DURALIE COAL MINE

Quarterly Compliance Noise Monitoring
April 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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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.11772-R08-v0.1	14 June 2018	Martin Davenport	Mark Russell	Martin Davenport

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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-R05-A, dated August 2017. This report presents the results and findings from the operator-attended noise surveys conducted between Wednesday 18 April 2018 and Thursday 19 April 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, NM2, NM4, NM5 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	$L_{Aeq(15minute)}$			$L_{A1(1minute)}$
	Daytime	Evening	Night-time	Night-time
NM1 Woodley	35	35	35	45
NM2 Zulumovski North	35	35	35	45
NM4 Fisher-Webster	35	35	37	45
NM5 Moylan	35	35	35	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	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
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	35	35	37	45
127 – Fisher-Webster				
131(1) - Relton				
180 (1) - Thompson	35	36	36	45
95 - Smith & Ransley	35	35	36	45
144 - Wielgosinski	35	36	35	45
169 - Williams				
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 INP requirements. The assessment indicated that there is no dominant low-frequency content relating to noise emissions from the DCM. As a result, low frequency analysis (L_{Ceq} minus L_{Aeq}) was not conducted on the noise compliance measurements for this round of DCM noise monitoring as the DCM noise contribution was not audible and/or significantly below the relevant noise criteria and is therefore not addressed further in this report.

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 ±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 determined.

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[1]	400644	6421907
NM2[2]	Residence	Zulumovski North	399042	6430384
NM4	Residence	Fisher-Webster	396790	6428961
NM5	Residence	Moylan	396770	6428945
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.

Note 2: Yancoal owned property.

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	400252	6441916
TN2	Residence	Wards River Village North	399914	6434771
TN3	Residence	Wards River Village South	399765	6434421

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ATTENDED NOISE MONITORING LOCATIONS

FIGURE 1

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}, L_{A1}, L_{A10}, L_{A90}, 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 commencing on Wednesday 18 April 2018. Results of the operator-attended noise surveys at NM1, NM2, NM4 and NM5 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 $L_{Aeq(<1.25kHz)}$ 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 (ºC) 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/ Weather	Primary Noise Descriptor dBA (15 minutes)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
Day	18/04/18 14:18 27°C 1 m/s SE	60	49	42	30	38	*Site related noise events:* **Duralie Coal Mine: Barely audible** Engine noise < 20 **LAeq(15minute) contribution <20dBA** *Other noise events:* Train 52 Insects 28-36 Birdsong 35-60 Distant traffic 30-37 Aeroplane 30-34
Evening	18/04/18 21:49 17°C 1 m/s N	53	38	36	29	33	*Site related noise events:* **Duralie Coal Mine: Audible** Engine noise/haul trucks 26-30 **LAeq(15minute) contribution 23 dBA** *Other noise events:* Insects 30-41 Operator 53
Night	18/04/18 22:04 17°C 1 m/s N 0 cc	55	37	35	29	32	*Site related noise events:* **Duralie Coal Mine: Audible** Engine noise/haul trucks 26-33 **LAeq(15minute) contribution 22 dBA** **LAmax contribution 33 dBA** *Other noise events:* Insects 30-55

A summary of the key findings is provided below;

- DCM operations were audible during all operator-attended noise surveys at this location from engine noise from equipment operating at the stockpile area.
- 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, rail movements and road traffic noise.
- The DCM $L_{Aeq(15minute)}$ noise contribution was estimated to be <20 dBA, 23 dBA and 22 dBA during the day, evening and night period, respectively.
- During the night-time noise monitoring survey engine noise resulted in a L_{Amax} noise level of 33 dBA.

4.1.2 Operator-attended Noise Survey Results - Monitoring Location NM2

Results of the operator-attended noise surveys at NM2 are provided in **Table 5**. Monitoring location NM2 represents residential receptors located to the north of the site.

Table 5 Attended Noise Survey Results – NM2

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minutes)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
Day	18/04/18 16:30 23°C 1 m/s NW	90	74	50	35	63	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Livestock 42-90 Birdsong 44-59 Road traffic 42-72 Insects 30
Evening	19/04/18 20:25: 17°C 2.5 m/s NW	64	46	40	34	38	*Site related noise events:* **Duralie Coal Mine: Audible** Engine noise 26-32 **$L_{Aeq(15minute)}$ contribution 28 dBA** *Other noise events:* Thunder 64 Road traffic 38-48Z Wind in trees 35-42
Night	18/04/18 23:08 17°C 2 m/s NNE 0 cc	47	41	34	29	32	*Site related noise events:* **Duralie Coal Mine: Barely Audible** Engine noise<20 **$L_{Aeq(15minute)}$ contribution <20 dBA** **L_{Amax} contribution <20 dBA** *Other noise events:* Wind in trees 43 Insects 33-35 Traffic 38-47

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 consisting of engine noise from plant operating in the pit.
- Other noise sources at this location generally included natural noise sources such as birdsong, insects, and wind, as well as transport related noise such as and road traffic noise.
- The DCM $L_{Aeq(15minute)}$ noise contribution was estimated to be 28 dBA and <20 dBA during the evening and night period, respectively.
- During the night-time noise monitoring survey engine noise resulted in a L_{Amax} noise level of <20 dBA.

4.1.3 Operator-attended Noise Survey Results - Monitoring Location NM4

Results of the operator-attended noise surveys at NM4 are provided in **Table 6**. NM4 represents residential receptors located to the north of the site.

Table 6 Attended Noise Survey Results – NM4

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minutes)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
Day	19/04/18 13:03 25°C 2 m/s NE	64	55	50	30	45	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Train 56 Birdsong 43-64 Traffic 38-46 Wind in trees 38-44 Aeroplane 55-61
Evening	No measurement conducted due to lightning storm.						
Night	18/04/18 22:47 17°C 1 m/s NNE 0 cc	43	34	31	26	29	*Site related noise events:* **Duralie Coal Mine: Barely Audible** Engine noise <20 **LAeq(15minute) contribution <20 dBA** **LAmax contribution <20 dBA** *Other noise events:* Livestock 41-43 Road traffic 30-36

A summary of the key findings is provided below;

- DCM operations were barely audible during the night-time operator-attended noise surveys at this location consisting of engine noise from the pit.
- 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 $L_{Aeq(15minute)}$ noise contribution was estimated to be <20 dBA during night period.
- During the night-time noise monitoring survey engine noise resulted in a L_{Amax} noise level of <20 dBA.

4.1.4 Operator-attended Noise Survey Results - Monitoring Location NM5

Results of the operator-attended noise surveys at NM5 are provided in **Table 7**. Monitoring location NM5 represents residential receptors located to the west of the site.

Table 7 Attended Noise Survey Results – NM5

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minutes)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
Day	18/04/18 14:49 24°C 2 m/s ESE	64	57	54	40	50	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Insects/frogs 40-57 Aeroplane 64 Road traffic 40-46
Evening	No measurement conducted due to lightning storm.						
Night	19/04/18 22:36 15°C 2 m/s WNW 8 cc	56	55	54	49	52	*Site related noise events:* **Duralie Coal Mine: Audible** Dozer 25 Engine noise 22-28 **$L_{Aeq(15minute)}$ contribution 25 dBA** **L_{Amax} contribution 28 dBA** *Other noise events:* Insects 46-56 Traffic 35-40 Aeroplane 42

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 noise from the pit.
- 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 $L_{Aeq(15minute)}$ 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_{Amax} noise level of 28 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/ Weather	Primary Noise Descriptor dBA (15 minutes)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	
Day	19/04/18 13:32 26°C 1.5 m/s SSE	72	63	47	30	50	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Helicopter 72 Birdsong 43-61 Road traffic 34-50 Insects 27-35 Residents 32-39
Evening	18/04/18 21:09 19°C 0.5 m/s N	56	45	34	23	33	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Road traffic 43 Aeroplane 55-56 Insects 27-32
Night	18/04/18 23:33 17°C 0.5 m/s N 0 cc	40	31	25	22	24	*Site related noise events:* **Duralie Coal Mine: Inaudible** *Other noise events:* Traffic 39-40 Dog barking 34 Livestock 26-29 Insects 20-29

A summary of the key findings is provided below;

- DCM operations were inaudible during all operator-attended noise surveys at this location.
- The ambient noise environment at the monitoring location during all operator-attended noise surveys was dominated by road traffic and other noise sources included insects, livestock and residential noise.

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_{Amax} (dBA)	
		Horn Included	Horn Excluded
TN1	19/4/2018 12:18	83	83
TN2	19/4/2018 14:18	72	72
TN3	19/4/2018 16:30	78	78

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

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 $L_{Aeq(15minute)}$ Contribution dBA			Noise Criteria $L_{Aeq(15minute)}$ dBA			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
NM1	<20	23	22	35	35	35	Yes	Yes	Yes
NM2[2]	I/A[1]	28	<20	35	35	35	Yes	Yes	Yes
NM4	I/A[1]	-	<20	35	35	37	Yes	Yes	Yes
NM5	I/A[1]	-	25	35	35	35	Yes	Yes	Yes
WR1	I/A[1]	I/A[1]	I/A[1]	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. Although no evening measurements were conducted at NM4 and NM5 due to a lightning storm, given the results during the night-time and at other monitoring locations, DCM operations are considered to be in compliance with the relevant criteria.

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) Contribution	Noise Criteria LA1(1minute)	Compliance
NM1	33	45	Yes
NM2[2]	<20	45	Yes
NM4	<20	45	Yes
NM5	28	45	Yes
WR1	I/A[1]	45	Yes

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

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, including 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 Wednesday 18 April 2018 and Thursday 19 April 2018. The assessment against the various noise requirements within the mines 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, including the sounding of horns on approach to level crossings.

APPENDIX A

Acoustic Terminology

APPENDIX B

Operator Attended Noise Survey Charts

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

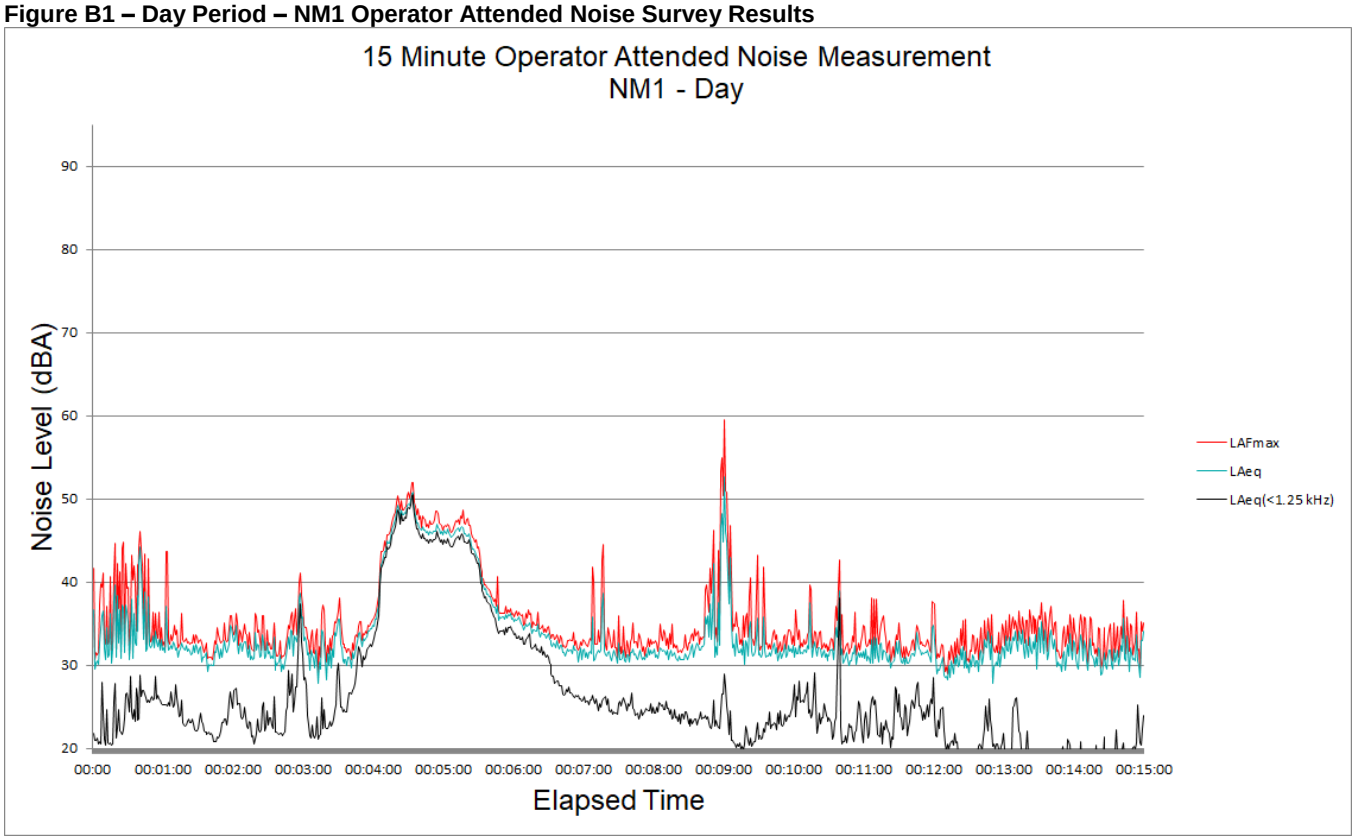


Figure B2 – Evening Period – NM1 Operator Attended Noise Survey Results

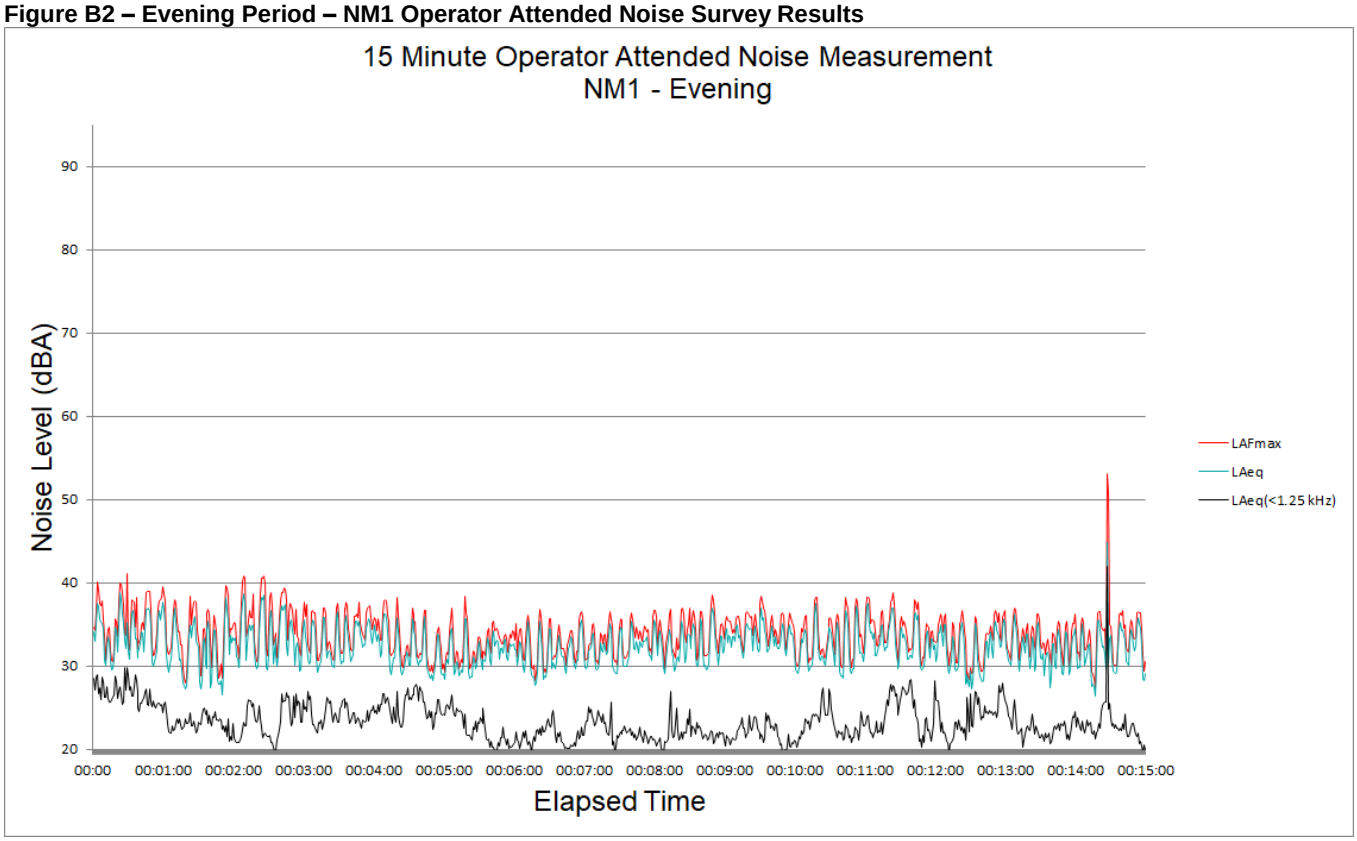


Figure B3 – Night-time Period – NM1 Operator Attended Noise Survey Results

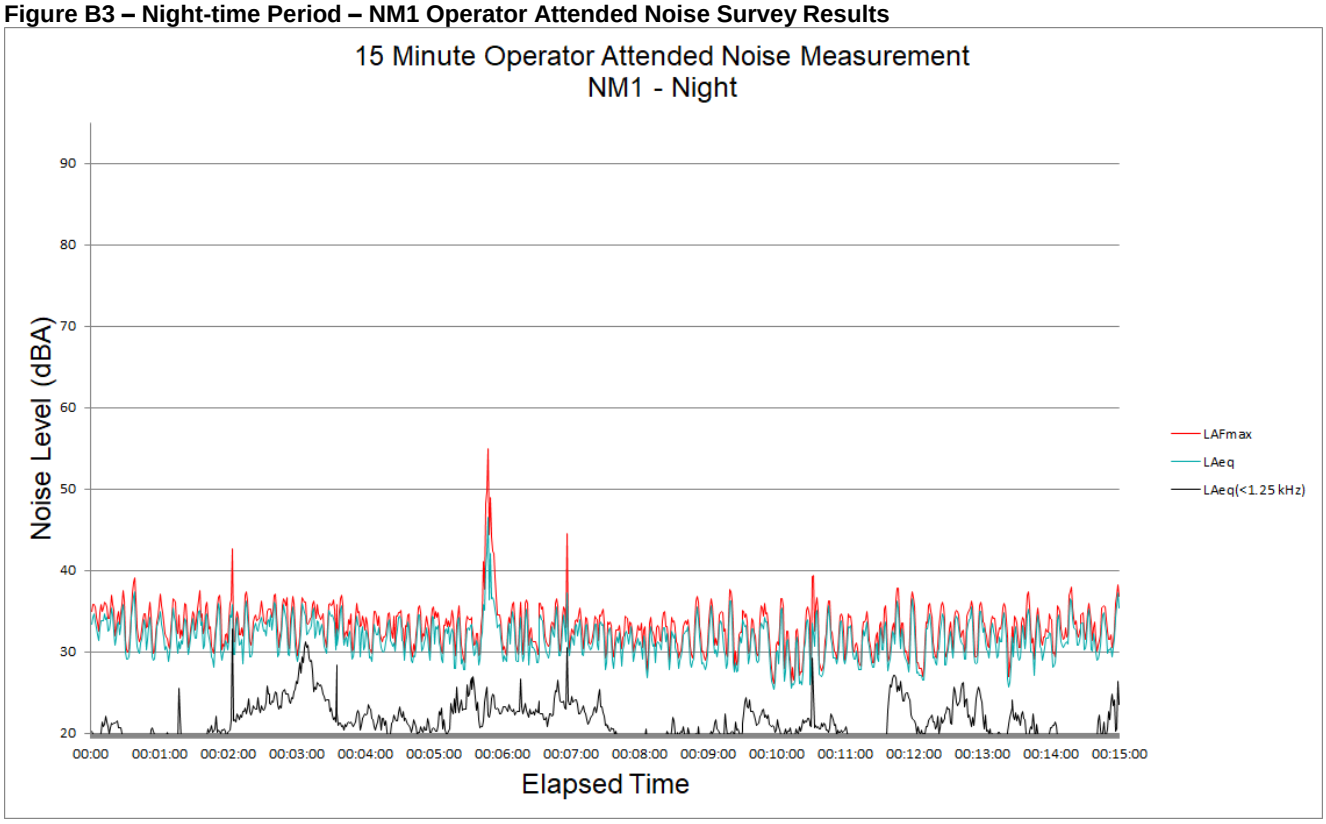


Figure B4 – Day Period – NM2 Operator Attended Noise Survey Results

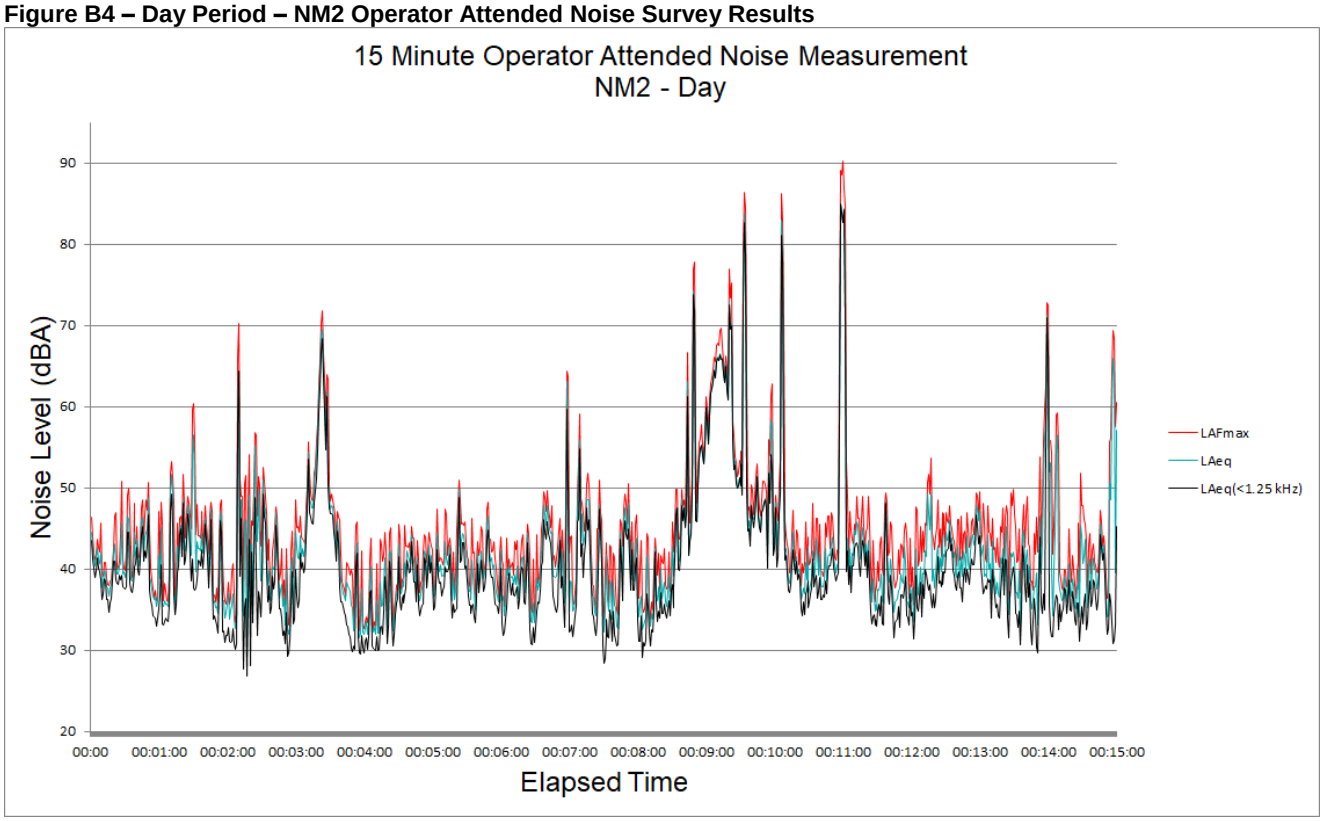


Figure B5 – Evening Period – NM2 Operator Attended Noise Survey Results

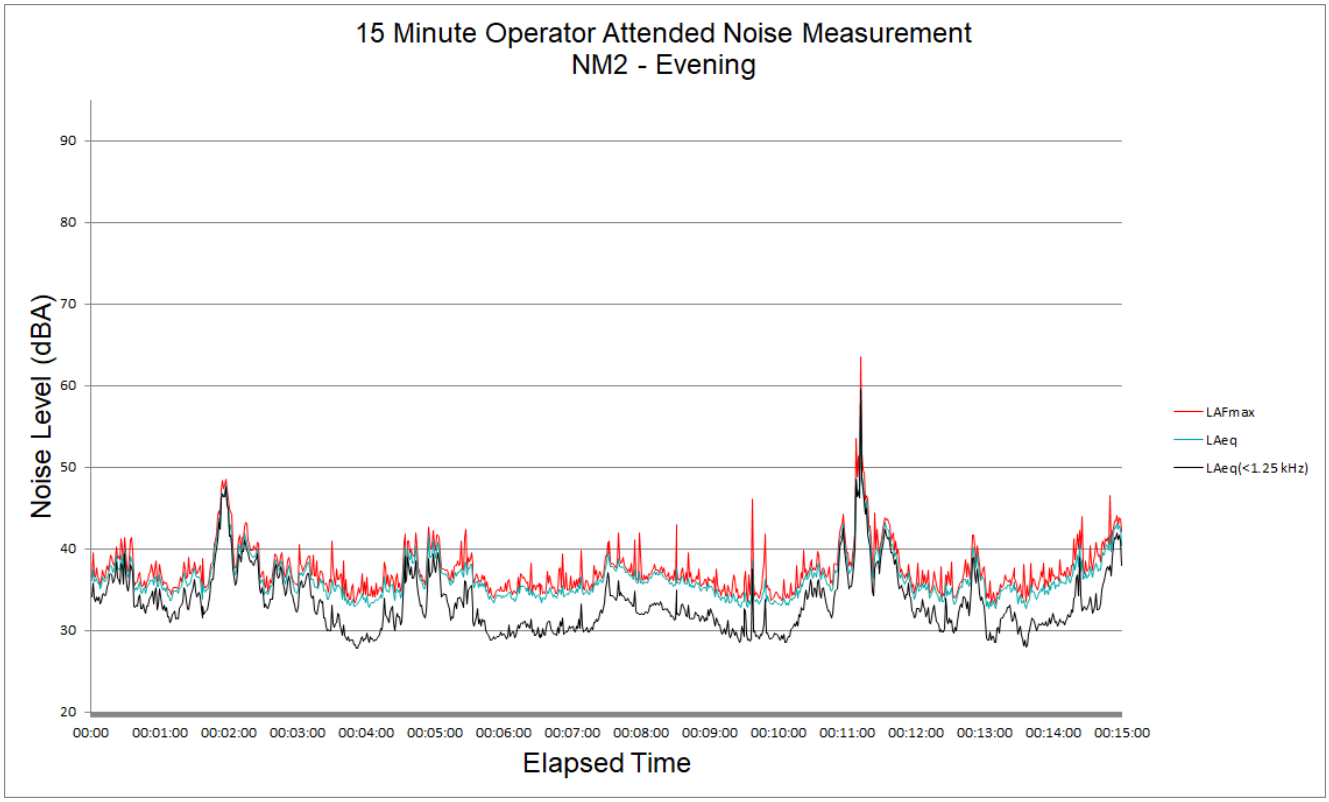


Figure B6 – Night-time Period – NM2 Operator Attended Noise Survey Results

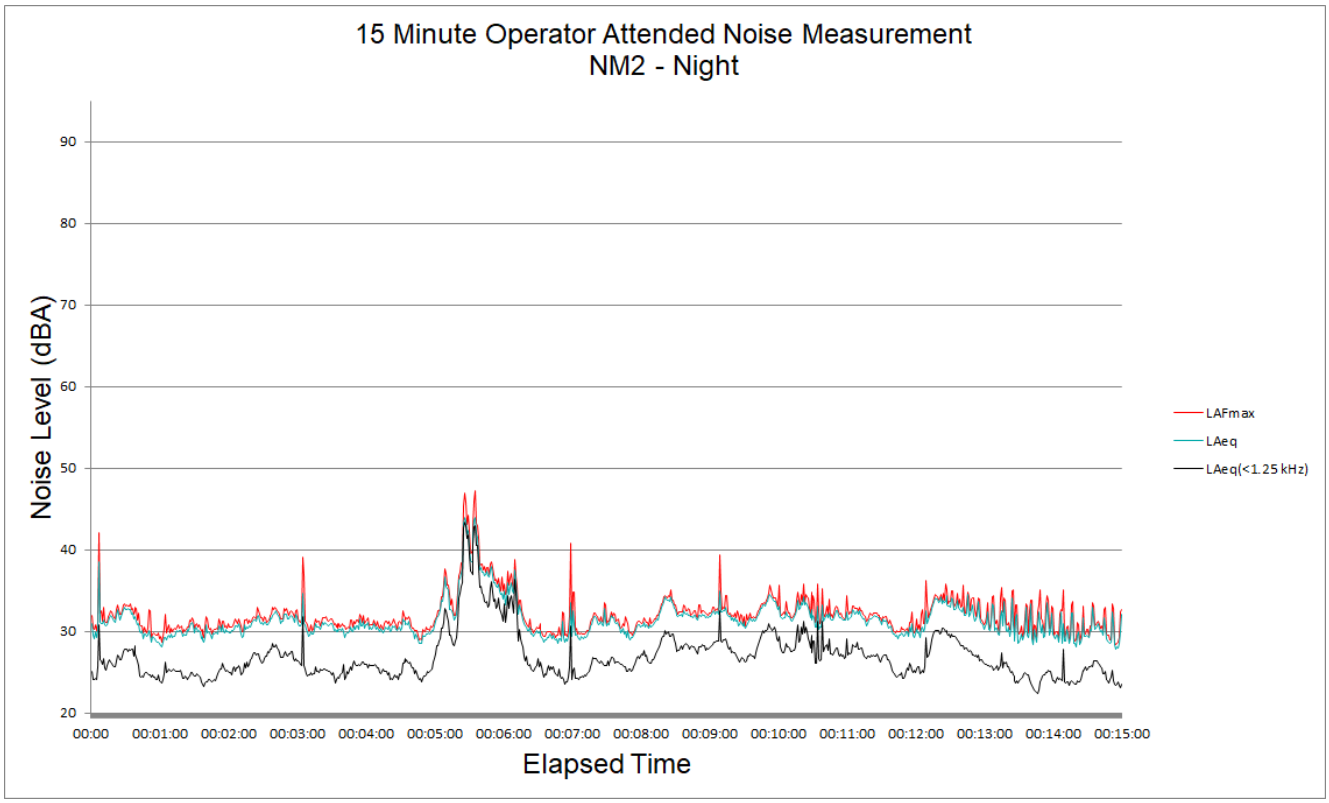


Figure B7 – Day Period – NM4 Operator Attended Noise Survey Results

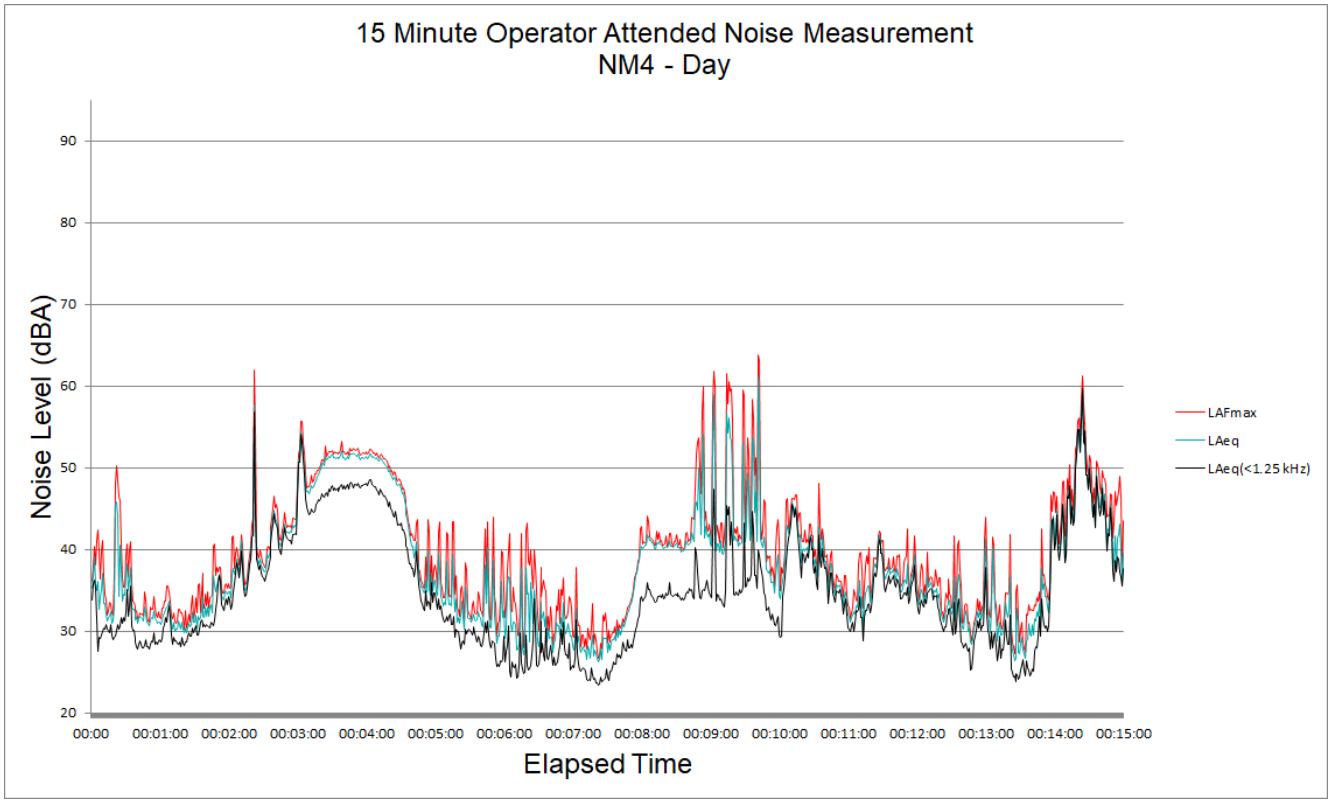


Figure B8 – Evening Period – NM4 Operator Attended Noise Survey Results

Not Conducted

Figure B9 – Night-time Period – NM4 Operator Attended Noise Survey Results

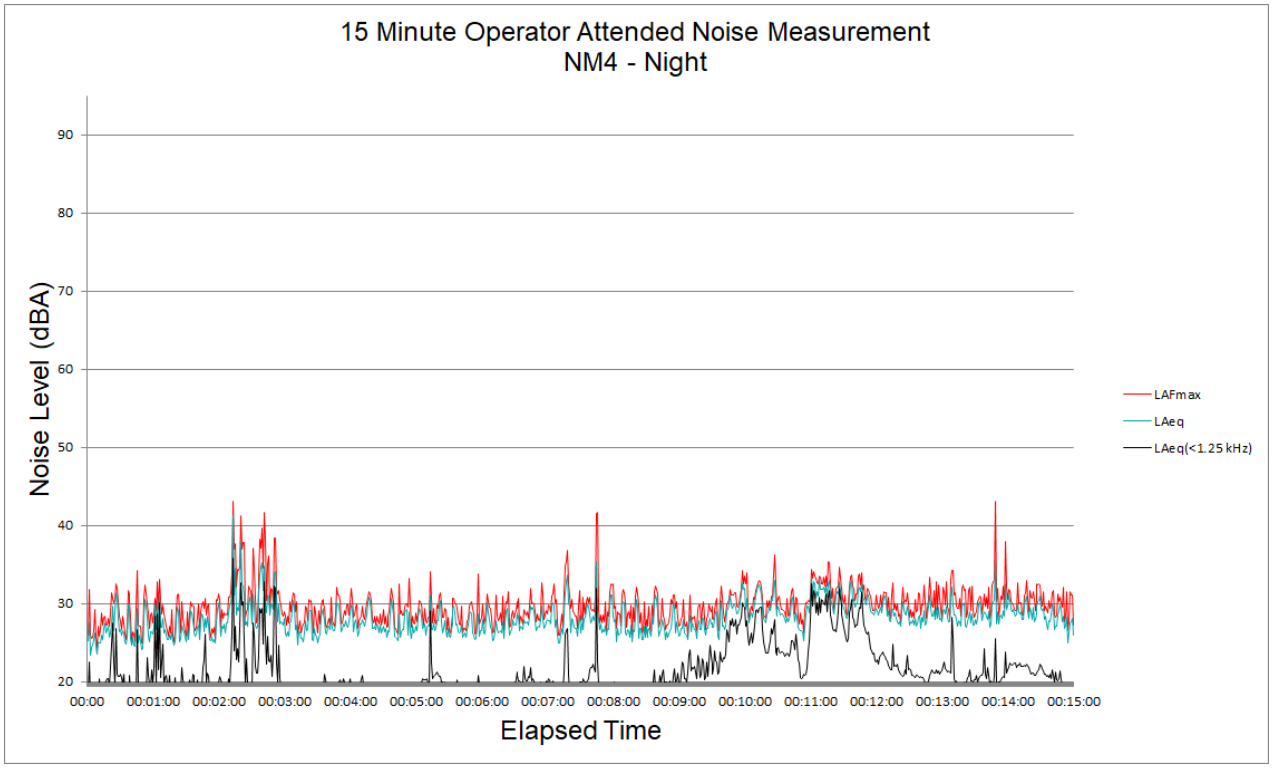


Figure B10 – Day Period – NM5 Operator Attended Noise Survey Results

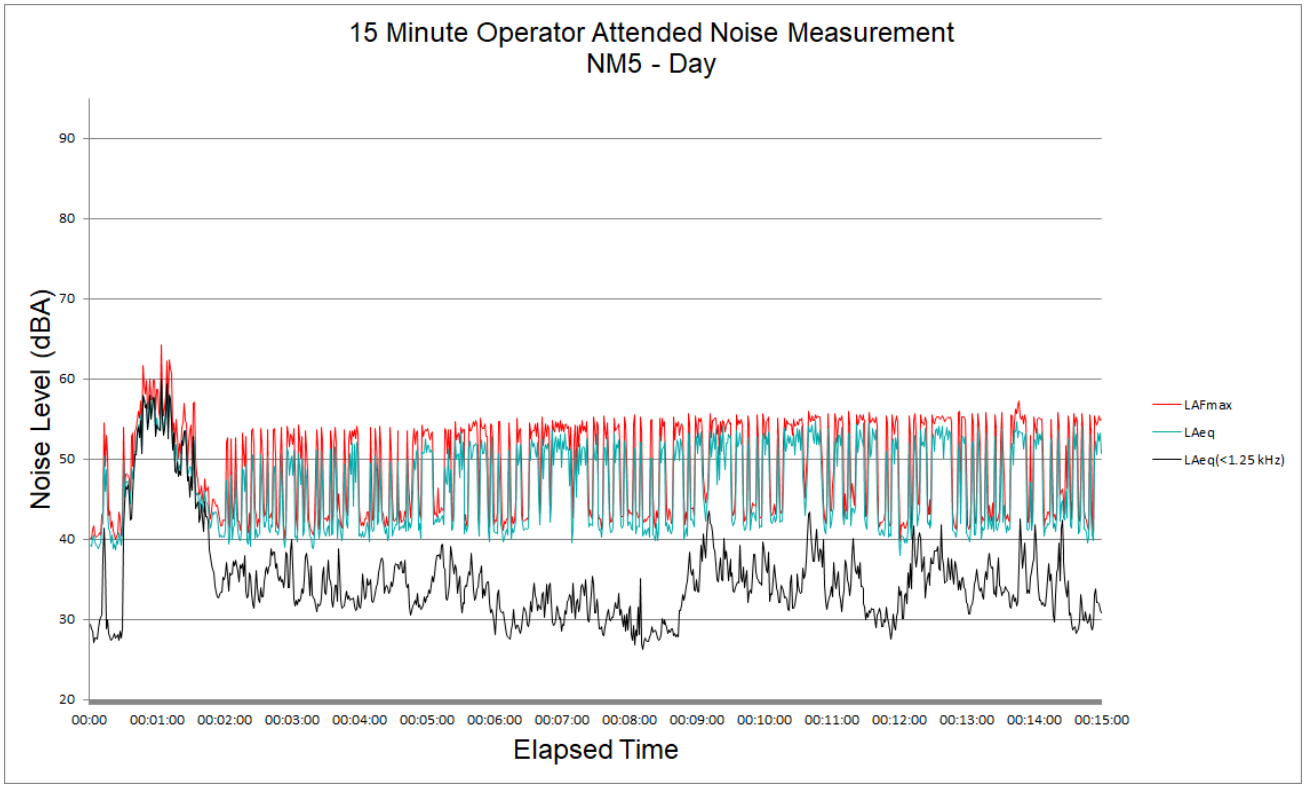


Figure B11 – Evening Period – NM5 Operator Attended Noise Survey Results

Not Conducted

Figure B12 – Night-time Period – NM5 Operator Attended Noise Survey Results

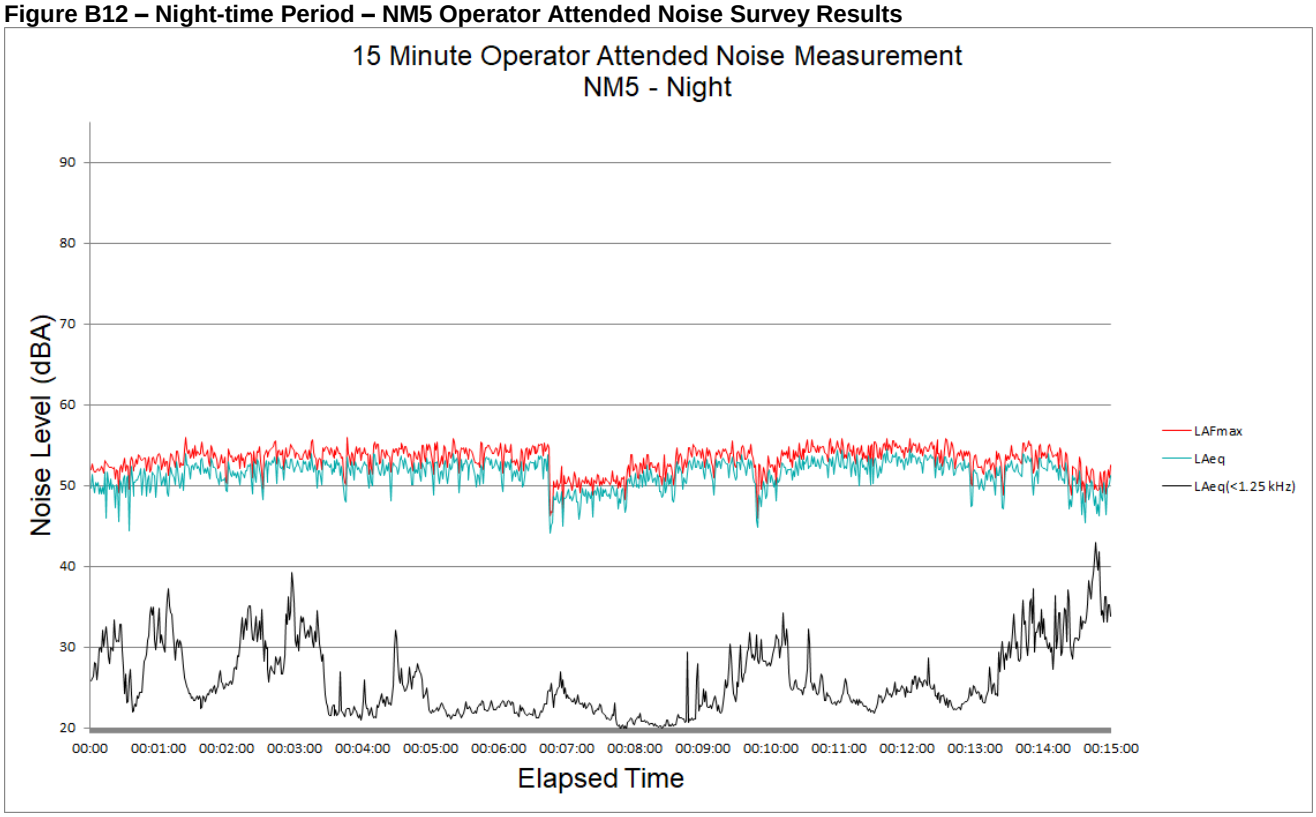


Figure B13 – Day Period – WR1 Operator Attended Noise Survey Results

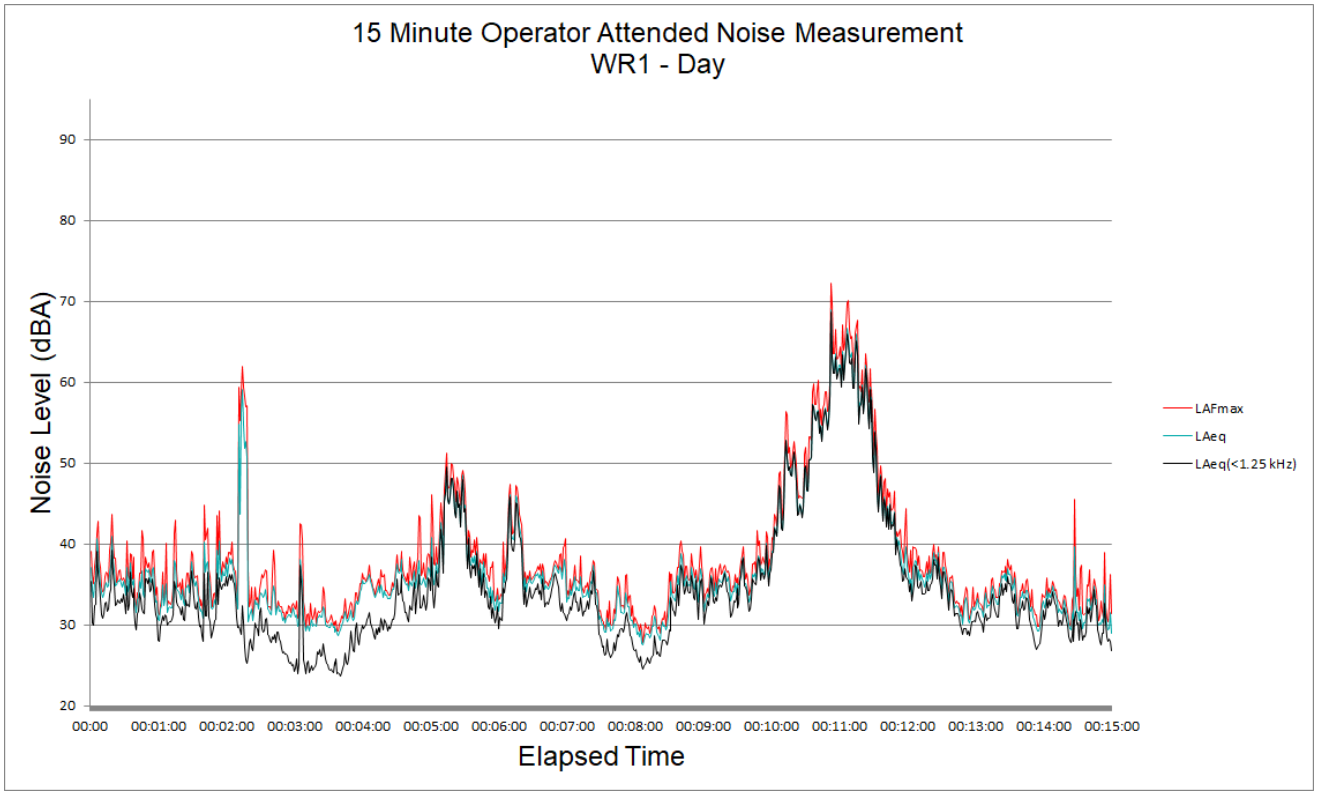


Figure B14 – Evening Period – WR1 Operator Attended Noise Survey Results

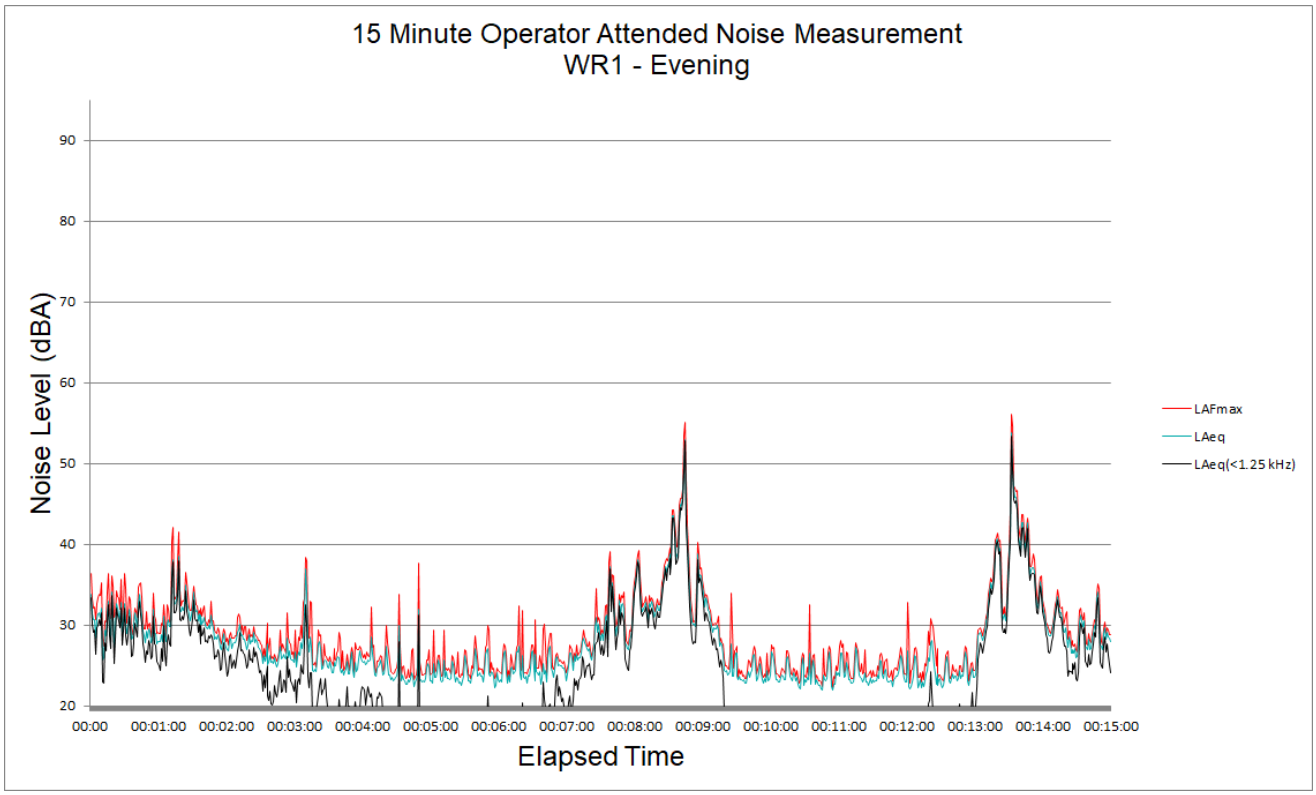
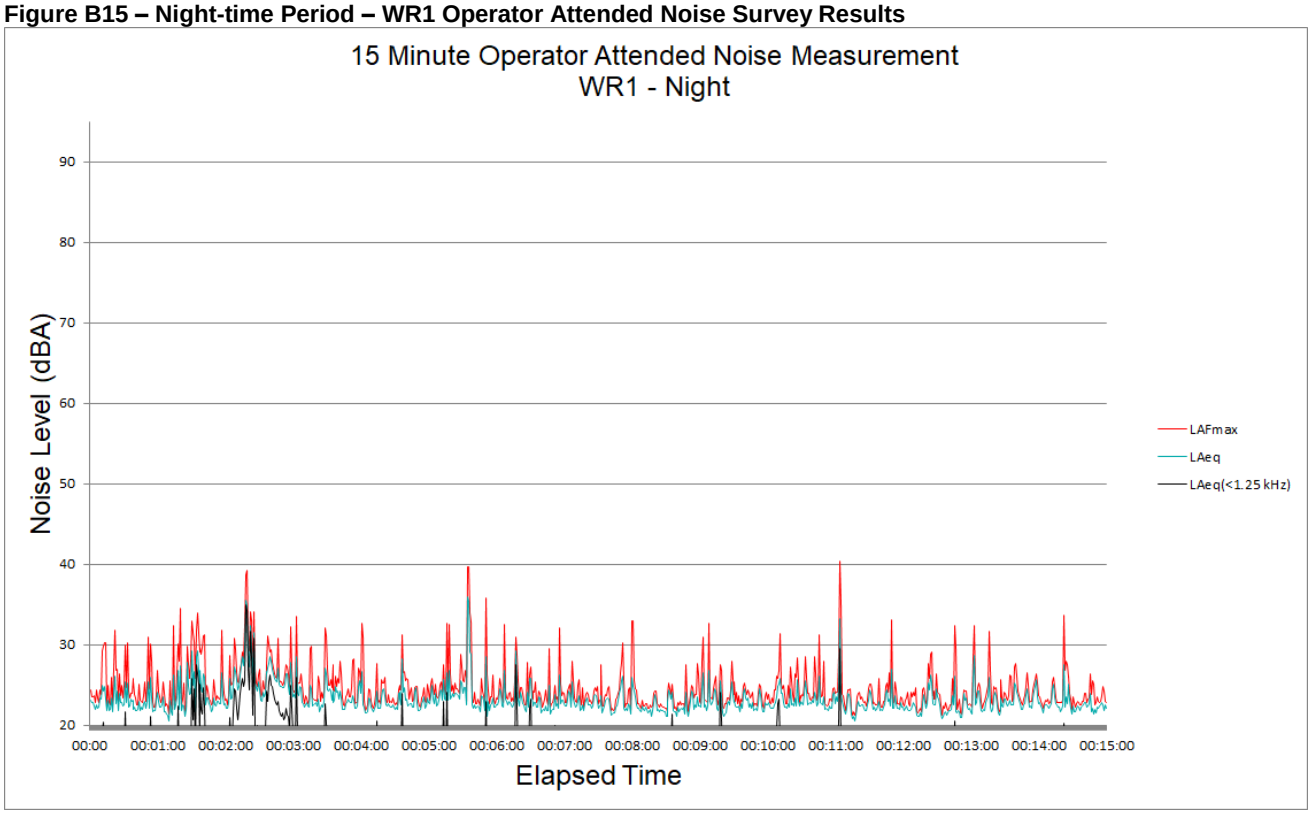


Figure B15 – Night-time Period – WR1 Operator Attended Noise Survey Results



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