Stratford Mining Complex

Review of Night-Time Noise Compliance

SSD-4966 Schedule 3 Condition 7

September 2018 to August 2020

Prepared for

Stratford Coal Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Review of Night-Time Noise Compliance SSD-4966, Schedule 3, Condition 7 September 2018 to August 2020

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Stratford Coal Pty Ltd (SCPL) to undertake a review of night-time noise compliance for the Stratford Mining Complex (SMC), an open cut coal mine located near Stratford, NSW. This review is required every two years following the commencement of night-time mining operation in accordance with Schedule 3, Condition 7 of the Stratford Extension Project (SEP) Consolidated Consent SSD-4966 Modification 2 (the consent).

In February 2021, SLR Consulting (SLR) prepared an initial review of night-time noise compliance for SMC. In response, the NSW Department of Planning, Industry & Environment (DPIE) provided a request for information (RFI) on 4 August 2021 that stated SLR were not deemed to be sufficiently independent to prepare this review on the basis that SLR undertake noise monitoring and noise modelling for SMC. Subsequently, Global Acoustics has been engaged as a suitably independent expert to prepare this review.

Regarding Schedule 3, Condition 7 of SSD-4966, a RFI provided by DPIE dated 4 August 2021 requests assessment of compliance with all noise conditions which pertain to night-time noise, including assessment of compliance at all receivers identified in the consent, rail noise management measures, reactive noise mitigation measures, response to real-time noise monitoring alarms, and calibration of the real-time noise monitoring system.

1.2 Scope

In accordance with Schedule 3, Condition 7 of SSD-4966, a review of compliance with the relevant conditions of consent for night-time operation at the SMC is required. The relevant condition is provided below:

Night-time Noise

7. Within 2 years of the commencement of night-time mining operations, and every 2 years thereafter, the Applicant shall engage an independent acoustic expert to undertake a review of compliance with the relevant conditions of consent for night-time operations, to the satisfaction of the Secretary.

   Should any review report show that night-time mining operations have been/are non-compliant, the Applicant must modify its operations and conduct another independent review with 30 days.

   If this second review demonstrates compliance, the Applicant may continue its modified night-time mining operations. If not, the Applicant must immediately cease night-time mining operations.

   Night-time mining operations may only restart if the Secretary is satisfied that the proposed operations would be compliant with the relevant conditions of consent.

Operations approved in the consent commenced in April 2018, furthermore operations during the night period commenced at SMC in September 2018. Subsequently, this review of night-time noise compliance addresses the period 1 September 2018 to 31 August 2020. As requested in the RFI from DPIE and SSD-4966, this review includes assessment of compliance with all noise conditions which pertain to night-time noise.

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations which may be used in this report are provided in Table 1.1.

Table 1.1: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise.
L_{Amax}	The maximum A-weighted noise level over a time period.
L_{A1}	The noise level which is exceeded for 1 per cent of the time.
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute.
L_{A10}	The noise level which is exceeded for 10 percent of the time.
L_{Aeq}	The average noise A-weighted energy during a measurement period.
L_{A50}	The noise level which is exceeded for 50 per cent of the time and the median noise level during a measurement period.
L_{A90}	The level exceeded for 90 percent of the time. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
AWS	Automatic weather station used to collect meteorological data, typically at an altitude of 10 metres
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude.
Sigma-theta	The standard deviation of the horizontal wind direction over a period of time.
SC	Stability class (or category) is determined from measured wind speed and either sigma-theta or VTG.
IA	Inaudible. When site noise is noted as IA then there was no site noise at the monitoring location.
NM	Not Measurable. If site noise is noted as NM, this means some noise was audible but could not be quantified.
Day	This is the period 7:00am to 6:00pm.
Evening	This is the period 6:00pm to 10:00pm.
Night	This is the period 10:00pm to 7:00am.

2 CONSENT CONDITIONS AND ASSOCIATED DOCUMENTS

2.1 Development Consent SSD-4966

The most current approval associated with activities at SMC is the SEP Consolidated Consent SSD-4966 (MOD 2, January 2020). Specifically, Schedule 3 and Appendix 6 of the consent detail conditions relating to noise generated by SMC during the night period.

The following conditions of the consent are applicable to night-time operations and included in the scope of this assessment:

- Schedule 2, Condition 8(d) – Coal Transport
- Schedule 3, Conditions 1 through 8 and Condition 24
- Appendix 6, Conditions 1 through 5

2.2 Noise Management Plan

Noise monitoring requirements are detailed in the SMC Noise Monitoring Plan (NMP). The most recent version of the NMP was approved in June 2019.

2.3 Environmental Impact Statement

A noise and blasting assessment (NBA) was prepared by SLR in October 2012 to support the Environmental Impact Statement (EIS) prepared for the SEP, including noise modelling of predicted noise levels from SMC during the night period.

3 REVIEW OF NIGHT-TIME NOISE CONDITIONS

3.1 Schedule 2, Condition 8(d)

Coal Transport

8. The Applicant shall ensure that:
   (a) all product coal is transported from the site by rail;
   (b) no more than an average of 2.5 laden trains leave the site each day over any calendar year;
   (c) no more than 6 laden trains leave the site in any 24-hour period; and
   (d) no more than 2 laden trains leave the site during any night.

   Note: This condition does not apply to movements of the Duralie shuttle train.

Rail logs have shown that no more than 2 laden trains left site during noise monitoring during the night period.

3.2 Schedule 3, Conditions 1 & 2

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.

SMC have advised that none of the properties listed as "Acquisition Upon Request" or "Additional Mitigation Upon Request" in the consent have provided a written request for acquisition or mitigation to SMC during the period of 1 September 2018 to 31 August 2020.

Notwithstanding, SCPL has previously purchased properties identified in Table 1 of the consent as 40/51/CR1 – Blanch and 42 – Blanch. Additionally, SCPL has previously purchased properties identified in Table 2 of the consent as 31(1) - Issac.

3.3 Schedule 3, Condition 3

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
• Water truck access to the Bowens Road Water Fill Point	7 am to 6 pm, Monday to Saturday

SMC have advised that operations did not occur outside of approved areas or hours during night period noise monitoring conducted during the two-year period reviewed. A sample of operational logs during the two-year period reviewed have been reviewed.

3.4 Schedule 3, Condition 4

Noise criteria for SMC during the night period are detailed in Table 4 of Schedule 3, Condition 4, which is reproduced below.

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.

Attended noise monitoring was undertaken on a monthly basis at the approved monitoring locations, in accordance with the approved NMP at the time. The RFI provided by DPIE specifically requests assessment of compliance for all noise criteria listed in this condition, not just the criteria which applied at the attended noise monitoring locations. Section 4 of this review details results of night-time attended noise monitoring.

Subsequent sections of this review have noted that some of the currently approved noise monitoring locations may not be suitable to determine compliance at some receivers listed in the consent. Additionally, relationships/corrections utilised by SLR to extrapolate noise levels at other receivers were not justified in some cases. Discussion is provided in subsequent sections of this report.

SMC have advised that private agreements have been executed for specific properties identified in the NBA for the SMC. The properties with existing private agreements are shown in Figure 3 of the NMP. Properties previously owned by AGL and Falla, where agreements were previously in place, have since been acquired by SCPL.

3.5 Schedule 3, Condition 5

Operating Conditions

5. The Applicant shall:
   (a) implement best management practice to minimise the construction, operational, road and rail noise of the development;
   (b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day-to-day planning of mining operations, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this consent;
   (c) minimise the noise impacts of the development during meteorological conditions under which the noise limits in this consent do not apply (see Appendix 6);
   (d) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142);
   (e) co-ordinate noise management on site with the noise management of the Gloucester Gas Project to minimise cumulative noise impacts; and
   (f) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent,
   to the satisfaction of the Secretary.

Condition 5(a) – Section 6 of the NMP describes the noise management measures for SMC. SMC have utilised management practices to minimise construction, operational, road, and rail noise of the development that are consistent with NMP commitments.

Additionally, SMC has indicated the following operational measures have been implemented during the two-year period reviewed:

- Reduced active mining operating hours compared to approved operating hours in Schedule 3, Condition 3 of the consent. Active mining operations are generally limited to:
  - 6:30am to 1:00am Monday to Friday (e.g. no active mining between 1:00am and 6:30am); and
  - No night-time operations on weekends.
- Total production reduced from 2.6 Mtpa to approximately 1.2 Mtpa.
- Reduction in total mobile plant fleet and total site sound power relative to that assessed in the SEP NBA.
- Fewer night-time rail movements compared to approved movements in Schedule 2, Condition 8 of the consent. Additionally, the Duralie shuttle train ceased operation in October 2018.

Condition 5(b) – SMC operate a noise management system that uses real-time noise and weather monitoring to guide day-to-day mining operations. Proactive mitigation measures described in Section 6.1 of the NMP

have occurred.

Condition 5(c) – The reactive measures taken by SMC in response to noise enhancing meteorological conditions are made publicly available on the Stratford Coal website.

Condition 5(d) – SMC have provided correspondence with Pacific National establishing that trains operating on the rail network are compliant with ARTC's EPL 3142.

Condition 5(e) – The Gloucester Gas Project did not proceed, therefore cumulative noise management is not required.

Condition 5(f) – Regular noise monitoring has been carried out to determine whether the development is complying with relevant noise criteria. A summary of this monitoring is provided in Section 4.

3.6 Schedule 3, Condition 6

Noise Management Plan

6. The Applicant shall prepare and implement a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA, and submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary;
   (b) describe the measures that would be implemented to ensure:
   - compliance with the noise criteria and operating conditions of this consent; and
   - the noise impacts of the project are minimised during meteorological conditions when the noise limits of this consent do not apply;
   (c) describe the proposed noise management system in detail;
   (d) include a monitoring program that:
   - includes monitoring of inversion strength at an appropriate sampling rate to determine compliance with noise limits;
   - provides for the biennial validation of the noise model for the project.
   - evaluates and reports on:
     - the effectiveness of the on-site noise management system;
     - compliance against the noise criteria in this consent; and
     - compliance with the noise operating conditions;
   - includes a program to calibrate and validate real-time noise monitoring results with attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria and as a trigger for further attended monitoring); and
   - defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents; and
   (e) include provisions for a review of the site's real-time noise monitoring and management system within 12 months of the commencement of mining operations under this consent to ascertain if, and how, the system could be designed and used to determine compliance with noise limits.

Condition 6(a) – The SEP NMP was initially approved in March 2018 prior to the commencement of the project. The NMP was last revised and approved in June 2019.

Condition 6(b) – The NMP describes measures to ensure compliance with noise criteria and minimise noise impact under meteorological conditions where noise criteria do not apply.

Condition 6(c) – The proposed noise management system is described in detail in the NMP.

Condition 6(d) –

- Monitoring of inversion strength occurs at an appropriate sampling rate to determine compliance with noise limits. However, the dashboard utility used to report inversion strength stopped corresponding with raw data reported by the respective weather stations from 29 November 2018. It appears SLR were using this dashboard utility for reporting, meaning inversion strengths reported by SLR were not correct. The issue has since been fixed by Novecom.

- Biennial validation of the noise model for the project did not occur during the two-year period reviewed.

- Section 9 of the NMP outlines evaluation and reporting requirements of the effectiveness of on-site management systems and compliance with noise criteria. Compliance with noise conditions is evaluated in this report.

- Section 7.1 of the NMP states that attended monitoring will be used to calibrate and validate the real-time noise monitoring results over time. Calibration certificates for the real-time noise monitoring units have been provided by SMC.

  Attended noise monitoring measurements occurred at the real-time noise monitoring units during the months of October 2018, June 2019, September 2019, December 2019, January 2020, April 2020, and July 2020. However, attended monitoring did not align with the sampling rate of real-time noise monitoring units to allow for direct comparison to corresponding real-time noise monitoring data and no comparison to real-time noise monitoring data occurred.

  Therefore, during the two-year period reviewed, calibration of the real-time noise monitoring units occurred but validation of the real-time monitoring units did not occur.

- Definition of what constitute a noise incident and the subsequent protocol for identifying and notifying DPIE and stakeholders is contained in the NMP.

Condition 6(e) – SMC have provided correspondence with DPIE confirming that this condition has been removed from the consent, despite it's appearance on the NSW Major Projects website.

3.7 Schedule 3, Condition 7

Night-time Noise

7. Within 2 years of the commencement of night-time mining operations, and every 2 years thereafter, the Applicant shall engage an independent acoustic expert to undertake a review of compliance with the relevant conditions of consent for night-time operations, to the satisfaction of the Secretary.

   Should any review report show that night-time mining operations have been/are non-compliant, the Applicant must modify its operations and conduct another independent review with 30 days.

   If this second review demonstrates compliance, the Applicant may continue its modified night-time mining operations. If not, the Applicant must immediately cease night-time mining operations.

   Night-time mining operations may only restart if the Secretary is satisfied that the proposed operations would be compliant with the relevant conditions of consent.

This report is intended to fulfil requirements of this condition, as well as an additional RFI provided by DPIE dated 4 August 2021.

3.8 Schedule 3, Condition 8

Record of Noise Limit Exemptions

8. The Applicant shall record and make available on its website:
   (a) when the real-time monitoring and management system detects any potential exceedance of the noise limits;
   (b) when exemptions from noise limits due to meteorological conditions apply;
   (c) the specific reasonable and feasible measures that were taken when either (a) or (b) apply; and
   (d) facilitate the regular review of this information by the CCC,
   to the satisfaction of the Secretary.

Condition 8(a) to 8(c) - The specific reactive measures taken by SMC in response to elevated noise levels measured by real-time monitoring units and in response to noise enhancing meteorological conditions are made publicly available on the Stratford Coal website, as required by the NMP.

Condition 8(d) – SMC has provided information to the Community Consultative Committee (CCC) on a quarterly basis.

3.9 Schedule 3, Condition 24

METEOROLOGICAL MONITORING

24. For the life of the development, the Applicant shall ensure that there is a meteorological station in the vicinity of the site that:
   (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline and the *NSW Industrial Noise Policy*; and
   (b) is capable of continuous real-time measurement of temperature lapse rate data that are able to be transformed accurately and repeatably, and no more favourably, to those that would be obtained by the use of a 60 m tower,
   to the satisfaction of the EPA.

It was noted that strong inversion conditions were observed in approximately half of night period measurements during the two-year period, and that extremely strong inversion conditions were occasionally measured during summer months. The use of two automatic weather stations (AWS) at different elevations to determine temperature lapse rate data has precedence in NSW. The INP does not provide guidance on the use of two weather stations to estimate temperature inversion conditions, but it is allowable under the NPfI:

Inversion strengths calculated by extrapolation of the difference between temperatures measured at the same or different heights above ground level, but where one measurement is laterally displaced on elevated terrain, may give reasonable accuracy. The accuracy should be established by comparison of the calculated values against measurements from a campaign of direct measurements, such as by tethersonde (NPfI, Fact Sheet D1.2)

In 2015, SMC engaged Todoroski Air Sciences to compare calculated values against measurements by

tethersonde. We consider that work fulfils the NPfI requirements.

3.10 Appendix 6, Condition 1

APPENDIX 6
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

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.

Monthly noise compliance monitoring reports have included wind speeds for each measurement, but have only included temperature inversion conditions sporadically. Therefore, it was necessary to source meteorological data independently in order to assess compliance with conditions 1(b) and (c). During this process, it was identified that meteorological data used for monthly reporting, including both wind speed and VTG, were not correct. An issue was identified where there may be a discrepancy between the reported data from the weather station and Sentinex system. Revised meteorological data has been provided in Section 4 of this report.

3.11 Appendix 6, Condition 2

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station required under condition 25 of Schedule 3.

This condition appears to incorrectly reference Condition 25 of Schedule 3, rather than Condition 24 of Schedule 3. Refer to comments under Schedule 3, Condition 24 above.

3.12 Appendix 6, Condition 3 & 4

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 12 times in each calendar year (ie at least once in every calendar month), unless the Secretary directs otherwise.

Attended monitoring was undertaken on a monthly basis to evaluate compliance with relevant conditions of this consent.

3.13 Appendix 6, Condition 5

> 5. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
>
> (a) monitoring locations for the collection of representative noise data;
> (b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment;
> (c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration; and
> (d) 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.

Condition 5(a) is addressed above by comments pertaining to Schedule 3, Condition 4. Additional discussion is provided in Section 5 of this report.

Condition 5(b) – Calibration certificates for equipment used to collect noise data has been checked by Global Acoustics with no issues identified.

Condition 5(c) and (d) – Low-frequency modifying factors have been assessed in accordance with the NPfI. This was the correct methodology as NPfI methodology for assessment of modifying factors superseded all other methodologies during the two-year period reviewed via a transitional arrangement issued by the NSW EPA. SLR have advised that tonality and intermittency modifying factors have been assessed.

4 SUMMARY OF ATTENDED NOISE COMPLIANCE MONITORING

Attended noise monitoring data for the SMC from monthly reports has been summarised below. Wind speed and temperature inversion (VTG) conditions were sourced independently and differ from monthly reports. An issue was identified where there may be a discrepancy between the reported data from the weather station and Sentinex system.

All other data provided in the tables below, including measurement start times and SMC-only noise levels, should match monthly reports with two exceptions:

- In October 2018 reporting, there appears to be a typo stating that monitoring at Pryce Jones occurred at 00:08 on 25 October. It has been assumed that this measurement occurred on 26 October, as all other night period measurements occurred during that night period; and
- In April 2020 reporting, during the night period measurement at Clarke, noted noise sources list SMC pit operations up to 57 dB but the site-only L_{Amax} is reported as 52 dB. Noise criteria were not applicable during this measurement, so no additional investigation has been undertaken.

While care and due diligence has been taken to ensure that all data reproduced in this section matches SLR reports, transcription errors may exist due to the large quantity of data reviewed.

4.1 Atkins

Since night period operations commenced in September 2018, the Atkins property has been owned by SMC. Subsequently, no noise criteria are directly applicable to this monitoring location. The Atkins monitoring location is intended to represent other properties to the north and north-west.

SMC was compliant on all occasions, with the exception of one instance where elevated noise levels measured at Atkins may have corresponded with elevated noise levels at other receivers. During this measurement, VTG data was not available to determine whether inversion conditions were sufficiently strong to make noise criteria not applicable.

Table 4.1 details measured SMC-only $L_{Aeq,15minute}$ and L_{Amax} noise levels measured at Atkins. Table 4.2 details derived SMC-only $L_{Aeq,15minute}$ and L_{Amax} noise levels at other receivers when criteria may have been applicable and measured noise levels were elevated at Atkins.

Table 4.1: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB [4]	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB [4]	Exceedance dB [5,6]
Atkins	24/09/2018 23:39	0.9	0.2	Yes	IA	NA	IA	NA	NA
Atkins	25/10/2018 22:35	2.5	1.7	No	27	NA	29	NA	NA
Atkins	22/11/2018 22:24	2.2	3.5	No	IA	NA	IA	NA	NA
Atkins	17/12/2018 22:25	2.0	0.7	Yes	<25	NA	<25	NA	NA
Atkins	30/01/2019 22:25	1.2	NR	Yes	26	NA	31	NA	NA
Atkins	27/02/2019 22:48	0.3	5.7	No	28	NA	36	NA	NA
Atkins	29/03/2019 22:22	3.4	-0.7	No	23	NA	29	NA	NA
Atkins	17/04/2019 22:25	0.2	3.8	No	38	NA	46	NA	NA
Atkins	30/05/2019 22:24	0.7	11.2	No	30	NA	40	NA	NA
Atkins	27/06/2019 22:26	1.3	0.7	Yes	34	NA	44	NA	NA
Atkins	29/07/2019 23:44	1.6	6.3	No	35	NA	41	NA	NA
Atkins	28/08/2019 23:41	0.6	14.0	No	29	NA	38	NA	NA
Atkins	27/09/2019 00:00	2.1	1.9	No	25	NA	32	NA	NA
Atkins	23/10/2019 00:01	2.8	2.9	No	31	NA	33	NA	NA
Atkins	29/11/2019 00:41	3.4	-0.9	No	IA	NA	IA	NA	NA
Atkins	06/12/2019 00:37	2.4	9.9	No	IA	NA	IA	NA	NA
Atkins	30/01/2020 06:14	1.0	0.6	Yes	27	NA	34	NA	NA
Atkins	20/02/2020 00:42	0.1	2.4	Yes	29	NA	33	NA	NA
Atkins	24/03/2020 22:00	2.1	NR	Yes	<25	NA	<25	NA	NA
Atkins	29/04/2020 22:52	0.9	4.5	No	33	NA	48	NA	NA
Atkins	28/05/2020 22:57	0.6	7.2	No	38	NA	42	NA	NA
Atkins	17/06/2020 22:53	1.5	NR	Yes	37	NA	48	NA	See Table 4.2
Atkins	09/07/2020 22:54	1.4	3.5	No	34	NA	47	NA	NA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB [4]	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB [4]	Exceedance dB [5,6]
Atkins	13/08/2020 22:51	1.1	4.8	No	36	NA	41	NA	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in criterion columns means criterion was not applicable due to property ownership;*
5. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
6. *Results in bold red text indicate exceedance of relevant criterion.*

Table 4.2: DERIVED $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AT OTHER RECEIVERS USING RELEVANT EIS NOISE MODEL PREDICTIONS

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG [1]	Measured SMC L_{Aeq} dB [3]	Measured SMC L_{Amax} dB [3]	Enhancing Met? [2]	EIS Correction [4]	Derived SMC L_{Aeq} / L_{Amax} [4,5]	Exceedance dB [5]
9 (2) Williams	17/06/2020 22:53	1.5	219	NR	37	48	Yes	-3/-2	34/**46**	Nil/**1**
10 Whatmore	17/06/2020 22:53	1.5	219	NR	37	48	Yes	-3/-1	34/**47**	Nil/**2**
11 Walker	17/06/2020 22:53	1.5	219	NR	37	48	Yes	-2/-1	35/**47**	Nil/**2**

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *If wind direction was source to receiver, in this case 190 to 335 degrees, plus or minus 30 degrees as a conservative measure;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *Derived SMC noise levels based on calm and enhancing noise predictions contained in the 2012 EIS Noise and Blasting Assessment; and*
5. *Results in bold red text indicate derived noise levels at the receiver were higher than relevant criteria.*

4.2 Clarke/Wadland

Attended noise monitoring was conducted at Clarke in order to evaluate compliance at properties to the north-east of SMC, including Bagnall, for the two-year period reviewed. Attended monitoring was also conducted at Wadland in August 2020 for the same purpose.

Access to Bagnall, the nearest privately-owned receiver to the northeast of SMC operations, is not permitted by the landholder. The Clarke and Wadland properties are owned by SMC and are situated at intermediate points between Bagnall and SMC operations.

SLR applied a variety of corrections to measured noise levels at Clarke in order to estimate noise levels of Bagnall. During the two-year period reviewed, distance loss corrections of -6 to -8 dB and noise modelling corrections of -9 to -14 dB were applied to measured noise levels at Clarke to estimate levels at Bagnall. A review of these has been provided in Section 5.

SMC was compliant on all occasions, with the exception of two instances where elevated noise levels measured at Clarke may have corresponded with potential exceedances at Bagnall.

Table 4.3 details measured SC-only $L_{Aeq,15minute}$ and L_{Amax} noise levels. Table 4.4 details derived SMC-only $L_{Aeq,15minute}$ and L_{Amax} noise levels at Bagnall when criteria were applicable and measured noise levels were elevated at Clarke.

Table 4.3: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB [4]	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB [4]	Exceedance dB [5,6]
Clarke	25/09/2018 00:02	1.0	-0.2	Yes	34	NA	47	NA	See Table 4.4
Clarke	25/10/2018 22:02	2.0	0.6	Yes	41	NA	49	NA	See Table 4.4
Clarke	22/11/2018 22:00	2.5	5.2	No	49	NA	60	NA	NA
Clarke	17/12/2018 22:00	2.5	0.4	Yes	36	NA	44	NA	Nil
Clarke	30/01/2019 22:00	1.1	0.0	Yes	32	NA	39	NA	Nil
Clarke	27/02/2019 22:02	0.6	5.2	No	44	NA	51	NA	NA
Clarke	29/03/2019 22:00	4.1	-0.8	No	41	NA	48	NA	NA
Clarke	17/04/2019 22:00	0.6	1.2	Yes	40	NA	54	NA	See Table 4.4
Clarke	30/05/2019 22:00	1.5	14.2	No	47	NA	60	NA	NA
Clarke	27/06/2019 22:00	1.7	1.8	Yes	44	NA	55	NA	See Table 4.4
Clarke	30/07/2019 00:11	1.2	5.1	No	43	NA	54	NA	NA
Clarke	29/08/2019 00:08	2.1	6.1	No	42	NA	49	NA	NA
Clarke	26/09/2019 23:38	2.1	1.2	Yes	44	NA	51	NA	See Table 4.4
Clarke	22/10/2019 23:32	1.7	6.0	No	45	NA	55	NA	NA
Clarke	29/11/2019 00:11	3.4	-0.4	No	35	NA	38	NA	NA
Clarke	06/12/2019 00:13	1.8	10.5	No	44	NA	53	NA	NA
Clarke	30/01/2020 05:54	0.8	0.2	Yes	IA	NA	IA	NA	Nil
Clarke	20/02/2020 00:18	1.2	1.8	Yes	41	NA	51	NA	See Table 4.4
Clarke	24/03/2020 22:25	2.2	NR	Yes	42	NA	54	NA	See Table 4.4
Clarke	29/04/2020 23:24	0.3	3.3	No	42	NA	52	NA	NA
Clarke	28/05/2020 22:00	0.3	7.4	No	41	NA	49	NA	NA
Clarke	17/06/2020 22:00	1.8	NR	Yes	42	NA	50	NA	See Table 4.4
Clarke	09/07/2020 22:00	1.4	2.8	Yes	41	NA	52	NA	See Table 4.4

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB [4]	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB [4]	Exceedance dB [5,6]
Clarke	13/08/2020 22:03	0.3	5.6	No	40	NA	51	NA	NA
Wadland	13/08/2020 22:25	1.0	5.2	No	33	NA	47	NA	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in criterion columns means criterion was not applicable due to property ownership;*
5. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
6. *Results in bold red text indicate exceedance of relevant criterion.*

Table 4.4: DERIVED $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AT BAGNALL USING RELEVANT EIS NOISE MODEL PREDICTIONS

Location	Start Date and Time	Wind Speed m/s	Wind Direction	VTG [1]	Measured SMC L_{Aeq} dB [3]	Measured SMC L_{Amax} dB [3]	Enhancing Met? [2]	EIS Correction [4]	Derived Bagnall L_{Aeq} / L_{Amax} [4,5]	Exceedance dB [5]
Bagnall	25/09/2018 00:02	1.0	209	-0.2	34	47	Yes	-6/-5	28/42	Nil/Nil
Bagnall	25/10/2018 22:02	2.0	16	0.6	41	49	No	-12/-12	29/37	Nil/Nil
Bagnall	17/04/2019 22:00	0.6	150	1.2	40	54	No	-12/-12	28/42	Nil/Nil
Bagnall	27/06/2019 22:00	1.7	293	1.8	44	55	Yes	-6/-5	**38/50**	**1/5**
Bagnall	26/09/2019 23:38	2.1	38	1.2	44	51	No	-12/-12	32/39	Nil/Nil
Bagnall	20/02/2020 00:18	1.2	173	1.8	41	51	Yes	-6/-5	35/**46**	Nil/**1**
Bagnall	24/03/2020 22:25	2.2	22	NR	42	54	No	-12/-12	30/42	Nil/Nil
Bagnall	17/06/2020 22:00	1.8	210	NR	42	50	Yes	-6/-5	36/45	Nil/Nil
Bagnall	09/07/2020 22:00	1.4	43	2.8	41	52	No	-12/-12	29/40	Nil/Nil

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *If wind direction was source to receiver, in this case 190 to 335 degrees, plus or minus 30 degrees as a conservative measure;*

3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *Derived SMC noise levels based on calm and enhancing noise predictions contained in the 2012 EIS Noise and Blasting Assessment; and*
5. *Results in bold red text indicate derived noise levels at the receiver were higher than relevant criteria.*

During June 2019 monitoring, SLR reported a calculated $L_{A1,1minute}$ of 52 dB at the Clarke monitoring location. Review of the measurement file showed that this calculation was based on measured L_{Aeq} at 1s intervals, which is not a sufficient resolution to evaluate the $L_{A1,1minute}$ (0.6 seconds) of a measurement. Therefore, the reported L_{Amax} for SMC has been used instead.

4.3 Greenwood

Attended noise monitoring Greenwood commenced in November 2019. The Greenwood monitoring location is intended to represent private receivers to the south-east of SMC.

There were no potential exceedances of relevant noise criteria at Greenwood during the two-year period reviewed. There were no instances identified where noise levels measured at Greenwood when noise criteria were applicable that could have caused potential exceedances at private receivers represented by Greenwood.

Table 4.5 compares SMC $L_{Aeq,15minute}$ and L_{Amax} noise levels with consent noise criteria. Criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.5: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Greenwood	28/11/2019 23:11	3.5	-0.1	No	25	35	27	45	NA
Greenwood	05/12/2019 22:35	1.4	4.6	No	IA	35	IA	45	NA
Greenwood	29/01/2020 22:00	3.0	-0.9	Yes	IA	35	IA	45	Nil
Greenwood	19/02/2020 22:23	2.2	-0.3	Yes	IA	35	IA	45	Nil
Greenwood	24/03/2020 23:34	2.0	NR	Yes	<25	35	<25	45	Nil
Greenwood	29/04/2020 22:00	0.4	5.3	No	25	35	26	45	NA
Greenwood	28/05/2020 22:38	0.6	6.3	No	29	35	33	45	NA
Greenwood	17/06/2020 23:22	1.7	NR	Yes	IA	35	IA	45	Nil
Greenwood	09/07/2020 23:25	1.3	4.4	No	<25	35	<25	45	NA
Greenwood	13/08/2020 23:22	1.2	4.1	No	26	35	28	45	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
5. *Results in bold red text indicate exceedance of relevant criterion.*

4.4 Hall

The Hall monitoring location is intended to represent private receivers to the west of SMC.

There were no exceedances of relevant noise criteria at Hall during the two-year period reviewed. There were no instances identified where noise levels measured at Hall when noise criteria were applicable that could have caused potential exceedances at private receivers represented by Hall.

Table 4.6 compares SMC $L_{Aeq,15minute}$ and L_{Amax} noise levels with consent noise criteria. Criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.6: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Hall	24/09/2018 22:27	0.5	-0.2	Yes	24	35	28	45	Nil
Hall	25/10/2018 23:21	2.4	1.7	No	28	35	30	45	NA
Hall	22/11/2018 23:31	1.6	6.2	No	IA	35	IA	45	NA
Hall	17/12/2018 23:44	2.4	0.4	Yes	29	35	34	45	Nil
Hall	30/01/2019 23:37	2.9	0.0	Yes	<25	35	<25	45	Nil
Hall	27/02/2019 23:42	0.6	4.5	No	25	35	32	45	NA
Hall	29/03/2019 23:32	2.8	-0.6	Yes	24	35	29	45	Nil
Hall	17/04/2019 23:34	0.3	3.0	Yes	25	35	29	45	Nil
Hall	30/05/2019 23:34	1.3	6.6	No	<20	35	<20	45	NA
Hall	27/06/2019 23:34	1.4	5.8	No	27	35	37	45	NA
Hall	29/07/2019 22:25	2.4	5.9	No	27	35	29	45	NA
Hall	28/08/2019 22:28	1.1	9.4	No	23	35	25	45	NA
Hall	26/09/2019 22:21	1.4	5.8	No	IA	35	IA	45	NA
Hall	22/10/2019 22:23	1.4	1.9	Yes	29	35	31	45	Nil
Hall	28/11/2019 22:11	3.9	0.1	No	IA	35	IA	45	NA
Hall	05/12/2019 23:00	1.5	10.6	No	IA	35	IA	45	NA
Hall	29/01/2020 22:47	1.7	-0.9	Yes	IA	35	IA	45	Nil
Hall	19/02/2020 23:08	2.7	-0.5	Yes	25	35	28	45	Nil
Hall	24/03/2020 23:01	2.3	NR	Yes	27	35	33	45	Nil
Hall	29/04/2020 22:48	0.9	4.5	No	27	35	33	45	NA
Hall	28/05/2020 23:26	0.8	7.3	No	30	35	33	45	NA
Hall	17/06/2020 22:57	1.5	NR	Yes	28	35	32	45	Nil
Hall	09/07/2020 22:34	1.2	6.5	No	26	35	28	45	NA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Hall	13/08/2020 22:34	1.0	5.2	No	27	35	30	45	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
5. *Results in bold red text indicate exceedance of relevant criterion.*

4.5 Lowrey

The Lowrey monitoring location is intended to represent private receivers to the west of Stratford Village. It was noted that predicted noise levels at 25 Thompson are 1 dB higher in the EIS noise model than the Lowrey monitoring location for Year 2 operations under both calm and enhancing noise conditions.

SMC was compliant on all occasions at the Lowrey monitoring location, with the exception of a single potential exceedance of relevant noise criteria at Lowrey during the two-year period reviewed.

During June 2020 monitoring, a potential exceedance of both L_{Aeq} and $L_{A1,1minute}$ criteria was reported for the measurement at Lowrey starting at 23:24 on 17 June 2020. A remeasure was taken within 75 minutes of the initial night measurement in accordance with the NMP. The remeasure was compliant with relevant criteria.

The potential exceedance at Lowrey corresponds with a potential exceedance at 25 Thompson. Derived noise levels at 25 Thompson were in compliance with relevant criteria during the remeasure at Lowrey.

It should be noted that VTG data was unavailable during both the initial measurement and remeasure. It has been assumed that noise criteria were applicable, but inversion conditions may have been present during both measurements.

Table 4.7 compares SMC $L_{Aeq,15minute}$ and L_{Amax} noise levels with consent noise criteria. Criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.7: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Lowrey	24/09/2018 23:13	1.4	0.2	Yes	31	35	37	45	Nil
Lowrey	25/10/2018 23:48	2.0	1.7	Yes	25	35	30	45	Nil
Lowrey	22/11/2018 22:48	1.8	3.1	No	IA	35	IA	45	NA
Lowrey	17/12/2018 22:51	1.4	0.4	Yes	35	35	41	45	Nil
Lowrey	31/01/2019 00:04	2.7	NR	Yes	27	35	33	45	Nil
Lowrey	28/02/2019 00:09	0.5	5.8	No	28	35	37	45	NA
Lowrey	29/03/2019 22:46	4.8	-1.0	No	29	35	33	45	NA
Lowrey	17/04/2019 23:58	0.3	3.6	No	26	35	29	45	NA
Lowrey	30/05/2019 23:59	2.5	0.0	Yes	IA	35	IA	45	Nil
Lowrey	27/06/2019 23:57	1.1	7.2	No	31	35	38	45	NA
Lowrey	29/07/2019 23:14	2.1	7.2	No	32	35	37	45	NA
Lowrey	28/08/2019 23:15	0.6	11.5	No	26	35	27	45	NA
Lowrey	26/09/2019 23:08	2.5	0.5	Yes	IA	35	IA	45	Nil
Lowrey	22/10/2019 23:09	1.6	6.6	No	30	35	31	45	NA
Lowrey	28/11/2019 23:55	3.4	-0.2	No	26	35	29	45	NA
Lowrey	05/12/2019 23:47	1.8	8.0	No	IA	35	IA	45	NA
Lowrey	30/01/2020 06:36	0.9	0.5	Yes	31	35	36	45	Nil
Lowrey	19/02/2020 23:52	2.3	-0.4	Yes	35	35	43	45	Nil
Lowrey	24/03/2020 22:32	2.2	NR	Yes	29	35	31	45	Nil
Lowrey	29/04/2020 22:24	1.1	5.9	No	29	35	34	45	NA
Lowrey	28/05/2020 23:27	0.8	7.3	No	IA	35	IA	45	NA
Lowrey	17/06/2020 23:24	1.2	NR	Yes	**36**	35	**50**	45	**1 / 5**
Lowrey [6]	18/06/2020 00:26	0.0	NR	Yes	29	35	40	45	Nil

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Lowrey	09/07/2020 23:21	1.1	4.6	No	<25	35	31	45	NA
Lowrey	13/08/2020 23:15	1.2	4.1	No	35	35	41	45	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent;*
5. *Results in bold red text indicate exceedance of relevant criterion; and*
6. *Remeasure.*

4.6 Pryce Jones

The Pryce Jones property is acquisition upon request, mitigation upon request, and is specifically listed in the consent noise criteria table. The Pryce Jones monitoring location is intended to represent private receivers in Craven and to the south-west.

It was noted that predicted noise levels in the EIS noise model for 44 Cross & Lane are 2 dB lower than predicted noise levels at the Pryce Jones monitoring location for Year 2 operations under enhancing conditions. However, the L_{Aeq} criterion for 44 Cross & Lane is 4 dB lower than Pryce Jones.

There were no potential exceedances of relevant noise criteria at Pryce Jones during the two-year period reviewed. There were no instances where noise levels measured at Pryce Jones were within 2 dB of the relevant L_{Aeq} criterion when noise criteria were applicable, therefore there were no potential exceedances at 44 Cross & Lane.

Table 4.8 compares SMC $L_{Aeq,15minute}$ and L_{Amax} noise levels with consent noise criteria. Criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.8: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Pryce Jones	24/09/2018 22:05	0.7	0.4	Yes	<25	43	<25	49	Nil
Pryce Jones	26/10/2018 00:08	1.8	1.9	Yes	IA	43	IA	49	Nil
Pryce Jones	22/11/2018 23:54	1.2	4.4	No	<25	43	35	49	NA
Pryce Jones	17/12/2018 23:33	2.2	0.8	Yes	34	43	35	49	Nil
Pryce Jones	30/01/2019 23:14	2.4	0.0	Yes	28	43	33	49	Nil
Pryce Jones	27/02/2019 23:19	0.6	6.6	No	25	43	30	49	NA
Pryce Jones	29/03/2019 23:53	4.1	-0.4	No	28	43	39	49	NA
Pryce Jones	17/04/2019 23:13	0.4	4.5	No	27	43	29	49	NA
Pryce Jones	30/05/2019 23:12	1.7	8.6	No	<20	43	<20	49	NA
Pryce Jones	27/06/2019 23:12	1.1	4.3	No	32	43	35	49	NA
Pryce Jones	29/07/2019 22:03	1.6	5.0	No	<20	43	<20	49	NA
Pryce Jones	28/08/2019 22:06	0.5	8.2	No	39	43	41	49	NA
Pryce Jones	26/09/2019 22:00	1.4	4.4	No	31	43	33	49	NA
Pryce Jones	22/10/2019 22:00	1.6	1.8	Yes	32	43	34	49	Nil
Pryce Jones	28/11/2019 22:32	3.6	-0.1	No	32	43	34	49	NA
Pryce Jones	05/12/2019 22:13	1.5	1.7	Yes	32	43	34	49	Nil
Pryce Jones	29/01/2020 22:25	2.6	-0.7	Yes	IA	43	IA	49	Nil
Pryce Jones	19/02/2020 22:44	3.1	-0.2	No	IA	43	IA	49	NA
Pryce Jones	24/03/2020 22:00	2.1	0.0	Yes	33	43	35	49	Nil
Pryce Jones	29/04/2020 22:25	1.1	5.9	No	34	43	35	49	NA
Pryce Jones	28/05/2020 23:02	0.6	7.2	No	41	43	49	49	NA
Pryce Jones	17/06/2020 23:57	1.4	0.0	Yes	<25	43	<25	49	Nil
Pryce Jones	09/07/2020 23:03	1.4	3.5	No	31	43	33	49	NA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Pryce Jones	13/08/2020 22:57	0.7	4.2	No	36	43	37	49	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
5. *Results in bold red text indicate exceedance of relevant criterion.*

4.7 Van der Drift

The Van der Drift monitoring location is intended to represent private receivers in Stratford Village.

During the course of this review, it was noted that some receivers to the south of the Van der Drift monitoring location have predicted noise levels in the 2012 EIS noise model up to 2 dB higher than than the monitoring location for calm conditions only.

There were no potential exceedances of relevant noise criteria at Van der Drift during the two-year period reviewed. There were no instances where noise levels measured at Van der Drift were within 2 dB of the relevant L_{Aeq} criterion when noise criteria were applicable and conditions were calm, therefore there were no potential exceedances at receivers in Stratford Village.

Table 4.9 compares SMC $L_{Aeq,15minute}$ and L_{Amax} noise levels with consent noise criteria. Criteria are applicable if weather conditions were within specified parameters during the measurement.

Table 4.9: $L_{Aeq,15minute}$ AND L_{Amax} GENERATED BY SMC AGAINST RELEVANT CONSENT NOISE CRITERIA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Van der Drift	24/09/2018 22:50	0.6	0.0	Yes	35	35	42	45	Nil
Van der Drift	25/10/2018 22:56	2.6	1.7	No	26	35	28	45	NA
Van der Drift	22/11/2018 23:09	1.1	6.7	No	IA	35	IA	45	NA
Van der Drift	18/12/2018 00:10	2.1	0.0	Yes	27	35	32	45	Nil
Van der Drift	30/01/2019 22:48	2.2	0.0	Yes	29	35	39	45	Nil
Van der Drift	27/02/2019 22:54	0.2	5.4	No	30	35	36	45	NA
Van der Drift	29/03/2019 23:07	4.1	-0.9	No	33	35	43	45	NA
Van der Drift	17/04/2019 22:47	0.4	4.6	No	37	35	45	45	NA
Van der Drift	30/05/2019 22:46	1.0	8.9	No	23	35	31	45	NA
Van der Drift	27/06/2019 22:49	0.7	2.4	Yes	28	35	34	45	Nil
Van der Drift	29/07/2019 22:48	2.1	7.1	No	34	35	38	45	NA
Van der Drift	28/08/2019 22:52	0.4	12.0	No	32	35	33	45	NA
Van der Drift	26/09/2019 22:45	1.8	3.5	No	22	35	24	45	NA
Van der Drift	22/10/2019 22:45	1.3	3.5	No	34	35	40	45	NA
Van der Drift	28/11/2019 23:34	3.5	0.1	No	30	35	33	45	NA
Van der Drift	05/12/2019 23:24	1.9	9.7	No	23	35	25	45	NA
Van der Drift	29/01/2020 23:08	0.8	-0.7	Yes	29	35	36	45	Nil
Van der Drift	19/02/2020 23:32	2.9	-0.4	Yes	26	35	27	45	Nil
Van der Drift	24/03/2020 22:51	2.5	0.0	Yes	29	35	41	45	Nil
Van der Drift	29/04/2020 22:00	0.4	5.3	No	25	35	26	45	NA
Van der Drift	28/05/2020 23:51	0.8	7.7	No	33	35	35	45	NA
Van der Drift	17/06/2020 23:59	1.4	0.0	Yes	34	35	37	45	Nil
Van der Drift	09/07/2020 23:44	1.5	5.3	No	<30	35	32	45	NA

Location	Start Date and Time	Wind Speed m/s	VTG [1]	Criterion Applies [2]	SMC L_{Aeq} dB [3]	L_{Aeq} Criterion dB	SMC L_{Amax} dB [3]	$L_{A1,1minute}$ Criterion dB	Exceedance dB [4,5]
Van der Drift	13/08/2020 23:39	1.3	3.9	No	31	35	40	45	NA

Notes:

1. *VTG calculations based on M3-10m and M4-10m sensor data sourced from SX98 and SX108. NR indicates that one or both of these sensors did not return a result during the measurement;*
2. *Noise criteria do not apply under meteorological conditions listed in Appendix 6, Condition 1 of the consent. If VTG was NR, noise criteria have been assumed to be applicable if wind speeds were 3m/s or less;*
3. *Site-only $L_{Aeq,15minute}$ and L_{Amax} attributed to SC, including modifying factors where applicable;*
4. *NA in exceedance column means criterion was not applicable due to property ownership and/or atmospheric conditions outside those specified in consent; and*
5. *Results in bold red text indicate exceedance of relevant criterion.*

5 DISCUSSION

During the two-year period reviewed, SLR have applied corrections to noise levels measured at the Atkins and Clarke monitoring locations to estimate noise levels at other receivers in order to assess compliance at those receivers. While this practice is acceptable, the corrections SLR have applied were variable month-to-month and were not based on the publicly available noise model predictions in the EIS.

The EIS noise model (also prepared by SLR) suggests corrections that are often more conservative than the corrections used by SLR to assess compliance. Additional detail was requested, which SLR provided, for both distance loss and noise modelling corrections used in monthly compliance noise monitoring. A summary of findings is detailed below.

5.1 Distance Loss Corrections

5.1.1 Atkins

Table 5.1 reproduces predicted "Year 2" noise levels under calm and enhancing conditions provided by the EIS.

Table 5.1: RELATIONSHIP BETWEEN ATKINS MONITORING LOCATION AND NEARBY RECEIVERS

Receiver	Calm L_{Aeq}	Enhancing L_{Aeq} (Inversion plus Drainage)	Enhancing $L_{A1,1minute}$
13(1) Atkins	22	30	35
9(1) Williams	20	27	32
9(2) Williams	21	27	33
10 Whatmore	21	27	34
11 Walker	21	28	34

Based on the EIS noise model, the relationship between Atkins and other receivers in the area suggests that corrections of minus 1 to minus 2 dB during calm (or non-enhancing) conditions and minus 1 to minus 3 dB during enhancing conditions for these receivers would be appropriate. In February, April, June, and July 2020, SLR have applied distance loss corrections of minus 6 to minus 9 dB to noise levels measured at Atkins to estimate noise levels at those other receivers.

Distance loss corrections were based on the distance from Atkins to the nearest point of the nearest pit. In other words, these corrections assumed that all noise emitted from SMC originated from the nearest point of the nearest pit, excluding all other pits, haul roads, dumps, and/or fixed plant. This methodology represents the least conservative approach to distance loss correction, resulting in corrections that we don't consider appropriate.

5.1.2 Clarke/Bagnall

Table 5.2 reproduces predicted Year 2 noise levels under calm and enhancing conditions provided by the EIS.

Table 5.2: RELATIONSHIP BETWEEN CLARKE MONITORING LOCATION AND NEARBY RECEIVERS

Receiver	Calm L_{Aeq}	Enhancing L_{Aeq} (Inversion plus Drainage)	Enhancing $L_{A1,1minute}$
19(40) Clarke	36	43	48
23 Bagnall	24	37	43
Difference	-12	-6	-5

Based on the EIS noise model, the relationship between Clark and Bagnall is a correction of minus 12 dB during calm (or non-enhancing) conditions and minus 5 to minus 6 dB during enhancing conditions.

During the two-year period reviewed, distance loss corrections of minus 6 to minus 8 dB have been applied to noise levels measured at Clarke. In all cases, distance loss corrections were based on the distance from the Clarke/Bagnall to the nearest point of the nearest pit. Figure 1 shows an example of the distance loss corrections as provided by SLR.

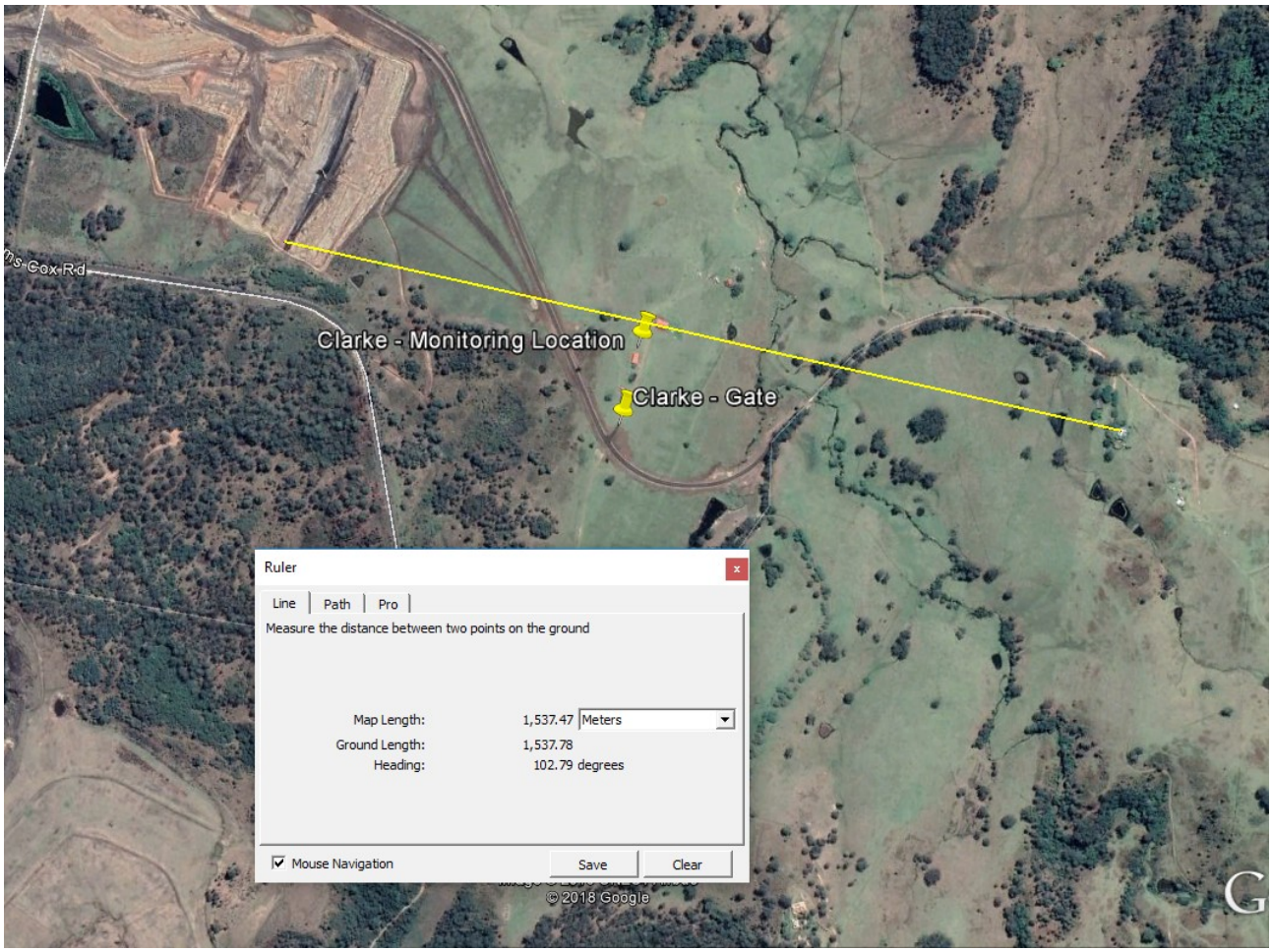

Figure 1: Example of Distance Loss Calculation

Again, this methodology represents the least conservative approach to distance loss correction, resulting in corrections that were not considered appropriate.

In September 2020, the NSW EPA identified distance loss calculations utilised to date by SLR had not established a sufficiently robust acoustic relationship between the Clarke monitoring location and Bagnall receiver.

5.2 Noise Modelling Corrections

In order to establish a more robust acoustic relationship between the Clarke monitoring location and Bagnall receiver, the NSW EPA recommended:

> *… that SMC use noise modelling to further justify the acoustic relationship between the compliance location and the intermediate location. This must occur under a range of applicable meteorological conditions and mine operational scenarios to demonstrate that differential distance attenuation alone does indeed represent a conservative approach. Additional alternative or intermediate locations could also be considered to further*

justify the relationship.

As an independent acoustic expert, Global Acoustics has decided not to use noise modelling relationships provided by SLR (outside of those detailed in the 2012 EIS noise model) for the following reasons:

- Biennial validation of the noise model has not occurred;
- Updated noise modelling has been based on deprecated INP methodology that does not necessarily consider worst-case noise impact at all receivers;
- Updated noise modelling has not been prepared in accordance with best practice NPfI requirements; and
- Modelled operational scenarios have been updated since the 2012 EIS noise model. While this is generally good practice, it also means the updated noise model is essentially a black box for the purposes of reviewing compliance.

5.3 Noise Monitoring Locations

It is considered best practice to conduct attended noise monitoring as close to the nearest noise sensitive or privately-owned receiver as possible, based on the assumption that more distant receivers along a similar path of enhancement will be less impacted. Typically, there are two justifiable reasons why monitoring would not occur at the nearest receiver, which are as follows:

- In some rare cases, typically involving significant shielding or differences in elevation, it is feasible that the closest receiver could be less impacted than a more distant receiver in the same direction; or
- More commonly, access to the nearest receiver is denied by the landholder. In this case, it is necessary to monitor at another point and apply a correction to estimate noise levels at the receiver.

During the course of this review, some issues were identified with the currently approved monitoring locations.

5.3.1 Atkins

Since night period operations commenced in September 2018, the Atkins property has been owned by SMC. Subsequently, no noise criteria were directly applicable to this monitoring location.

During this review, it was noted that receivers represented by the Atkins monitoring location are on the opposite of the Avon River compared to the Atkins monitoring location, which suggests that cold air drainage conditions during the night period could be different.

It is recommended that this monitoring location be moved to a location that is more representative of

receivers to the northwest of SMC operations, preferably on the same side of the Avon River as the nearest private receivers.

5.3.2 Clarke/Bagnall/Wadland

Access to Bagnall, the nearest privately-owned receiver to the northeast of SMC operations, is not permitted by the landholder. The Clarke and Wadland properties are owned by SMC and are situated at intermediate points between Bagnall and SMC operations. SLR applied a variety of corrections to measured noise levels at Clarke in order to estimate noise levels of Bagnall.

It is our opinion that the Clarke monitoring location is not suitable to predict noise impact at Bagnall since the relationship between the two locations is highly variable under different meteorological conditions.

Monitoring at Wadland only occurred in the last month of the two-year period reviewed. Additional analysis would be required to determine whether monitoring at Wadland will be suitable to predict noise impact at Bagnall.

5.3.3 Lowrey

Based on EIS noise model predictions, it was noted that compliance at the Lowrey monitoring location does not preclude compliance at 25 Thompson under both calm and enhancing conditions.

5.3.4 Pryce Jones

Based on EIS noise model predictions, it was noted that compliance at the Pryce Jones monitoring location does not preclude compliance at 44 Cross & Lane under enhancing conditions only.

5.3.5 Van der Drift

Based on EIS noise model predictions, it was noted that compliance at the Van der Draft monitoring location does not preclude compliance at some receivers in Stratford Village under calm conditions only.

5.4 Noise Model Validation

SMC have updated the original 2012 EIS noise model to take into account operational changes described in Section 3.5. Biennial validation of the noise model has not occurred. Validation and subsequent calibration of noise modelling should have been undertaken prior to operational updates to the noise model.

5.5 Rail Noise Monitoring

Rail noise monitoring was undertaken in accordance with the NMP, during the months of September and

December of 2018, April, May, September, and December of 2019, and March, June, and August of 2020. L_{Amax} rail noise levels from train passes were compliant with the relevant criterion when train horns sounded at a local crossing were excluded.

$L_{Aeq,period}$ rail noise levels were not assessed as this would require monitoring at each location for a duration of 15 hours during the day/evening periods and 9 hours during the night period. $L_{Aeq,period}$ rail noise levels could theoretically be estimated based on the number of trains accessing site in a given period. Utilising either methodology would likely result in $L_{Aeq,period}$ rail noise levels lower than relevant criteria.

5.6 Real-Time Noise Monitoring

Real-time noise monitors were installed to manage noise impact from SMC in Stratford and Craven villages. During attended monitoring in the two-year period reviewed, there was a single exceedance measured at Lowrey (Stratford), no potential exceedances measured at Van der Drift (Stratford), and no potential exceedances measured at Pryce Jones (Craven). Based on these results, it appears that the existing real-time noise management system is facilitating effective management of noise impact in Stratford and Craven villages.

Additional real-time monitoring was undertaken at Clarke throughout the construction phase of the Avon North Open Cut.

6 RECOMMENDATIONS

6.1 Noise Monitoring Corrections

The corrections SLR have used vary from month-to-month and are not based directly on publicly available noise model results in the EIS. Section 5.1 and 5.2 provide reasons why corrections utilised by SLR during the two-year period reviewed were not adopted by this review of compliance.

Corrections/offsets from the recommended monitoring location to other receivers should be based on publicly available information. This allows for consistency when compliance monitoring is undertaken by a contractor, an independent auditor, or a regulator.

6.2 Noise Monitoring Locations

It is considered best practice to conduct attended noise monitoring as close to the nearest noise sensitive or privately-owned receiver as possible, based on the assumption that more distant receivers along a similar path of enhancement will be less impacted. Subsequently, monitoring locations should be updated from time to time to take into account changes in property ownership

Noise monitoring has occurred at approved noise monitoring locations outlined in the NMP, however it is recommended that a review of these noise monitoring locations be undertaken.

6.3 Noise Model Validation

Biennial noise model validation did not occur during the two-year period reviewed. During the course of this review, it was noted that measured noise levels monitoring locations were occasionally higher than predicted in the EIS noise model. It is recommended that biennial validation of the noise model be undertaken.

6.4 Sleep Disturbance Assessment

Global Acoustics recommends use of L_{Amax} to assess compliance with sleep disturbance criteria as this is considered best practice and the approved methodology in the NPfI.

6.5 Real-Time Noise Validation

Attended monitoring was undertaken at the real-time monitoring sites, however real-time noise validation measurements did not occur during the night period and did not align with the sampling rate of the real-time monitoring units. No comparison was made to measured real-time noise levels in monthly reports issued by SLR.

It is recommended that validation measurements align with real-time unit start times to allow for direct comparison of data. It is also recommended that validation occur during the more sensitive night period, when accurate estimation of mining noise levels is most important.

7 SUMMARY

Global Acoustics was engaged by SCPL to undertaken a review of night-time noise compliance for SMC, an open cut coal mine located near Stratford, NSW. This review is required every two years by Schedule 3, Condition 7 of the SEP Consolidated Consent SSD-4966. As requested in the RFI from DPIE, this review includes assessment of compliance with all noise conditions that pertain to night-time noise.

Operations approved in the consent began in April 2018, however operations during the night period did not commence at SMC until September 2018. Subsequently, this review of compliance addresses the period 1 September 2018 to 31 August 2020.

SMC complied with conditions of consent in all matters except the following:

- During June 2020 monitoring at Lowrey, potential exceedances of both L_{Aeq} and $L_{A1,1minute}$ criteria were reported for the measurement starting at 23:24 on 17 June 2020. The potential exceedance at Lowrey corresponds with a potential exceedance at 25 Thompson. It should be noted that VTG data used to determine whether noise criteria were applicable was unavailable during the initial measurement. A remeasure was taken within 75 minutes of the initial night measurement in accordance with the NMP. The remeasure was compliant with relevant criteria at both Lowrey and 25 Thompson.

- During June 2020 monitoring at Atkins, elevated L_{Amax} noise levels were reported for the measurement starting at 22:53 on 17 June 2020. The measured L_{Amax} exceeded relevant $L_{A1,1minute}$ criteria at 9(2) Williams, 10 Whatmore, and 11 Walker when utilising corrections derived from EIS noise model predictions. It should be noted that VTG data used to determine whether noise criteria were applicable was unavailable during this measurement.

- During June 2019 and February 2020 monitoring at Clarke, elevated noise levels were measured that may have corresponded with potential exceedances of relevant criteria at Bagnall when utilising corrections derived from EIS noise model predictions.

- Biennial validation of the noise model did not occur.

- Validation of real-time noise monitoring units did not occur. Attended monitoring at these units was undertaken, but no comparison was made between attended and real-time noise monitoring data.

- Wind speeds and temperature inversion conditions in monthly reports did not correspond with raw weather data supplied by SCPL.

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