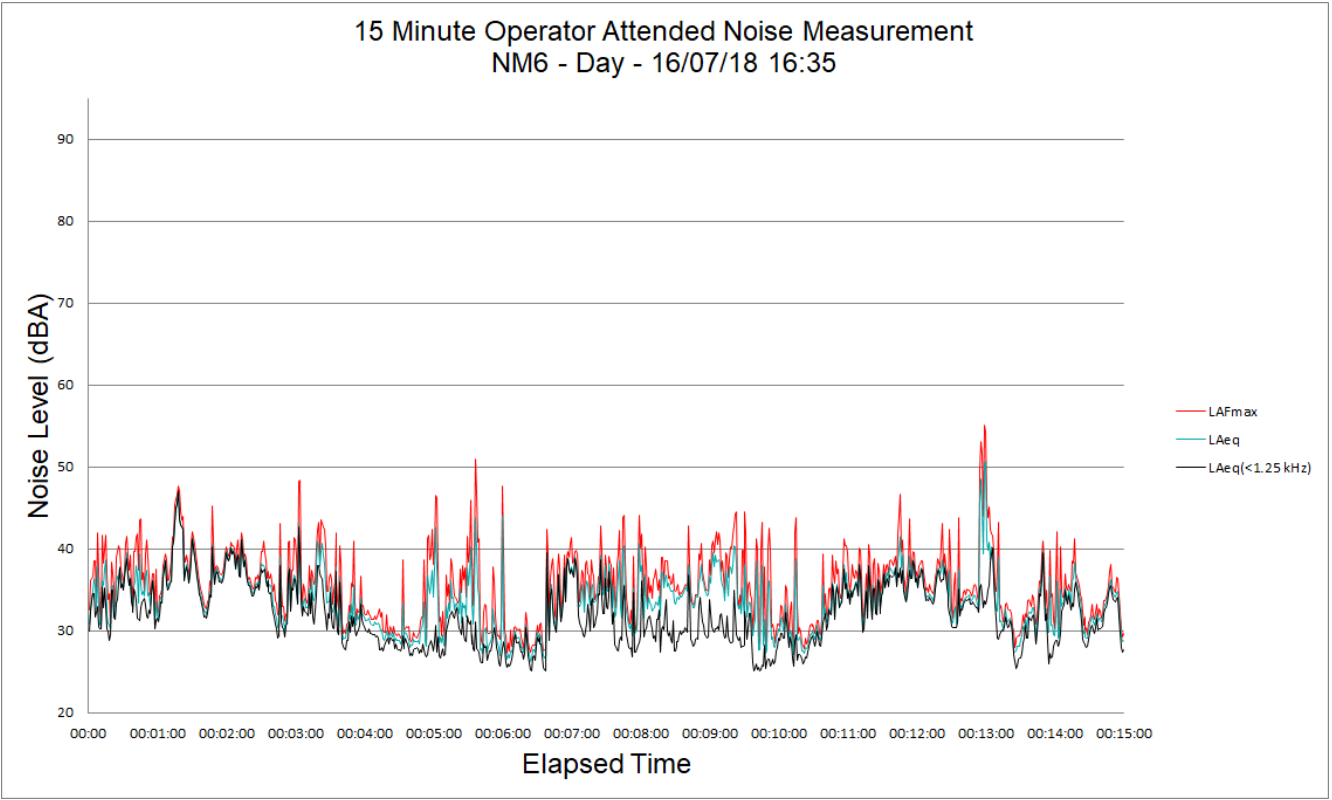


Figure B11 – Evening Period – NM6 Operator Attended Noise Survey Results

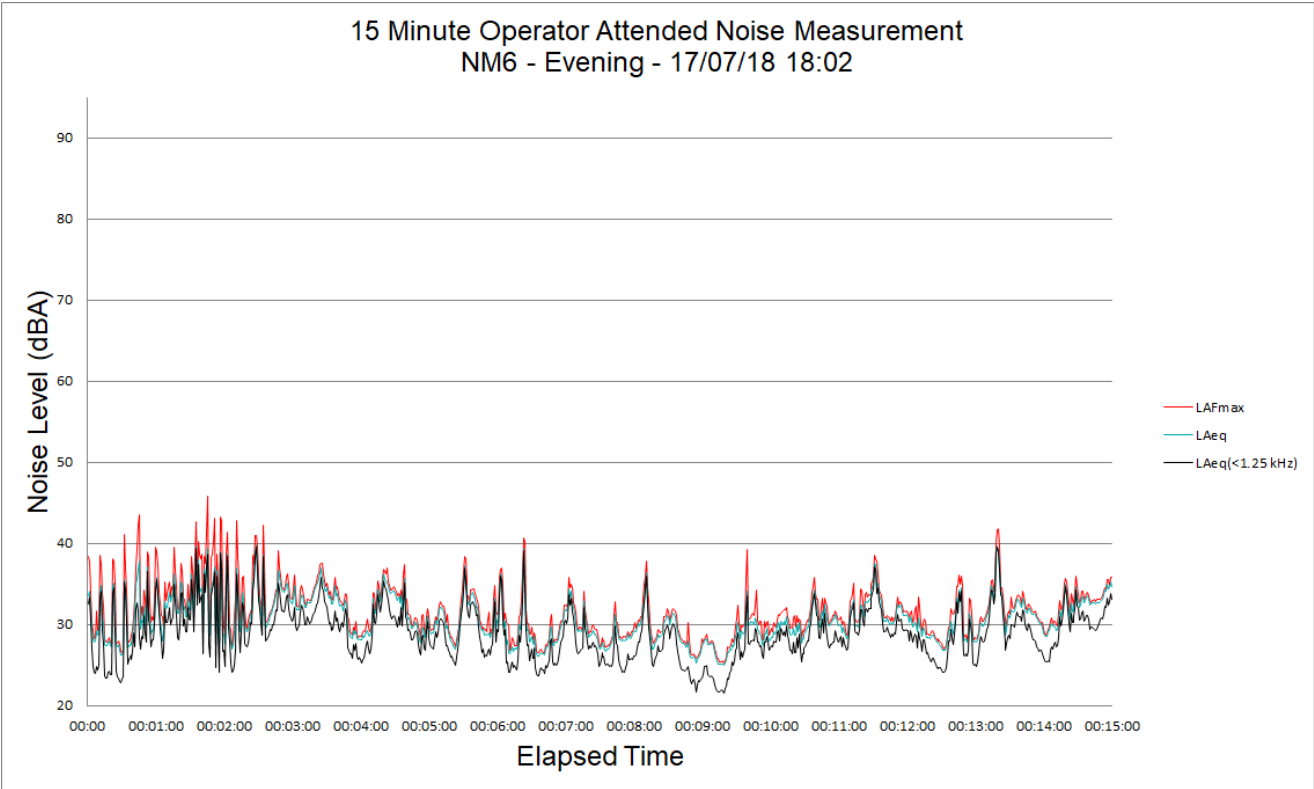


Figure B12 – Night-time Period – NM6 Operator Attended Noise Survey Results

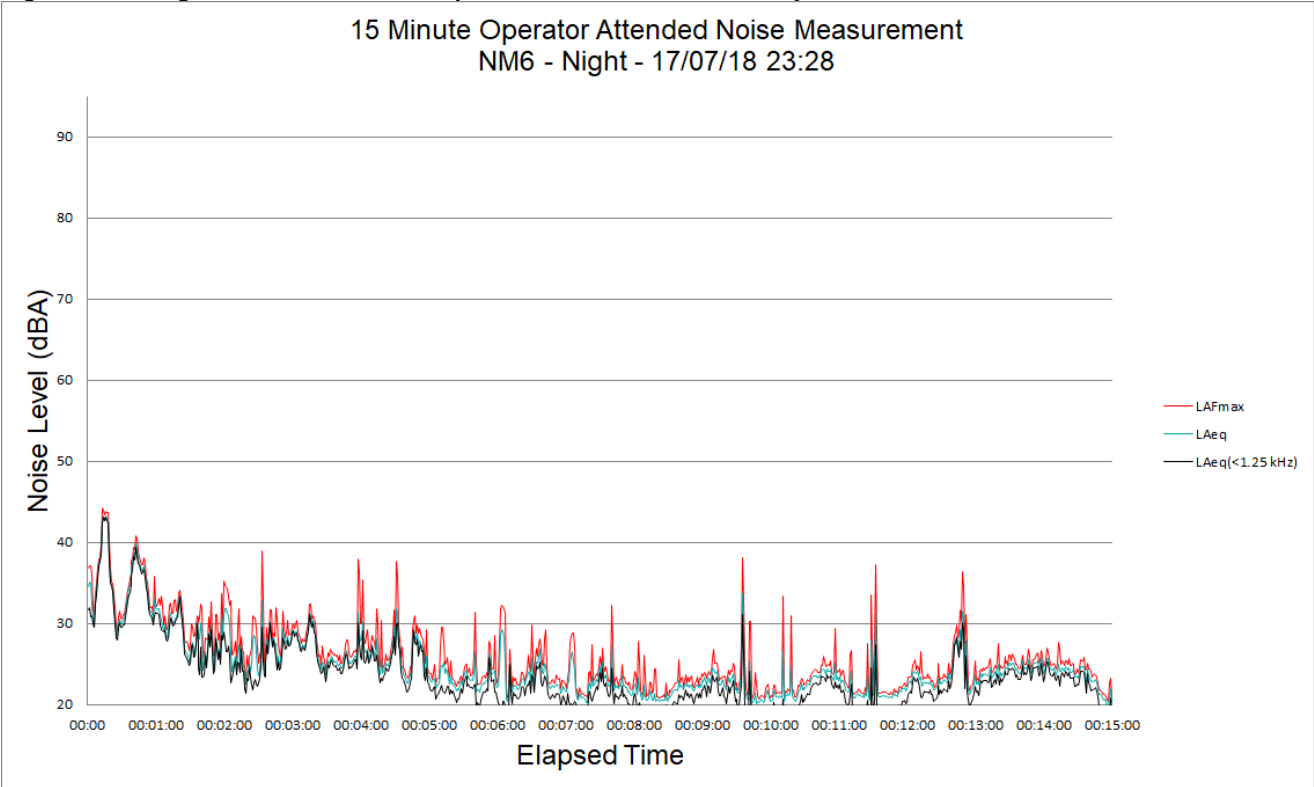


Figure B13 – Day Period – WR1 Operator Attended Noise Survey Results

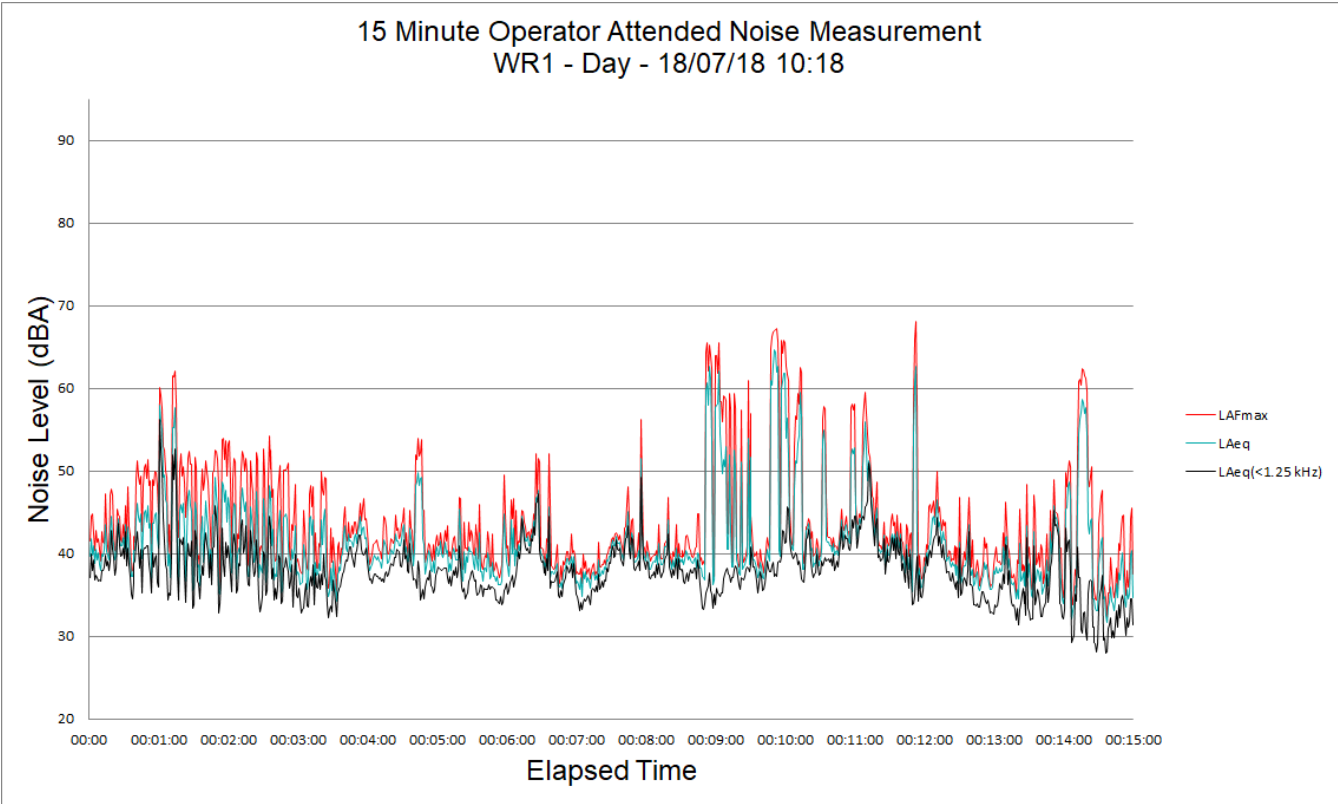


Figure B14 – Evening Period – WR1 Operator Attended Noise Survey Results

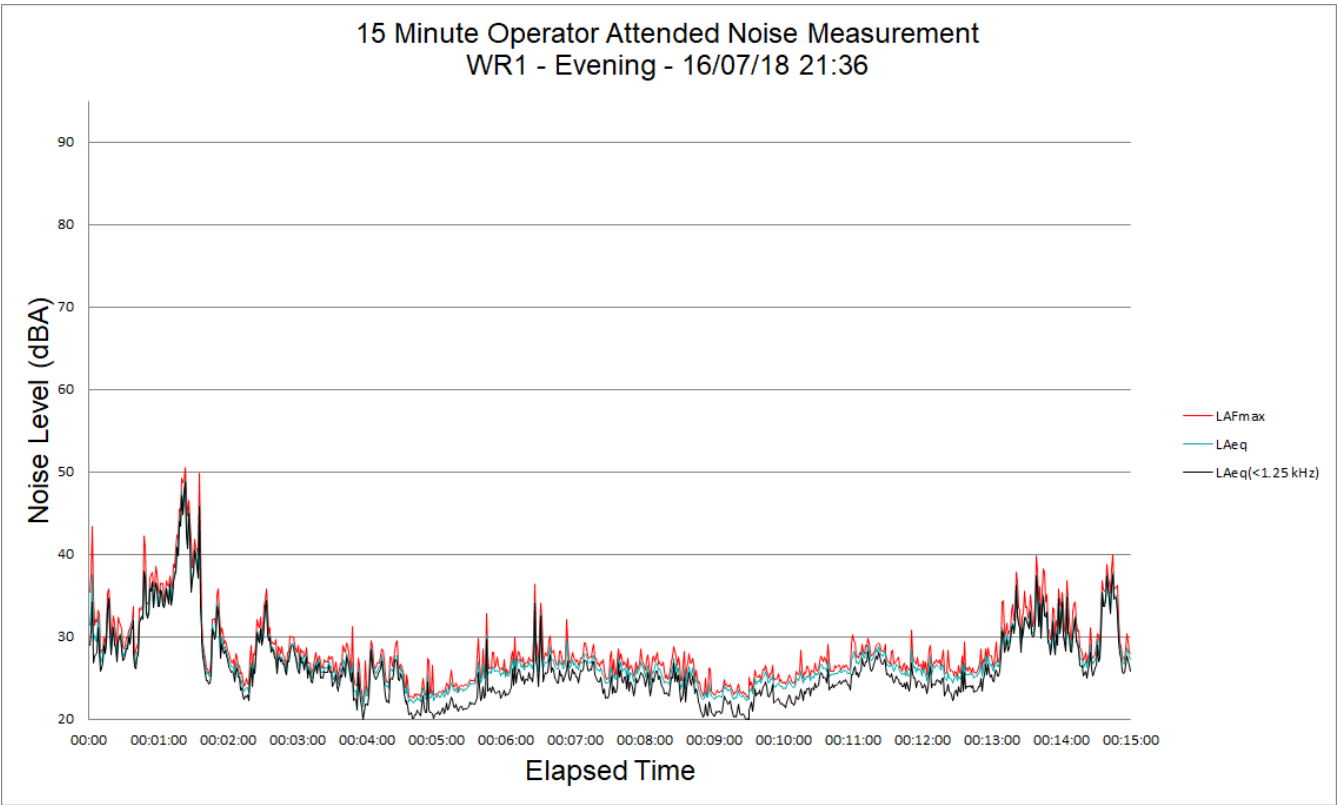
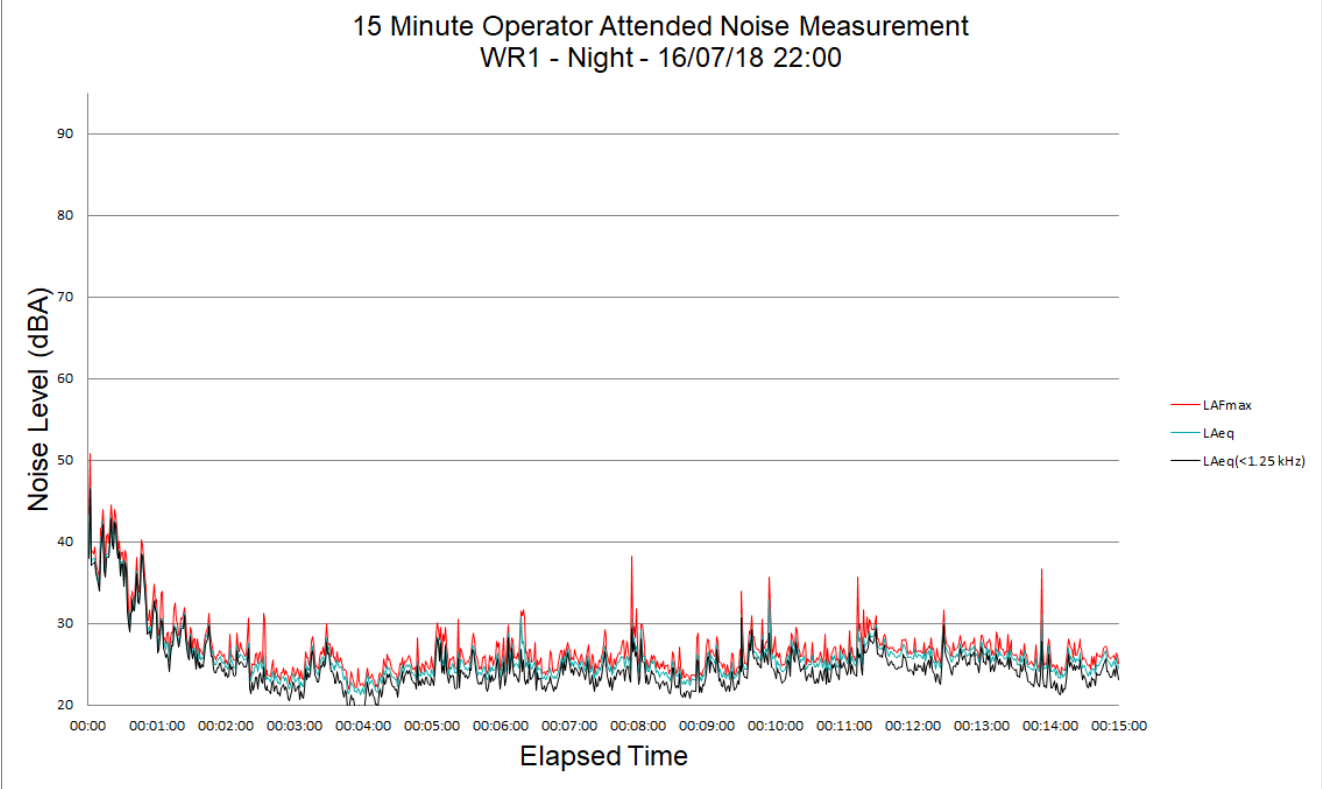


Figure B15 – Night-time Period – WR1 Operator Attended Noise Survey Results



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