Report

Compliance Noise Monitoring

December, 2019

Newcrest Mining Ltd (Cadia)

6 January, 2020
Rev 0 (Final)

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History

Date	Revision	Comments
19/12/2019	B	Draft Issue for Review
06/01/2020	0	Final Issue

Endorsements

Function	Signature	Name and Title	Date
Prepared by		Louis Abell (Grad M.A.A.S) Environmental Scientist	6 January, 2020
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Authorised for Release by		Clayton Sparke (M.A.A.S) Environment Specialist (Acoustics)	6 January, 2020

EXECUTIVE SUMMARY

Advitech Pty Limited was engaged by Newcrest Mining to undertake attended noise monitoring at sensitive receivers adjacent to its Cadia Valley Operations (CVO). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

Operator attended noise monitoring was undertaken between 9 and 13 December, 2019, at fourteen locations adjacent to the Cadia Valley Operations (CVO), Blayney Dewatering Facility (BDF) and the Cadia Dewatering Facility (CDF). Results indicate that measured noise levels (from all sources) were below the relevant criteria levels at all monitoring locations.

While noise generated by mining and concentrate handling activities was observed to influence noise levels in all receiving environments, prevailing noise levels were controlled by extraneous (non-mining) noise sources in most cases. Analysis of operator attended monitoring results indicates that:

- mining and processing activities were audible at the Willow Creek, Rosebank and Chesterfield monitoring locations adjacent to Cadia Valley mining operations;
  - CVO contributions were measured or evaluated at levels below the relevant noise criteria in all cases;
  - tonal characters were observed across these locations; however, modifying factors (in accordance with Fact Sheet C of the NPfI) were not applied as they were present at frequencies above 2500Hz and were attributed to bird and insect noise;
- noise associated with operation of the Blayney Dewatering Facility was not audible at any of the monitoring locations in Blayney. Measurement results were assessed as compliant with conditions of the PA and EPL during the day, evening and night periods at all locations; and
- emissions from the Cadia Dewatering Facility were primarily associated with operation of the pump farm / water treatment facilities. These sources were audible at the Hollwood and 247 Newbridge Rd monitoring locations. Contributions were below all relevant noise criteria at all CDF monitoring locations.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

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1. INTRODUCTION

Advitech Pty Limited (trading as Advitech Environmental) was engaged by Newcrest Mining to undertake operator attended noise monitoring at sensitive receivers adjacent to Cadia Valley Operations (Cadia). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295 Mod2) and Environment Protection Licence (EPL) No. 5590.

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

1.1 Environmental Monitoring Programme

Attended noise monitoring is undertaken at fourteen locations adjacent to the Cadia Valley mining, Blayney Dewatering Facility and Cadia Dewatering Facility operations in accordance with provisions of the CVO Noise Monitoring Plan (NMP). The Cadia Valley monitoring locations (shown in **Figure 1**) include:

- Rosebank;
- Chesterfield;
- Willow Creek;
- South Log;
- Bonnie Glen;
- Warrengong;
- Northwest.

The Blayney dewatering facility monitoring locations (shown in **Figure 2**) include:

- Blayney L1;
- Blayney L2;
- Blayney L3;
- Blayney L5.

The CVO dewatering facility monitoring locations (shown in **Figure 2**) include:

- Athol;
- Hollwood;
- 247 Newbridge Road (Ewens).

1.2 Mining Operations

During the monitoring period, CVO mining operations were comprised of the following activities:

- underground mining;
- surface movement of stockpiled material;
- operation of an ore treatment facility;
- operation of tailings dams;
- progressive rehabilitation of the South Waste Rock Dump;
- operation and maintenance of ancillary plant and infrastructure; and
- dewatering and loading of concentrate for rail transportation at Blayney.

The general arrangement of CVO workings and infrastructure are provided in **Figure 1** and **Figure 2.**

Figure 1: Cadia Valley Monitoring Locations

Figure 2: Blayney and Cadia Dewatering Facility monitoring locations

1.3 Statutory Requirements

1.3.1 Noise Assessment Criteria

Table 1 and **Table 2** detail the noise criteria for each of the monitoring locations adjacent to CVO. These criteria are established in a Noise Monitoring Program (NMP), and address the conditions of:

- Project Approval (PA) 06_0295 issued by the NSW Department of Planning and Infrastructure (DoPI); and
- Environment Protection License (EPL) 5590 issued by the NSW EPA.

Table 1: Environmental noise limits for all privately owned land (dB(A)) (Cadia Valley)

Environment	Location	$L_{Aeq,15minute}$			$L_{Aeq,period}$			$L_{A1,1minute}$ (night)
		Day	Evening	Night	Day	Evening	Night	
Cadia Valley Operations	Chesterfield	43	38	35	50	45	40	45
	Willow Creek	43	38	35	50	45	40	45
	South Log	43	38	38	50	45	40	45
	Bonnie Glen	43	38	36	50	45	40	45
	Rosebank	43	38	36	50	45	40	45
	Northwest	43	38	38	50	45	40	45
	Warrengong	43	38	35	50	45	40	45

Table 2: Environmental noise limits for all privately owned land (dB(A)) (dewatering operations)

Environment	Location	$L_{Aeq,15minute}$			$L_{Aeq,period}$			$L_{A1,1minute}$ (night)
		Day	Evening	Night	Day	Evening	Night	
Blayney Dewatering Facility	Blayney L1	50	50	39	-	-	-	49
	Blayney L2	50	50	36	-	-	-	46
	Blayney L3	46	46	37	-	-	-	47
	Blayney L5	58	58	45	-	-	-	55
Cadia Dewatering Facility	Athol	38	38	35	-	-	-	45
	247 Newbridge Road	50	42	42	-	-	-	45
	Hollwood	43	35	35	50	45	40	45

1.3.2 Assessment Periods

Current approvals and management plans state that noise generated by the project is to be measured and evaluated in accordance with the relevant requirements and exemptions of the NSW Industrial Noise Policy (INP). The INP states:

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

1.3.3 Monitoring Locations

The INP establishes that noise from the mine is to be measured at:

- the most affected point on, or within the residential boundary; or,
- at the most affected point within 30 metres of the dwelling where the dwelling is more than 30m from the boundary.

1.3.4 Meteorological Conditions

Condition 2 of the Project Approval notes that *"noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including meteorological conditions) of the NSW Industrial Noise Policy".* The INP identifies the following meteorological exemptions:

- wind speeds exceeding 3m/s (measured at 10m);
- temperature inversions greater than 3˚C / 100m; and
- rainfall.

On this basis, monitoring data observed when these conditions prevail would lead to their exclusion from any assessment of compliance.

1.4 Monitoring Objectives

This assessment relates to operational noise monitoring undertaken between 9 and 13 December, 2019. The objective of the monitoring is to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

2. METHODOLOGY

2.1 Operational Noise Monitoring

Operator attended noise monitoring was undertaken as a means of assessing the character of, and to identify the noise sources contributing to measured noise levels at each of the monitoring locations. Attended noise monitoring was undertaken at each location for a period of 30 minutes (2 x 15 minute measurements):

- in accordance with the methodology established in *AS1055-2018: Acoustics - Description and measurement of environmental noise*;
- following guidance in the NSW Industrial Noise Policy (INP) and Noise Policy for Industry (NPfI);
- in accordance with *AS2659 - 1998: Guide to the use of sound measuring equipment - portable sound level meters*; and
- using equipment that satisfied the requirements of *AS1259 - 1990. Acoustics - Sound Level Meters*.

Details of operator attended monitoring equipment are provided in **Table 3.** A copy of calibration certificates are provided in **Appendix I**.

Table 3: Operator attended noise monitoring

Parameter	SLM
Sound Level Meter (SLM)	Svantek 971 / Svantek 958
SLM Serial Number	60686 / 20777
SLM Calibration Date	15/5/2019 / 15/7/2019
Field Calibrator	Svantek SV30A
Field Calibrator Serial Number	7906
Field Calibrator Calibration Date	15/7/2019
Frequency Weighting(s),(Response), Units	A, C, Lin (Fast), dB SPL

Local meteorological observations were recorded at the time of the noise monitoring using a handheld anemometer to assist with interpretation of impacts and validation of noise monitoring results. Review of prevailing regional meteorology from the Ridgeway and Spring Hill (Orange Airport) monitoring stations was undertaken for the Cadia Valley and Blayney monitoring locations respectively. These monitoring data were reviewed to validate results in the context of INP and NPfI provisions.

2.2 Evaluating Operational Source Contributions

The noise criteria established in **Section 1.3.1** are assessable only in terms of the contribution from CVO noise sources, not total measured environmental noise. For the purposes of this assessment, extraneous noise is defined as noise contributed from any source that is not associated with CVO activities. In typical rural receiving environments, this may include:

- transportation noise (except that associated with train loading at the Blayney Dewatering Facility (BDF), CVO Dewatering Facility, or road traffic generated by Cadia Valley Operations);
- environmental noise, such as gusting wind, rustling leaves, birds, insects, frogs and livestock;
- domestic noise, such as barking dogs or loud music.

Several methods are available to exclude extraneous noise contributions or evaluate contributions from specific noise sources.

2.2.1 Exclusions Based on Operator Observation

Where contributions from extraneous noise sources are considered to influence measured noise levels, operator observations may be used to exclude discrete events, or identify alternate descriptors representative of noise contributions from the assessable noise source. These may include:

- exclusion of a portion of the measurement influenced by short term extraneous events (for example, the passage of a vehicle), allowing recalculation of results from remaining data; or
- use of the L_{A90} descriptor, where the character of the noise source under assessment is typically continuous, with little variation in level.

Alternative methods are available where extraneous sources cannot be reasonably excluded based on measurement descriptors or discrete events.

2.2.2 Band Pass Filters

Previous assessment of mining and quarrying developments indicates that noise emissions from these operations typically manifest in the low frequency end of the noise spectrum (<1000Hz). Application of band pass filtering is further supported by recent industry research (Parnell, 2015). Review of the CVO receiving environments indicates environmental noise measurements may be subject to significant (continuous) influence from extraneous sources across the full noise spectrum, including frogs (approximately 2000 to 3150Hz) and insect noise (approximately 3150 to 6300Hz).

Where multiple sources cannot be excluded on the basis of operator observations, and are found to contribute in different parts of the spectrum, a frequency band filter may be applied to isolate contributions from specific sources. The extent of band pass filtering is determined based on operator observations at the time of monitoring. Following application of a band pass filter, the $L_{Aeq\ (band\ pass)}$ noise level may be recalculated as a means of evaluating the contribution from mining operations.

3. RESULTS

3.1 Operational Noise Monitoring

Operator attended noise monitoring was undertaken at fourteen locations between 9 and 13 December, 2019. The objective was to measure noise levels at each of the monitoring locations, evaluate the contribution from Cadia noise sources and assess these contributions against the noise criteria relevant to each receiver location. Preliminary findings of the assessment indicate:

- mining and concentrate processing activities were audible at the Willow Creek, Rosebank and Chesterfield receiver locations. Audible contributions were not observed at other locations in the monitoring network;
- activities at the Blayney Dewatering Facility BDF were not observed at any locations in the monitoring network;
- operation of the pump farm and plant within the Cadia Dewatering Facility (CDF) was audible at the Hollwood and 247 Newbridge Road monitoring locations.

Monitoring data indicates that total environmental noise levels (from all sources) did exceed the CVO criteria levels at several monitoring locations. Extraneous noise contributions were observed from a variety of sources, including:

- insects;
- bird noise;
- aircraft;
- livestock;
- windblown vegetation;
- trains;
- barking dogs;
- road traffic;
- domestic noise.

The characteristics of these sources (generally continuous or affecting large portions of the measurement data) made it difficult to evaluate monitoring results based on discrete event contributions (for example, single car pass-by). Where feasible, application of alternative descriptors and band pass filters were used to evaluate CVO contributions.

3.2 Operator Attended Monitoring: Noise Impact Assessment Results

A summary of the results from attended noise monitoring in the receiving environments adjacent to mining and dewatering operations is provided in **Table 4** to **Table 6**. Results are provided for comparison against the relevant $L_{Aeq,15minute}$ noise criteria. Potential sleep disturbance impacts are evaluated against the highest observed $L_{A1,\ 1minute}$ noise level during each night period measurement, with relevant sources identified when this level is above the criteria.

Detailed assessment of monitoring results, including measured noise levels, and description of the ambient noise environment is provided in **Appendix II**. These results indicate that:

- mining activities were audible (but below the relevant noise criteria) at the Willow Creek, Rosebank and Chesterfield receiver locations. Audible contributions were not observed at the Warrengong, South log, Northwest or Bonnie Glenn monitoring locations;
  - measurements representative of Northwest were undertaken at a location approximately 500m from the dwelling, at the nearest publicly accessible boundary of the property, closest to the CVO. Levels at this location are likely to be marginally higher than equivalent levels at the dwelling (due to distance and topographical effects). Thus, where compliance can be demonstrated at the measurement location, it may be assumed at the dwelling location;

  - emissions from the CVO were observed at levels below 30dB(A) and were identified to have dominant low frequency characteristics, however quantitative tests (Fact Sheet C of the NPfI) indicate a modifying factor was not warranted at any of the locations with CVO contributions;
  - tests for annoying noise characters (Fact Sheet C of the NPfI) did indicate the presence of tonal characters at the Willow Creek, Rosebank and Chesterfield receiver locations, however these tonal characteristics were observed at frequencies above 2500Hz and were attributed to the presence of birds and insects and not contributions from the CVO. No modifying factor was applied to these measurements;
- noise associated with operation of the Blayney Dewatering Facility was not audible at any of the monitoring locations in Blayney. Measurement results were assessed as compliant with conditions of the PA and EPL during the day, evening or night periods at all locations; and
- operations at the CDF were audible at the Hollwood and 247 Newbridge Road monitoring locations but were assessed to be below the relevant NIAC. Operations at the CDF were not audible at the Athol monitoring location;
  - emissions from the CDF were observed at background levels below the relevant criteria and were identified to have dominant low frequency characteristics, however quantitative tests (Fact Sheet C of the NPfI) indicate a modifying factor was not warranted at any of the locations with CDF contributions.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

Table 4 : Cadia Valley Operations summary of monitoring results, dB(A)

Location	Period	CVO Contribution (L_{Aeq}) Mes1	CVO Contribution (L_{Aeq}) Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
Bonnie Glen	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		36	
	$L_{A1, 1min}$	41	47	Barking Dogs	45	
Rosebank	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	29		36	
	$L_{A1, 1min}$	52	42	Gusting Wind	45	
Warrengong	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	35	37	n/a[1]	45	
South Log	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	$L_{A1, 1min}$	36	36	n/a[1]	45	
Northwest	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	$L_{A1, 1min}$	34	69	Road Noise	45	
Willow Creek	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	27		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	41	45	Barking Dogs	45	
Chesterfield	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	27	<25		35	
	$L_{A1, 1min}$	37	43	n/a[1]	45	

Note 1: L_{A1} level equivalent to or less than the criteria, no further assessment undertaken.

Note 2: Monitoring undertaken at property boundary (Cadia Road). This location is approximately 500m from the dwelling (sensitive receiver location), and closer to the CVO.

Table 5 : Blayney Dewatering Facility summary of monitoring results, dB(A)

Location	Period	CVO Contribution Mes1	CVO Contribution Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
L1	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		50	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		50	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		39	
	$L_{A1, 1min}$	48	56	Barking Dogs	49	
L2	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		50	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		50	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		36	
	$L_{A1, 1min}$	48	41	Barking Dogs	46	
L3	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		46	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		46	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		37	
	$L_{A1, 1min}$	53	50	Train horn	47	
L5	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		58	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		58	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		45	
	$L_{A1, 1min}$	53	64	Road Noise	55	

Note 1: $L_{A1, 1minute}$ level equivalent to or less than the criteria, no further assessment undertaken.

Table 6 : Cadia Dewatering Facility summary of monitoring results, dB(A)

Location	Period	CVO Contribution Mes1	CVO Contribution Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
247 Newbridge Road	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		50	Compliant
	Evening $L_{Aeq, 15min}$	31	30		42	
	Night $L_{Aeq, 15min}$	31	29		42	
	$L_{A1, 1min}$	44	43	n/a[1]	45	
Hollwood	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	27	31		35	
	Night $L_{Aeq, 15min}$	26	26		35	
	$L_{A1, 1min}$	45	36	Gusting Wind	45	
Athol	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		38	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	42	41	n/a[1]	45	

Note 1: $L_{A1, 1minute}$ level equivalent to or less than the criteria, no further assessment undertaken.

Note 2: a +5dB modifying factor was added to the measured noise levels in accordance with Fact Sheet C of the NPfI, following identification of tonal signals in the emission

4. RECOMMENDATIONS AND CONCLUSIONS

Advitech Pty Limited was engaged by Newcrest Mining to undertake attended noise monitoring at sensitive receivers adjacent to its Cadia Valley Operations (CVO). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

Operator attended noise monitoring was undertaken between 9 and 13 December, 2019, at fourteen locations adjacent to the Cadia Valley Operations (CVO), Blayney Dewatering Facility (BDF) and the Cadia Dewatering Facility (CDF). Results indicate that measured noise levels (from all sources) were below the relevant criteria levels at all monitoring locations.

While noise generated by mining and concentrate handling activities was observed to influence noise levels in all receiving environments, prevailing noise levels were controlled by extraneous (non-mining) noise sources in most cases. Analysis of operator attended monitoring results indicates that:

- mining and processing activities were audible at the Willow Creek, Rosebank and Chesterfield monitoring locations adjacent to Cadia Valley mining operations;
  - CVO contributions were measured or evaluated at levels below the relevant noise criteria in all cases;
  - tonal characters were observed across these locations; however, modifying factors (in accordance with Fact Sheet C of the NPfI) were not applied as they were present at frequencies above 2500Hz and were attributed to bird and insect noise;
- noise associated with operation of the Blayney Dewatering Facility was not audible at any of the monitoring locations in Blayney. Measurement results were assessed as compliant with conditions of the PA and EPL during the day, evening or night periods at all locations;
- emissions from the Cadia Dewatering Facility were primarily associated with operation of the pump farm / water treatment facilities, but container handling and train loading operations were also observed. These sources were audible at the Hollwood and 247 Newbridge Rd monitoring locations. Contributions were below all relevant noise criteria at all CDF monitoring locations.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

5. REFERENCES

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

1. AS1055-2018: Acoustics – Description and measurement of environmental noise;
2. AS1259 – 1990. Acoustics – Sound Level Meters.
3. AS2659 – 1998: Guide to the use of sound measuring equipment – portable sound level meters.
4. AS 2706-1984: Numerical Values: Rounding and interpretation of limiting values.
5. Cadia Valley Operations Environmental Protection Licence (EPL) (5590);
6. Cadia Valley Operations Noise Monitoring Program (Version 4, dated June 2018).
7. Cadia Valley Operations Project Approval (06_0295);
8. EPA, 2000. NSW Industrial Noise Policy, NSW Environment Protection Agency, Sydney;
9. EPA, 2017. NSW Noise Policy for Industry, NSW Environment Protection Agency, Sydney;
10. Parnell, J (2015). Acoustic Signature of Open Cut Coal Mines, Acoustics 2015. Hunter Valley: Australian Acoustical Society.
11. Wilkinson Murray Pty Ltd (2009). Cadia East Project Noise and Blast Impact Assessment.

Appendix I Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24705 & FILT 5190

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-971	**Serial No:**	60686
Microphone Type:	7052E	**Serial No:**	66701
Preamplifier Type:	SV18	**Serial No:**	62787
Filter Type:	1/3 Octave	**Serial No:**	60686
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Advitech Pty Ltd 7 Riverside Drive Mayfield West NSW 2304		
Ambient Pressure:	1012 hPa ±1.5 hPa		
Temperature:	24 °C ±2° C	**Relative Humidity:**	48% ±5%
Date of Calibration:	15/05/2019	**Issue Date:**	16/05/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: **AUTHORISED SIGNATURE:**

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

ACU-VIB
ELECTRONICS

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Accredited Lab. No. 9262
Acoustic and Vibration Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 24702

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Svantek
Type No: SV35A **Serial No:** 90218
Owner: Advitech Pty Ltd
7 Riverside Drive
Mayfield West NSW 2304

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	93.70	Y	94.05	1000.02	1.41
Level 2:	113.70	Y	114.05	1000.02	0.35
Uncertainty:			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1016 hPa ±1.5 hPa **Relative Humidity:** 48% ±5%
Temperature: 24 °C ±2° C
Date of Calibration: 15/05/2019 **Issue Date:** 16/05/2019
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017
CHECKED BY: VKB **AUTHORISED SIGNATURE:** ..... Hein Soe

.Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Acoustic and Vibration Measurements

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 25143 & FILT 5307

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-958	**Serial No:**	20777
Microphone Type:	40AE	**Serial No:**	151134
Preamplifier Type:	SV12L	**Serial No:**	25683
Filter Type:	1/3 Octave	**Serial No:**	20777
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Advitech Pty Ltd 7 Riverside Drive Mayfield West NSW 2304		
Ambient Pressure:	1003 hPa ±1.5 hPa		
Temperature:	22 °C ±2° C	**Relative Humidity:**	31% ±5%
Date of Calibration:	15/07/2019	**Issue Date:**	15/07/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: IKB **AUTHORISED SIGNATURE:** Jack Kiett

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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Acoustic and Vibration Measurements

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Appendix II Detailed Monitoring Results

AII.1 Assessment of Results – Blayney L1 (Blayney)

The L1 monitoring location noise environment was dominated by local traffic, bird calls and insect noise. No contribution from the Blayney dewatering facility was audible during any periods at this location. Contributions at this location were thus considered to be compliant for all time periods.

Table 7: L1 noise monitoring results, dB(A)

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	50	9/12/2019	15:45	46	32	n/a[1]	Noise environment dominated by environmental (birds, frogs, wind and barking dogs) and transportation (road noise) sources.	N at 2-3ms	WNW at 6.1ms
		9/12/2019	16:04	44	33	n/a[1]			
Evening	50	9/12/2019	20:21	47	38	n/a[1]	Barking dogs and local traffic noise control this noise environment. Domestic noise (doors slamming and chatter) was also observed	Calm	WSW at 2.5ms
		9/12/2019	20:39	44	38	n/a[1]			
Night	39	9/12/2019	22:53	39	33	n/a[1]	Noise environment controlled by barking dogs and both distant and local traffic.	Calm	Calm
		9/12/2019	23:10	45	32	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.2 Assessment of Results – L2 (Blayney)

The L2 monitoring location noise environment was dominated by local traffic, bird calls and barking dogs. Noise from the BDF was not audible at this location. Contributions at this location were thus considered to be compliant for all time periods.

Table 8 : L2 (Railway Ln, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	50	9/12/2019	14:08	51	36	n/a[1]	Road traffic (distant and local) control noise levels at this location. Range of environmental sources (barking dogs, windblown vegetation and birds) also observed. No audible contribution from the BDF.	ENE at above 3ms	NW at 6.1ms
		9/12/2019	14:28	51	36	n/a[1]			
Evening	50	9/12/2019	18:33	50	35	n/a[1]	Distant through traffic & control measured noise levels, with intermittent contributions from barking dogs and birds. No audible contribution from the BDF	NW at 2ms	NW at 4.7ms
		9/12/2019	18:50	63	36	n/a[1]			
Night	36	10/12/2019	0:10	39	34	n/a[1]	Noise environment controlled by distant traffic and through, insects and barking dogs. Low frequency contribution observed from nearby industrial facility, but unrelated to BDF. No audible contribution from the BDF.	Calm	Calm
		10/12/2019	0:27	36	33	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.3 Assessment of Results – L3 (Blayney)

The noise environment at this location consisted of road traffic, local industrial noise, barking dogs and windblown vegetation. Noise from the BDF was not audible at this location and was considered to be compliant for all time periods.

Table 9 : L3 (Hill Street, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	46	9/12/2019	16:40	52	38	n/a1	Noise environment controlled by local industrial noise. Transportation (road and rail) also intermittently audible. No audible contribution from the BDF.	NW at 2-3ms	NW at 4.7ms
		9/12/2019	16:59	50	34	n/a1			
Evening	46	9/12/2019	21:02	45	39	n/a1	Road traffic noise and barking dogs dominates background and ambient noise levels at this location. No audible contribution from the BDF.	Calm	SW at 2.5ms
		9/12/2019	21:21	44	38	n/a1			
Night	37	9/12/2019	22:15	46	37	n/a1	Distant road noise and insects control levels at this location. Occasional noise from domestic sources. No audible contribution from the BDF.	Calm	SW at 2.5ms
		9/12/2019	22:31	46	36	n/a1			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.4 Assessment of Results – L5 (Railway Lane Pre School)

Road traffic, windblown vegetation and birds were audible and characteristic of the noise environment at this location. Noise from the BDF was not audible at this location and was considered to be compliant for all time periods.

Table 10 : L5 (Railway Lane Pre School, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**58**	9/12/2019	14:50	50	38	n/a[1]	Gusts of wind controlled the noise environment. Distant road noise also audible. No BDF contribution audible.	NW at 3-5ms	NW at 5.6ms
		9/12/2019	15:09	50	35	n/a[1]			
Evening	**58**	9/12/2019	19:30	56	35	n/a[1]	Local and distant road noise controlled the background noise environmental. Intermittent peaks from barking dogs and birds. BDF not audible. windblown vegetation.	Calm	WSW at 2.5ms
		9/12/2019	19:48	43	35	n/a[1]			
Night	**45**	9/12/2019	23:31	50	35	n/a[1]	Road noise controls background at this location, with occasional pass by event. Other sources include distant road traffic and barking dogs. BDF inaudible.	Calm	WNW at 1.7ms
		9/12/2019	23:51	49	33	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.5 Assessment of Results – Bonnie Glen

This noise environment is dominated by local environmental sources, including barking dogs, birds, windblown vegetation, livestock, and occasional road traffic noise. Mining operations not audible at this monitoring location and was considered to be compliant for all time periods.

Table 11 : Bonnie Glen noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	12/12/2019	17:38	50	36	n/a[1]	Windblown vegetation, birds, barking dogs and cattle classified the noise environment. Aircraft noise and local engine noise (from nearby property) was audible for a short period also. No contribution from the CVO observed.	S at above 3ms	SSW at 4.6ms
		13/12/2019	11:09	51	26	n/a[1]			
Evening	**38**	12/12/2019	18:01	49	33	n/a[1]	Windblown vegetation controlled the noise environment. Peaks from wind gusts, bird calls and dog barks. No CVO contribution audible.	SW at 3ms	SSW at 4.3ms
		12/12/2019	18:23	44	32	n/a[1]			
Night	**36**	12/12/2019	23:27	31	19	n/a[1]	Occasional gust of wind and dog bark. Very low ambient environment levels. No CVO contribution audible.	W at 2-3ms	S at 2.7ms
		12/12/2019	23:43	34	17	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.7 Assessment of Results – Warrengong

This receiving environment is characterised by local environmental sources including insects, birds, livestock and windblown vegetation. Contributions from mining operations not were audible at this monitoring location and was considered to be compliant for all time periods.

Table 12 : 346 Carbine Rd noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/12/2019	15:22	53	34	n/a[1]	Windblown vegetation dominates the noise environment. Intermittent bird noise, local engine noise, domestic noise (taking bins in) and cattle observed. No CVO audible.	E at 1-2ms	WSW at 5.7ms
		11/12/2019	15:43	46	34	n/a[1]			
Evening	**38**	11/12/2019	19:33	46	33	n/a[1]	Windblown vegetation controls the noise environment. Cattle and birds also heard intermittently. No CVO contribution.	E at 1-2ms	SSW at 4.2ms
		11/12/2019	19:50	46	33	n/a[1]			
Night	**35**	12/12/2019	0:11	30	21	n/a[1]	Barking dogs, insects and birds control the noise environment. Low frequency contribution from nearby air conditioner unit. No CVO contribution audible.	Calm	NNW at 2.4ms
		12/12/2019	0:26	33	21	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.8 Assessment of Results – South Log

Monitoring at this location indicates the noise environment consists mainly of environmental noise sources including insects, birds, livestock and windblown vegetation. Contributions from mining operations not were audible at this monitoring location and was compliant for all time periods.

Table 13 : South Log noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	12/12/2019	16:42	51	36	n/a[1]	Windblown vegetation controls the noise environment. Intermittent gusts of wind and bird calls also observed. No CVO contribution.	S at above 3ms	S at 3.8ms
		12/12/2019	16:58	49	34	n/a[1]			
Evening	**38**	12/12/2019	19:56	41	30	n/a[1]	Windblown vegetation controls the noise environment. Intermittent bird calls also observed. No CVO contribution.	W at 1-2ms	SSW at 3.5ms
		12/12/2019	20:12	44	29	n/a[1]			
Night	**38**	13/12/2019	0:25	30	17	n/a[1]	Insects, cattle and local impacts control the noise environment. No CVO contribution.	W at 1-2ms	SSW at 2.7ms
		13/12/2019	0:42	33	13	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.9 Assessment of Results – North West

Following consultation with the resident of this property, monitoring was conducted at the boundary of the property closest to the CVO. This location is approximately 500m from the dwelling, closer to the CVO and at a more (topographically) exposed location that the dwelling. Where compliance is demonstrated at this location, it is assumed at the dwelling. Agreement was made to undertake further measurements at the property if exceedances of the criteria were observed, but this scenario did not manifest. Audible noise sources at this monitoring location included environmental noise (windblown vegetation, and birds) and intermittent road traffic.

Table 14 : Northwest noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/12/2019	17:11	57	38	n/a[1]	Noise environment dominated by wind-blown vegetation, gusting wind and road noise (car pass-by). No CVO contribution observed.	W at 2-3ms	SW at 4.4ms
		11/12/2019	17:26	60	41	n/a[1]			
Evening	**38**	11/12/2019	21:36	53	23	n/a[1]	Cattle, insects and windblown vegetation dominant. Car pass-by events throughout measurement. No CVO contribution audible.	NW at 1-2ms	SSW at 2.6ms
		11/12/2019	21:53	33	22	n/a[1]			
Night	**38**	11/12/2019	22:15	33	22	n/a[1]	Cattle, birds and wind gusts characterise the noise environment. No CVO contribution audible.	W at 1ms	SW at 2ms
		11/12/2019	22:31	62	21	n/a[1]			

Note [1]: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.10 Assessment of Results – Willow Creek

The noise environment at this location was dominated by environmental sources including windblown vegetation and livestock. Noise from mining activities was observed predominantly in the form of low level engine noise, but only when ambient noise dropped to sufficiently low levels. CVO contributions were audible but below compliance limits.

Table 15 : Willow Creek noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/12/2019	16:20	47	39	n/a[1]	Wind gusts, insects and windblown vegetation controls the noise environment. Intermittent bird calls also observed. No CVO contribution audible.	W at above 3ms	SW at 4.9ms
		11/12/2019	16:36	46	38	n/a[1]			
Evening	**38**	11/12/2019	20:27	41	35	n/a[1]	Wind dominated environment, with intermittent faint low frequency contributions from the CVO, assessed to be haul trucks. Insects also constant in noise environment.	ESE at 3ms	SSW at 3.8ms
		11/12/2019	20:50	41	29	27			
Night	**35**	12/12/2019	1:06	36	18	n/a[1]	Cattle and intermittent barking dogs. CVO contribution not audible.	Calm	NNW at 1.4ms
		12/12/2019	1:23	33	20	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.11 Assessment of Results – Chesterfield

The noise environment at this location was characterised by environmental sources including windblown vegetation, insects, and livestock noise. Noise from mining activities was observed predominantly in the form of low level engine noise, but only when ambient noise dropped to sufficiently low levels. CVO contributions were audible but below compliance limits.

Table 16 : Chesterfield noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	12/12/2019	15:07	46	33	n/a[1]	Windblown vegetation, cattle, birds and gust of wind dominate the environment. No CVO contribution audible.	NW 2-3ms	SSW at 4.9ms
		12/12/2019	15:30	45	33	n/a[1]			
Evening	**38**	11/12/2019	18:11	43	32	n/a[1]	Constant windblown vegetation with gusts intermittently. Birds also observed intermittently. CVO contributions not audible.	NW 1-2ms	SW at 5.7ms
		11/12/2019	18:30	41	33	n/a[1]			
Night	**35**	11/12/2019	23:15	37	24	27	Insect noise and distant livestock observed throughout. CVO audible as background source in the form of a low rumble with occasional faint reversing alarm and track clatter.	W at 1ms	S at 2.5ms
		11/12/2019	23:32	29	23	<25			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.12 Assessment of Results – Rosebank

The noise environment at this location was characterised by environmental noise sources including windblown vegetation, birds, insects, and livestock noise. Mining operations were audible in the form of low level engine noise during the night period, however contributions were assessed as below the relevant criteria. CVO contributions were compliant during all periods.

Table 17 : Rosebank noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	13/12/2019	11:39	41	31	n/a[1]	No audible contribution from CVO. Noise environment influenced by birds, insects and windblown vegetation. Intermittent road traffic noise also observed.	SE 1-2ms	WSW at 3.8ms
		13/12/2019	11:55	46	31	n/a[1]			
Evening	**38**	12/12/2019	18:57	48	35	n/a[1]	Gusting wind, windblown vegetation and insects control measured noise levels. Occasional aircraft noise also observed. No audible contribution from CVO.	S at 3ms	SSW at 3.6ms
		12/12/2019	19:13	47	33	n/a[1]			
Night	**36**	12/12/2019	22:32	41	30	n/a[1]	Noise environment controlled by gusting wind. Background of insect and frog noise when wind levels drop. Contribution from the CVO in the form of low frequency rumble.	S at 1-2ms	SSW at 3.1ms
		12/12/2019	22:48	34	27	29			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.13 Assessment of Results – 247 Newbridge Road

Background contributions from road traffic, gusting wind, and bird noise dominate noise environment at this monitoring location. Noise sources within the Cadia Dewatering Facility (CDF) (operation of the pump farm) were audible at this location, but contributions were evaluated at levels below the NIAC.

Table 18 : 247 Newbridge Road noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	50	10/12/2019	17:28	55	38	n/a[1]	Windblown vegetation dominates noise environment with intermittent car pass by events. No CDF contribution audible.	NNW at 3ms	WSW at 7.8ms
		10/12/2019	17:45	60	40	n/a[1]			
Evening	42	10/12/2019	21:37	35	29	31	CDF is audible throughout. Pump farm largely controls background noise levels, while activities within plant building contribute under 30dB(A) to ambient noise environment. Road traffic, insects, frogs and livestock are also intermittently audible on occasion, and tend to mask contributions from CDF when active.	Calm	SW at 3.6ms
		10/12/2019	21:55	54	29	30			
Night	42	10/12/2019	22:20	38	30	31	CDF is audible throughout. Pump farm largely controls background noise levels. Truck manoeuvring on CDF site also audible. Road traffic, insects, frogs and livestock are also intermittently audible on occasion, and tend to mask contributions from CDF when active.	Calm	SW at 3.6ms
		10/12/2019	22:36	34	28	29			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**

AII.14 Assessment of Results – Hollwood

Background contributions from windblown vegetation, livestock and road traffic noise define the noise environment at this monitoring location. Noise sources within the Cadia Dewatering Facility (CDF) were audible at this location, but contributions were evaluated at levels below the relevant noise criteria.

Table 19 : Hollwood noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	43	10/12/2019	16:53	60	49	n/a[1]	Shearing shed nearby monitoring location heard for majority of measurement. Strong winds dominated the sample. CDF Contribution not audible,	NW at 5ms	W at 7.2ms
		10/12/2019	17:08	59	50	n/a[1]			
Evening	35	10/12/2019	20:58	39	25	27	Transportation (road & rail) and environmental sources (insects, livestock) observed throughout. CDF audible in form of pump farm noise (continuous).	NW at 2ms	WSW at 3.1ms
		10/12/2019	21:15	35	27	31			
Night	35	10/12/2019	22:58	35	25	26	Transportation (road & rail) and environmental sources (insects, livestock) observed throughout. CDF audible in form of pump farm noise (continuous) but very faint <30dB(A).	Calm	SW at 5.3ms
		10/12/2019	23:17	31	25	26			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**

AII.15 Assessment of Results – Athol

Contributions from rustling vegetation, intermittent road traffic and bird noise typically control noise levels at this monitoring location. Activities associated with activities from nearby facility not associated with the CDF were audible during the night period. Contributions were not audible at the location and was therefore considered complaint.

Table 20 : Athol noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**38**	10/12/2019	16:05	58	36	n/a[1]	Wind blown vegetation dominates the environment with intermittent car pass by events. No CDF contribution audible.	NNW at 2-3ms	WSW at 8.3ms
		10/12/2019	16:25	58	36	n/a[1]			
Evening	**38**	10/12/2019	19:14	58	31	n/a[1]	Road noise and pass by event frequent during this period. Birds also observed intermittently.	Calm	WSW at 6.1ms
		10/12/2019	19:45	56	32	n/a[1]			
Night	**35**	10/12/2019	23:40	36	31	n/a[1]	Distant traffic audible, and dominant throughout measurements. Low frequency contribution in the form of refrigeration fans audible from nearby facility. No CDF contribution observed.	Calm	SW at 4.7ms
		11/12/2019	0:00	34	28	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**

Report

Compliance Noise Monitoring

March, 2020

Newcrest Mining Ltd (Cadia)

3 April 2020
Rev 1 (Final)

advitech.com.au

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History

Date	Revision	Comments
23 March 2020	0	Draft Issue for Review
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Endorsements

Function	Signature	Name and Title	Date
Prepared by		Natasha Pegler Acoustic Scientist	3 April 2020
Checked by		Clayton Sparke (M.A.A.S) Environment Specialist (Acoustics)	3 April 2020
Authorised for Release by		Clayton Sparke (M.A.A.S) Environment Specialist (Acoustics)	3 April 2020

EXECUTIVE SUMMARY

Advitech Pty Limited was engaged by Newcrest Mining to undertake attended noise monitoring at sensitive receivers adjacent to its Cadia Valley Operations (CVO). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

Operator attended noise monitoring was undertaken between 9 and 11 March, 2020, at fourteen locations adjacent to the Cadia Valley Operations (CVO), Blayney Dewatering Facility (BDF) and the Cadia Dewatering Facility (CDF). Results indicate that measured noise levels associated with Newcrest activities were below the relevant criteria levels at all monitoring locations.

While noise generated by demolition, mining, and concentrate handling activities was observed to influence noise levels in several receiving environments, prevailing noise levels were controlled by extraneous (non-mining) noise sources in most cases. Analysis of operator attended monitoring results indicates that:

- mining and processing activities were audible at the Rosebank and Bonnie Glen monitoring locations adjacent to Cadia Valley mining operations;
  - CVO contributions were measured or evaluated at levels below the relevant noise criteria in all cases;
- noise associated with demolition of the Blayney Dewatering Facility was audible at the L1, L2, and L5 monitoring locations during the day;
  - BDF contributions were measured or evaluated at levels below the relevant noise criteria in all cases;
  - Measurements at the L2 monitoring location required low frequency modifications due to BDF activities; however, this did not cause the BDF contribution to exceed the relevant criteria;
- activities at the Cadia Dewatering Facility were largely inaudible at all monitoring locations. Contributions were below all relevant noise criteria at all CDF monitoring locations.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

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FIGURES

APPENDICES

1. INTRODUCTION

Advitech Pty Limited (trading as Advitech Environmental) was engaged by Newcrest Mining to undertake operator attended noise monitoring at sensitive receivers adjacent to Cadia Valley Operations (Cadia). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295 Mod2) and Environment Protection Licence (EPL) No. 5590.

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

1.1 Environmental Monitoring Programme

Attended noise monitoring is undertaken at fourteen locations adjacent to the Cadia Valley mining, Blayney Dewatering Facility and Cadia Dewatering Facility operations in accordance with provisions of the CVO Noise Monitoring Plan (NMP). The Cadia Valley monitoring locations (shown in **Figure 1**) include:

- Rosebank;
- Chesterfield;
- Willow Creek;
- South Log;
- Bonnie Glen;
- Warrengong;
- Northwest.

The Blayney dewatering facility monitoring locations (shown in **Figure 2**) include:

- Blayney L1;
- Blayney L2;
- Blayney L3;
- Blayney L5.

The CVO dewatering facility monitoring locations (shown in **Figure 2**) include:

- Athol;
- Hollwood;
- 247 Newbridge Road (Ewens).

1.2 Mining Operations

During the monitoring period, CVO mining operations were comprised of the following activities:

- underground mining;
- surface movement of stockpiled material;
- operation of an ore treatment facility;
- operation of tailings dams;
- progressive rehabilitation of the South Waste Rock Dump;
- operation and maintenance of ancillary plant and infrastructure;
- demolition of the Blayney Dewatering Facility; and
- dewatering and loading of concentrate for rail transportation at the CVO Dewatering Facility.

The general arrangement of CVO workings and infrastructure are provided in **Figure 1** and **Figure 2.**

Figure 1: Cadia Valley Monitoring Locations

Figure 2: Blayney and Cadia Dewatering Facility monitoring locations

1.3 Statutory Requirements

1.3.1 Noise Assessment Criteria

Table 1 and **Table 2** detail the noise criteria for each of the monitoring locations adjacent to CVO. These criteria are established in a Noise Monitoring Program (NMP), and address the conditions of:

- Project Approval (PA) 06_0295 issued by the NSW Department of Planning and Infrastructure (DoPI); and
- Environment Protection License (EPL) 5590 issued by the NSW EPA.

Table 1: Environmental noise limits for all privately owned land (dB(A)) (Cadia Valley)

Environment	Location	$L_{Aeq,15minute}$			$L_{Aeq,period}$			$L_{A1,1minute}$ (night)
		Day	Evening	Night	Day	Evening	Night	
Cadia Valley Operations	Chesterfield	43	38	35	50	45	40	45
	Willow Creek	43	38	35	50	45	40	45
	South Log	43	38	38	50	45	40	45
	Bonnie Glen	43	38	36	50	45	40	45
	Rosebank	43	38	36	50	45	40	45
	Northwest	43	38	38	50	45	40	45
	Warrengong	43	38	35	50	45	40	45

Table 2: Environmental noise limits for all privately owned land (dB(A)) (dewatering operations)

Environment	Location	$L_{Aeq,15minute}$			$L_{Aeq,period}$			$L_{A1,1minute}$ (night)
		Day	Evening	Night	Day	Evening	Night	
Blayney Dewatering Facility	Blayney L1	50	50	39	-	-	-	49
	Blayney L2	50	50	36	-	-	-	46
	Blayney L3	46	46	37	-	-	-	47
	Blayney L5	58	58	45	-	-	-	55
Cadia Dewatering Facility	Athol	38	38	35	-	-	-	45
	247 Newbridge Road	50	42	42	-	-	-	45
	Hollwood	43	35	35	50	45	40	45

1.3.2 Assessment Periods

Current approvals and management plans state that noise generated by the project is to be measured and evaluated in accordance with the relevant requirements and exemptions of the NSW Industrial Noise Policy (INP). The INP states:

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

1.3.3 Monitoring Locations

The INP establishes that noise from the mine is to be measured at:

- the most affected point on, or within the residential boundary; or,
- at the most affected point within 30 metres of the dwelling where the dwelling is more than 30m from the boundary.

1.3.4 Meteorological Conditions

Condition 2 of the Project Approval notes that *"noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including meteorological conditions) of the NSW Industrial Noise Policy".* The INP identifies the following meteorological exemptions:

- wind speeds exceeding 3m/s (measured at 10m);
- temperature inversions greater than 3˚C / 100m; and
- rainfall.

On this basis, monitoring data observed when these conditions prevail would lead to their exclusion from any assessment of compliance.

1.4 Monitoring Objectives

This assessment relates to operational noise monitoring undertaken between 9 and 11 March 2020. The objective of the monitoring is to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

2. METHODOLOGY

2.1 Operational Noise Monitoring

Operator attended noise monitoring was undertaken as a means of assessing the character of, and to identify the noise sources contributing to, measured noise levels at each of the monitoring locations. Attended noise monitoring was undertaken at each location for a period of 30 minutes (2 x 15 minute measurements):

- in accordance with the methodology established in *AS1055-2018: Acoustics - Description and measurement of environmental noise*;
- following guidance in the NSW Industrial Noise Policy (INP) and Noise Policy for Industry (NPfI);
- in accordance with *AS2659 - 1998: Guide to the use of sound measuring equipment - portable sound level meters*; and
- using equipment that satisfied the requirements of *AS1259 - 1990. Acoustics - Sound Level Meters*.

Details of operator attended monitoring equipment are provided in **Table 3.** A copy of calibration certificates are provided in **Appendix I**.

Table 3: Operator attended noise monitoring

Parameter	SLM
Sound Level Meter (SLM)	Svantek 971 / Svantek 971
SLM Serial Number	60686 / 77606
SLM Calibration Date	16/5/2019 / 9/5/2019
Field Calibrator	Svantek SV30A / Svantek SV35A
Field Calibrator Serial Number	7906 / 90218
Field Calibrator Calibration Date	15/7/2019 / 16/5/2019
Frequency Weighting(s),(Response), Units	A, C, Lin (Fast), dB SPL

Local meteorological observations were recorded at the time of the noise monitoring using a handheld anemometer to assist with interpretation of impacts and validation of noise monitoring results. Review of prevailing regional meteorology from the Ridgeway and Spring Hill (Orange Airport) monitoring stations was undertaken for the Cadia Valley and Blayney monitoring locations respectively. These monitoring data were reviewed to validate results in the context of INP and NPfI provisions.

2.2 Evaluating Operational Source Contributions

The noise criteria established in **Section 1.3.1** are assessable only in terms of the contribution from CVO noise sources, not total measured environmental noise. For the purposes of this assessment, extraneous noise is defined as noise contributed from any source that is not associated with CVO activities. In typical rural receiving environments, this may include:

- transportation noise (except that associated with train loading at the Blayney Dewatering Facility (BDF), CVO Dewatering Facility, or road traffic generated by Cadia Valley Operations);
- environmental noise, such as gusting wind, rustling leaves, birds, insects, frogs and livestock;
- domestic noise, such as barking dogs or loud music.

Several methods are available to exclude extraneous noise contributions or evaluate contributions from specific noise sources.

2.2.1 Exclusions Based on Operator Observation

Where contributions from extraneous noise sources are considered to influence measured noise levels, operator observations may be used to exclude discrete events, or identify alternate descriptors representative of noise contributions from the assessable noise source. These may include:

- exclusion of a portion of the measurement influenced by short term extraneous events (for example, the passage of a vehicle), allowing recalculation of results from remaining data; or
- use of the L_{A90} descriptor, where the character of the noise source under assessment is typically continuous, with little variation in level.

Alternative methods are available where extraneous sources cannot be reasonably excluded based on measurement descriptors or discrete events.

2.2.2 Band Pass Filters

Previous assessment of mining and quarrying developments indicates that noise emissions from these operations typically manifest in the low frequency end of the noise spectrum (<1000Hz). Application of band pass filtering is further supported by recent industry research (Parnell, 2015). Review of the CVO receiving environments indicates environmental noise measurements may be subject to significant (continuous) influence from extraneous sources across the full noise spectrum, including frogs (approximately 2000 to 3150Hz) and insect noise (approximately 3150 to 6300Hz).

Where multiple sources cannot be excluded on the basis of operator observations, and are found to contribute in different parts of the spectrum, a frequency band filter may be applied to isolate contributions from specific sources. The extent of band pass filtering is determined based on operator observations at the time of monitoring. Following application of a band pass filter, the $L_{Aeq\ (band\ pass)}$ noise level may be recalculated as a means of evaluating the contribution from mining operations.

3. RESULTS

3.1 Operational Noise Monitoring

Operator attended noise monitoring was undertaken at fourteen locations between 9 and 11 March, 2020. The objective was to measure noise levels at each of the monitoring locations, evaluate the contribution from Cadia noise sources and assess these contributions against the noise criteria relevant to each receiver location. Preliminary findings of the assessment indicate:

- mining and concentrate processing activities were audible at the Rosebank and Bonnie Glen receiver locations. Audible contributions were not observed at other locations in the monitoring network;
- demolition of the Blayney Dewatering Facility BDF was audible at locations L1, L2 and L5 during the day. Audible contributions were not observed at other locations or at other times;
- operation of the Cadia Dewatering Facility (CDF) was largely inaudible at all nearby monitoring locations.

Monitoring data indicates that total environmental noise levels (from all sources) did exceed the CVO criteria levels at several monitoring locations. Extraneous noise contributions were observed from a variety of sources, including:

- insects;
- bird noise;
- aircraft;
- livestock;
- windblown vegetation;
- trains;
- barking dogs;
- road traffic;
- domestic noise.

The characteristics of these sources (often continuous or affecting large portions of the measurement data) made it difficult to evaluate monitoring results based on discrete event contributions (for example, single car pass-by). Where feasible, application of alternative descriptors and band pass filters were used to evaluate CVO contributions.

3.2 Operator Attended Monitoring: Noise Impact Assessment Results

A summary of the results from attended noise monitoring in the receiving environments adjacent to mining and dewatering operations is provided in **Table 4** to **Table 6**. Results are provided for comparison against the relevant $L_{Aeq,15minute}$ noise criteria. Potential sleep disturbance impacts are evaluated against the highest observed $L_{A1,\ 1minute}$ noise level during each night period measurement, with relevant sources identified when this level is above the criteria.

Detailed assessment of monitoring results, including measured noise levels, and description of the ambient noise environment is provided in **Appendix II**. These results indicate that:

- mining activities were audible (but below the relevant noise criteria) at the Rosebank and Bonnie Glen receiver locations. Audible contributions were not observed at the Chesterfield, Warrengong, South Log, Willow Creek, or Northwest monitoring locations;
  - measurements representative of Northwest were undertaken at a location approximately 500m from the dwelling, at the nearest publicly accessible boundary of the property, closest to the CVO. Levels at this location are likely to be marginally higher than equivalent levels at the dwelling (due to distance and topographical effects). Thus, where compliance can be demonstrated at the measurement location, it may be assumed at the dwelling location;

- measurements representative of Chesterfield were undertaken at a location approximately 160 metres east of the residence at the nearest publicly accessible boundary of the property. Noise immissions from the CVO may be lower at this position than at an appropriate location within 30 metres of the residence, as the residence is positioned on a hill. While it is possible that results at the monitoring location may be lower than at the residence (as the residence is located on a rise, and closer to the CVO), the inaudibility of any mining contribution at this location indicates compliance. Should mining noise have been observed at the monitoring location, the residence would have been subject to further assessment (within 30m of the dwelling) once access arrangements with the landowner were made.
- measurements representative of Rosebank were undertaken at a location approximately 150 metres north of the property. While the monitoring location is slightly further away from the CVO than the residence, it is also positioned at a higher altitude, and would receive less shielding from the hill to the southeast of the residence. Levels at this location are likely to be marginally higher than equivalent levels at the dwelling. Thus, where compliance can be demonstrated at the measurement location, it may be assumed at the dwelling location;
- emissions from the CVO were observed at Bonnie Glen and Rosebank at levels below 35dB(A) and were identified to have dominant low frequency characteristics. However, quantitative tests (Fact Sheet C of the NPfI) indicate a modifying factor was not warranted at any of the locations with CVO contributions;
- tests for annoying noise characters (Fact Sheet C of the NPfI) indicated no tonal characters in measurements where CVO operations were audible;

- noise associated with demolition of the Blayney Dewatering Facility was audible at locations L1, L2, and L5 during the day. No audible contributions were observed at L3;
  - emissions from the BDF were observed to have dominant low frequency characteristics due to the engine noise of the two excavators. Quantitative tests (Fact Sheet C of the NPfI) indicate a modifying factor was required for one measurement at location L2. The addition of the modifying factor did not cause the contribution at the measurement location to exceed the impact assessment criteria at this location;
- operations at the CDF were audible at the Athol monitoring location but were assessed to be below the relevant NIAC. Operations at the CDF were not audible at the Hollwood or 247 Newbridge Road monitoring locations;
  - emissions from the CDF were observed as noise events with impulse-like characteristics; the events had no contribution to measured sound descriptors.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

Table 4 : Cadia Valley Operations summary of monitoring results, dB(A)

Location	Period	CVO Contribution (L_{Aeq}) Mes1	CVO Contribution (L_{Aeq}) Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
Bonnie Glen	Day $L_{Aeq, 15min}$	29	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	33[3]		36	
	$L_{A1, 1min}$	49	41	Barking Dogs	45	
Rosebank[2]	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	33	34		38	
	Night $L_{Aeq, 15min}$	Inaudible	33		36	
	$L_{A1, 1min}$	43	45	n/a[1]	45	
Warrengong	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	41	42	n/a[1]	45	
South Log	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	$L_{A1, 1min}$	48	49	Wind Noise	45	
Northwest[2]	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	$L_{A1, 1min}$	48	52	Wind Noise	45	
Willow Creek	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	55	54	Wind Noise	45	
Chesterfield[2]	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	37	37	n/a[1]	45	

Note 1: L_{A1} level equivalent to or less than the criteria, no further assessment undertaken.

Note 2: Monitoring was undertaken at a position not representative of the property in accordance with the INP. See **Section 3.2** for more information.

Note 3: The effect of ambient noise could not be fully isolated from site noise. The value presented is an absolute upper limit of the CVO contribution.

Table 5 : Blayney Dewatering Facility summary of monitoring results, dB(A)

Location	Period	CVO Contribution Mes1	CVO Contribution Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
L1	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		50	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		50	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		39	
	$L_{A1, 1min}$	38	43	n/a[1]	49	
L2	Day $L_{Aeq, 15min}$	49	50[2]		50	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		50	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		36	
	$L_{A1, 1min}$	51	66	Road noise	46	
L3	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		46	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		46	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		37	
	$L_{A1, 1min}$	51	44	Road noise	47	
L5	Day $L_{Aeq, 15min}$	52	54		58	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		58	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		45	
	$L_{A1, 1min}$	54	57	Train horn	55	

Note 1: $L_{A1, 1minute}$ level equivalent to or less than the criteria, no further assessment undertaken.

Note 2: this value includes a +2dB modifying factor was added to the measured noise levels in accordance with Fact Sheet C of the NPfI, following identification of low frequency noise

Table 6 : Cadia Dewatering Facility summary of monitoring results, dB(A)

Location	Period	CVO Contribution Mes1	CVO Contribution Mes2	$L_{A1, 1min}$ Source	Criteria	Compliance Assessment
247 Newbridge Road	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		50	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		42	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		42	
	$L_{A1, 1min}$	47	45	Dog barking	45	
Hollwood	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		43	Compliant
	Evening $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	44	50	Wind noise	45	
Athol	Day $L_{Aeq, 15min}$	Inaudible	Inaudible		38	Compliant
	Evening $L_{Aeq, 15min}$	30	Inaudible		38	
	Night $L_{Aeq, 15min}$	Inaudible	Inaudible		35	
	$L_{A1, 1min}$	55	55	Wind noise	45	

4. RECOMMENDATIONS AND CONCLUSIONS

Advitech Pty Limited was engaged by Newcrest Mining to undertake attended noise monitoring at sensitive receivers adjacent to its Cadia Valley Operations (CVO). The objective of the monitoring was to evaluate compliance with the conditions of the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590.

Operator attended noise monitoring was undertaken between 9 and 11 March, 2020, at fourteen locations adjacent to the Cadia Valley Operations (CVO), Blayney Dewatering Facility (BDF) and the Cadia Dewatering Facility (CDF). Results indicate that measured noise levels (from all sources) were below the relevant criteria levels at all monitoring locations.

While noise generated by mining and concentrate handling activities was observed to influence noise levels in several receiving environments, prevailing noise levels were controlled by extraneous (non-mining) noise sources in most cases. Analysis of operator attended monitoring results indicates that:

- mining and processing activities were audible at the Rosebank and Bonnie Glen monitoring locations adjacent to Cadia Valley mining operations;
  - CVO contributions were measured or evaluated at levels below the relevant noise criteria in all cases;
- noise associated with operation of the Blayney Dewatering Facility was audible at monitoring locations L1, L2, and L5 during the day;
  - one measurement at L2 was identified to require a low frequency modifying factor in accordance with fact sheet C of the NPfI;
  - measurement results were assessed as compliant with conditions of the PA and EPL during the day, evening or night periods at all locations;
- emissions from the Cadia Dewatering Facility were rarely audible at Athol and not audible at Hollwood and 247 Newbridge Rd. Contributions were below all relevant noise criteria at all CDF monitoring locations.

Observed noise levels did not exceed the cumulative criteria at any monitoring location. Noise impacts were assessed to be compliant with both Project Specific and Cumulative noise impact criteria established in the CVO Project Approval (PA 06_0295) and Environment Protection Licence (EPL) No. 5590 at all monitoring locations.

5. REFERENCES

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

1. AS1055-2018: Acoustics – Description and measurement of environmental noise;
2. AS1259 – 1990. Acoustics – Sound Level Meters.
3. AS2659 – 1998: Guide to the use of sound measuring equipment – portable sound level meters.
4. AS 2706-1984: Numerical Values: Rounding and interpretation of limiting values.
5. Cadia Valley Operations Environmental Protection Licence (EPL) (5590);
6. Cadia Valley Operations Noise Monitoring Program (Version 4, dated June 2018).
7. Cadia Valley Operations Project Approval (06_0295);
8. EPA, 2000. NSW Industrial Noise Policy, NSW Environment Protection Agency, Sydney;
9. EPA, 2017. NSW Noise Policy for Industry, NSW Environment Protection Agency, Sydney;
10. Parnell, J (2015). Acoustic Signature of Open Cut Coal Mines, Acoustics 2015. Hunter Valley: Australian Acoustical Society.
11. Wilkinson Murray Pty Ltd (2009). Cadia East Project Noise and Blast Impact Assessment.

Appendix I Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM 24705 & FILT 5190

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-971	**Serial No:**	60686
Microphone Type:	7052E	**Serial No:**	66701
Preamplifier Type:	SV18	**Serial No:**	62787
Filter Type:	1/3 Octave	**Serial No:**	60686
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Advitech Pty Ltd 7 Riverside Drive Mayfield West NSW 2304		
Ambient Pressure:	1012 hPa ±1.5 hPa		
Temperature:	24 °C ±2° C	**Relative Humidity:**	48% ±5%
Date of Calibration:	15/05/2019	**Issue Date:**	16/05/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: **AUTHORISED SIGNATURE:**

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 23933 & FILT 5178**

Equipment Description:	Sound Level Meter		
Manufacturer:	Svantek		
Model No:	Svan-971	**Serial No:**	77606
Microphone Type:	7052E	**Serial No:**	70851
Preamplifier Type:	SV18	**Serial No:**	78287
Filter Type:	1/3 Octave	**Serial No:**	77606
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Novecom 7 Riverside Drive Mayfield West NSW 2304		
Ambient Pressure:	1000 hPa ±1.5 hPa		
Temperature:	25 °C ±2° C	**Relative Humidity:**	54% ±5%
Date of Calibration:	09/05/2019	**Issue Date:**	09/05/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: VKB **AUTHORISED SIGNATURE:** Jack Kielt

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 24702

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Svantek
Type No: SV35A **Serial No:** 90218
Owner: Advitech Pty Ltd
7 Riverside Drive
Mayfield West NSW 2304

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	93.70	Y	94.05	1000.02	1.41
Level 2:	113.70	Y	114.05	1000.02	0.35
Uncertainty:			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1016 hPa ±1.5 hPa **Relative Humidity:** 48% ±5%
Temperature: 24 °C ±2° C
Date of Calibration: 15/05/2019 **Issue Date:** 16/05/2019
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017
CHECKED BY: VKB **AUTHORISED SIGNATURE:** ..... Hein Soe

.Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 25144

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Svantek
Type No: SV-30A **Serial No:** 7906
Owner: Advitech Pty Ltd
7 Riverside Drive
Mayfield West NSW 2304

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	93.88	1000.11	5.62
Level 2:	NA	N	113.88	1000.04	0.79
Uncertainty:			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1002 hPa ±1.5 hPa **Relative Humidity:** 29% ±5%
Temperature: 23 °C ±2° C
Date of Calibration: 15/07/2019 **Issue Date:** 15/07/2019
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017
CHECKED BY: JKS. **AUTHORISED SIGNATURE:** .....
Jack Kidd

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Appendix II Detailed Monitoring Results

AII.1 Assessment of Results – Blayney L1 (Blayney)

The L1 monitoring location noise environment was dominated by local traffic, bird calls and insect noise. During the day period, noise from the demolition of the BDF dominated the noise environment; noise from the BDF was not audible in other time periods. BDF contributions were assessed as compliant during all periods.

Table 7: L1 noise monitoring results, dB(A)

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	50	10/03/2020	10:52	41	33	n/a[1]	2x excavators demolishing BDF structure: noise from metal dragging, drops, and excavator engines. Occasional lawn mower, insects & birds in background	E at 0-2 m/s	ENE at 4.2m/s
		10/03/2020	11:09	45	36	n/a[1]			
Evening	50	9/03/2020	18:58	45	38	n/a[1]	Insects, birds, road noise, wind, lawn mower; occasional dog barking	E at 2-5 m/s	E at 4.7m/s
		9/03/2020	19:18	66	40	n/a[1]			
Night	39	9/03/2020	23:01	33	30	n/a[1]	Traffic, wind blown vegetation, dogs barking, insect noise	Calm	ENE at 4.7m/s
		9/03/2020	23:20	35	31	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.2 Assessment of Results – L2 (Blayney)

The L2 monitoring location noise environment was dominated by local traffic, bird calls and barking dogs. During the day period, noise from the demolition of the BDF dominated the noise environment; noise from the BDF was not audible in other time periods. BDF contributions were assessed as compliant during all periods.

Table 8 : L2 (Railway Ln, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**50**	10/03/2020	11:40	49	39	49	2x excavators demolishing BDF structure: noise from metal dragging, drops, and excavator engines. Occasional car passbys; road noise dominant when demolition pauses	Calm	E at 3.1m/s
		10/03/2020	12:01	48	38	48			
Evening	**50**	9/03/2020	19:43	60	45	n/a[1]	Birds, traffic on Ogilvy St, occasional dog barking	Calm	E at 4.2m/s
		9/03/2020	20:02	62	38	n/a[1]			
Night	**36**	9/03/2020	22:13	42	33	n/a[1]	Wind, windblown vegetation, road noise, dog barking; later aircraft, insects	E at 0-3 m/s	E at 4.7m/s
		9/03/2020	22:29	57	34	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.3 Assessment of Results – L3 (Blayney)

The noise environment at this location consisted of road traffic, local industrial noise, barking dogs and windblown vegetation. Noise from the BDF was not audible at this location and was considered to be compliant for all time periods.

Table 9 : L3 (Hill Street, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	46	10/03/2020	11:34	64	41	n/a[1]	School playground dominates noise environment; nearby warehouse, birds sometimes audible	Calm	E at 3.1m/s
		10/03/2020	11:51	61	49	n/a[1]			
Evening	46	9/03/2020	19:45	50	40	n/a[1]	Road traffic, birds; occasional aircraft, residential noise; insect noise in background	Calm	E at 4.2m/s
		9/03/2020	20:01	42	36	n/a[1]			
Night	37	9/03/2020	23:44	41	34	n/a[1]	Road traffic, wind, windblown vegetation, dog barking	Calm	ENE at 4.2m/s
		10/03/2020	0:01	35	30	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.4 Assessment of Results – L5 (Railway Lane Pre School)

Road traffic, windblown vegetation and birds were audible and characteristic of the noise environment at this location. During the day period, noise from the demolition of the BDF dominated the noise environment; noise from the BDF was not audible in other time periods. BDF contributions were assessed as compliant during all periods.

Table 10 : L5 (Railway Lane Pre School, Blayney) noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**58**	10/03/2020	10:54	52	41	52	2x excavators demolishing BDF structure: noise from metal dragging, drops, and excavator engines. When not operating, wind, road traffic, lawnmower, parking cars	E at 1-2 m/s	ENE at 4.2m/s
		10/03/2020	11:15	54	43	54			
Evening	**58**	9/03/2020	18:58	44	37	n/a[1]	Traffic on Ogilvy St, train passby, leaf blower; background from birds, wind, distant road noise	E at 1-2 m/s	E at 4.7m/s
		9/03/2020	19:16	55	40	n/a[1]			
Night	**45**	9/03/2020	22:21	42	33	n/a[1]	Distant road noise, wind, voices	E at 1-2 m/s	E at 4.7m/s
		9/03/2020	22:23	44	34	n/a[1]			

Note 1: Site operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.5 Assessment of Results – Bonnie Glen

This noise environment is dominated by local environmental sources, including barking dogs, birds, windblown vegetation, livestock, domestic noise, and occasional road traffic noise. Mining operations at CVO were not audible at this monitoring location and were considered compliant for all time periods.

Table 11 : Bonnie Glen noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	15:08	43	29	29	Wind noise, aircraft; CVO barely audible in background	E at 2-3 m/s	NE at 5.3ms
		11/03/2020	15:25	44	35	n/a[1]			
Evening	**38**	10/03/2020	19:45	39	27	n/a[1]	Dog barks, birds, distant road noise, domestic noise	Calm	NE at 3.2ms
		10/03/2020	20:17	33	23	n/a[1]			
Night	**36**	10/03/2020	23:24	38	33	n/a[1]	Wind through vegetation, dogs barking; CVO contributes when other sources are quiet	E at 1-2 m/s	NE at 5.2ms
		10/03/2020	23:42	36	33	33[3]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

Note 3: The effect of ambient noise could not be fully isolated from site noise. The value presented is an absolute upper limit of the CVO contribution.

AII.7 Assessment of Results – Warrengong

This receiving environment is characterised by local environmental sources including insects, birds, livestock and windblown vegetation. Contributions from mining operations at CVO were not audible at this monitoring location and were considered compliant for all time periods.

Table 12 : 346 Carbine Rd noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	15:50	48	36	n/a[1]	Wind noise, cattle, road noise, aircraft, occasional birds	E at >3 m/s	NE at 5.3ms
		11/03/2020	16:05	44	35	n/a[1]			
Evening	**38**	10/03/2020	20:17	30	21	n/a[1]	Cattle, frogs, local domestic noise, other environmental noise sources	Calm	NE at 4.8ms
		10/03/2020	20:33	29	23	n/a[1]			
Night	**35**	10/03/2020	23:07	34	31	n/a[1]	Wind blown vegetation; occasional residential noise, livestock, dog barks	Calm	NNE at 4.9ms
		10/03/2020	23:22	35	30	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.8 Assessment of Results – South Log

Monitoring at this location indicates the noise environment consists mainly of environmental noise sources including insects, birds, livestock and windblown vegetation. Contributions from mining operations at CVO were not audible at this monitoring location and were considered compliant for all time periods.

Table 13 : South Log noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	14:04	45	32	n/a[1]	Wind blown vegetation, occasional birds, sheep	E at >3 m/s	NE at 5.5ms
		11/03/2020	14:20	49	38	n/a[1]			
Evening	**38**	10/03/2020	18:57	34	23	n/a[1]	Birds, occasional sheep	E at 0-1 m/s	NNE at 1.9ms
		10/03/2020	19:16	44	26	n/a[1]			
Night	**38**	11/03/2020	0:30	43	39	n/a[1]	Wind noise	E at >3 m/s	NNE at 4.5ms
		11/03/2020	0:47	44	41	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.9 Assessment of Results – North West

Monitoring was conducted at the boundary of the property closest to the CVO. This location is approximately 500m from the dwelling, closer to the CVO and at a more (topographically) exposed location that the dwelling. Where compliance is demonstrated at this location, it is assumed at the dwelling. Audible noise sources at this monitoring location included environmental noise (windblown vegetation, and birds) and intermittent road traffic. Noise from mining activities at CVO was inaudible at this location, and was therefore considered compliant.

Table 14 : Northwest noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	43	11/03/2020	13:57	55	40	n/a[1]	Wind noise; occasional road noise	E at >3 m/s	NE at 5.5ms
		11/03/2020	14:12	54	37	n/a[1]			
Evening	38	10/03/2020	18:38	57	23	n/a[1]	Road noise dominates; birds and cows determine background levels	E at 1.5-2 m/s	NE at 1.4ms
		10/03/2020	18:55	53	24	n/a[1]			
Night	38	11/03/2020	0:45	41	37	n/a[1]	Wind noise	E at >3 m/s	NNE at 5ms
		11/03/2020	1:01	42	36	n/a[1]			

Note [1]: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.10 Assessment of Results – Willow Creek

The noise environment at this location was dominated by environmental sources including windblown vegetation and livestock. Noise from mining activities at CVO was inaudible at this location, and was therefore considered compliant.

Table 15 : Willow Creek noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	16:41	46	35	n/a[1]	Wind noise, occasional road noise, domestic noise	E at >3 m/s	ENE at 6ms
		11/03/2020	16:57	49	40	n/a[1]			
Evening	**38**	10/03/2020	21:34	46	43	n/a[1]	Wind blown vegetation	E at >3 m/s	NE at 4.9ms
		10/03/2020	21:50	49	44	n/a[1]			
Night	**35**	10/03/2020	22:16	50	46	n/a[1]	Wind noise	E at >3 m/s	NE at 5ms
		10/03/2020	22:32	50	47	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.11 Assessment of Results – Chesterfield

Monitoring was conducted at the nearest publicly accessible location. The monitoring location is approximately 160 metres east of the residence, and is at a less (topographically) exposed position. Noise levels experienced at the residence may be higher than those observed at the monitoring position. The noise environment at this location was characterised by environmental sources including windblown vegetation, insects, and livestock noise. Noise from mining activities at CVO was inaudible at this location, and was therefore considered compliant at the measurement position.

Table 16 : Chesterfield noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	15:03	43	35	n/a[1]	Wind blown vegetation, birds, cattle	E at 2 m/s	NE at 5.5ms
		11/03/2020	15:19	44	36	n/a[1]			
Evening	**38**	10/03/2020	19:27	41	33	n/a[1]	Cattle & cockatoos dominate; insect noise determines background levels	Calm	N at 2ms
		10/03/2020	19:43	41	29	n/a[1]			
Night	**35**	10/03/2020	23:57	28	18	n/a[1]	Livestock, wind through vegetation, background of frogs & insects	E at 0-1 m/s	NNE at 4.8ms
		11/03/2020	0:13	28	16	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.12 Assessment of Results – Rosebank

Monitoring was conducted at a position approximately 140 metres north of the residence. While slightly further away from the CVO than the residence, the monitoring location is a more (topographically) exposed location and experiences less shielding from the surrounding terrain. Where compliance is demonstrated at this location, it is assumed at the dwelling. The noise environment at this location was characterised by environmental noise sources including windblown vegetation, birds, insects, and livestock noise. Mining operations were audible in the form of low level engine noise during the evening and night period, however contributions were assessed as below the relevant criteria. CVO contributions were assessed as compliant during all periods.

Table 17 : Rosebank noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**43**	11/03/2020	16:04	42	33	n/a[1]	Wind noise, intermittent horses	E at >3 m/s	NE at 7.1ms
		11/03/2020	16:20	44	31	n/a[1]			
Evening	**38**	11/03/2020	20:47	35	32	33	Constant CVO continuum & crickets; occasional wind, birds, horses	E at 1 m/s	NE at 5.4ms
		10/03/2020	21:21	35	33	34			
Night	**36**	10/03/2020	22:19	38	35	n/a[1]	Wind through vegetation; background of CVO noise	E at 2-3 m/s	NE at 5ms
		10/03/2020	22:36	39	36	33			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**.

AII.13 Assessment of Results – 247 Newbridge Road

Background contributions from road traffic, gusting wind, and bird noise dominate noise environment at this monitoring location. Noise sources within the Cadia Dewatering Facility (CDF) were not audible at this location, and were therefore considered compliant.

Table 18 : 247 Newbridge Road noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	**50**	10/03/2020	12:59	55	31	n/a[1]	Insects, birds & frogs; occasional car passbys	Calm	E at 2.5m/s
		10/03/2020	13:15	50	32	n/a[1]			
Evening	**42**	9/03/2020	21:30	48	44	n/a[1]	Constant wind through vegetation; frogs, occasional dog barking	>3 m/s	E at 5.6m/s
		9/03/2020	21:46	47	42	n/a[1]			
Night	**42**	10/03/2020	1:10	40	35	n/a[1]	Wind, dog barking, frogs	>3 m/s	E at 3.6m/s
		10/03/2020	1:27	37	32	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**

AII.14 Assessment of Results – Hollwood

Background contributions from windblown vegetation, livestock and road traffic noise define the noise environment at this monitoring location. Noise sources within the Cadia Dewatering Facility (CDF) were not audible at this location, and were therefore considered compliant.

Table 19 : Hollwood noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	43	10/03/2020	12:23	51	26	n/a[1]	Road traffic, aircraft, occasional wind gusts; birds in background	ENE 0-2 m/s	ENE at 1.9m/s
		10/03/2020	12:39	52	26	n/a[1]			
Evening	35	9/03/2020	20:47	42	37	n/a[1]	Wind blown vegetation; occasional dog barking	E at >3 m/s	E at 4.2m/s
		9/03/2020	21:03	45	39	n/a[1]			
Night	35	10/03/2020	0:30	39	36	n/a[1]	Wind noise	>3 m/s	E at 4.7m/s
		10/03/2020	0:46	42	37	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**

AII.15 Assessment of Results – Athol

Contributions from rustling vegetation, intermittent road traffic and bird noise typically control noise levels at this monitoring location. Activities associated with activities from nearby facility not associated with the CDF were audible during the day and night period. CDF contributions were just audible in the evening but not measurable at the location; the measurement was therefore considered complaint.

Table 20 : Athol noise monitoring results

Period	Criteria	Date	Time	L_{Aeq}	L_{A90}	CVO Contribution	Description of Noise Environment	Local Weather	Regional Weather[2]
Day	38	10/03/2020	12:28	55	37	n/a[1]	Road traffic, lawnmower at refrigeration plant	E at <1 m/s	E at 2.5m/s
		10/03/2020	12:47	55	37	n/a[1]			
Evening	38	9/03/2020	20:40	54	43	30	Constant frogs & wind; occasional road passbys. Two impacts audible from CDF direction, too quiet to measure	E at >3 m/s	E at 4.2m/s
		9/03/2020	20:58	51	45	n/a[1]			
Night	35	10/03/2020	0:30	49	45	n/a[1]	Frogs, refrigeration plant, occasional wind gusts	E at >3 m/s	E at 4.7m/s
		10/03/2020	0:47	49	45	n/a[1]			

Note 1: Mining operations not audible during assessment.

Note 2: Prevailing meteorology assessed on basis of regional conditions in accordance with provisions of INP and Project Approval, as outlined in **Section 1.3.4**