STRATFORD MINING COMPLEX

Monthly Compliance Noise Monitoring
April 2019

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Stratford Coal Pty Ltd
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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 Stratford Coal Pty Ltd (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
630.11771-R17-v1.0	4 July 2019	Jordan Murray	Martin Davenport	Martin Davenport

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1 Introduction

Stratford Coal Pty Limited (DCPL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), has commissioned SLR Consulting Australia Pty Ltd (SLR) to conduct monthly noise monitoring for the Stratford Mining Complex (SMC) operations guided by the requirements of the *Stratford Mining Complex (Stratford Extension Project) Noise Management Plan* (NMP), Document No. NMP-R01-A, dated 19 October 2018. This report presents the results and findings from the operator-attended noise surveys conducted between Wednesday 17 April 2019 and Thursday 18 April 2019.

It is understood that the SMC collectively comprises the Stratford Coal Mine (SCM), the Bowens Road North Open Cut (BRNOC) and the associated coal processing and handling facilities. Run-of-mine (ROM) coal from the Duralie Coal Mine (DCM) is transported by rail to the SMC, where it is processed along with ROM coal from the SCM and BRNOC. SMC coal is then loaded and railed 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 six nominated locations, representative of receivers in the area surrounding the SMC. The six nominated external operator-attended noise measurement locations are:
  - Atkins – Off Wenhams Cox Road, Stratford
  - Clarke – Off Wenhams Cox Road, Stratford
  - Hall – Upper Avon Road
  - Lowrey – Off Crowthers Road, Stratford
  - Pryce Jones – The Bucketts Way, Craven
  - Van der Drift – Wood Street. Stratford

  Noise monitoring will occur for a day, evening and night period. The day, evening and night periods being those defined in the NSW *Industrial Noise Policy* (EPA 2000).
- The operator will quantify and characterise the maximum (L_{Amax}) and the intrusive (L_{Aeq} and L_{Ceq}) noise level contributions from SMC operations over a 15 minute measurement period. In addition, the operator will quantify and characterise the overall levels of ambient noise (i.e. L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, and L_{Aeq}) over the 15 minute measurement interval.
- Assess the noise emissions of SMC and determine compliance with respect to the limits contained in the NMP.

In addition to monthly noise monitoring at the nominated residential receivers, the NMP requires quarterly noise monitoring of rail activity and verification monitoring of the Real Time Noise Monitor (RTNM) network.

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

2 SMC Noise Criteria

The figures presented in this Section are extracts from the *Stratford Extension Project* (SSD-4966) Development Consent dated 29 May 2015.

2.1 Project Approval Schedule 3 Environmental Performance Conditions

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from an owner of the land listed in Table 1, the Applicant shall acquire the land in accordance with the procedures in conditions 5-6 of Schedule 4.

Table 1: Land subject to acquisition upon request

Property ID	
40/51/Cr1 – L. Blanch	42 – D. Blanch
Cr7 – Pryce-Jones	Cr 2 – Boorer

Note: To interpret the location referred to in Table 1 see the applicable figure in Appendix 5.

However, the obligation to acquire a property does not apply if the Applicant has a negotiated agreement with the owner/s of the relevant land that sets aside acquisition under the terms of this consent, and the Applicant has advised the Department in writing of the terms of this agreement.

ADDITIONAL MITIGATION UPON REQUEST

2. Upon receiving a written request from the owner of any residence on the land listed in Tables 1 and 2, the Applicant 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 and directed towards reducing the noise impacts of the development on the residence.

If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Table 2: Land subject to additional noise mitigation upon request

Property ID	Property ID
31(1) – Isaac	60 – Healy / Greenwood
44 – Cross / Jane	36 – Wallace
37 – Worth	29 – Ward
15(3) – Falla	

Note: To interpret the locations referred to in Table 2 see the applicable figure in Appendix 5.

However, the obligation to implement noise mitigation measures does not apply if the Applicant has a negotiated agreement with the owner/s of the relevant residence or land that sets aside noise mitigation measures under the terms of this consent, and the Applicant has advised the Department in writing of the terms of this agreement.

NOISE

Hours of Operation

3. The Applicant shall comply with the operating hours in Table 3.

Table 3: Operating hours

Activity	Operating Hours
• Open cut mining operations in the Bowens Road North and Roseville West Extension pits • Recovery and transport of CHPP rejects for re-processing • Construction of the noise mitigation bunds on the western side of the Avon North, Roseville West Extension and Stratford East pits	7 am to 6 pm, 7 days per week
• Open cut mining operations in the Avon North and Stratford East pits • Coal processing, loading and dispatch of product coal trains	24 hours a day, 7 days per
• Maintenance activities	week

Noise Criteria

4. The Applicant shall ensure that the noise generated by the development does not exceed the criteria in Table 4 at any residence on privately-owned land.

Table 4: Noise criteria dB(A)

Land	Day $L_{Aeq(15\ min)}$	Evening $L_{Aeq(15\ min)}$	Night $L_{Aeq(15\ min)}$	Night $L_{A1\ (1\ min)}$
40/51/Cr1 – L. Blanch	43	43	43	50
Cr7 – Pryce-Jones	43	43	43	49
42 – D. Blanch	42	42	42	50
Cr 2 – Boorer	41	41	41	49
31(1) – Isaac	40	40	40	48
36 – Wallace	39	39	39	47
44 – Cross / Jane				
60 – Healy / Greenwood	39	39	39	45
37 – Worth	38	38	38	46
29 – Ward	38	38	37	45
23 – Bagnall	37	37	37	45
31(2) – Isaac				
296 – Watson				
297 – Bosma				
298 – Yates	36	36	36	45
15(3) – Falla	39	35	35	45
15(2) – Falla	36	35	35	45
Stratford Village	37	36	35	45
All other privately-owned residences	35	35	35	45

- *To interpret the locations referred to in Table 4 see the applicable figure(s) in Appendix 5.*
- *Stratford village is shown on the figure(s) in Appendix 5.*

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Applicant has a negotiated agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

1. The noise criteria in Table 4 in Schedule 3 are to apply to a receiver under all meteorological conditions except under:
   (a) wind speeds greater than 3 m/s at 10 m above ground level; or
   (b) temperature inversion conditions between 1.5°C and 3°C/100 m and wind speed greater than 2 m/s at 10 m above ground level; or
   (c) temperature inversion conditions greater than 3°C/100 m.

2.2 EPL Noise Limits – SMC Operations

The noise limits specified in EPL 5161 are consistent with the noise criteria specified in SSD-4966.

2.3 Noise Limits at the Nominated Attended Noise Monitoring Locations

The site specific noise limits for the six nominated attended noise monitoring locations are summarised in **Table 1**.

Table 1 Noise Limits for the Nominated Noise Monitoring Locations

Locality	Intrusiveness Criteria $L_{Aeq(15minute)}$			Night $L_{A1(1minute)}$ Criterion
	Day	Evening	Night	Night
Atkins[1]	35	35	35	45
Clarke[1,2]	37	37	37	45
Hall	35	35	35	45
Lowrey	35	35	35	45
Pryce Jones[3]	43	43	43	49
Van der Drift	37	36	35	45

Note 1: Owned by Stratford Coal Pty Ltd

Note 2: Criteria adopted from Bagnall as a guide only and are not definitive at this location.

Note 3: Land subject to acquisition upon request.

2.4 Rail Noise Goals

The NMP has adopted ARTC's EPL 3142 noise goals as criteria for the assessment of SMC rail transport noise. The noise objectives specified in ARTC's EPL 3142 apply at 1 m from the façade of affected residential properties and are provided in **Table 2**.

Table 2 ARTC EPL 3142 Noise Objectives

Descriptor	Rail Traffic Goal dBA
Daytime/Evening $L_{Aeq(15hour)}$	65
Night-time $L_{Aeq(9hour)}$	60
Maximum Pass-by L_{Amax}	85

2.5 Assessment of Low-frequency Emissions

To address the low-frequency noise assessment issues raised in the 2014 Independent Environmental Audit, as outlined in the VIPAC letter (29N-15-0009-TNT-472681-0, dated 26 February 2015), the following analysis of the operator-attended monitoring data was proposed:

> *…a full L_{Ceq} minus L_{Aeq} spectrum low frequency analysis will be conducted on all noise compliance measurements where the mine noise contribution is deemed to be the dominant noise source. This will be conducted in accordance with the guidance set out in the INP in accordance with the requirements of Development Consent 23-98/99 Schedule 3 Condition 7(a) and Development Consent 39-02-01 Schedule 2 Condition 6.4C(a)(i).*

The low-frequency analysis proposed above shall also serve to meet the *Compliance Monitoring* requirement of Section 5(d) of Appendix 6 *Noise Compliance Assessment* of the Stratford Extension Project Development Consent (SSD-4966, dated 29 May 2015), that states:

> *…the use of an appropriate modifying factor for low frequency noise to be applied during compliance testing at any individual residence if low frequency noise is present (in accordance with the INP) and before comparison with the specified noise levels in the consent.*

Low frequency noise is assessed under the *NSW Noise Policy for Industry* (NPfI) methodology following its introduction in 2017, and replaces the INP methodology. A full L_{Ceq} minus L_{Aeq} and, if required, low frequency 1/3 octave analysis of SMC noise contributions was conducted at the following locations:

- Lowrey - Evening

At all other locations weather conditions were either outside of the consented conditions, SMC 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 ±0.5 dBA.

All operator-attended noise measurements were conducted using a one-third octave integrating Brüel & Kjær Type 2270 (s/n 2679354) together with a Svantek SV30A acoustical calibrator (s/n 24713).

3.2 Operator-attended Noise Monitoring Locations

Noise monitoring was conducted in accordance with the requirements of the NMP.

Operator-attended noise measurements were conducted during the day, evening and night-time period for a minimum of 15 minutes per period at each of the six nominated residential noise monitoring locations. The details of the operator-attended SMC operational noise monitoring locations are contained within **Table 3** and shown generally in **Figure 1**. During the operator-attended noise measurements, the character and relative contribution of ambient noise sources and SMC contributions were determined by observations on site.

Table 3 SMC Operational Noise Monitoring Locations

Monitoring Location	Receiver Type	Resident / Owner	Monitoring Location - MGA Zone 56	
			Easting (m)	Northing (m)
Atkins	Residence	Atkins	401544	6447134
Clarke	Residence	Clarke	404406	6445783
Hall	Residence	Hall	398269	6443709
Lowrey	Residence	Lowrey	399193	6445879
Pryce Jones	Residence	Pryce Jones	400807	6441846
Van der Drift	Residence	Van der Drift	400171	6445775

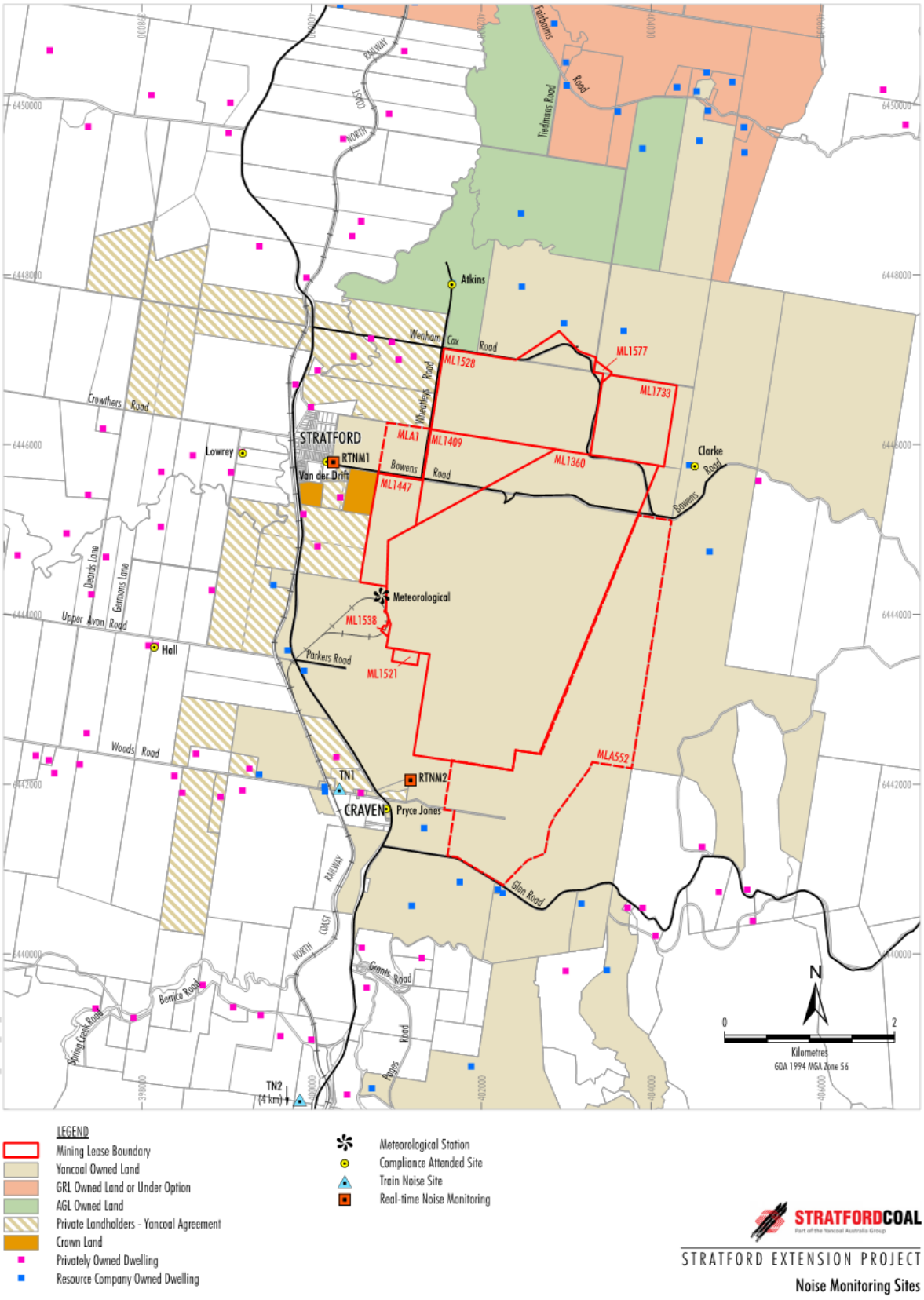
The objective of the SMC operational operator-attended noise monitoring was to measure the maximum (L_{Amax}) and the $L_{Aeq(15minute)}$ noise level contributions at the nearest potentially affected receptors to determine the noise contribution of mining activities associated with SMC operations over a 15 minute measurement period. During the measurement, the operator also 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 details of the rail noise monitoring locations are contained within **Table 4** and shown generally in **Figure 1**.

Table 4 Rail Noise Monitoring Locations

Monitoring Location	Receiver Type	Representative Receiver Locality	Monitoring Location - MGA Zone 56	
			Easting (m)	Northing (m)
TN1	Rail Noise Monitoring Location	Craven	400182	6441933
TN2	Rail Noise Monitoring Location	Wards River	399914	6434771

Figure 1 Stratford Mining Complex Attended Noise Monitoring Locations



Source: NMP

4 Results

4.1 Operator-attended Noise Monitoring - SMC Operational Activity

Operator-attended noise measurements were conducted during a day, evening and night period between Wednesday 17 April 2019 and Thursday 18 April 2019. Results of the operator-attended noise surveys at residential locations are provided in **Sections 4.1.1** to **4.1.6**

A summary of the results for the attended noise monitoring are displayed graphically in **Appendix B** showing 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 (cows, bulls), the natural environment (wind, wind in trees), domestic noises, other industrial operations as well as SMC noise emissions.

Weather data during the monitoring period has been obtained from the weather station located on the SMC site.

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 – 'Atkins'

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

Table 5 Operator-attended Noise Survey Results - 'Atkins'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	L_{Aeq} (≤1.25kHz)	
Day	18/4/19 10:29 22°C 3 m/s NE	52	42	36	27	33	26	*Site related noise events:* **SMC: Audible** Mining operations 22-29 **$L_{Aeq(15minute)}$ contribution 26 dBA** *Other noise events:* Birdsong 35-52 Livestock 32-36
Evening	17/4/19 20:56 15°C 3.5 m/s ENE	48	43	42	40	41	27	*Site related noise events:* **SMC: Audible** Engine noise 20-28 Haul truck 24-37 **$L_{Aeq(15minute)}$ contribution 27 dBA** *Other noise events:* Insects 40-48
Night	17/4/19 22:25 15°C 1.5 m/s SSE 0 CC	48	46	43	40	42	38	*Site related noise events:* **SMC: Audible** Haul trucks 32-46 Engine noise 30-36 **$L_{Aeq(15minute)}$ contribution 38 dBA** **L_{Amax} contribution 46 dBA** *Other noise events:* Insects 40-43

SMC operations were audible during the day, evening and night-time surveys. SMC operations generated an $L_{Aeq(15minute)}$ noise contribution of 26 dBA, 27 dBA and 38 dBA during the day, evening and night-time, respectively. During the night time period general engine noise generated L_{Amax} noise levels of up to 46 dBA at the monitoring location.

Meteorological data from the onsite SMC automatic weather stations showed a temperature inversion in excess of 3°C/100 m. As such, the night-time criteria was not applicable during the night-time operator attended noise survey.

4.1.2 Operator-attended Noise Survey Results - 'Clarke'

Results of the operator-attended noise surveys at 'Clarke' are provided in **Table 6**. Monitoring location 'Clarke' represents residential receptors located to the east of the site, and is a SMC owned property. The monitoring results at Clarke are used to determine SMC contributions at the 'Bagnall' residence located further to the east.

Table 6 Operator-attended Noise Survey Results - 'Clarke'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	LAeq (≤1.25kHz)	
Day	18/4/19 10:54 24°C 4 m/s NNW	57	54	47	40	45	44	*Site related noise events:* **SMC: Audible** Avon north operations 39-48 **LAeq(15minute) contribution 44 dBA** *Other noise events:* Aeroplane 53-56 Birdsong 40-57
Evening	17/4/19 21:40 15°C 4 m/s W	57	54	52	46	50	49	*Site related noise events:* **SMC: Audible** Avon north operations 43-57 **LAeq(15minute) contribution 49 dBA** *Other noise events:* Birdsong 42 Insects 39-42
Night	17/4/19 22:00 15°C 3 m/s SW 0 CC	55	48	45	38	42	40	*Site related noise events:* **SMC: Audible** Avon north operations -35-50 Loading horn 54 **LAeq(15minute) contribution 40 dBA** **LAmax contribution 54 dBA** *Other noise events:* Birdsong 55 Insects 39-44

Mining operations in the Avon North open cut were the dominant noise source during the day, evening and night-time periods. SMC operations generated an $L_{Aeq(15minute)}$ noise contribution of 44 dBA, 49 dBA and 40 dBA during the day, evening and night-time, respectively. During the night time period the operation of haul trucks generated L_{Amax} noise levels of up to 54 dBA at the monitoring location.

Taking into account the distance between the observed SMC operations and the nearest privately owned residence Bagnall, $L_{Aeq(15minute)}$ noise levels of 37 dBA during the daytime, 42 dBA during the evening and 33 dBA during the night-time are predicted at the Bagnall location. L_{Amax} noise levels are predicted to be 47 dBA. This figure is considered conservative as it takes into account corrections for propagation distance only (i.e. no shielding due to topography or atmospheric absorption). Furthermore wind speeds during the evening survey were above 3 m/s, and as such, the evening criterion was not applicable. Therefore SMC operations are considered to be compliant at the Bagnall location.

4.1.3 Operator-attended Noise Survey Results - 'Hall'

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

Table 7 Operator-attended Noise Survey Results - 'Hall'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	L_{Aeq} (≤1.25kHz)	
Day	18/4/19 09:38 18°C 2 m/s NNE	74	48	41	27	45	44	*Site related noise events:* **SMC: Barely Audible** Site operations <25 **$L_{Aeq(15minute)}$ contribution <25 dBA** *Other noise events:* Road traffic 30-74 Birdsong 42-49
Evening	17/4/2019 19:47 16°C 1.5 m/s S	52	49	46	39	43	40	*Site related noise events:* **SMC: Audible** Haul trucks 23-32 **$L_{Aeq(15minute)}$ contribution 27 dBA** *Other noise events:* Train 47 Insects 40-44 Livestock 38-44 Road traffic Aeroplane 52
Night	17/4/19 23:34 14°C 1.5 m/s NNE 0 CC	44	38	34	29	32	28	*Site related noise events:* **SMC: Audible** Site operations 23-29 **$L_{Aeq(15minute)}$ contribution 25 dBA** **L_{Amax} contribution 29 dBA** *Other noise events:* Road traffic 32-41 Insects 30-36 Livestock 33

SMC operations were barely audible during the day and audible during the evening and night-time operator attended noise surveys at this location. SMC operations generated an $L_{Aeq(15minute)}$ noise contribution of <25 dBA during the day, 27 dBA during the evening and 25 dBA during the night-time. During the night time period SMC operations generated L_{Amax} noise levels of 29 dBA at the monitoring location.

4.1.4 Operator-attended Noise Survey Results - 'Lowrey'

Results of the operator-attended noise surveys at 'Lowrey' are provided in **Table 8**. Monitoring location 'Lowrey' represents residential receptors located to the west of the site and west of Bucketts Way.

Table 8 Attended Noise Survey Results - 'Lowrey'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	L_{Aeq} (≤1.25kHz)	
Day	18/4/19 10:05 18°C 2 m/s NNE	56	47	42	34	39	38	*Site related noise events:* **SMC: Barely Audible** Engine noise <25 **$L_{Aeq(15minute)}$ contribution <25 dBA** *Other noise events:* Birdsong 38-56 Road traffic 36-48
Evening	17/4/19 20:12 16°C 2 m/s WNW	59	56	52	41	49	38	*Site related noise events:* **SMC: Audible** Haul trucks 24-37 **$L_{Aeq(15minute)}$ contribution 31 dBA** *Other noise events:* Road traffic 38-47 Birdsong (plover) 52-58 Insects/frogs 45-56
Night	17/4/19 23:58 14°C 1 m/s WSW 0 CC	57	54	51	35	48	37	*Site related noise events:* **SMC: Audible** Haul trucks 23-29 **$L_{Aeq(15minute)}$ contribution 26 dBA** **L_{Amax} contribution 29 dBA** *Other noise events:* Road traffic 42-49 Insects/frogs 46-57

SMC operations were barely audible during all monitoring periods at this location. The SMC $L_{Aeq(15minute)}$ noise contribution was estimated at <25 dBA during the day, 31 dBA during the evening and 26 dBA during the night-time with an L_{Amax} up to 29 dBA.

It was noted during the evening measurement that the SMC L_{Ceq} was 16 dB above the L_{Aeq} and therefore triggers a more detailed assessment of low frequency noise. **Table 9** details the 1/3 octave SMC contribution assessed against the NPfI low frequency threshold.

Table 9 Lowrey Evening - NPfl Low Frequency Analysis

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
LZeq(15minute) threshold Level dBZ	92	89	86	77	69	61	54	50	50	48	48	46	44
SMC LZeq(15minute) noise level	41	39	37	34	35	37	36	42	38	41	37	35	34
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-

Based on the comparison in **Table 9**, SMC noise did not exceed the NPfl threshold level in the any 1/3 octave band. As such no positive adjustment to the measured noise level is to be applied.

4.1.5 Operator-attended Noise Survey Results - 'Pryce-Jones'

Results of the operator-attended noise surveys at 'Pryce Jones' are provided in **Table 10.** Monitoring location 'Pryce Jones' represents residential receptors located in Craven to the south of the site.

Table 10 Attended Noise Survey Results – 'Pryce Jones'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	LAeq (≤1.25kHz)	
Day	18/4/19 09:16 17°C 4 m/s N	72	70	64	41	60	59	*Site related noise events:* **SMC: Audible** Site operations 24-29 **LAeq(15minute) contribution 25 dBA** *Other noise events:* Road traffic 55-72 Birdsong 40-48 Train 38-40
Evening	17/4/19 19:25 16°C 2 m/s SSW	73	68	58	42	56	55	*Site related noise events:* **SMC: Audible** Site operations 24-29 **LAeq(15minute) contribution 25 dBA** *Other noise events:* Road traffic 68-73 Insects 45-48 Livestock 28-32 Aeroplane 48-52

Period	Date/Start Time /	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical
Night 0	17/4/19 23:13 14°C 2 m/s NE 0 CC	74	66	52	33	53	51	*Site related noise events:* **SMC: Audible** Site operations 25-29 **LAeq(15minute) contribution 27 dBA** **LAmax contribution 29 dBA** *Other noise events:* Road traffic Insects/frogs

SMC operations were audible during all surveys at this location. The day and evening surveys generated an $L_{Aeq(15minute)}$ contribution 25 dBA and with the night-time period generating an $L_{Aeq(15minute)}$ contribution of 27 dBA. Engine noise during the night-time period generated an L_{Amax} of 33 dBA.

4.1.6 Operator-attended Noise Survey Results – 'Van der Drift'

Results of the operator-attended noise surveys at 'Van der Drift' are provided in **Table 11.**

Table 11 Attended Noise Survey Results – 'Van der Drift'

Period	Date/Start Time/ Weather	Primary Noise Descriptor dBA (15 minute)						Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		L_{Amax}	L_{A1}	L_{A10}	L_{A90}	L_{Aeq}	L_{Aeq} (≤1.25kHz)	
Day	18/4/19 11:23 24°C 3.5 m/s NW	76	61	43	30	49	47	*Site related noise events:* **SMC: Barely Audible** Haul trucks <25 **$L_{Aeq(15minute)}$ contribution <25 dBA** *Other noise events:* Road traffic 35-76 House construction 42-58
Evening	17/4/19 20:34 15°C 4 m/s WSW	58	56	49	30	45	45	*Site related noise events:* **SMC: Barely Audible** Engine noise <25 **$L_{Aeq(15minute)}$ contribution <25 dBA** *Other noise events:* Train 58 Insects 32-34 Road traffic 40-46
Night	17/4/2019 22:47 15°C 1 m/s SSW 0 CC	47	43	40	33	37	37	*Site related noise events:* **SMC: Audible** Haul trucks 32-45 **$L_{Aeq(15minute)}$ contribution 37 dBA** **L_{Amax} contribution 45 dBA** *Other noise events:* Operators vehicle exhaust cooling 47 Insects 25-29

SMC operations were barely audible during the day and evening and audible during the night-time operator attended noise surveys at this location generating an $L_{Aeq(15minute)}$ noise contribution of <30 dBA, <25 dBA and 29 dBA respectively. L_{Amax} noise levels of 39 dBA were measured during the night-time survey.

Meteorological data from the onsite SMC automatic weather station showed a temperature inversion in excess of 3°C / 100 m. As such the night-time criteria did not apply during the night-time operator attended noise survey.

4.2 Rail Noise Monitoring

SMC rail pass-by noise levels are presented in **Table 12**.

Table 12 Operator-attended Rail Noise Monitoring Results

Monitoring Location	Date and Time	L_{Amax} (dBA)	
		Horn Included	Horn Excluded
TN1	18/4/2019 1:40 - to Stratford	95	80

Maximum SMC rail pass-by noise levels were below 85 dBA L_{Amax} at TN1, excluding the sounding of horns on approach to level crossings.

5 Performance Assessment

5.1 Operations

Results of the operator-attended noise measurements compared with the relevant noise criteria contained in the SMC Development Consent are given in **Table 13**.

Table 13 Performance Assessment – Operations

	Estimated SMC $L_{Aeq(15minute)}$ Noise Level dBA[1]			Noise Criteria $L_{Aeq(15minute)}$ dBA			Compliance		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
Atkins	26	27	38	35	35	35	Yes	Yes	N/A[5,6]
Clarke[2]	44	49	40	37	37	37	N/A[4]	N/A[4]	N/A[4]
Bagnall[3]	37	42	33	37	37	37	Yes	N/A[5]	Yes
Hall	<25	27	25	35	35	35	Yes	Yes	Yes
Lowrey	<25	31	26	35	35	35	Yes	Yes	Yes
Pryce Jones	25	25	27	43	43	43	Yes	Yes	Yes
Van der Drift	<25	<25	37	37	36	35	Yes	Yes	N/A[5]

Note 1: I/A = Inaudible.
Note 2: Owned by Stratford Coal Pty Ltd. Criteria adopted from Bagnall.
Note 3: Calculated result from monitoring location Clarke.
Note 4: Criteria adopted as a guide only.
Note 5: Criteria not applicable due to weather conditions outside meteorological conditions detailed in SSD-4966.
Note 6: Owned by Stratford Coal Pty Ltd

Results presented in **Table 13** indicate that SMC operations during the operator-attended noise monitoring at all privately owned locations were compliant with the relevant Development Consent conditions.

5.2 Sleep Disturbance

Results of the night period sleep disturbance measurements compared with the relevant noise criteria contained in the Development Consent are given in **Table 14.**

Table 14 Performance Assessment – Sleep Disturbance

Location	SMC $L_{A1(1minute)}$ Contribution	Noise Criteria $L_{A1(1minute)}$	Compliance
Atkins	46	45	N/A[5,6]
Clarke[2]	54	45	N/A[4]
Bagnall[3]	47	45	N/A
Hall	29	45	Yes
Lowrey	26	45	Yes
Pryce Jones	29	49	Yes
Van der Drift	45	45	Yes

Note 1: I/A = Inaudible.
Note 2: Owned by Stratford Coal Pty Ltd. Criteria adopted from Bagnall.
Note 3: Calculated result from monitoring location Clarke.
Note 4: Criteria adopted as a guide only.
Note 5: Criteria not applicable due to weather conditions outside meteorological conditions detailed in SSD-4966.
Note 6: Owned by Stratford Coal Pty Ltd

Table 14 indicate that SMC operations during the night-time operator-attended noise monitoring at all privately owned locations were compliant with the relevant Development Consent conditions. Noise levels at Clarke were above the adopted noise criteria, however the Clarke property is owned by Stratford Coal Pty Ltd.

5.3 Rail Noise

Maximum SMC rail pass-by noise levels complied with the noise goal of 85 dBA L_{Amax} at TN1, excluding the sounding of horns on approach to level crossings.

6 Conclusion

SLR was engaged by Stratford Coal Pty Limited to conduct monthly noise monitoring for the Stratford Mining Complex (SMC) operations guided by the requirements of the *Stratford Mining Complex Noise Management Plan* (NMP), Document No. NMP-R01-A, dated October 2018.

Operator-attended noise monitoring was conducted at six residential receiver locations between Wednesday 17 April 2019 and Thursday 18 April 2019 in order to determine the noise performance of the SMC operations against the Development Consent conditions.

Based on the measured SMC noise contribution, compliance with the relevant operational noise criteria was achieved at all noise monitoring locations during the day, evening and night monitoring periods, with the exception of Clarke during the day period. Noise levels at Clarke were above the adopted noise criteria, however the Clarke property is owned by Stratford Coal Pty Ltd.

Based on the measured SMC noise contribution, compliance with the relevant sleep disturbance noise criteria was achieved at all noise monitoring locations during the night-time noise monitoring period, with the exception of Clarke. Noise levels at Clarke were above the adopted noise criteria, however the Clarke property is owned by Stratford Coal Pty Ltd.

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APPENDIX A

Acoustic Terminology

The following is a brief description of the acoustic terminology.

Acoustic Terminology	Description
'A' Weighted	Frequency filter applied to measured noise levels to represent how humans hear sounds.
dBA	'A' Weighted overall sound pressure level.
L_{90} , L_{10}, L_1	A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, i.e., L_{90} is the level which is exceeded for 90 percent of an observation period. L_{90} is commonly referred to as the background sound level.
L_{Amax}	Highest value of the A-weighted sound pressure level with a specified time weighting that occurs during a given event.

APPENDIX B

Operator Attended Noise Survey Charts

Figure B1 – Day Period – 'Atkins' Operator Attended Noise Survey Results

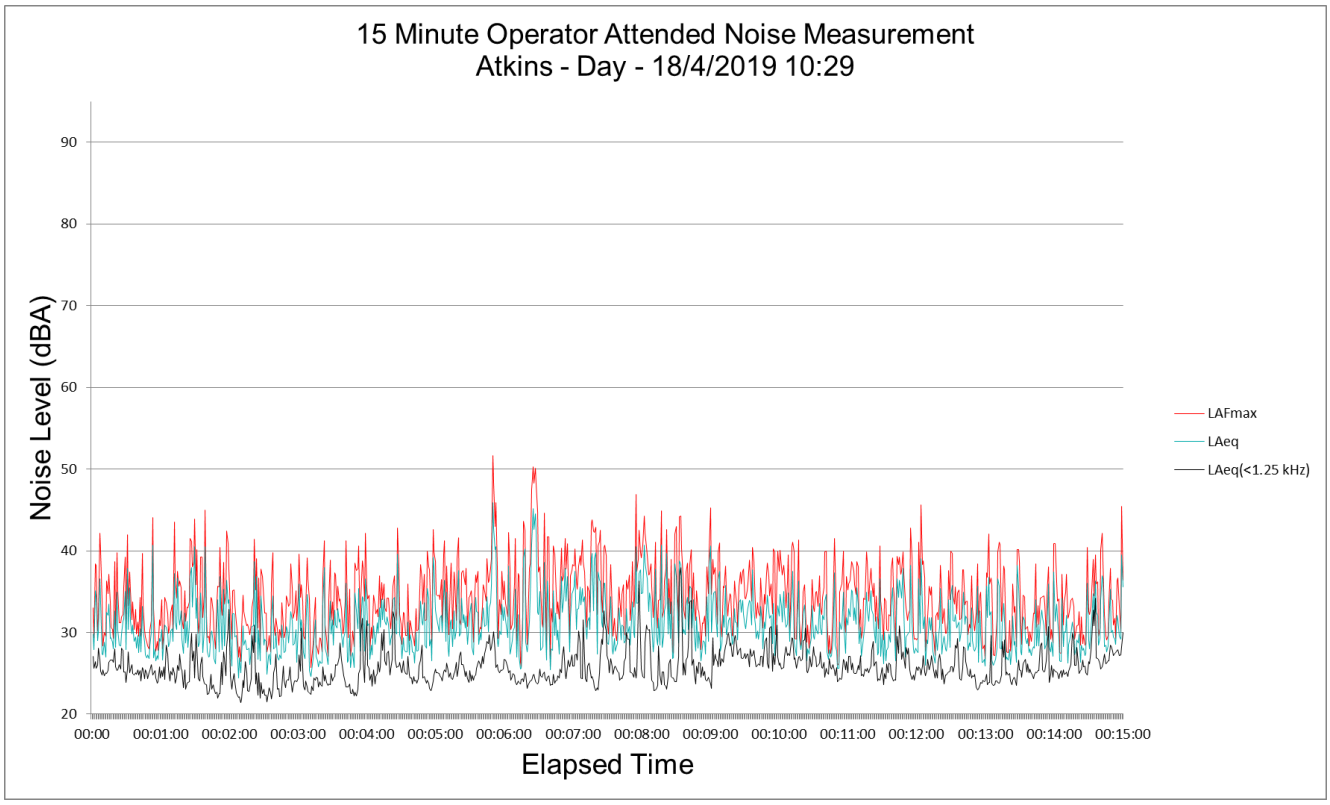


Figure B2 – Evening Period – 'Atkins' Operator Attended Noise Survey Results

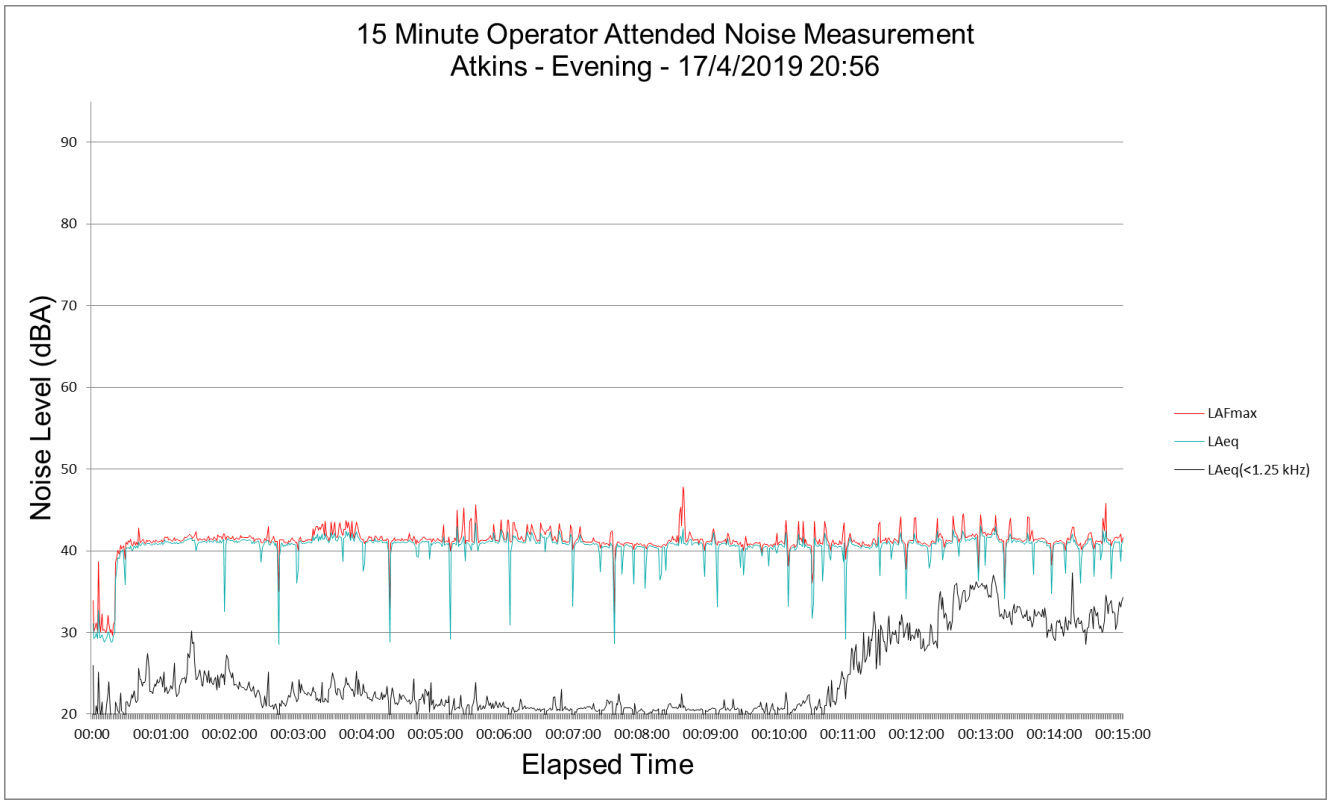


Figure B3 – Night Period – 'Atkins' Operator Attended Noise Survey Results

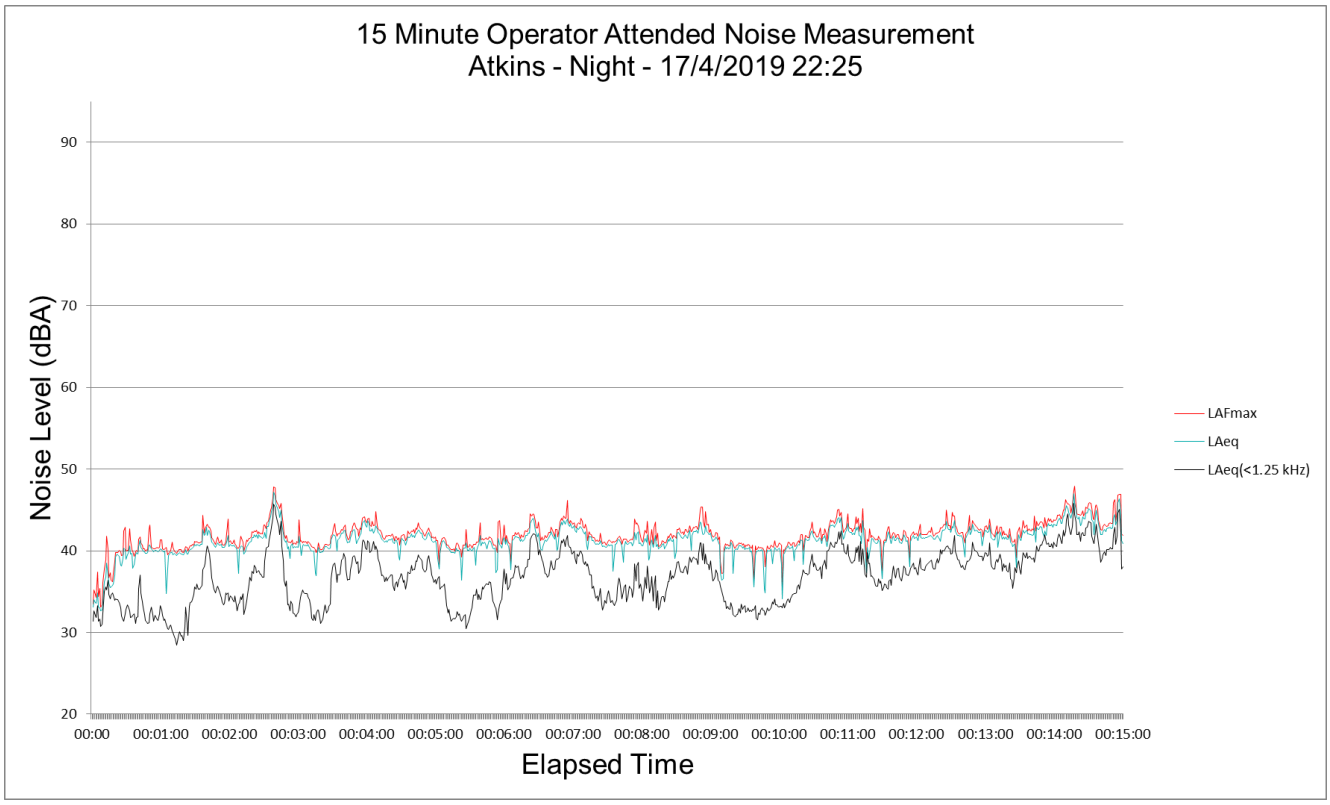


Figure B4 – Day Period – 'Clarke' Operator Attended Noise Survey Results

10.5

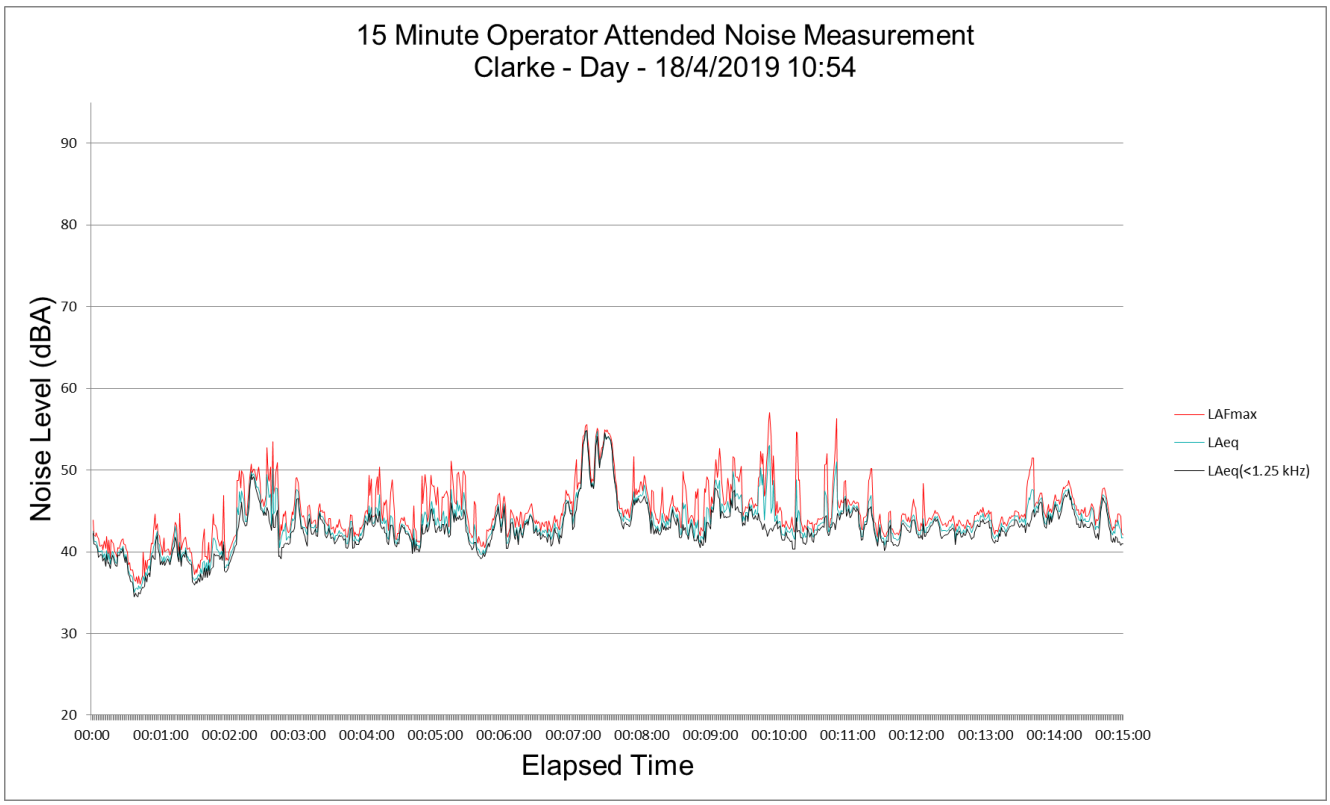


Figure B5 – Evening Period – 'Clarke' Operator Attended Noise Survey Results

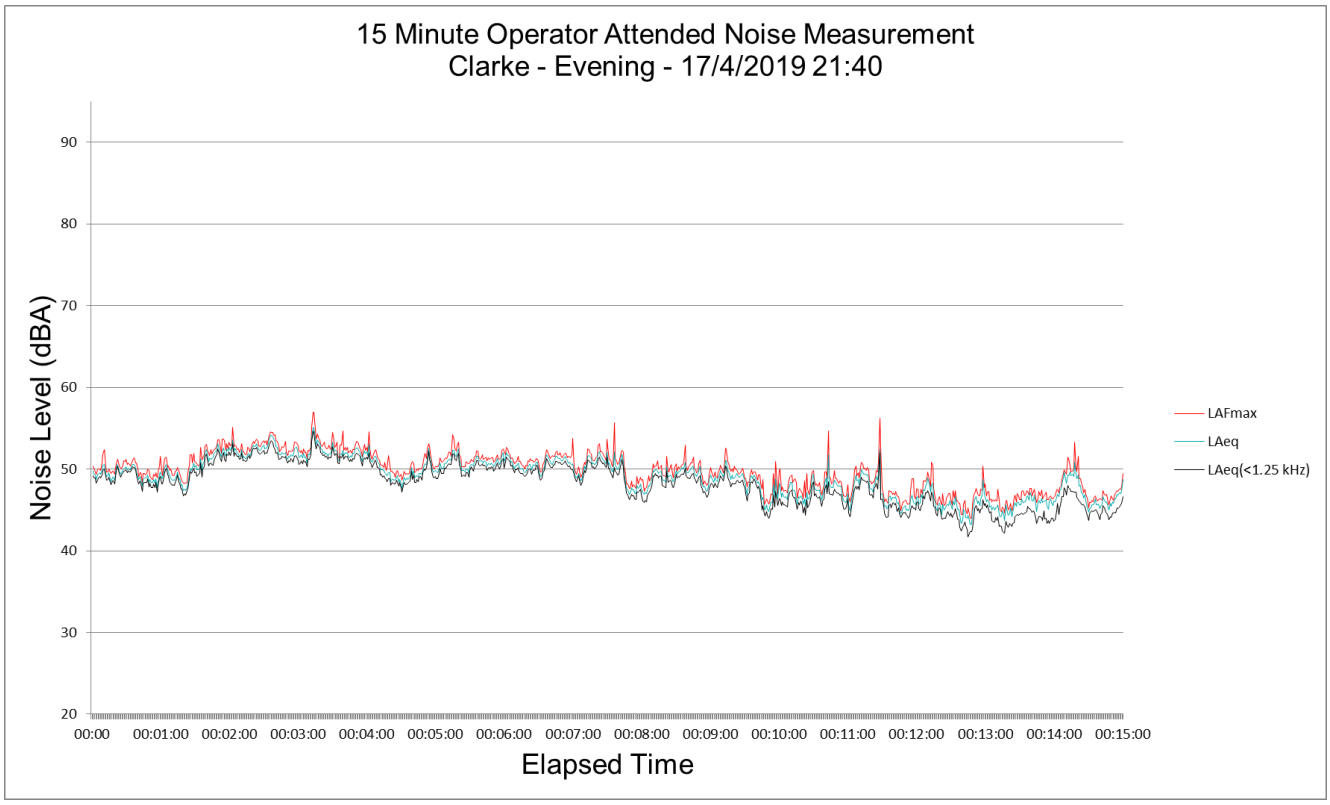


Figure B6 – Night Period – 'Clarke' Operator Attended Noise Survey Results

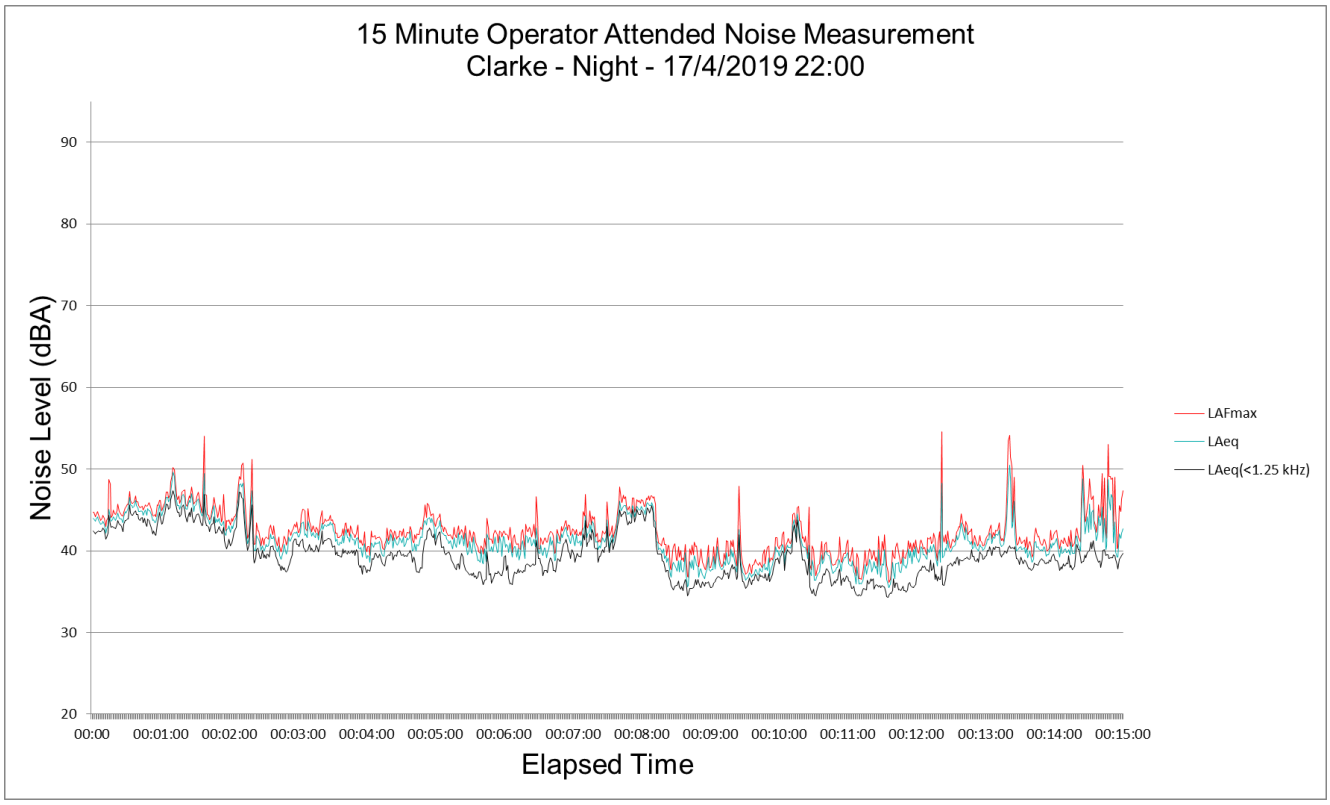


Figure B7 – Day Period – 'Hall' Operator Attended Noise Survey Results

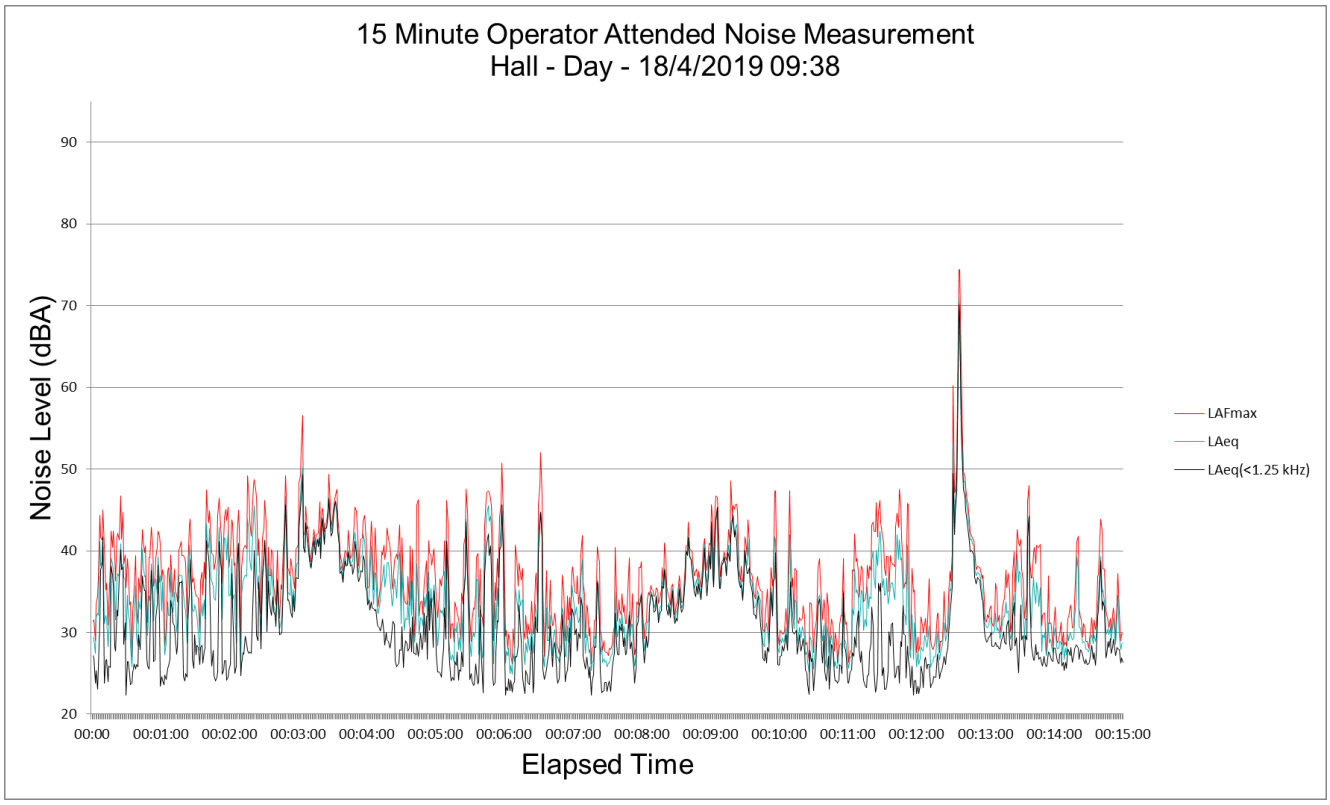


Figure B8 – Evening Period – 'Hall' Operator Attended Noise Survey Results

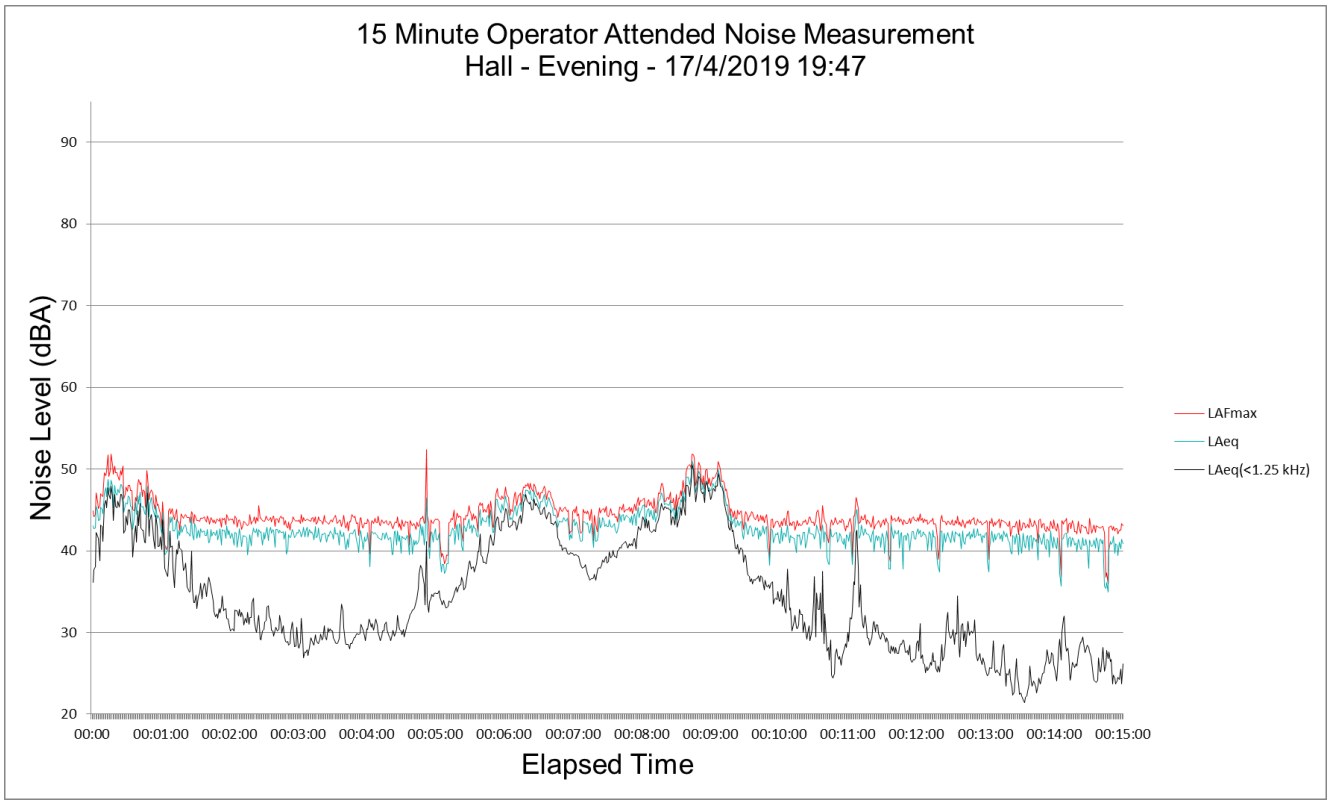


Figure B9 – Night Period – 'Hall' Operator Attended Noise Survey Results

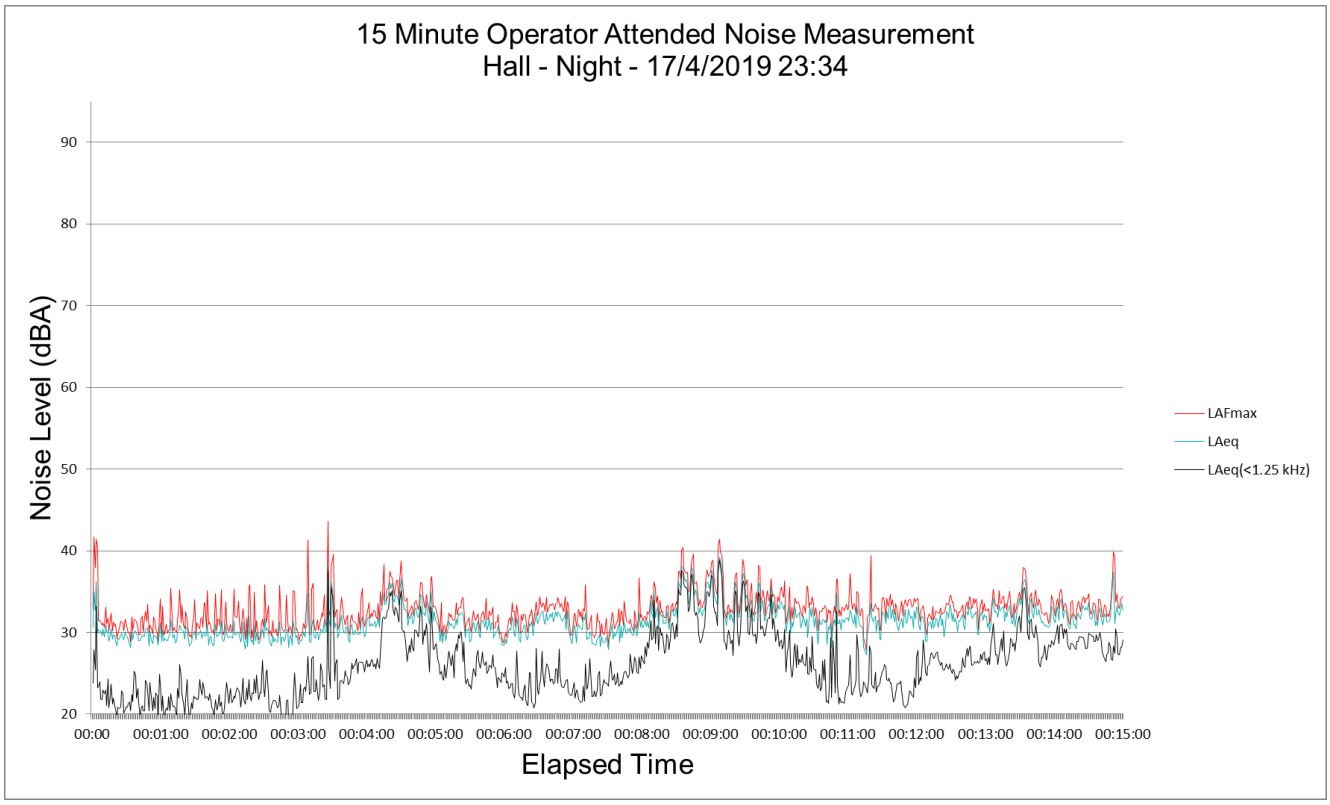


Figure B10 – Day Period – 'Lowrey' Operator Attended Noise Survey Results

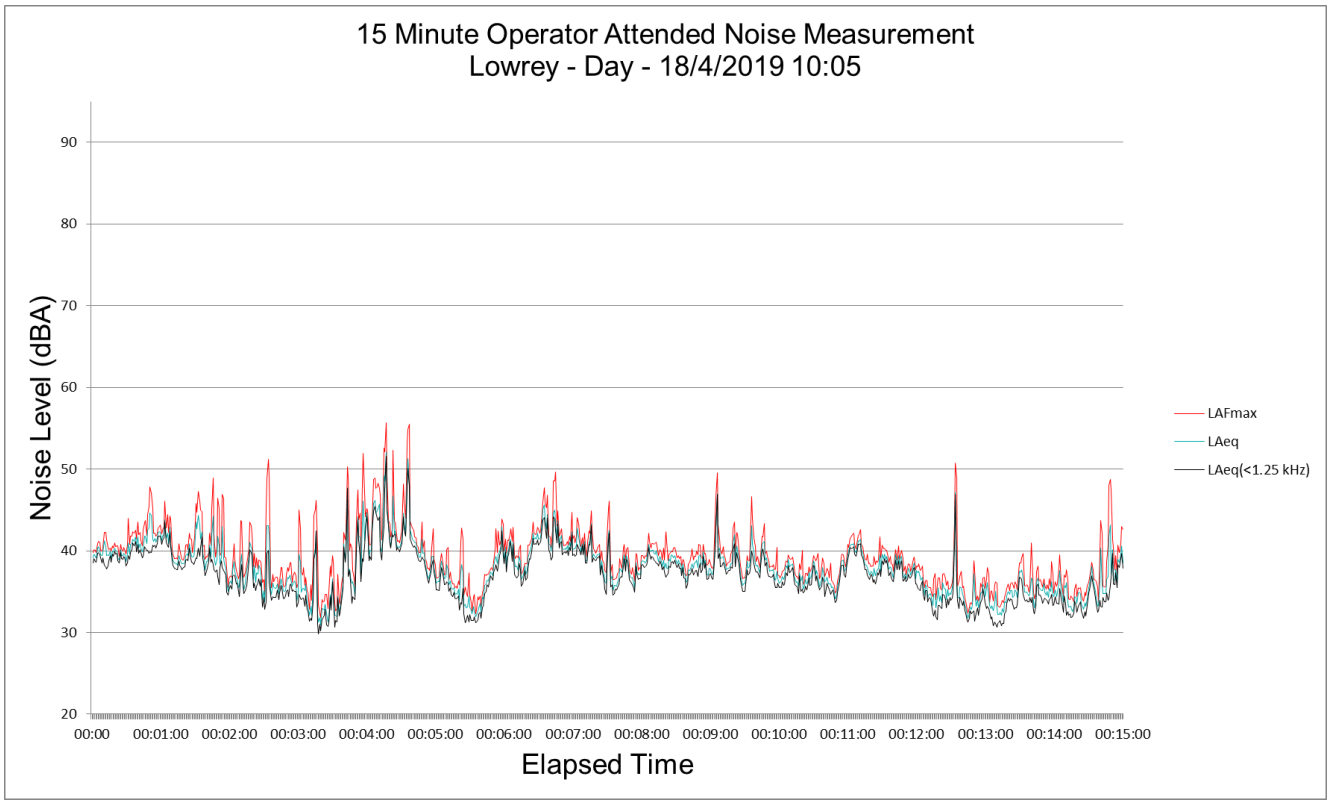


Figure B11 – Evening Period – 'Lowrey' Operator Attended Noise Survey Results

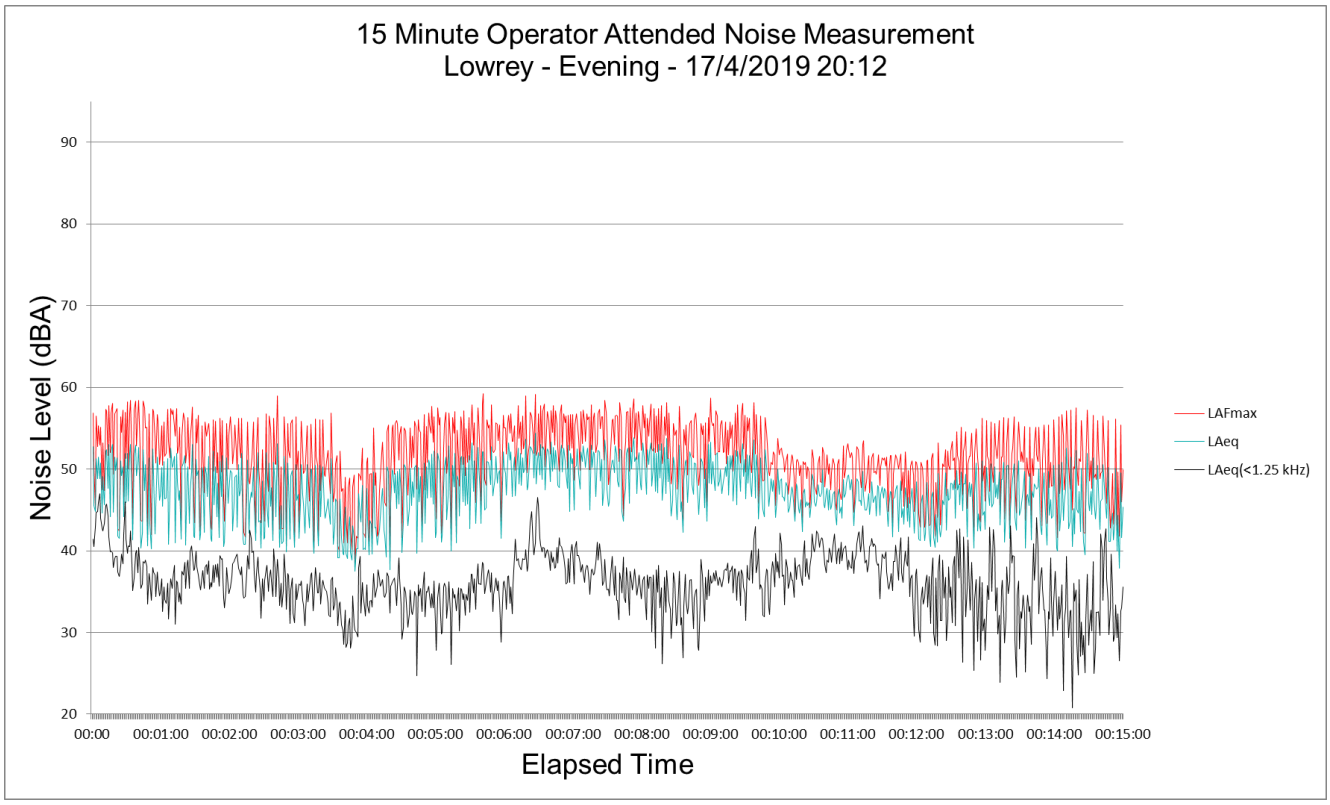


Figure B12 – Night Period – 'Lowrey' Operator Attended Noise Survey Results

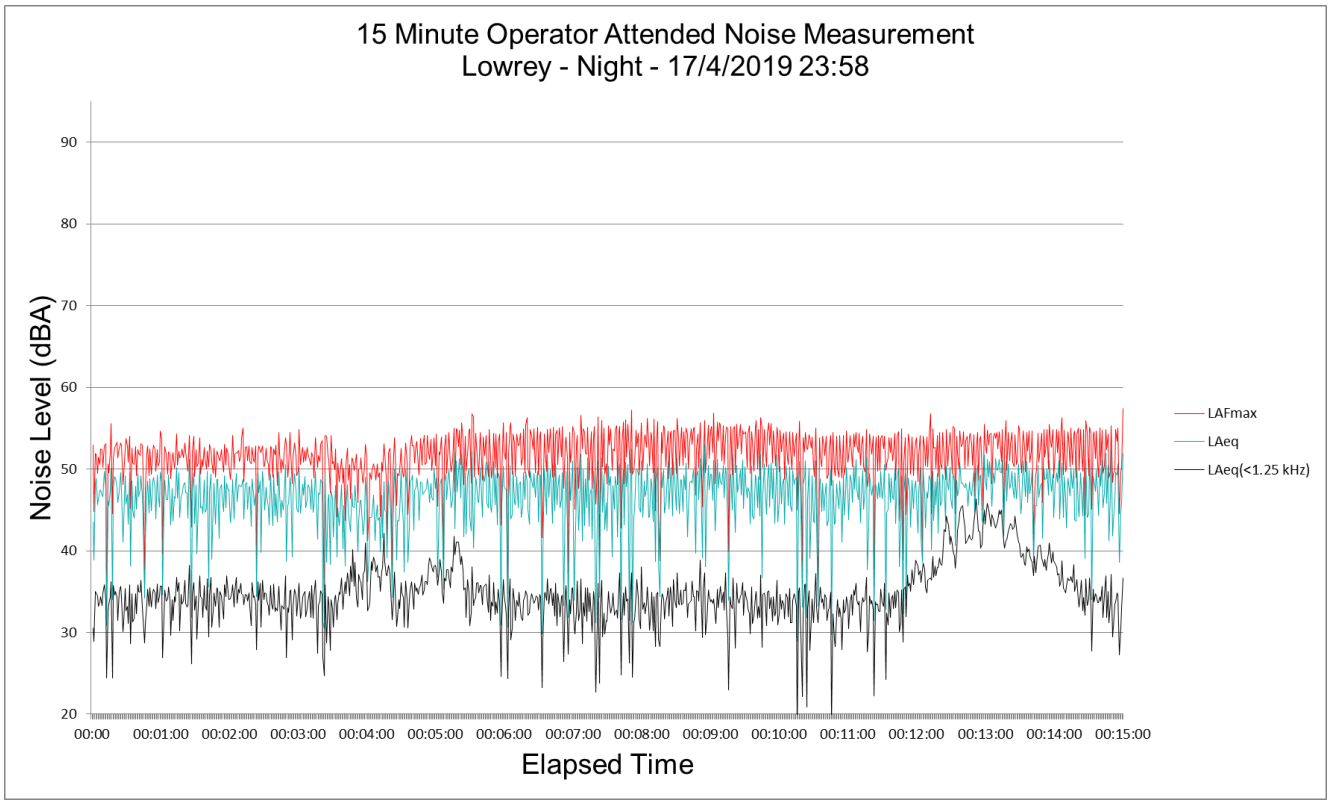


Figure B13 – Day Period – 'Pryce Jones' Operator Attended Noise Survey Results

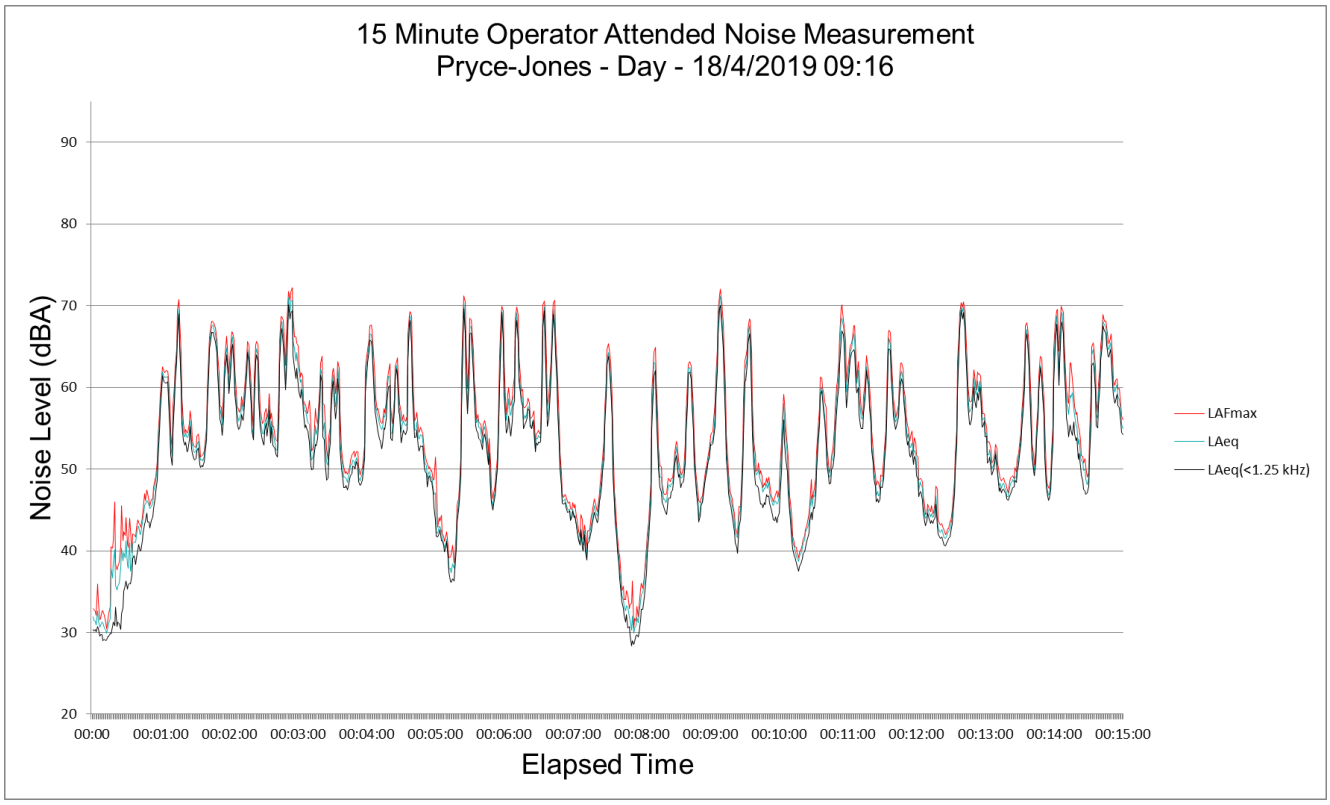


Figure B14 – Evening Period – 'Pryce Jones' Operator Attended Noise Survey Results

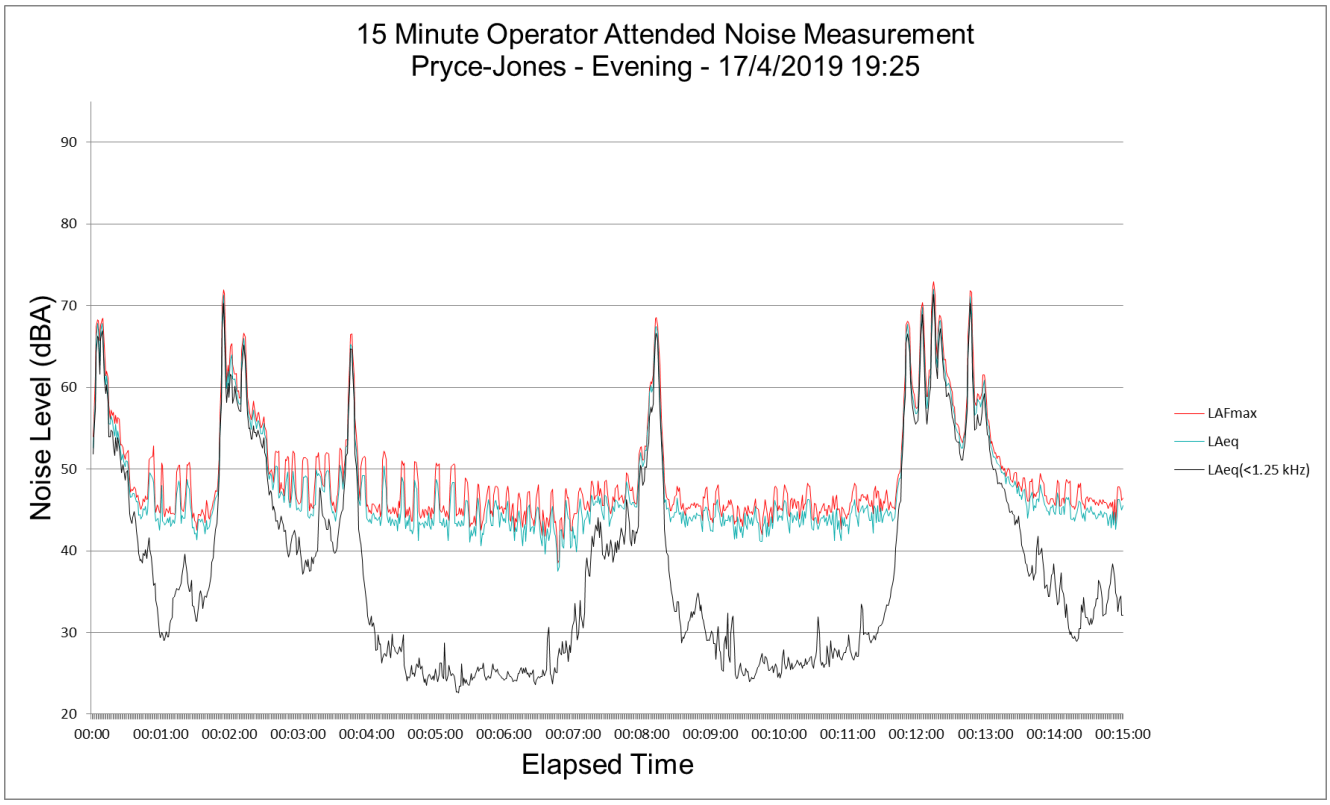


Figure B15 – Night Period – 'Pryce Jones' Operator Attended Noise Survey Results

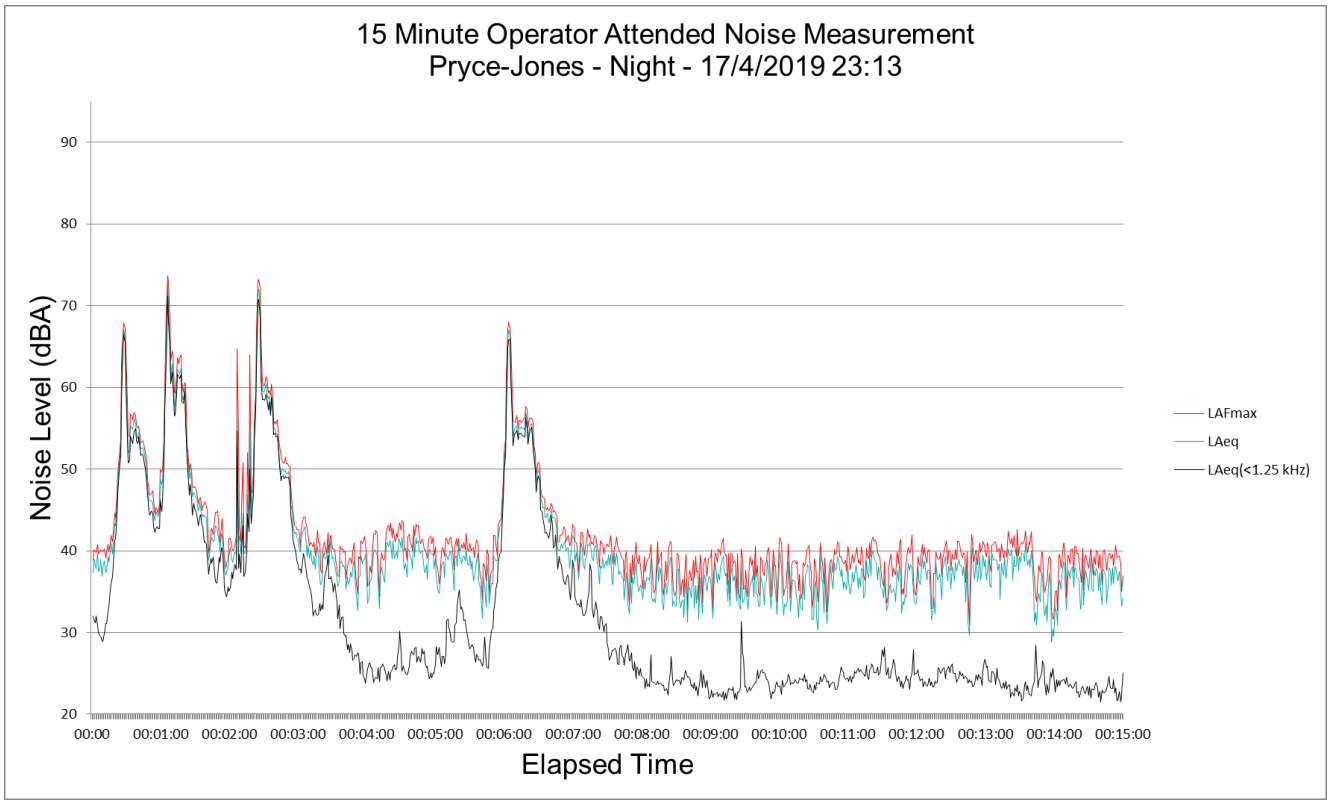


Figure B16 – Day Period – 'Van der Drift' Operator Attended Noise Survey Results

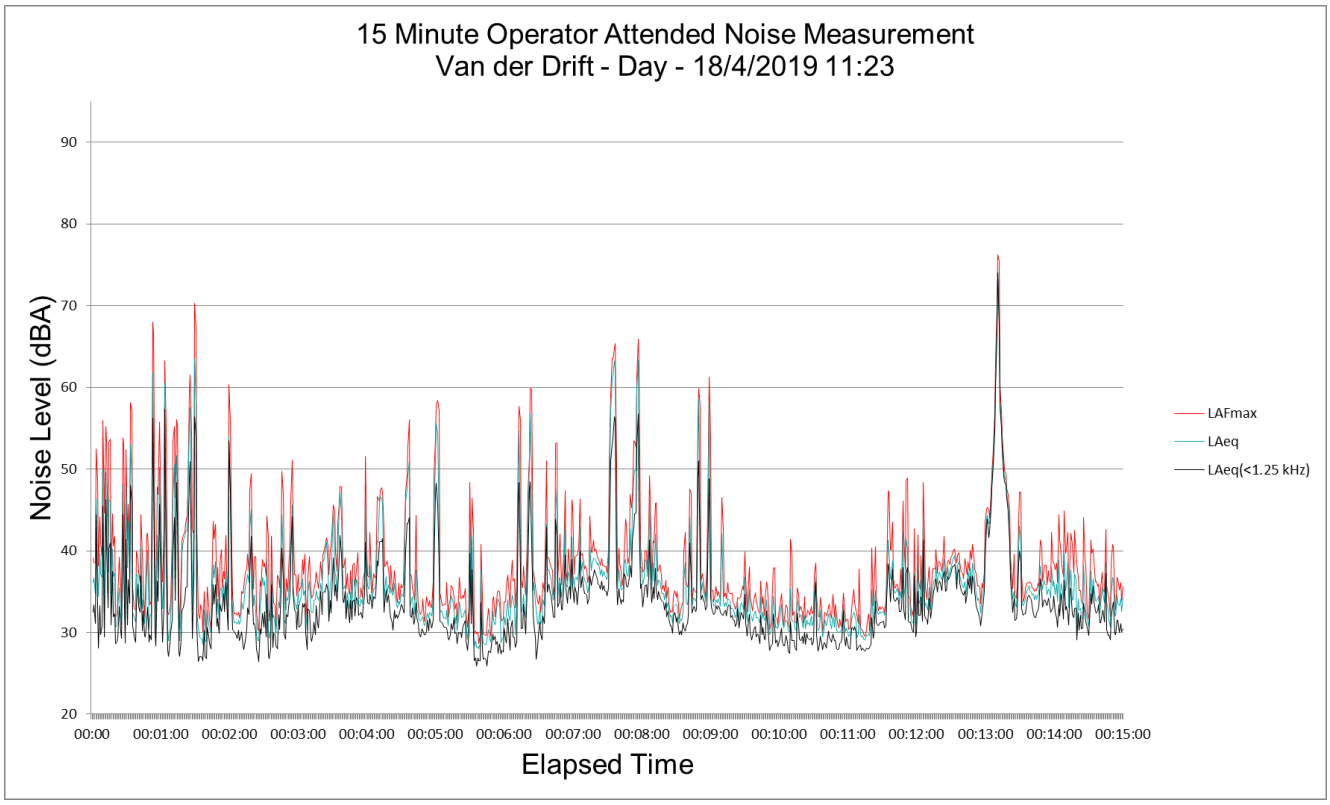


Figure B17 – Evening Period – 'Van der Drift' Operator Attended Noise Survey Results

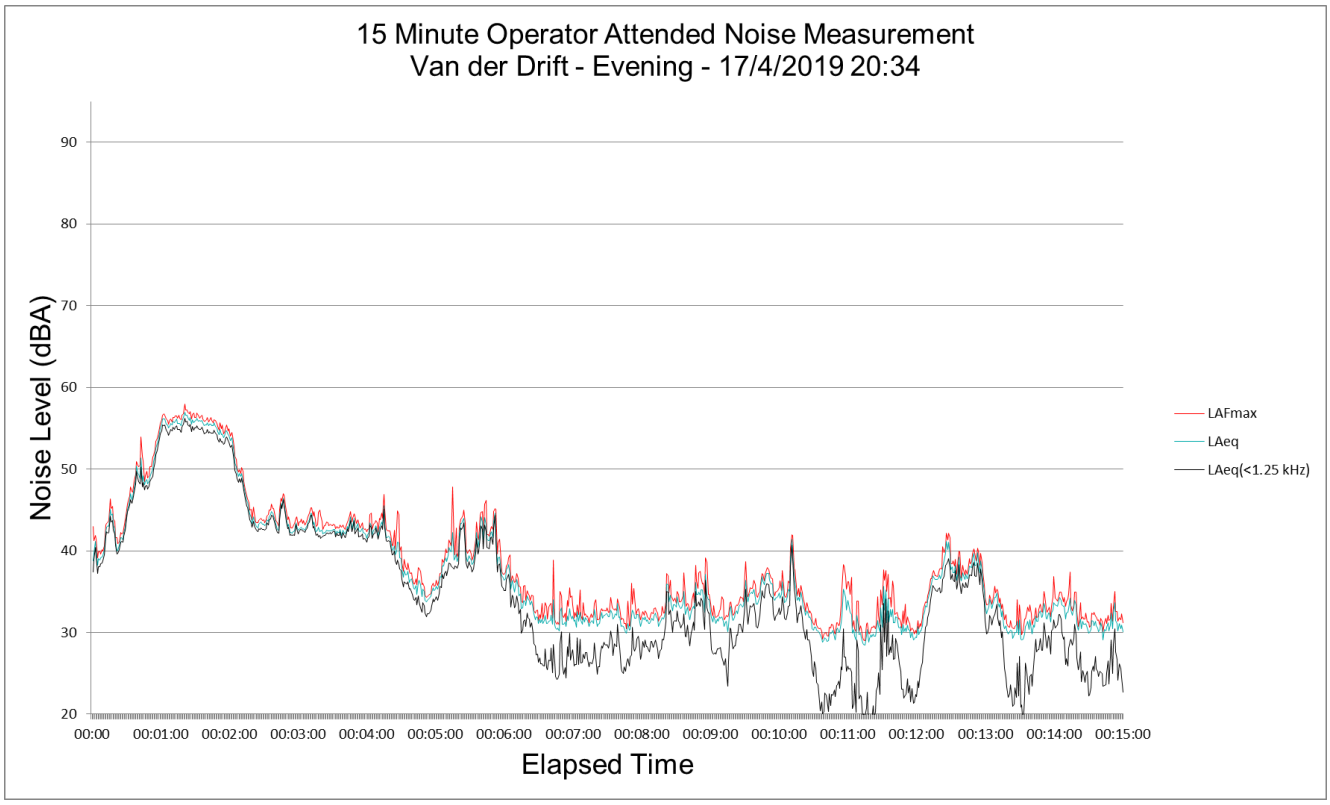
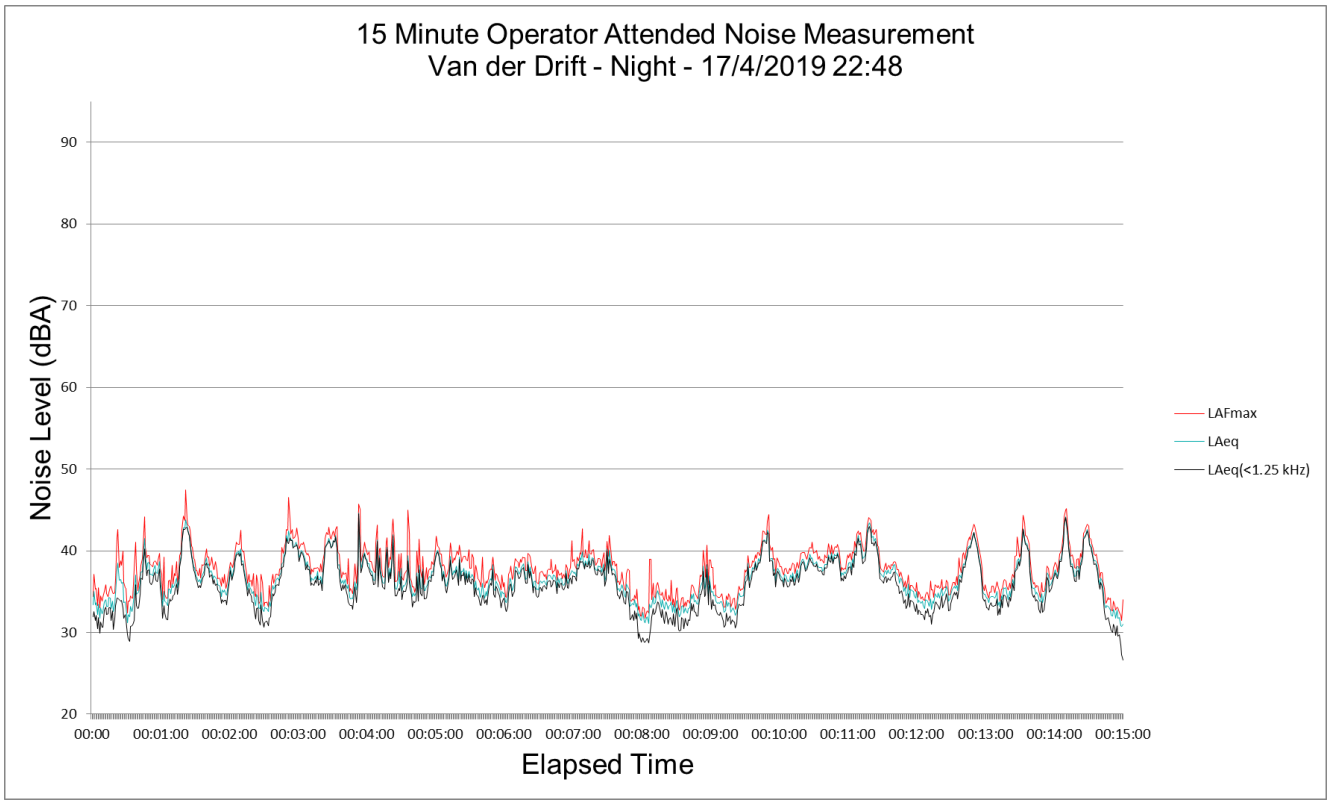


Figure B18 – Night Period – 'Van der Drift' Operator Attended Noise Survey Results



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