



Adelaide Brighton Cement Ltd

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adelaidebrighton.com.au

Adelaide Brighton Cement Ltd
ABN 96 007 870 199
PO Box 229
Angaston SA 5353
+61 8 8561 3100

ANNUAL NOISE MANAGEMENT REPORT FOR ANGASTON WORKS

COMPLIANCE DATE: 31/10/2022 – Annual Report - 2022
EPA Licence 35: Noise Prevention (S-265)

Licensed site: Adelaide Brighton Cement, Angaston Works

845 Stockwell Road, Angaston SA 5353

Date of Submission: 18 November 2022

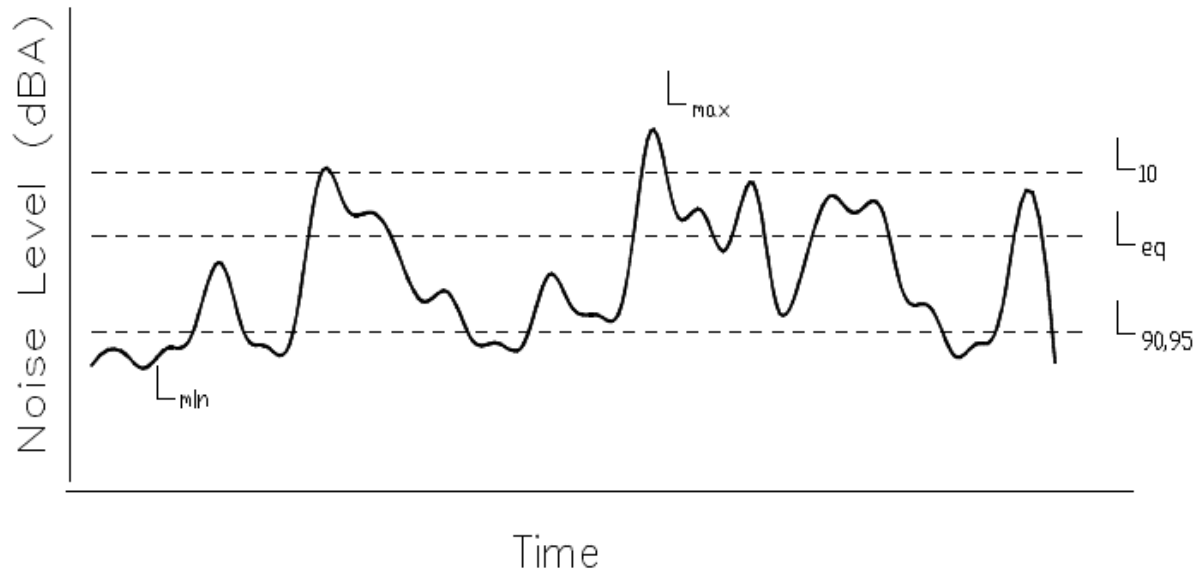
Version Number: 1



Report Submitted by: Advisor Environment - C&L (SA/NSW/NT)

Glossary of acoustic terminology

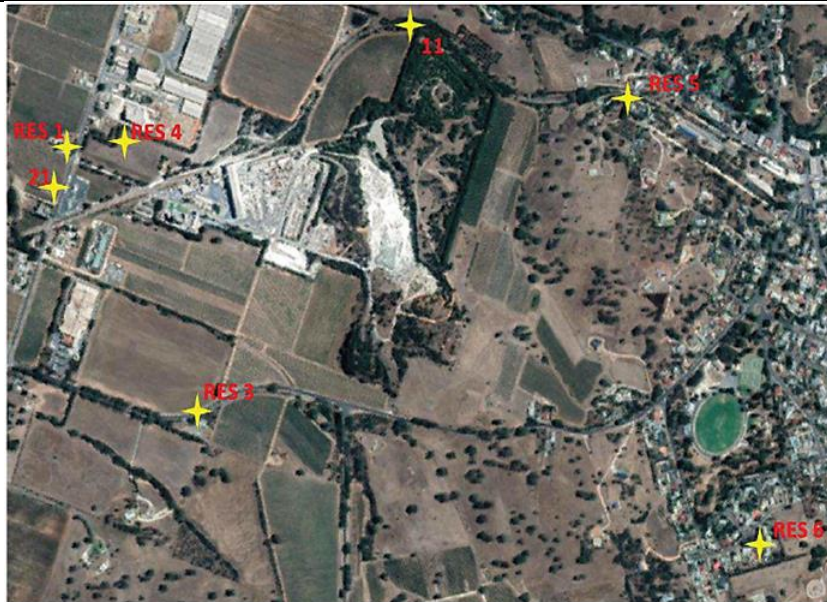
dB(A)	A unit of measurement, decibels(A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
L₁	The noise level which is equalled or exceeded for 1% of the measurement period. L ₁ is an indicator of the impulse noise level, and is used in Australia as the descriptor for intrusive noise (usually in dBA).
L₁₀	The noise level which is equalled or exceeded for 10% of the measurement period. L ₁₀ is an indicator of the mean maximum noise level, and is used in Australia as the descriptor for intrusive noise (usually in dBA).
L₉₀	The noise level which is equalled or exceeded for 90% of the measurement period. L ₉₀ is an indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L_{eq}	The equivalent continuous noise level for the measurement period. L _{eq} is an indicator of the average noise level (usually in dBA).
L_{max}	The maximum noise level for the measurement period (usually in dBA).



Note: *The subjective reaction or response to changes in noise levels can be summarised as follows:*

A 3 dB(A) increase in sound pressure level is required for the average human ear to notice a change; a 5 dB(A) increase is quite noticeable and a 10 dB(A) increase is typically perceived as a doubling in loudness

Monitoring Objective	<p>Annual reports will include where applicable:</p> <ul style="list-style-type: none"> • Details of noise complaints (excluding complainant name and identifying address details for reasons of confidentiality), received during the year, including outcomes of the complaint investigation and where applicable corrective actions implemented • Details of noise attenuation projects including effectiveness • Details of noise monitoring reports • Details of other noise minimisation activities • Assessment of the effectiveness of this noise management plan 																
Monitoring Plan	<p>This monitoring report complies with the Noise Management Plan approved on 25 October 2019 by the SA EPA.</p> <p>The Plan is available on the ABC Angaston Community Website: https://www.angastoncommunity.com.au/</p>																
Community based noise monitoring & assessment	<p>Noise Monitoring Reports</p> <p>Vipac Acoustic Engineers & Scientists conducted noise monitoring in May 2021. The Vipac “Angaston Attended Noise Survey”, May 2021, 50B-21-0128-TRP-11983-2, 18 October 2021 report is summarised below</p> <p>Site Noise Criteria</p> <p>Noise from the activities undertaken at the ABC Angaston site is subject to the provisions of the Environment Protection (Noise) Policy 2007 (Noise EPP). The Noise EPP outlines Noise Goals which provide one method for demonstrating compliance with the General Environmental Duty under Section 25 of the Environment Protection Act 1993 (the Act).</p> <p>ABC uses acoustic engineers, Vipac, to undertake attended noise monitoring surveys in the community to gain an understanding of how noise from the site impacts the community. Attended measurements have been conducted during the day-time and night-time periods (as defined by the Noise EPP), and defined measurement positions have been established allowing for trends in noise levels at each location to be established over time.</p> <p style="text-align: center;">Location of attended noise measurements</p> <table border="1"> <thead> <tr> <th>Location ID</th><th>Location Description</th></tr> </thead> <tbody> <tr> <td>Resident 1 (#20a)</td><td>Stockwell Rd opposite ABC main entrance at the Fibiger property (830-846 Stockwell Rd)</td></tr> <tr> <td>Resident 3 (#27a)</td><td>At resident's house 300m west of the intersection of Crennis Mines Rd and Long Gully Rd</td></tr> <tr> <td>Resident 4 (#18)</td><td>Corner fence post on ABC boundary fence opposite large shed of neighbouring manufacturing firm, adjacent house</td></tr> <tr> <td>Resident 5</td><td>53 Fife Street (rear lawn facing Angaston)¹</td></tr> <tr> <td>Resident 6</td><td>3 Hague Street, Angaston</td></tr> <tr> <td>#11</td><td>Near ABC plant entrance gate at the most northerly point of the boundary fence, alongside old railway line</td></tr> <tr> <td>#21</td><td>Stockwell Rd opposite the Gas distribution facility – next to 'stobie' pole</td></tr> </tbody> </table>	Location ID	Location Description	Resident 1 (#20a)	Stockwell Rd opposite ABC main entrance at the Fibiger property (830-846 Stockwell Rd)	Resident 3 (#27a)	At resident's house 300m west of the intersection of Crennis Mines Rd and Long Gully Rd	Resident 4 (#18)	Corner fence post on ABC boundary fence opposite large shed of neighbouring manufacturing firm, adjacent house	Resident 5	53 Fife Street (rear lawn facing Angaston) ¹	Resident 6	3 Hague Street, Angaston	#11	Near ABC plant entrance gate at the most northerly point of the boundary fence, alongside old railway line	#21	Stockwell Rd opposite the Gas distribution facility – next to 'stobie' pole
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The following Indicative Noise Levels (INLs) apply to ABC's operations:

Receivers	Indicative Noise Levels (L_{eq} , dB(A))	
	Day-time (7am to 10pm)	Night-time (10pm to 7am)
Resident 1	60	52
Location #11	64	55
Location #21	60	52
Resident 3	60	52
Resident 4	62	54
Resident 5	55	47
Resident 6	52	45

Noise monitoring was undertaken by Vipac, 04 - 05 May 2021

The noise results for the daytime and night-time monitoring periods are shown in the following tables:

Day-Time Environmental Noise Survey Results

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Day-Time) dB(A)	Compliance
	L_{Aeq}	L_{A90}			
Resident 1 (02:55PM)	56	52	<ul style="list-style-type: none"> - Heavy influence due to traffic movements (dominant source) - Noise influence from road works on Stockwell Road - High noise influence from APA Compressor Station (continuously audible) - Plant just audible due to high extraneous noise (APA Station and traffic) 	60	Complies

	Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Day-Time) dB(A)	Compliance
		L _{Aeq}	L _{A90}			
	Resident 3 (03:45PM)	71	42	<ul style="list-style-type: none"> - Very high traffic volumes observed, which influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Vipac considers L_{A90} to be an appropriate descriptor of noise from ABC plant, due to traffic noise influence - Where possible Vipac paused measurement during truck pass by, however, not paused for cars/utes pass-by. - Plant was inaudible 	60	<i>Does not comply</i> <i>(Acceptable)</i>
	Resident 4 (02:35PM)	53	49	<ul style="list-style-type: none"> - Minor traffic noise and road works noise influenced the measurements - Plant slightly audible - Bird noise influence 	62	<i>Complies</i>
	Resident 5 (03:20PM)	46	38	<ul style="list-style-type: none"> - Minimum traffic noise influence - Dog barking at nearby property - Plant not audible - No tones detected 	55	<i>Complies</i>
	Resident 6 (04:40PM)	42	37	<ul style="list-style-type: none"> - No traffic noise influence - Plant not audible - Bird noise and dog barking influence 	52	<i>Complies</i>
	#11 (02:03PM)	41	35	<ul style="list-style-type: none"> - Traffic noise influence from nearby roads - Plant not audible 	64	<i>Complies</i>
	#21 (04:16PM)	65	47	<ul style="list-style-type: none"> - Very high traffic volumes observed, which influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Vipac considers L_{A90} to be an appropriate descriptor of noise from ABC plant, due to traffic noise influence - Where possible Vipac paused measurement during truck pass by, however, not paused for cars/utes pass by. - Noise influence from APA Compressor Station (continuously audible) - Plant was inaudible. 	60	<i>Does not comply</i> <i>(Acceptable)</i>

With reference to the results presented above and the graphs presented in Appendix A, and the graphs presented in Appendix A of the Vipac report, Vipac notes makes the following comments:

- No tonal characteristic, resulting due to ABC plant operation, was observed at any NSR.
- The stipulated day-time criterion was achieved at all NSR's except **Resident 3** and **Location 21**.
- **Resident 3**
 - Noise due to traffic movements affected the day-time measurements at Resident 3. Therefore, L_{A90} descriptor was considered more appropriate to measure noise influence from ABC plant. Vipac notes that the L_{A90} levels were well below the day-time limits.
 - In addition to above, no audible noise from ABC plant was noted at this location.
 - As such, Vipac considers the noise influence from ABC to be **compliant** at this location.
- **Location #21**
 - Noise due to traffic movements on Stockwell Road and continuous operational noise from APA Station (pump/generator noise) affected the day-time measurements at Location 11.
 - Therefore, L_{A90} descriptor was considered more appropriate to measure noise influence from ABC plant. Vipac notes that the L_{A90} levels were well below the day-time limits.
 - In addition to above, no audible noise from ABC plant was noted at this location.
 - As such, Vipac considers the noise influence from ABC to be **compliant** at this location.

Overall, due to extraneous noise influence (traffic noise, APA Station noise, etc.) at most of the NSR locations, Vipac considers the L_{A90} descriptor to be more appropriate to measure noise influence from ABC plant for day-time measurements.

Night -Time Environmental Noise Survey Results

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Night-Time) dB(A)	Compliance
	L_{Aeq}	L_{A90}			
Resident 1	53	51	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	52	<i>Minor Non-Compliance</i> (Acceptable)

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Night-Time) dB(A)	Compliance
	L _{Aeq}	L _{A90}			
Resident 3	39	36	<ul style="list-style-type: none"> - Minor influence due to distant traffic movements - ABC plant slightly audible - Some noise influence from CAPRAL plant due to internal car/truck movements. 	52	<i>Complies</i>
Resident 4	49	47	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	54	<i>Complies</i>
Resident 5	42 ²	29	<ul style="list-style-type: none"> - Plant not audible - Traffic noise slightly audible - 50Hz tone observed 	47	<i>Complies</i>
Resident 6	40	36	<ul style="list-style-type: none"> - The hydrator was operational at that time - Tree noise - Plant not audible - Distant traffic movements audible 	45	<i>Complies</i>
Resident 6 (without hydrator working)	40	36	<ul style="list-style-type: none"> - Hydrator was not operational during this measurement - Tree noise - Plant not audible - Distant traffic movements audible 	45	<i>Complies</i>
#11	42	37	<ul style="list-style-type: none"> - Distant traffic movement noise - Tree noise - Plant inaudible 	55	<i>Complies</i>
#21	45	43	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	52	<i>Complies</i>

² 8 dB(A) penalty included for 2 noise characteristics. Discussed in sections below.

With reference to the results presented above and the graphs presented in Appendix A, Vipac makes the following comments:

- The stipulated night-time criterion at each residential receiver was achieved, except **Resident 1**, which showed minor-noncompliance (~1dB(A)).

- No tonal characteristic, resulting due to ABC plant operation, was observed at any NSR, except Resident 5 (50Hz tone). This is further discussed in **Section 5.3** of Vipac report.
- **Resident 1**
 - Major noise influence from APA Station across the road from Resident 1 was observed during the survey. Continuous generator/pump type noise was audible and was observed to be major noise source. The actual noise from ABC plant was not audible due to noise from APA station noise.
 - As such, the noise impact due to ABC plant operation is negligible as compared to noise impact due to APA Station. Therefore, Vipac considers ABC to be **compliant** against the night-time noise criterion at Resident 1 location.
- **APA Pump Station Noise Influence**
 - Compared to day-time noise survey, major noise influence from APA Station was observed during the night-time survey.
 - At the following locations, the APA Station was observed to be the dominant noise source
 - Resident 1
 - Resident 4
 - Location #21
 - At each of the above locations, a tonal component of 50Hz was also observed, which was associated with the APA Station. This was confirmed by an additional noise measurement conducted at 2m away from the APA Station boundary (L_{Aeq} 59 dB(A), L_{A90} 58 dB(A), with tonal component at 50Hz).
 - Based on our subjective observation, the Station noise sounded similar to characteristic pump and generator noise.
- **Resident 6**

Based on the information provided by ABC in regard to noise issues in the areas around Resident 6, Vipac conducted 2-sets of measurements at this location, one with the hydrator on and one without the hydrator operational.

 - The measurements showed no apparent difference between the noise levels with and without the hydrator operational.
 - There was no difference in the measured $L_{Aeq,15min}$ and L_{A90} noise level descriptors.
 - No tonal or low frequency components were observed in both cases.
 - The octave-band data is presented below. The Octave band data shows no significant change in the levels. 16Hz frequency shows a decrease in levels once the Hydrator was switched ON, which may have been associated with the ambient noise sources.

Octave band data for Resident 6 measurements

Resident 6	$L_{Aeq,15min}$ Octave Band Data										
	16Hz z	31.5 Hz	63Hz z	125 Hz	250 Hz	500 Hz	1kHz z	2kHz z	4kHz z	8kHz z	16kHz z
Hydrator OFF	57	48	44	39	37	35	35	31	29	25	18
Hydrator ON	51	44	42	39	37	36	35	32	30	25	17

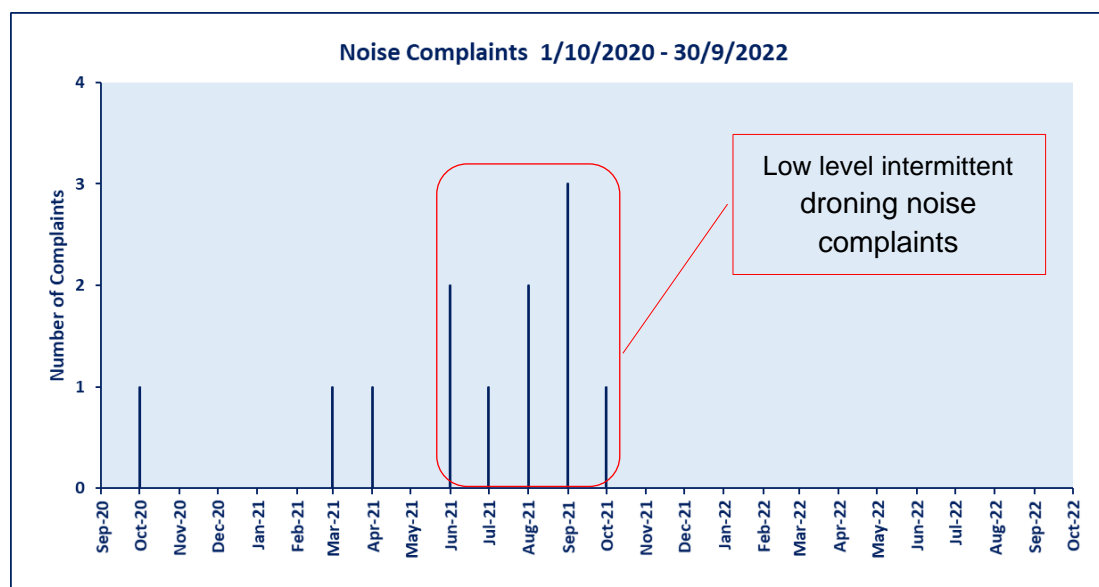
	<p>Vipac notes that the ABC has installed an attenuator (silencer) on the hydrator to ensure the noise levels are kept to the minimum. Since installed (10+ years), the attenuator is maintained regularly, including regular cleaning and unblocking any material build up in the attenuator. Also, considering the separation between the hydrator and Resident 6, it is considered unlikely that the Hydrator or any other equipment/machinery at ABC would be audible at this location. However, unfavourable wind conditions (high wind speeds blowing from ABC towards Resident 6) may result in faint noise influence at this location, which is not expected to occur more than a few times a year.</p> <p>As such, considering the factors discussed above and summarised below, Vipac believes that ABC have implemented all reasonable and practicable measures to reduce the noise impact to the resident, and hence, satisfies the General Environmental Duty applicable under Section 25 of the Act</p> <p>Installation of an attenuator.</p> <ul style="list-style-type: none"> • Regular maintenance of the attenuator and the hydrator fan • Large separation between the resident and the ABC plant • Few events of minimal noise influence observed at that location during unfavourable wind conditions (possibly). Vipac believes that the noise experienced by the resident may be associated with a different source. • No difference in noise levels observed by Vipac with and without the hydrator operating. <p><u>Summary of Results:</u></p> <p>The monitoring results confirm that noise levels from the site operations comply with the indicative noise levels for:</p> <ul style="list-style-type: none"> • Day-time periods for all sensitive noise receivers except for two locations which are impacted by heavy traffic and other sources: Resident 3 (Traffic) and location 21 (Traffic and APA station). • Night-time periods for all receivers.
<p>Noise Reports</p>	<p>Site Noise Model</p> <p>A noise model was prepared for the Angaston site, by independent acoustic Engineers Vipac. The noise model is a noise assessment tool that is used to evaluate the noise impacts from proposed changes to plant, equipment and operational activity. The noise model was found to provide good agreement between predicted noise levels and attended noise measurements in the community.</p> <p>The model has been used to assess a proposed new project which involves the recommissioning of cement mill 2, installation of a slag drier and associated equipment to enable the manufacture of neat, milled slag at Angaston. The assessment showed there would be no apparent increase in noise levels for all noise sensitive receivers. The project is under consideration by ABC and would need Environment Protection Authority approval before it could proceed.</p>

Noise complaints

Noise complaints for reporting period (1/10/2021-30/9/2022) are summarised in the table below:

Date	Location	Description	Action Taken
29/10/2021	Anonymous	<p>Enquiry about a droning noise she has been hearing for last couple of years and is trying to locate the source.</p> <p>Wanted to know if plant shuts down over Christmas as it might help to identify the source.</p>	<p>Resident advised plant had received similar calls.</p> <p>Source of an intermittent low level droning noise was suspected to be coming from the hydrator exhaust fan and solutions to address were being investigated.</p> <p>Hydrator exhaust fan belt drive /pulley configuration was adjusted to reduce the hydrator fan speed, which did not reduce overall noise level but removed tones at 250 Hz and 500 Hz, but also introduced a new tone at 630 Hz.</p> <p>The hydrator attenuator was cleaned and this significantly reduced noise levels. Hydrator attenuator is now on a quarterly cleaning frequency.</p> <p>The above actions have resolved the noise issue and there have been no further noise complaints since.</p>

Complaints for the last two reporting years are shown in the graph below.



Independent noise monitoring undertaken in May 2021 (Vipac Report 50B-21-0128-TRP-11983-2), confirmed that the site is compliant with the Environment Protection (Noise) Policy 2007 and at the time found that there was no apparent difference between the noise levels with and without the hydrator operating.

However following the Vipac Report in May 2021, the site has received nine noise complaints about an intermittent low level drone. ABC undertook further investigative work that indicated these nuisance noise complaints appeared to be related to the operation of the hydrator exhaust fan see abatement section for details.

Noise Abatement Projects	<p>In response to noise complaints about an intermittent low level drone, that appear to be related to the operation of the hydrator exhaust fan, ABC investigated if there were additional, reasonable and practical noise attenuation options that may be able to be applied to the already installed attenuator to further reduce noise emissions from the hydrator.</p> <p>The following actions were undertaken:</p> <p>Reduction in hydrator fan speed</p> <p>The hydrator exhaust fan belt drive/pulley configuration was changed in November 2021 to reduce the hydrator fan speed. Whilst this did not reduce overall noise levels from the hydrator fan, it removed tones at 250 Hz and 500 Hz, but also introduced a new tone at 630 Hz. (Vipac Report 50B-21-0128-GCO-25422). Vipac's report also indicated that the increase in noise levels from 2019 may be associated with a blockage in the attenuator and duct.</p> <p>Improved Hydrator attenuator cleaning</p> <p>The Hydrator attenuator, duct and fan was thoroughly cleaned with a pressure washer to remove build up in March 2022.</p> <p>Vipac undertook a site noise survey in March 2022 for the development of a SoundPLAN Model for the Angaston site. The Hydrator noise levels were measured as part of this survey and are compared against recent survey noise levels in the table below.</p> <table><tr><th rowspan="2">Plant / Equipment</th><th rowspan="2">Measurement Distance from Plant/Equipment</th><th colspan="4">Measured Levels dB(A)</th></tr><tr><th>March 2022 Survey</th><th>December 2021 Survey</th><th>May 2021 Survey</th><th>2019 Survey</th></tr><tr><td rowspan="3">Hydrator Fan</td><td>1m from fan (normal operation)</td><td>67</td><td>91</td><td>92</td><td>86</td></tr><tr><td>1.5 m from exhaust outlet (normal operation)</td><td></td><td>87</td><td>90</td><td>80</td></tr><tr><td>2 m from exhaust outlet (normal operation)</td><td>70</td><td></td><td></td><td></td></tr></table> <p>These measurements show that there has been a significant reduction in noise levels from the Hydrator following cleaning of the attenuator and ducting. Consequently the frequency of cleaning the hydrator attenuator/ fan and duct has been reduced to every three months.</p> <p>Effectiveness of changes implemented</p> <p>Since implementation of the above measures there has been no noise complaints.</p>	Plant / Equipment	Measurement Distance from Plant/Equipment	Measured Levels dB(A)				March 2022 Survey	December 2021 Survey	May 2021 Survey	2019 Survey	Hydrator Fan	1m from fan (normal operation)	67	91	92	86	1.5 m from exhaust outlet (normal operation)		87	90	80	2 m from exhaust outlet (normal operation)	70			
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	2 m from exhaust outlet (normal operation)	70																									
Noise Minimisation Activities	<p>ABC developed a Noise Management Plan for the Angaston site, which was approved on 25 October 2019 by the SA EPA.</p> <p>The plan outlines how ABC assesses and manages the impacts of noise generated at the Angaston site, with the aim of ensuring that</p> <ul style="list-style-type: none">Noise impacts are considered as part of routine operationsNoise emissions are controlled at source by good operational practices, physical and management controlsAppropriate, reasonable and practicable measures are taken to reduce noise emissions from the site and the impact on nearby receptors in the local community <p>Ongoing daily management of operational activities to minimise the impact of noise emissions on sensitive receptors includes:</p>																										

	<ul style="list-style-type: none"> • Maintenance of plant and equipment to minimise unnecessary noise emissions • Employees and contractors are aware of site noise requirements and their responsibilities to take action to minimise and prevent noise complaints • Ensuring that potential noise impacts are assessed and mitigated when plant modification and equipment changes are made • Investigation of noise complaints and implementation of corrective/preventative action
Plan Effectiveness	<p>Noise levels from the site operations comply with the indicative noise levels for:</p> <ul style="list-style-type: none"> • Day-time periods for all sensitive noise receivers except for two locations which are impacted by heavy traffic and other sources; Resident 3 (Traffic) and location 21 (traffic and APA station) • Night-time periods for all noise sensitive receivers. • The continuous improvement approach to managing noise emissions embodied in the Noise Management Plan is effective.
Appendix	<ul style="list-style-type: none"> • Vipac “Angaston Attended Noise Survey”, May 2021, 50B-21-0128-TRP-11983-2, 18 October 2021 • Vipac “Angaston Plant Acoustics SoundPLAN Model Report”, May 2022, 50B-22-0031-TRP-31463-1 • Vipac Memorandum “ABC Angaston Hydrator Fan & Kiln 3 Blending Silo Fan Review” 50B-21-0128, dated 22 December 2021



Vipac Engineers and Scientists Limited
33 Bacon St, Hindmarsh, SA 5007, Australia

t. +61 8 8334 0900 | e. adelaide@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627


Adelaide Brighton Cement Ltd

Angaston Environmental Noise Survey

Environmental Noise Survey Report

50B-21-0128-TRP-11983-2

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Prepared For:	Adelaide Brighton Cement Ltd PO Box 77 Port Adelaide, 5015, Australia Contact: Craig Mackenzie Tel: 08 8300 0512		
Prepared By:	Vipac Engineers and Scientists Limited 33 Bacon St, Hindmarsh, SA 5007, Australia Tel: +61 8 8334 0900		
Author:	Saksham Garg	Senior Engineer	
	18 October 2021		
Reviewer:	Mark Ogilvie	Senior Engineer	
	18 October 2021		
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1 Introduction

Adelaide Brighton Cement (ABC) operates a cement plant at Angaston, approximately 60 kilometres to the north-east of Adelaide in the Barossa Valley region of South Australia. ABC's Angaston operations are licensed by the Environment Protection Authority (EPA) for conduct of an activity identified in Schedule 1 of the *Environment Protection Act 1993* [2]. ABC's EPA licence is renewed on a 5-yearly basis, with the licence most recently renewed in 2019.

As a part of ongoing noise monitoring every 2 years, Vipac was engaged by Adelaide Brighton Cement to conduct on-site noise survey to measure noise levels from critical Angaston plant equipment/machinery and to conduct routine environmental noise survey at various residential noise sensitive receivers during EPA defined day-time and night-time period. This report summarises the applicable criteria, survey results assessed against the criteria and treatment recommendations where required.

2 References

- [1] Environment Protection (Noise) Policy 2007, Version 31.3.2008, EPA SA.
- [2] Environment Protection Act 1993.
- [3] The Barossa Council Development Plan – Consolidated 05 September 2019. *Currently revoked and replaced by The Planning & Design Code - SA.*
- [4] Guidelines for the use of the Environment Protection (Noise) Policy 2007, EPA South Australia, June 2009.
- [5] "Adelaide Brighton Cement Ltd (ABC) – EPA License 35 – Angaston Noise Survey – dated 26 November 2014", EPA Letter dated 09 January 2015.
- [6] "Angaston Noise Emissions and Assessment Summary", 50B-19-0135-TRP-8950504-0, dated 07 June 2019.
- [7] Australian Standard AS IEC 61672.1-2004 Electroacoustics – Sound level meters Specifications, Standards Australia (2004).
- [8] "ABC Angaston SoundPLAN Modelling", 50H-07-002-TRP-293536-0, dated 24 September 2007.
- [9] Planning & Design Code – South Australia, Version 2021.2, dated 19 March 2021.
- [10] Australian Standard, AS 1055.1-1996, *Acoustics – Description and measurement of environmental noise.*

3 ABC Angaston Plant Location

The ABC Angaston site is located approximately 60 kilometres to the north-east of Adelaide in the Barossa Valley region of South Australia. The plant is rurally located, approximately 1.5 kilometres to the west of the township of Angaston. The surrounding locality is transitional, comprising isolated rurally located dwellings among vineyards and other rural land uses, along with other commercial and industrial enterprises along Stockwell Road (including Hanson Concrete, Capral, Vinpac International, APA Compressor Station and the Angaston Power Station).

An overview of the ABC Angaston site and the surrounding locality with noise sensitive premises marked in red and other noise-generating operations identified in green is provided in Figure 1 below.

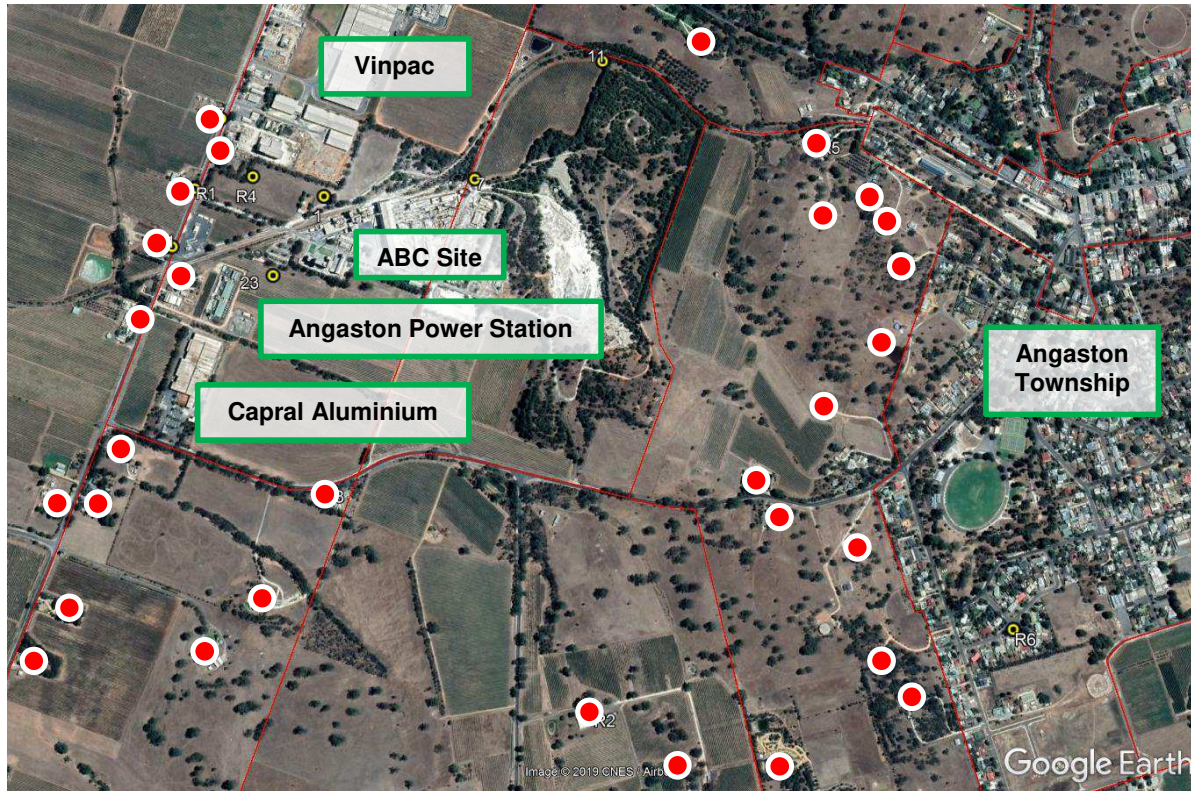


Figure 1: ABC Angaston Site and surrounding locality (rural noise sensitive premises marked in red)

4 Environmental Noise Criteria

Noise from industrial activities (such as those conducted at the ABC Angaston site) is subject to the provisions of the *Environment Protection (Noise) Policy 2007* (Noise EPP) [1]. The Noise EPP outlines Noise Goals which provide one method for demonstrating compliance with the General Environmental Duty under Section 25 of the *Environment Protection Act 1993* (the Act) [2]. Compliance with the Noise Goals may be achieved by demonstrating compliance with the Indicative Noise Levels (INLs) applicable to the site, as determined in accordance with Clause 5 of the Noise EPP and the relevant council Development Plan provisions. It is noted that with the change in SA legislation, council development plans have been superseded by The Planning & Design Code ("The Code") [9].

Indicative Noise Levels have been calculated in accordance with the procedure outlined in Clause 5 of the Noise EPP and the relevant provisions of the Code [9]. With reference to the Code and the PlanSA website, the site is located partially within the "Strategic Employment (SE)" zone, and partially within the "Rural Extraction (RE)" zone. The nearest noise sensitive receptors (NSRs) are located within various zones, including:

- Rural Zone (Ru)
- Strategic Employment (SE)
- Rural Extraction (RE)
- Neighbourhood Zone (N)
- Rural Living Zone (RuL)

With reference to the Development Plan [3] and *Guidelines for the Use of the Environment Protection (Noise) Policy 2007* [1], for the purposes of calculating INLs in accordance with the Noise EPP the following Land Use Categories are considered to be “principally promoted” by each of the relevant zones described above:

Table 1: Principally promoted Land Use Categories

Zone	Principally promoted land uses	Applicable Land Use Categories
Neighbourhood Zone	Residential character developments	Residential
Rural Living Zone	Rural residential character developments	Rural Living
Rural Zone	Primary production, warehousing etc.	Rural Industry
Strategic Employment	Primary production, horticulture, viticulture, wineries	General Industry
Rural Extraction	Mining and quarrying of minerals	General Industry

As such, in accordance with Clause 5 of the Noise EPP, Vipac derived the following Indicative Noise Levels applicable to noise emissions from ABC’s operations when assessed at Noise Sensitive Receptors (NSRs) within the relevant zones:

Table 2: Indicative Noise Levels

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Rural	Resident 1	61	53
Rural	Location #11	61	53
Rural	Location #21	61	53
Rural	Resident 3	61	53
Strategic Employment	Resident 4	65	55
Rural Living	Resident 5	56	48
Neighbourhood Zone	Resident 6	52	45

However, as per EPA’s letter to ABC (dated 09 January 2015), Vipac notes that EPA recommends the following criterion at each critical receiver. Please note that the following criteria was used by Vipac to conduct previous environmental noise assessment in 2019.

Table 3: EPA Recommended Criterion/INL

Receivers	Indicative Noise Levels (L_{eq} dB(A))	
	Day-time (7am to 10pm)	Night-time (10pm to 7am)
Resident 1	60	52
Location #11	64	55
Location #21	60	52
Resident 3	60	52
Resident 4	62	54
Resident 5	55	47
Resident 6	52	45

Please note that the survey was conducted at the receiver locations mentioned in Table 3 above. These locations congruent with the EPA's letter in regard to criterion change and the locations from Vipac's most recent monitoring campaigns [6].

4.1 Adjustment for Characteristics

For a noise containing a characteristic (tonal, impulsive, low frequency or modulating), the following adjustments are to be made to the source noise level:

- Noise containing 1 characteristic; a 5dB(A) penalty must be added to the noise level (continuous),
- Noise containing 2 characteristics; an 8dB(A) penalty must be added to the noise level (continuous),
- Noise containing 3 or 4 characteristics, a 10dB(A) penalty must be added to the noise level (continuous).

5 Attended Environmental Noise Survey

5.1 Equipment & Methodology

An attended noise survey was conducted on 04 May 2021 and 05 May 2021 at locations highlighted in Figure 2 and Table 4. The measurements were conducted during EPA defined day-time and night-time period, to measure the noise impact to the nearest noise sensitive receivers due to ABC plant operation. Following methodology and equipment were used to conduct the survey:

- Measurements using the noise descriptors L_{Aeq} and L_{A90} were taken for a period of 15 minutes at each receiver location. Day-time measurements were conducted on 04 May 2021 between 02:00PM – 05:00PM and night-time measurements were conducted between 10:00PM on 04 May 2021 and 12:30AM 05 May 2021.
- Where possible, measurements were paused to avoid influence from the extraneous sources (such as traffic, etc.).
- Where heavy traffic was observed and pausing the measurement was not possible, Vipac has provided comments to reflect the noise influence.
- The wind conditions during the survey (measurement period) are presented in Appendix B.

- Equipment details:
 - Model – Brüel & Kjær Type 2250 Class 1 sound level meter (sound level meter satisfies the requirements of AS IEC 61672.1-2004 [7]).
 - Serial number – 3012267
 - Calibration – Due for calibrated on February 2022
 - Spot calibration check – The calibration of the sound level meter was checked before and after measurements and no drift in sensitivity was detected.

Table 4: Attended Noise Monitoring Locations

Location ID	Location Description
Resident 1 (#20a)	Stockwell Rd opposite ABC main entrance at the Fibiger property (830-846 Stockwell Rd)
Resident 3 (#27a)	At resident's house 300m west of the intersection of Crennis Mines Rd and Long Gully Rd
Resident 4 (#18)	Corner fence post on ABC boundary fence opposite large shed of neighbouring manufacturing firm, adjacent house
Resident 5	53 Fife Street (rear lawn facing Angaston) ¹
Resident 6	3 Hague Street, Angaston
#11	Near ABC plant entrance gate at the most northerly point of the boundary fence, alongside old railway line
#21	Stockwell Rd opposite the Gas distribution facility – next to 'stobie' pole

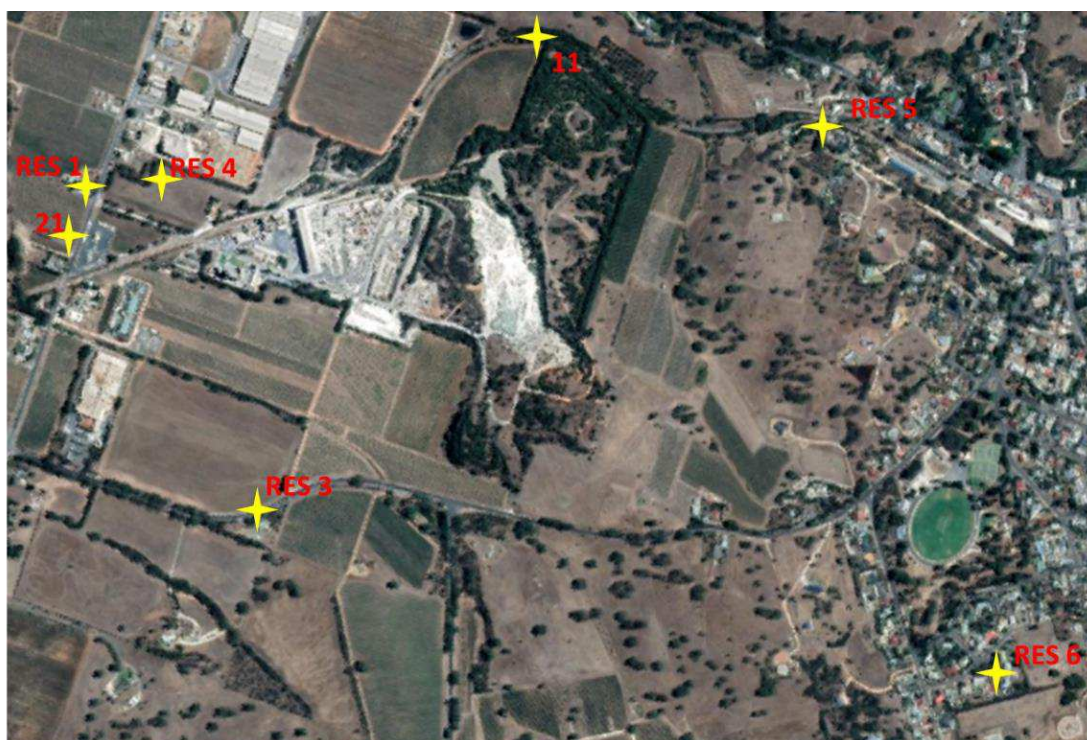


Figure 2: Attended Noise Monitoring Locations

¹ Access to the rear lawn of 55 Fife Street was not available. Therefore, the measurement was conducted on Fife Street in front of the house.

5.2 Survey Results & Discussion

The results of the survey conducted at noise sensitive receivers, assessed against the stipulated criterion (for criterion refer Table 3 above), is presented in Table 5 and Table 6 below.

Please note that the results for day-time and night-time measurements at each location have been graphically presented in Appendix A.

5.2.1 Day-Time Survey

Table 5: Day-Time Environmental Noise Survey Results

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Day-Time) dB(A)	Compliance
	L _{Aeq}	L _{A90}			
Resident 1 (02:55PM)	56	52	<ul style="list-style-type: none"> - Heavy influence due to traffic movements (dominant source) - Noise influence from road works on Stockwell Road - High noise influence from APA Compressor Station (continuously audible) - Plant just audible due to high extraneous noise (APA Station and traffic) 	60	Complies
Resident 3 (03:45PM)	71	42	<ul style="list-style-type: none"> - Very high traffic volumes observed, which influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Vipac considers L_{A90} to be an appropriate descriptor of noise from ABC plant, due to traffic noise influence - Where possible Vipac paused measurement during truck pass by, however, not paused for cars/utes pass-by. - Plant was inaudible 	60	Does not comply (Acceptable)
Resident 4 (02:35PM)	53	49	<ul style="list-style-type: none"> - Minor traffic noise and road works noise influenced the measurements - Plant slightly audible - Bird noise influence 	62	Complies
Resident 5 (03:20PM)	46	38	<ul style="list-style-type: none"> - Minimum traffic noise influence - Dog barking at nearby property - Plant not audible - No tones detected 	55	Complies
Resident 6 (04:40PM)	42	37	<ul style="list-style-type: none"> - No traffic noise influence - Plant not audible - Bird noise and dog barking influence 	52	Complies

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Day-Time) dB(A)	Compliance
	L _{Aeq}	L _{A90}			
#11 (02:03PM)	41	35	<ul style="list-style-type: none"> - Traffic noise influence from nearby roads - Plant not audible 	64	Complies
#21 (04:16PM)	65	47	<ul style="list-style-type: none"> - Very high traffic volumes observed, which influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Vipac considers L_{A90} to be an appropriate descriptor of noise from ABC plant, due to traffic noise influence - Where possible Vipac paused measurement during truck pass by, however, not paused for cars/utes pass by. - Noise influence from APA Compressor Station (continuously audible) - Plant was inaudible. 	60	Does not comply (Acceptable)

With reference to the results presented above and the graphs presented in Appendix A, Vipac notes makes the following comments:

- No tonal characteristic, resulting due to ABC plant operation, was observed at any NSR. This is further discussed in **Section 5.3**.
- The stipulated day-time criterion was achieved at all NSR's except **Resident 3** and **Location 21**.
- **Resident 3**
 - Noise due to traffic movements affected the day-time measurements at Resident 3. Therefore, L_{A90} descriptor was considered more appropriate to measure noise influence from ABC plant. Vipac notes that the L_{A90} levels were well below the day-time limits.
 - In addition to above, no audible noise from ABC plant was noted at this location.
 - As such, Vipac considers the noise influence from ABC to be **compliant** at this location.
- **Location #21**
 - Noise due to traffic movements on Stockwell Road and continuous operational noise from APA Station (pump/generator noise) affected the day-time measurements at Location 11.
 - Therefore, L_{A90} descriptor was considered more appropriate to measure noise influence from ABC plant. Vipac notes that the L_{A90} levels were well below the day-time limits.
 - In addition to above, no audible noise from ABC plant was noted at this location.
 - As such, Vipac considers the noise influence from ABC to be **compliant** at this location.

Overall, due to extraneous noise influence (traffic noise, APA Station noise, etc.) at most of the NSR locations, Vipac considers the L_{A90} descriptor to be more appropriate to measure noise influence from ABC plant for day-time measurements.

5.2.2 Night-Time Survey

Table 6: Night-Time Environmental Noise Survey Results

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Night-Time) dB(A)	Compliance
	L _{Aeq}	L _{A90}			
Resident 1	53	51	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	52	Minor Non-Compliance (Acceptable)
Resident 3	39	36	<ul style="list-style-type: none"> - Minor influence due to distant traffic movements - ABC plant slightly audible - Some noise influence from CAPRAL plant due to internal car/truck movements. 	52	Complies
Resident 4	49	47	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	54	Complies
Resident 5	42 ²	29	<ul style="list-style-type: none"> - Plant not audible - Traffic noise slightly audible - 50Hz tone observed 	47	Complies
Resident 6	40	36	<ul style="list-style-type: none"> - The hydrator was operational at that time - Tree noise - Plant not audible - Distant traffic movements audible 	45	Complies

² 8 dB(A) penalty included for 2 noise characteristics. Discussed in sections below.

Receiver Location	Measured Noise Levels dB(A)		Comments	Assessment Criterion (Night-Time) dB(A)	Compliance
	L _{Aeq}	L _{A90}			
Resident 6 (without hydrator working)	40	36	<ul style="list-style-type: none"> - Hydrator was not operational during this measurement - Tree noise - Plant not audible - Distant traffic movements audible 	45	Complies
#11	42	37	<ul style="list-style-type: none"> - Distant traffic movement noise - Tree noise - Plant inaudible 	55	Complies
#21	45	43	<ul style="list-style-type: none"> - Major noise influence from APA Compressor Station (dominant source). - The noise seemed to be continuous generator/pump noise from APA Station. - Plant slightly audible. 	52	Complies

With reference to the results presented above and the graphs presented in Appendix A, Vipac notes makes the following comments:

- The stipulated night-time criterion at each residential receiver was achieved, except **Resident 1**, which showed minor-noncompliance (~1dB(A)).
- No tonal characteristic, resulting due to ABC plant operation, was observed at any NSR, except Resident 5 (50Hz tone). This is further discussed in **Section 5.3**.
- Resident 1**
 - Major noise influence from APA Station across the road from Resident 1 was observed during the survey. Continuous generator/pump type noise was audible and was observed to be major noise source. The actual noise from ABC plant was not audible due to noise from APA station noise.
 - As such, the noise impact due to ABC plant operation is negligible as compared to noise impact due to APA Station. Therefore, Vipac considers ABC to be **compliant** against the night-time noise criterion at Resident 1 location.
- APA Pump Station Noise Influence**
 - Compared to day-time noise survey, major noise influence from APA Station was observed during the night-time survey.
 - At the following locations, the APA Station was observed to be the dominant noise source
 - Resident 1
 - Resident 4
 - Location #21
 - At each of the above locations, a tonal component of 50Hz was also observed, which was associated with the APA Station. This was confirmed by an additional noise measurement conducted at 2m away from the APA Station boundary (L_{Aeq} 59 dB(A), L_{A90} 58 dB(A), with tonal component at 50Hz).

- Based on our subjective observation, the Station noise sounded similar to characteristic pump and generator noise.

• Resident 6

Based on the information provided by ABC in regard to noise issues in the areas around Resident 6, Vipac conducted 2-sets of measurements at this location, one with the hydrator on and one without the hydrator operational.

- The measurements showed no apparent difference between the noise levels with and without the hydrator operational.
- There was no difference in the measured $L_{Aeq,15min}$ and L_{A90} noise level descriptors.
- No tonal or low frequency components were observed in both cases.
- The octave-band data is presented below. The Octave band data shows no significant change in the levels. 16Hz frequency shows a decrease in levels once the Hydrator was switched ON, which may have been associated with the ambient noise sources.

Table 7: Octave band data for Resident 6 measurements

Resident 6	$L_{Aeq,15min}$ Octave Band Data										
	16Hz	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
Hydrator OFF	57	48	44	39	37	35	35	31	29	25	18
Hydrator ON	51	44	42	39	37	36	35	32	30	25	17

Vipac notes that the ABC has installed an attenuator (silencer) on the hydrator to ensure the noise levels are kept to the minimum. Since installed (10+ years), the attenuator is maintained regularly, including regular cleaning and unblocking any material build up in the attenuator. Also, considering the separation between the hydrator and Resident 6, it is considered unlikely that the Hydrator or any other equipment/machinery at ABC would be audible at this location. However, unfavourable wind conditions (high wind speeds blowing from ABC towards Resident 6) may result in faint noise influence at this location, which is not expected to occur more than a few times a year.

As such, considering the factors discussed above and summarised below, Vipac believes that ABC have implemented all reasonable and practicable measures to reduce the noise impact to the resident, and hence, satisfies the General Environmental Duty applicable under Section 25 of the Act [2].

- Installation of an attenuator.
- Regular maintenance of the attenuator and the hydrator fan
- Large separation between the resident and the ABC plant
- Few events of minimal noise influence observed at that location during unfavourable wind conditions (possibly). Vipac believes that the noise experienced by the resident may be associated with a different source.
- No difference in noise levels observed by Vipac with and without the hydrator operating.

5.3 Noise Characteristics

To assess the requirements provided in Part 2 Clause 14 Subclause 3 of Noise EPP for noise characteristics, Vipac conducted an assessment to identify noise characteristics such as tonal, low frequency, modulating and impulsive characteristic at each NSR location. The results of our assessment are discussed below.

5.3.1 Tonal Characteristic

An objective test was conducted in accordance with AS 1055.1-1997 [10] to identify tones at each NSR. The results are presented below:

Table 8: Tonal Characteristic Check

Receiver Location	Day-Time	Night-Time
Resident 1	No	Yes - At 50Hz
Resident 3	No	No
Resident 4	Yes - At 50Hz	Yes - At 50Hz
Resident 5	No	Yes - At 50Hz
Resident 6	No	No
#11	No	No
#21	No	Yes - At 50Hz

- The 50Hz tonal characteristic observed at locations Resident 1, Resident 4 and Location 21 was associated with noise emanating from APA Pump Station (as discussed above).
- The 50Hz tonal characteristic was observed at Resident 5 during night-time survey. Based on our subjective observation on site, Vipac believes this characteristic may be associated with Kiln 3 Blending Silo Fan. As such, Vipac has considered a penalty in the values presented above.

As such, apart from resident 5, Vipac notes that the tonal characteristics identified during the survey were not associated with the noise emanating from ABC plant, and therefore, no tonal characteristic penalty is warranted.

5.3.2 Low Frequency Characteristic

In accordance with *New South Wales Industrial Noise Policy (1999)*, a difference of 15dB or more between the 'A' and 'C' weighted equivalent noise levels establish the presence of low frequency characteristic. As such, based on the measured levels, low frequency characteristic was noted at the following locations:

Table 9: Low Frequency Characteristic Check

Receiver Location	Day-Time	Night-Time
Resident 1	Yes	Yes
Resident 3	No	Yes
Resident 4	No	Yes
Resident 5	No	Yes
Resident 6	No	No
#11	No	No
#21	No	Yes

- The low frequency characteristic observed at locations Resident 1, Resident 4 and Location 21 was associated with the continuous noise from APA Station. This was confirmed with the low frequency characteristic identified in the noise levels measured at 2m from the Station boundary.
- At Resident 3 location, the low frequency characteristic was driven by the noise from CAPRAL plant (car/truck movements and fan noise) and traffic movements on Stockwell Road.
- As discussed above, at Resident 5 location, based on our subjective observation on site, Vipac believes this characteristic may be associated with Kiln 3 Blending Silo Fan. As such, a characteristic penalty has been considered in the results presented above (for night-time results only).

As such, apart from Resident 5, Vipac notes that the tonal characteristics identified during the survey were not associated with the noise emanating from ABC plant, and therefore, no low frequency characteristic penalty is warranted.

5.3.3 Modulating Characteristic

Modulating characteristic is often described as varying, fluctuating, pulsating or changing noise characteristic, which is usually clearly audible. Even though no objective test was conducted to identify modulating characteristic, Vipac notes that, subjectively no modulating characteristic was observed during the day-time and night-time noise survey.

5.3.4 Impulsive Characteristic

Impulsive characteristic is often described as thumping, banging or impact noise usually clearly audible above everything else. No objective test was conducted to identify impulsive characteristic, however, Vipac notes that no impulsive noise events, associated with the plant operation, were observed during the noise survey.

5.4 Comparison with previous monitoring campaign

Vipac assessed the noise levels measured during the survey against the 2019 & 2014 noise survey results [5] and 2007 noise modelling data [8], as shown in Table 10 and Table 11 below:

5.4.1 Day-Time Comparison

Table 10: Day-time measurements comparison

Receiver Location	Measured Noise Levels, dB(A) Day-Time						September 2007 Predicted L _{Aeq} under worst meteorological conditions
	2021		2019		2014		
	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}	
Resident 1	56	52 ⁽²⁾	48	45	-	-	46
Resident 3	71	42 ⁽²⁾	68	48 ⁽²⁾	71	46 ⁽²⁾	49 ⁽¹⁾
Resident 4	53	49 ⁽²⁾	48	42	49	44	49
Resident 5	46	38	42	38	39	33	34 ⁽¹⁾
Resident 6	42	37	41	33	42	36	-
Location #11	41	35	43	39	39	36	-
Location #21	65	47 ⁽²⁾	58	49 ⁽²⁾	67	43 ⁽²⁾	-

(1) Tonal penalty of 5dB(A) considered in the presented value.

(2) L_{A90} descriptor was considered to assess the noise levels, due to L_{Aeq} measurements being contaminated with extraneous noise sources (traffic, etc.).

Based on the comparison results presented above, Vipac comments as follows:

- The noise levels measured at Resident 1, Resident 4 and Resident 5 are slightly higher than the noise levels measured during the 2019 and 2014 survey [5], however within the criterion and are considered acceptable. The increase in noise levels have been associated with extraneous noise source influence, such as traffic noise, road work noise, noise from APA Pump Station, etc.
- Noise levels measured at other locations were similar to or lower than the measured noise levels in 2019 and 2014 survey and are lower than the noise levels predicted using the SoundPLAN modelling [8].

5.4.2 Night-Time Comparison

Table 11: Night-time measurements comparison

Receiver Location	Measured Noise Levels, dB(A) Night-Time						September 2007 Predicted L _{Aeq} under worst meteorological conditions
	2021		2019		2014		
	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}	
Resident 1	53	51 ⁽²⁾	47	44	-	-	46
Resident 3	39	36 ⁽²⁾	45	42	61	44 ⁽²⁾	49 ⁽¹⁾
Resident 4	49	47 ⁽²⁾	47	45	47	45	49
Resident 5	42 ⁽³⁾	29	37	31	32	27	34 ⁽¹⁾
Resident 6	40	36	38	35	33	29	-
Location #11	42	37	38	27	40	38	-
Location #21	45	43 ⁽²⁾	48	44	64	41 ⁽²⁾	-

(1) Tonal penalty of 5dB(A) considered in the presented value.

(2) L_{A90} descriptor was considered to assess the noise levels, due to L_{Aeq} measurements being contaminated with extraneous noise sources (traffic, etc.).

(3) 8dB(A) penalty for noise characteristics (2-off) applied (discussed below).

Based on the results compared above, Vipac notes the following:

- The noise levels measured at Resident 1, Resident 4, Resident 6 and Location 11 are slightly higher than the noise levels measured during the 2019 and 2014 survey [5], however within the criterion. As discussed in previous sections, the increase in noise levels have been associated with extraneous noise source influence, such as traffic noise, noise from APA Pump Station, etc.
- Penalty for 2 noise characteristics (8 dB(A)) was applied to the noise levels measured at Resident 5 (night-time only). Vipac believes the observed noise characteristics are possibly associated with Kiln 3 Blending Silo Fan.
- Noise levels measured at other locations were similar to or lower than the measured noise levels in 2019 and 2014 survey and are lower than the noise levels predicted using the SoundPLAN modelling [8].

6 Attended On-Site Survey

6.1 Results

In addition to the environmental noise survey, a survey was conducted on-site (at ABC Angaston plant on 04 May 2021 between 11:00AM – 2:00PM) to measure the noise emissions from the equipment considered major noise sources during previous monitoring campaigns and were rectified during various noise abatements projects throughout the years [6]. The equipment/plant surveyed during the site visit with corresponding measured noise levels are presented below.

Table 12: On-site Survey Measurements

Plant/Equipment	Measurement Distance from Plant/Equipment	Measured Levels dB(A)		Notes
		2021 Survey	2019 Survey	
Kiln 3 Blending Silo Fan	1.5 from the fan (inside)	98	90	<ul style="list-style-type: none"> - Measurement taken inside the room housing the fan. - Tonal component observed at 50Hz and 630Hz. - 630Hz tone possibly due to the surrounding equipment as no 630Hz tonal component was observed in the outdoor measurement at the exhaust outlet. - Noise levels higher than the 2019 survey
	3m from the exhaust outlet	79	76	<ul style="list-style-type: none"> - Tones observed at 50Hz, 100Hz and 315Hz - No tones were observed in 2019 survey - Noise levels higher than the 2019 survey
H17 Hydrator Scrubbing Fan	1m from the fan	92	86	<ul style="list-style-type: none"> - Tonal component at 250Hz and 500Hz identified - Noise level higher than 2019 survey
	1.5m from the exhaust outlet	90	80	<ul style="list-style-type: none"> - Tone at 500Hz present at the exhaust outlet - Noise level higher than 2019 survey
Raw Mill Filter Exhaust R15 Fan	1m from fan (indoor)	86	86	<ul style="list-style-type: none"> - No tones observed - Access to roof was not available, therefore measurement was taken inside the building
Raw Mill Filter Exhaust R15 & R16 Fan	50m from the fans, near carpark	68	67	<ul style="list-style-type: none"> - Noise influence from R15 and R16 was measured - No tones observed - Noise levels similar to 2019 survey
Raw Mill Filter Exhaust R16 Fan	1m from fan (indoor)	88	-	<ul style="list-style-type: none"> - No tones observed - Access to roof was not available, therefore measurement was taken inside the building
Cement Mill 4 Fan	2m from the exhaust outlet	75	74	<ul style="list-style-type: none"> - Noise measurements taken on roof - No tones - Noise level similar to 2019 survey

6.2 Discussion

Kiln 3 Blending Silo Fan

Based on the survey results above, Vipac comments as follows:

- Tonal component
 - Tonality at 630Hz was observed when the measurement was taken inside the building, however, no tonal component was observed when the measurement taken outside the building (near the exhaust outlet of the fan). Therefore, Vipac considers the tonality would have resulted due to other plant equipment within the building. Please note that no tonality at 630Hz was observed at any receiver location during the environmental noise survey.
 - Tonality at 50Hz was observed both inside and outside (at exhaust outlet) the building. Since no tones at 50Hz were observed in 2019 survey, Vipac believes this to be associated with the silo fan.
 - Tonality at 100Hz and 315Hz also observed at the exhaust outlet point. Vipac notes that the tonal component was associated with the silo fan.
- Overall noise levels – Significant increase in overall noise levels was observed at both the measurement points.

Based on the discussion above and comparison with 2019 survey results, Vipac believes that the increase in noise levels and the associated tonality may be associated with the attenuator/silencer being blocked. ABC had previously confirmed that weekly (scheduled) maintenance was being conducted on the fan and the attenuator. Vipac recommends the maintenance logs be checked and ABC to confirm if the attenuator maintenance works were changed since 2019 survey.

H17 Hydrator Scrubbing Fan

Based on the survey results above, Vipac comments as follows:

- Tonal component
 - Similar to 2019 survey tonal component at 250Hz was observed when measurement was conducted at close proximity to the fan. Please note that 250Hz tonal component was observed during the previous monitoring campaigns and it was considered to be associated with the H17 fan [6]. However, due to the low energy, the tonal component was not observed at any receiver locations.
 - Unlike 2019 survey, tonal component at 500Hz was also observed at both the fan location and the exhaust outlet location. Vipac believes that the tonality at 500Hz is also associated with the fan (possibly associated with the fan belt). However, no 500Hz tonal component was observed at any NSR locations.
- Overall noise levels – Significant increase (8-10 dB(A)) in overall noise levels was observed at both the measurement points.

Raw Mill Filter Exhaust R15 & R16 Fan

Based on the survey results above, Vipac comments as follows:

- No tonal components were identified.
- The measured noise levels were similar to the 2019 survey results.

CM4 Fan

Based on the survey results above, Vipac comments as follows:

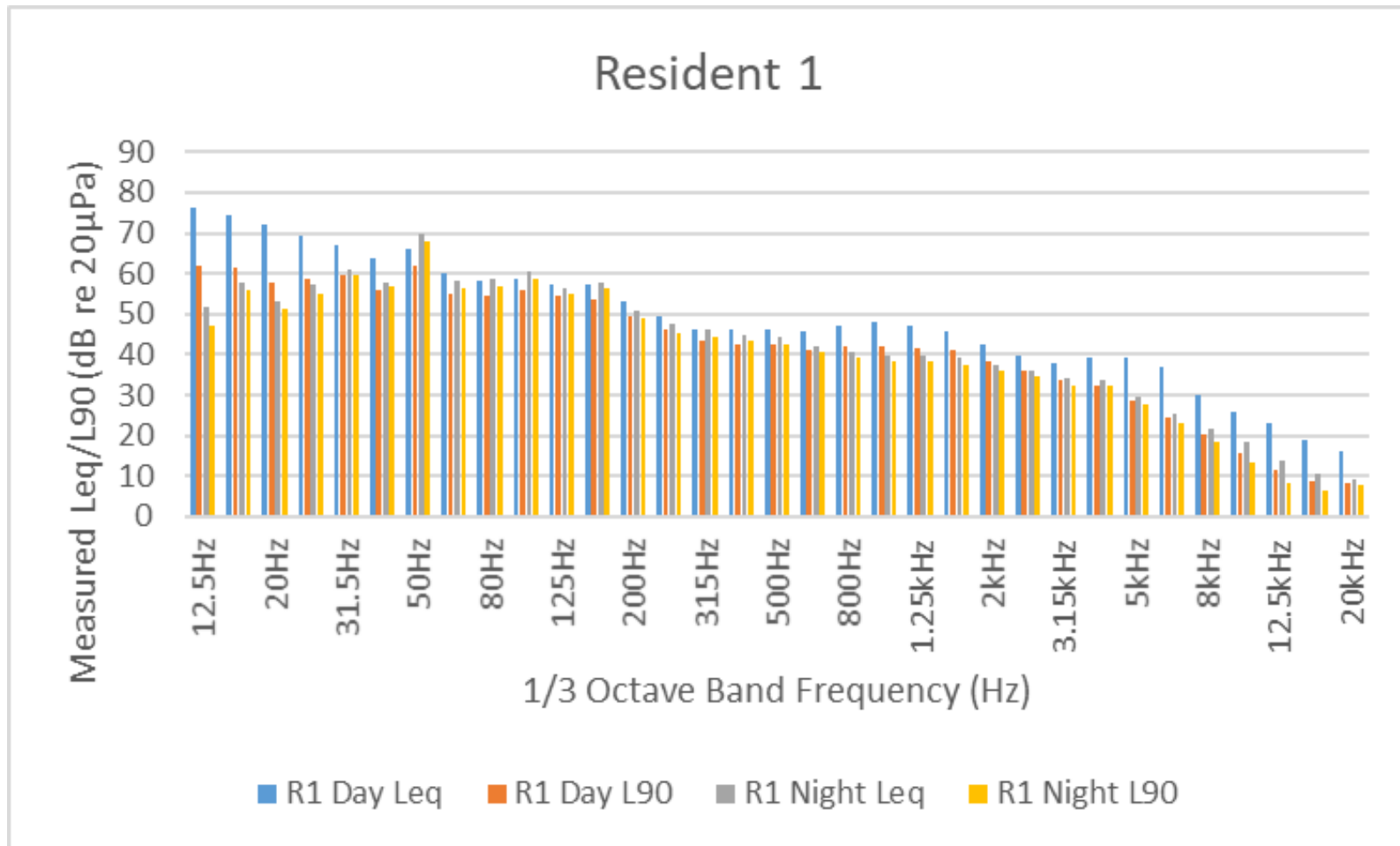
- No tonal components were identified.
- The measured noise levels were similar to the 2019 survey results.

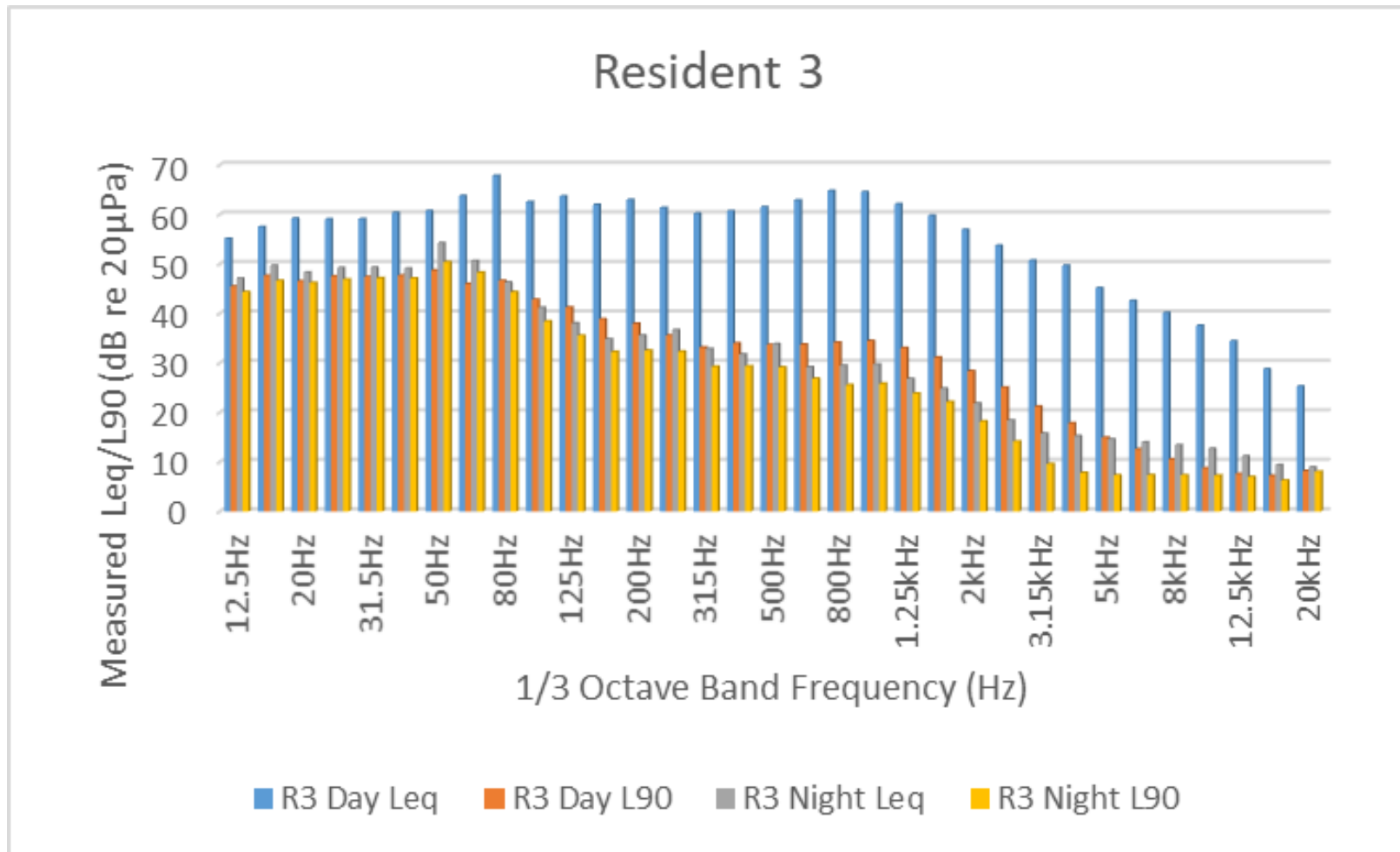
7 Conclusion

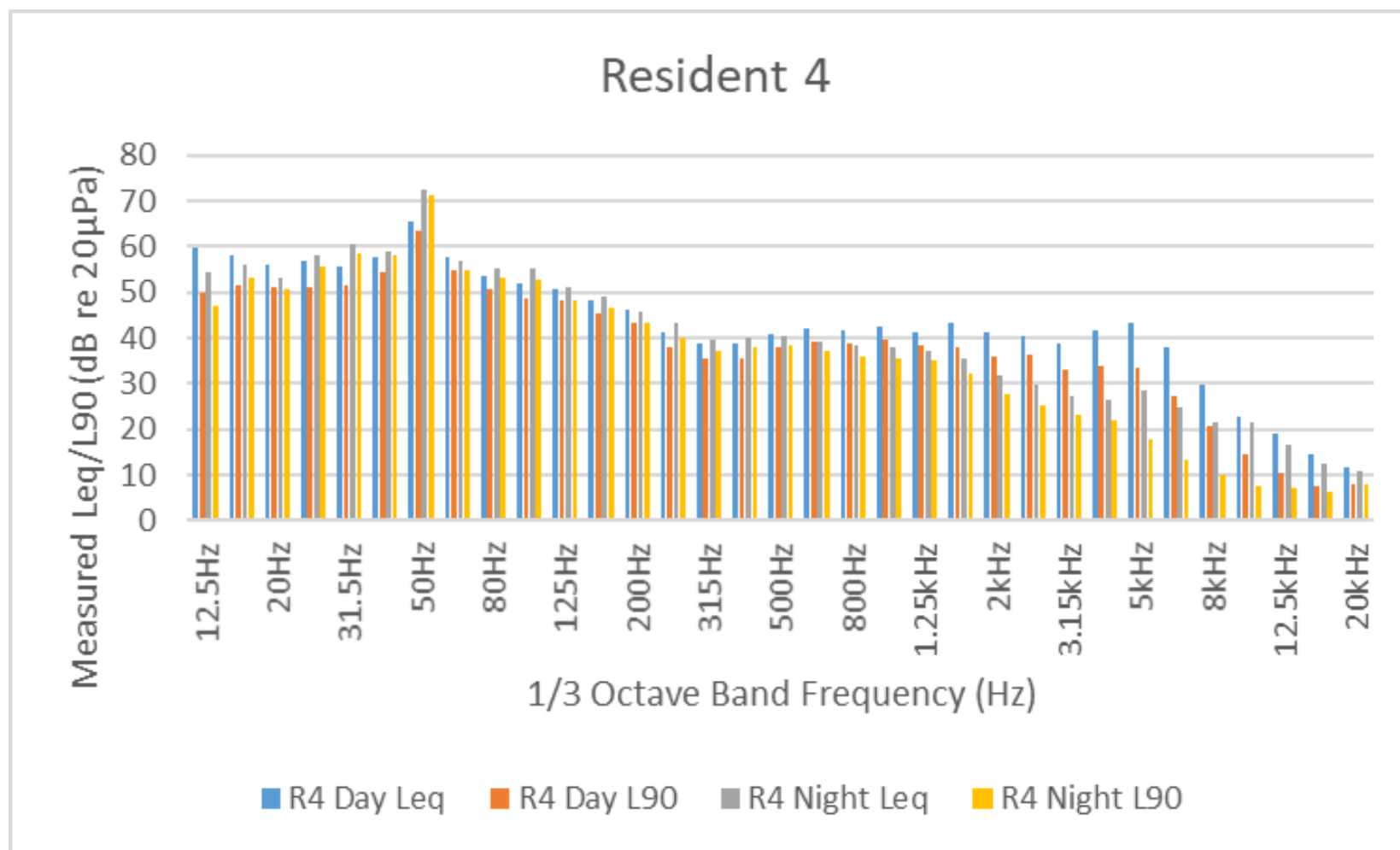
Vipac was engaged by Adelaide Brighton Cement to conduct on-site noise survey to measure noise levels from critical Angaston plant equipment/machinery and to conduct routine environmental noise survey at various residential noise sensitive receivers during EPA defined day-time and night-time period. The survey results indicate general compliance with the EPA criteria. However, based on the assessment, Vipac notes the following critical conclusions:

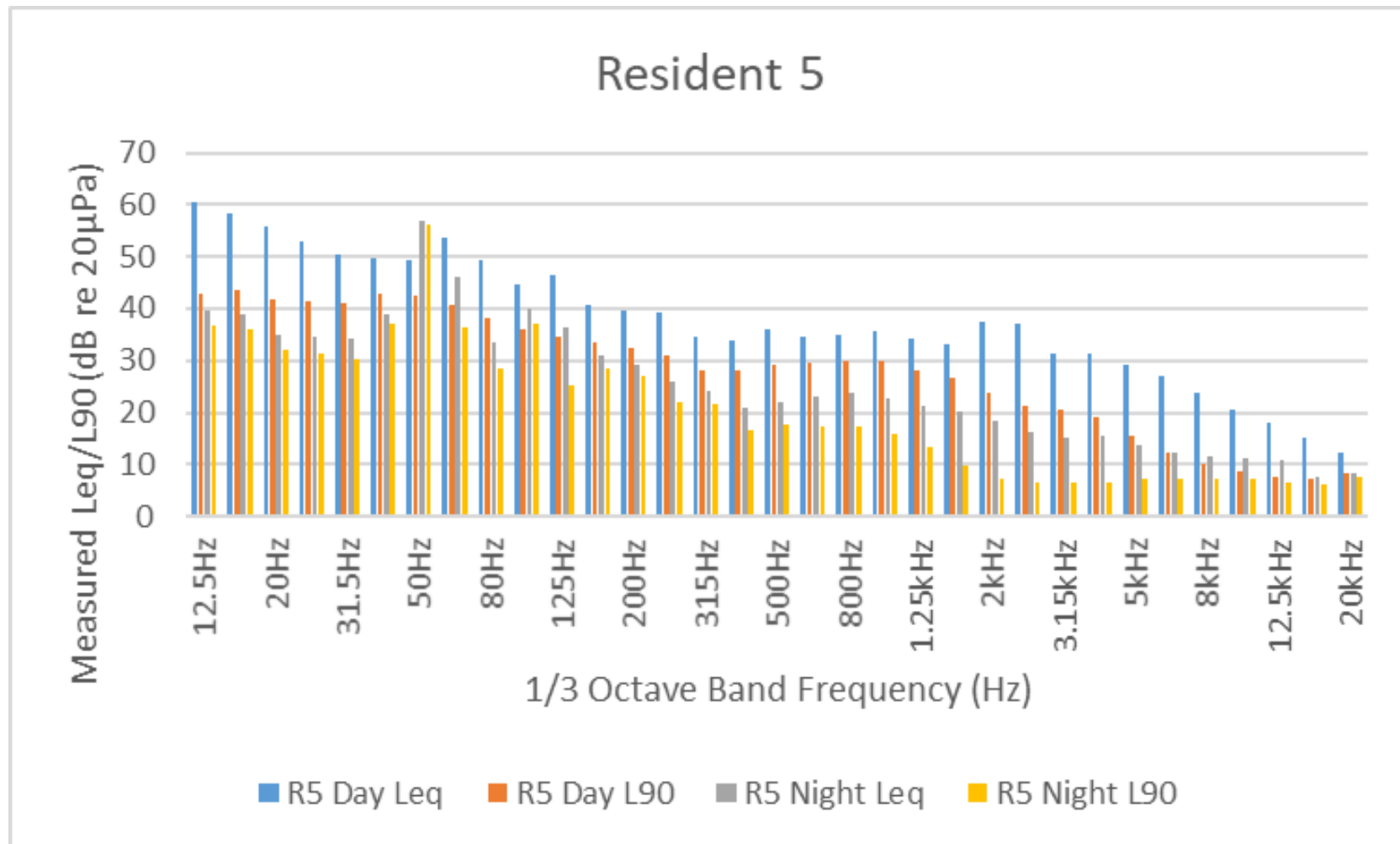
- Kiln 3 Blending Silo Fan
 - New tonal components (50Hz, 100Hz & 315Hz) were observed at the exhaust outlet. Vipac believes this is associated with the attenuator being not serviced (to be confirmed by ABC).
 - The exhaust outlet indicated significant increase in noise levels, which may be associated with the deteriorated attenuator performance.
- H17 Hydrator Fan
 - Significant increase in noise levels was observed. Vipac believes that this may be associated with the maintenance works conducted on the fan (specifically the fan belt). Vipac suggests ABC to review the latest maintenance records to monitor the changes to the fan (including belt).
- Noise Sensitive Receivers
 - Noise levels at most of the receivers were either similar or lower than the previous surveys.
 - Slight increase in incident noise levels were observed at some receivers. This was mostly associated with the inclusion of new extraneous sources in the locality (APA Station, CAPRAL, etc.).
 - Tonal and low frequency noise influence was observed at Resident 5 location (penalty included). Vipac believes that the characteristics observed at R5 were associated with Kiln 3 Blending Silo Fan.

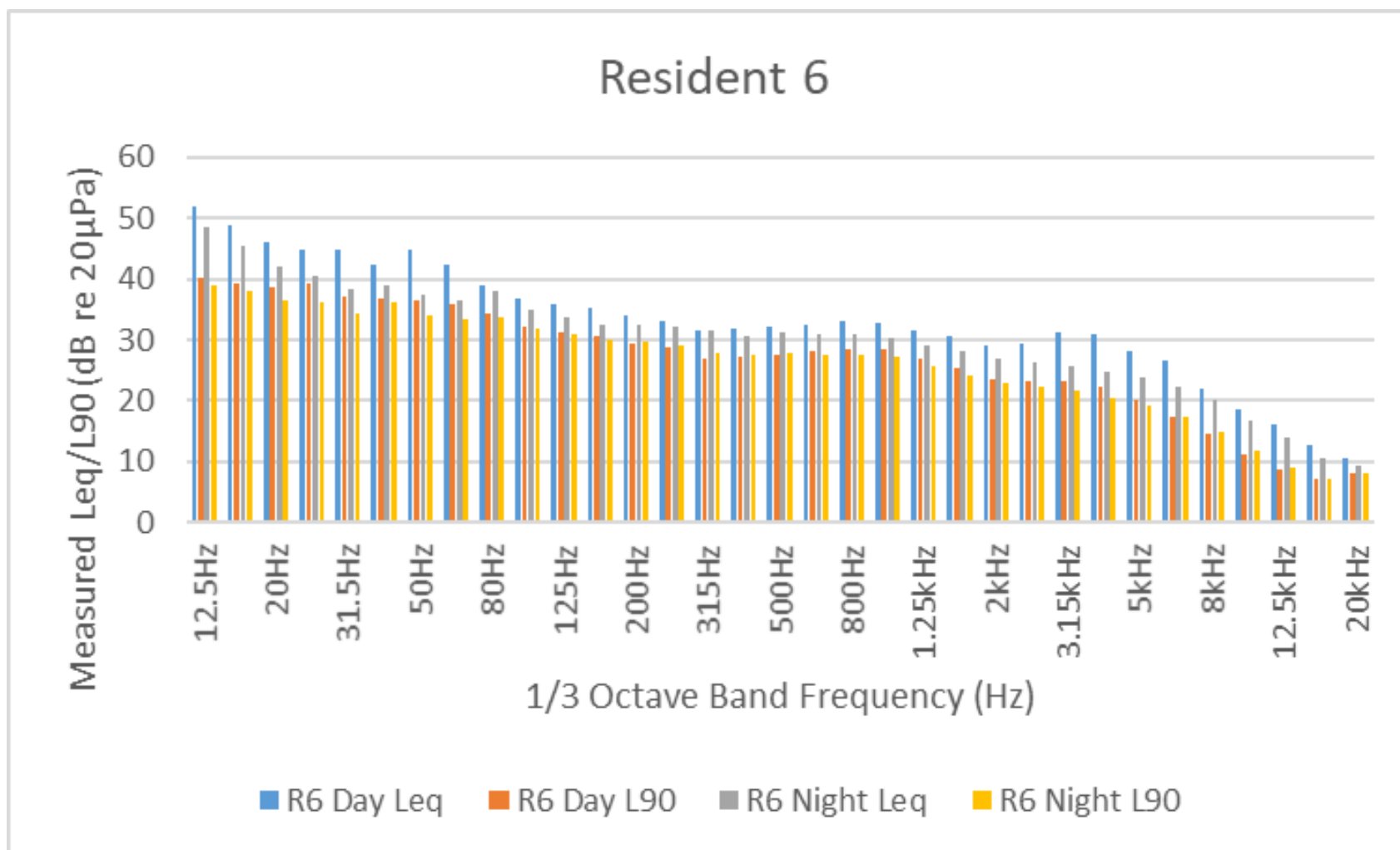
Appendix A Environmental Noise Survey Data

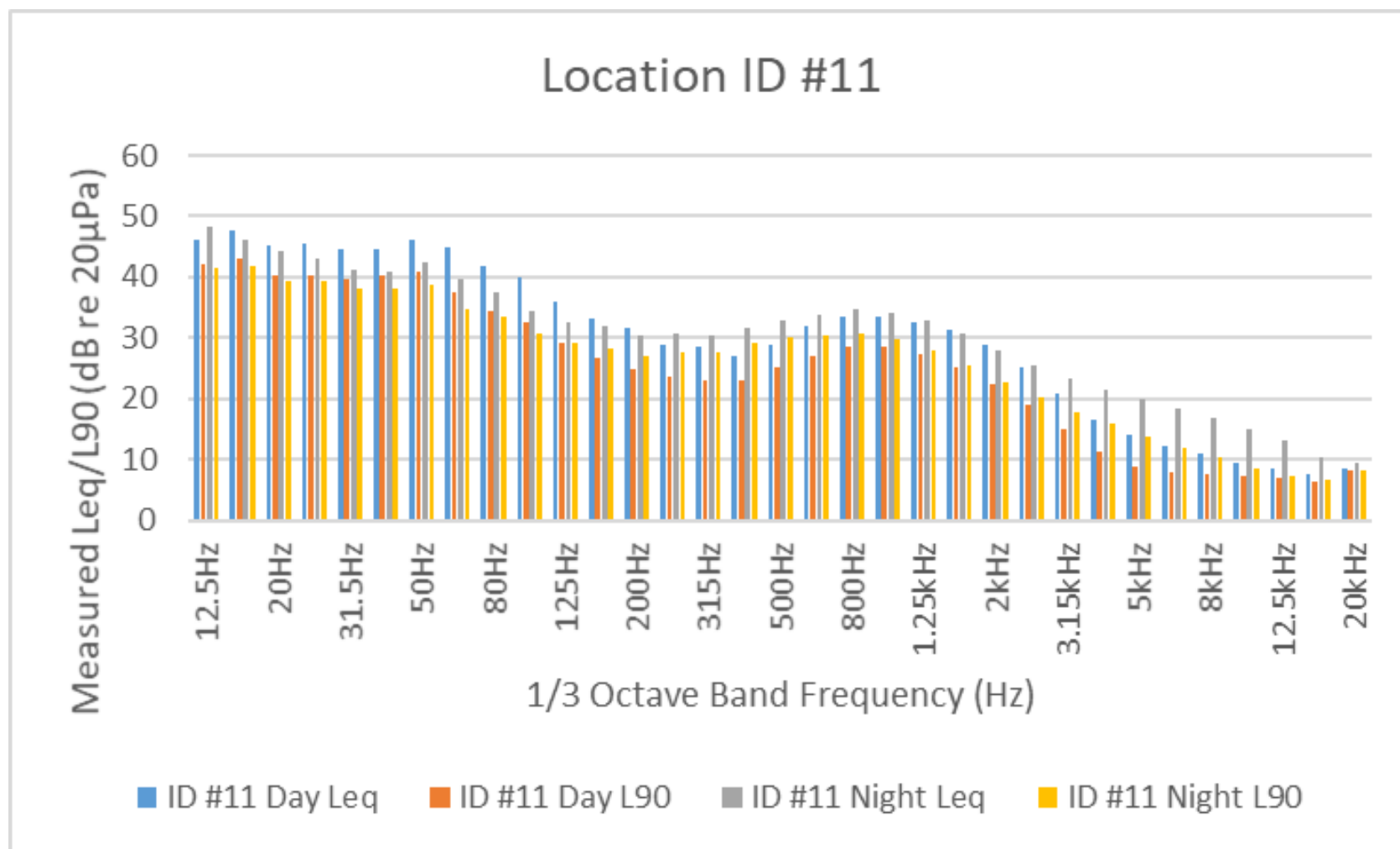


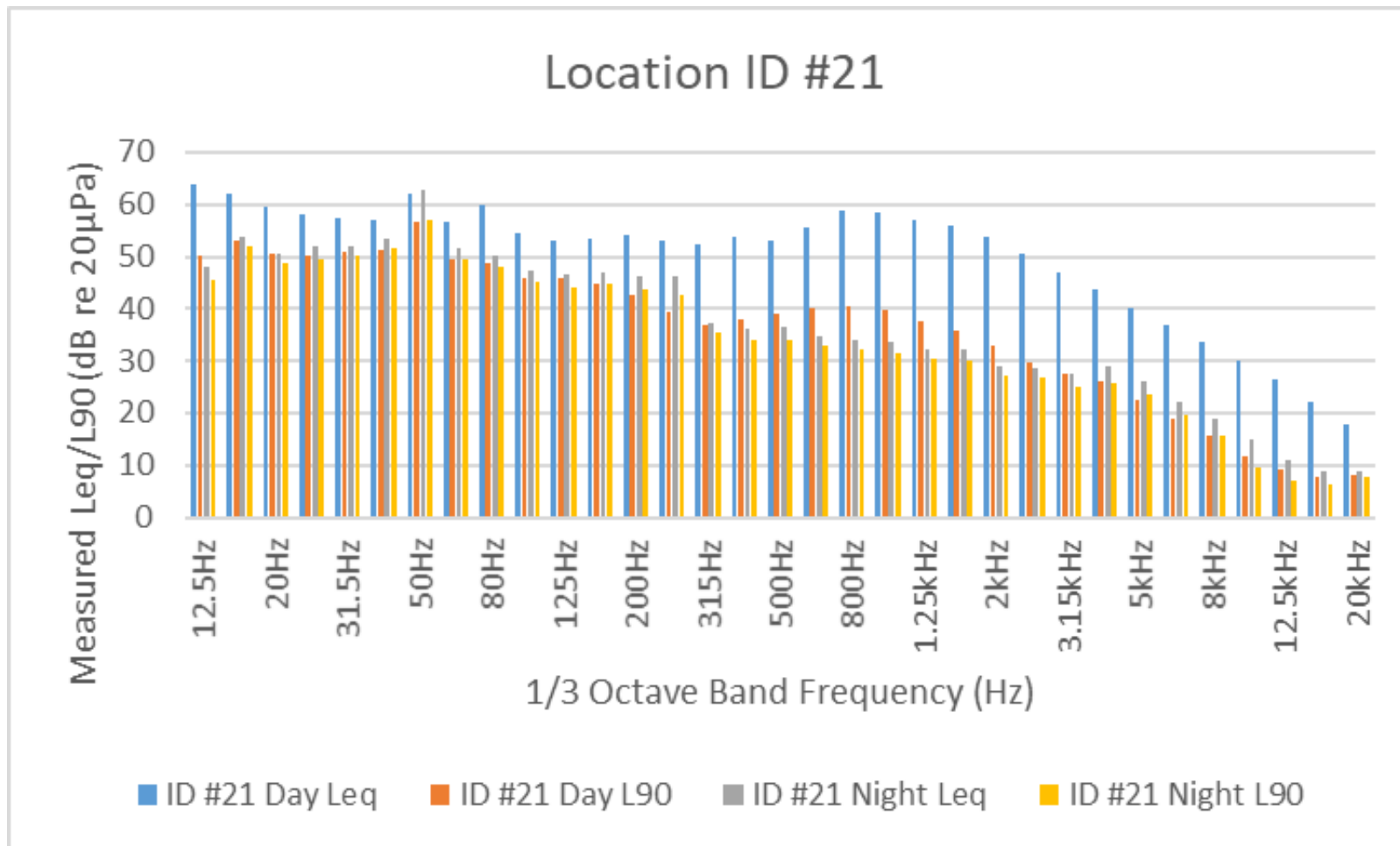












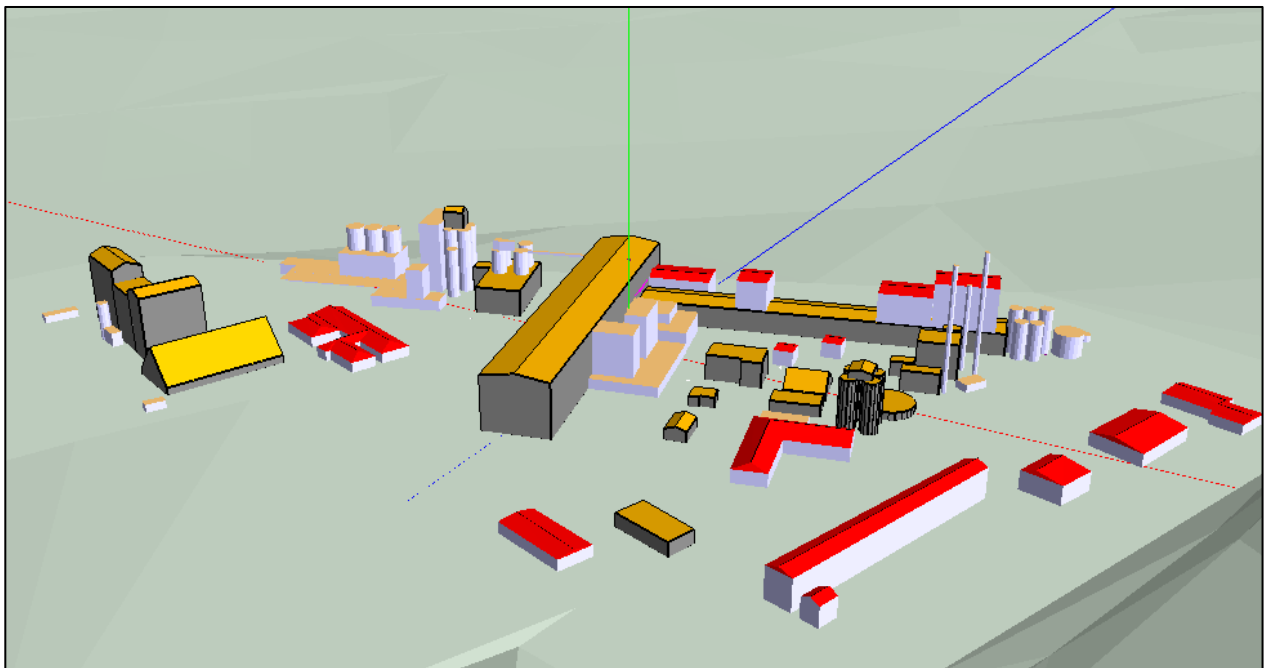
Appendix B METEOROLOGY DATA

Data Reference – Bureau of Meteorology (Australian Government), http://www.bom.gov.au/climate/dwo/IDCJDW5049.latest.shtml Weather Station – Nuriootpa Pirs (ID 023373)																
Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)	Direction of maximum wind gust	Speed of maximum wind gust (km/h)	Time of maximum wind gust	9am Temperature (°C)	9am relative humidity (%)	9am wind direction	9am wind speed (km/h)	9am MSL pressure (hPa)	3pm Temperature (°C)	3pm relative humidity (%)	3pm wind direction	3pm wind speed (km/h)	3pm MSL pressure (hPa)
4/05/2021	5.3	15.5	0	SSW	39	13:09	11	71	SSE	11	1027.1	14.3	46	S	22	1024.5
5/05/2021	5.4	17.1	0	ESE	33	9:30	10.7	65	ESE	17	1026.4	16.8	45	ESE	11	1022.8

Adelaide Brighton Cement Ltd


Angaston Plant Acoustics

SoundPLAN Model Report



50B-22-0031-TRP-31463-1

26 May 2022

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Prepared For: Adelaide Brighton Cement Ltd Contact: Craig Mackenzie Tel: 08 8300 0512	Prepared By: Vipac Engineers and Scientists Limited 33 Bacon St, Hindmarsh, SA 5007, Australia Tel: +61 8 8334 0900
Author:	Saksham Garg Senior Engineer 26 May 2022
Reviewer:	Mark Ogilvie Senior Engineer 26 May 2022
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1 Introduction

Vipac Engineers & Scientists (Vipac) were engaged by Adelaide Brighton Cement Limited (ABC) to undertake an on-site noise measurement survey of the existing plant and develop a comprehensive computer noise model (SoundPLAN model) to include the plant infrastructure and associated noise levels for each source. The model also incorporates the currently de-commissioned Cement Mill 2 (CM 2), the associated CM 2 infrastructure and a new slag drier. This report provides details of the results of the on-site attended noise survey, details of the computer noise model and treatment recommendations where applicable.

2 References

- [1] Environment Protection (Noise) Policy 2007, Version 31.3.2008, EPA SA.
- [2] Environment Protection Act 1993.
- [3] The Barossa Council Development Plan – Consolidated 05 September 2019. *Currently revoked and replaced by The Planning & Design Code - SA.*
- [4] Guidelines for the use of the Environment Protection (Noise) Policy 2007, EPA South Australia, June 2009.
- [5] "Adelaide Brighton Cement Ltd (ABC) – EPA License 35 – Angaston Noise Survey – dated 26 November 2014", EPA Letter dated 09 January 2015.
- [6] "Angaston Noise Emissions and Assessment Summary", 50B-19-0135-TRP-8950504-0, dated 07 June 2019.
- [7] Australian Standard AS IEC 61672.1-2004 Electroacoustics – Sound level meters Specifications, Standards Australia (2004).
- [8] "ABC Angaston SoundPLAN Modelling", 50H-07-002-TRP-293536-0, dated 24 September 2007.
- [9] Planning & Design Code – South Australia, Version 2021.2, dated 19 March 2021.
- [10] Australian Standard, AS 1055.1-1996, *Acoustics – Description and measurement of environmental noise.*
- [11] Site Plans & 3D model in dxf format, provided by FYFE, February 2022.
- [12] Vipac Report 50B-21-0128-TRP-11983-2, "Angaston Environmental Noise Survey Report", dated 18 October 2021.
- [13] Vipac Report 50B-19-0135-TRP-8950642-1, "ABS Angaston Environmental Noise Survey May 2019", dated 20 June 2019.
- [14] Vipac Report 50B-13-0022, "ABC Angaston November 2014 Noise Survey", dated 26 November 2014.

3 Proposed Development

ABC is proposing to manufacture Neat Milled Slag at the Angaston site to meet the current and predicted future business demand. The proposal requires re-commissioning of Cement Mill 2 and associated infrastructure, which includes the following works:

- New rotary slag drier within the existing Building 16 (Raw Materials/ Clinker Gantry & Crane Building)
- New belt conveyor (10m), exterior to Building 16, connecting to the existing CM2 bucket elevator
- Re-commissioning of existing CM2 bucket elevator
- Repairs of the CM2 shell, rotor and stator for re-commissioning
- Possible addition of Dust Collector Fan inside Building 16, exhausting via Building 16 Roof

The proposed infrastructure upgrade is shown in Figure 3-1 below:

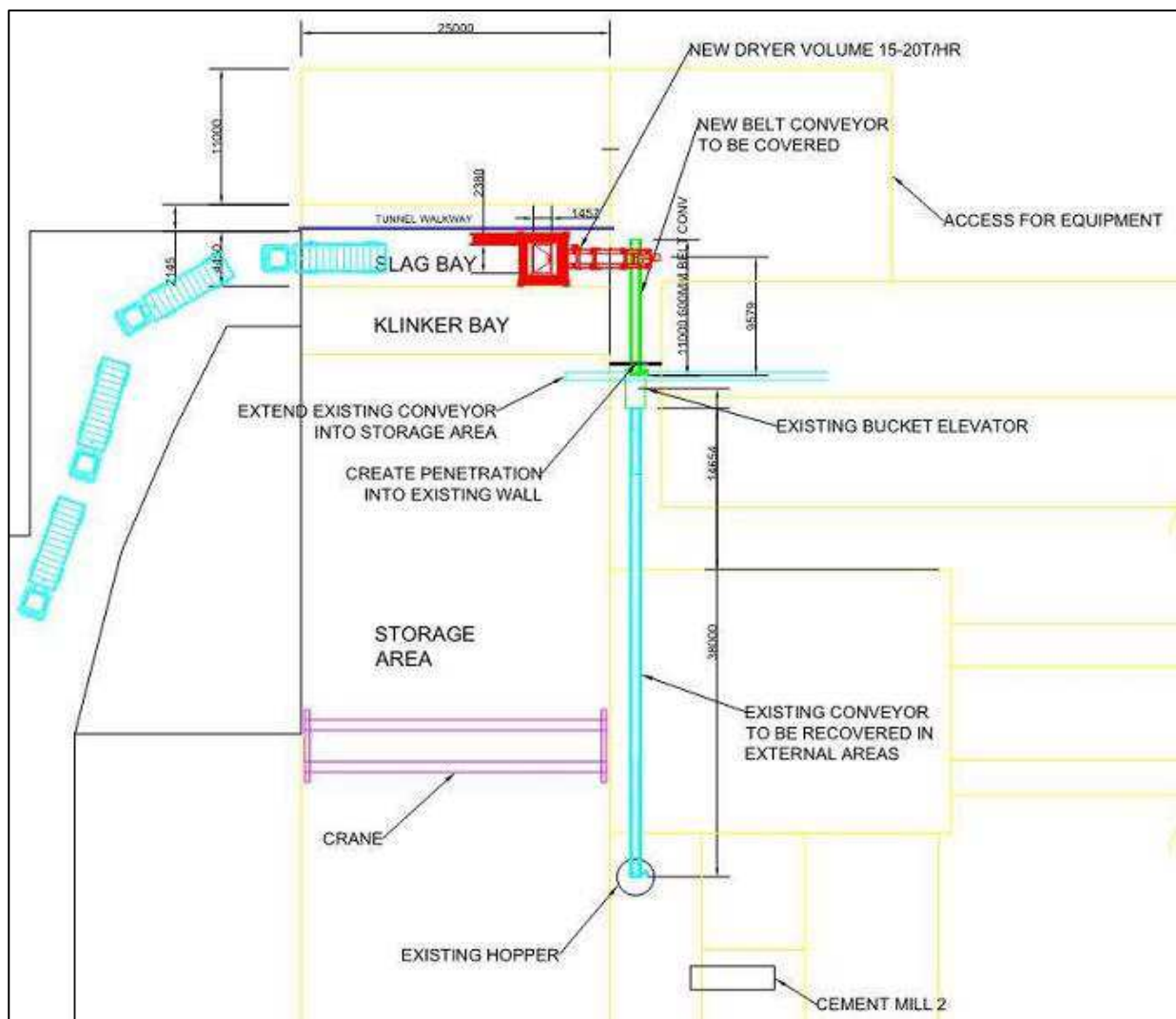


Figure 3-1: Proposed CM 2 Works

4 ABC Angaston Plant Location

The ABC Angaston site is located approximately 60 kilometres to the north-east of Adelaide in the Barossa Valley region of South Australia. The plant is rurally located, approximately 1.5 kilometres to the west of the township of Angaston. The surrounding locality is transitional, comprising isolated rurally located dwellings among vineyards and other rural land uses, along with other commercial and industrial enterprises along Stockwell Road (including Hanson Concrete, Capral, Vinpac International, APA Compressor Station and the Angaston Power Station).

An overview of the ABC Angaston site and the surrounding locality with noise sensitive premises marked in red and other noise-generating operations identified in green is provided in Figure 4-1 below.

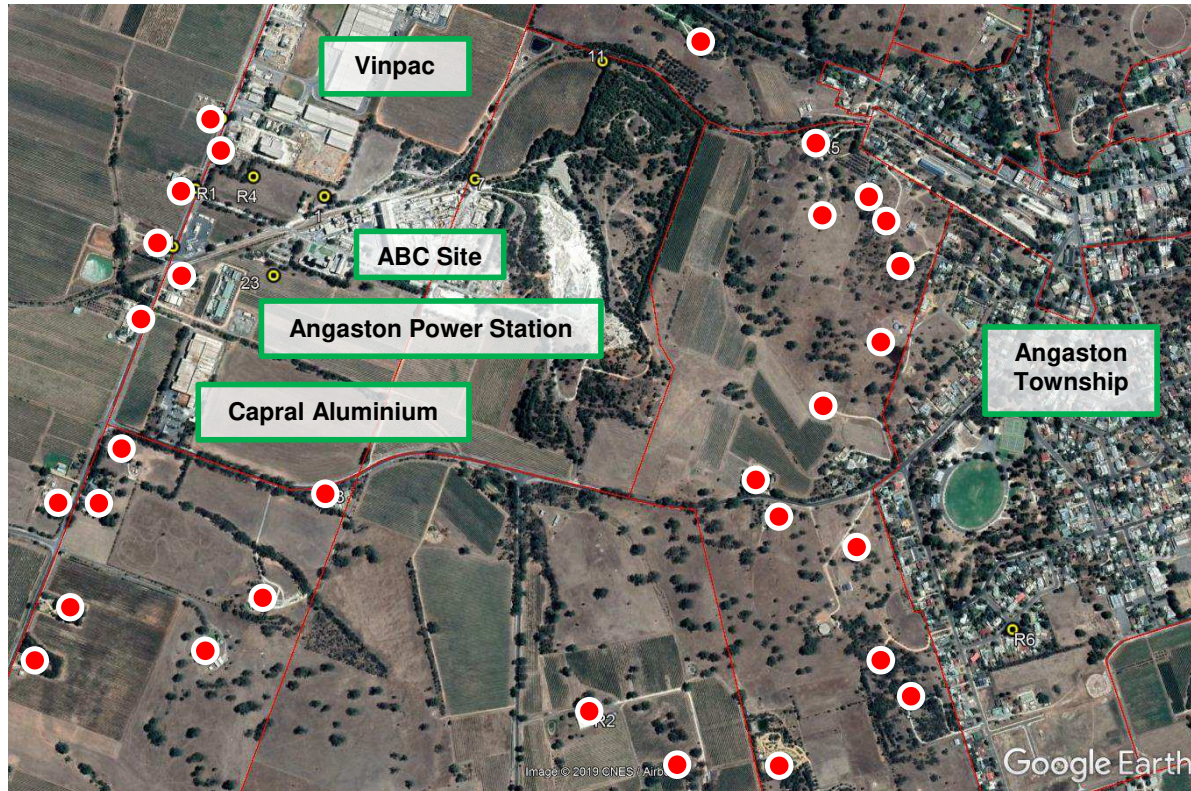


Figure 4-1: ABC Angaston Site and surrounding locality (rural noise sensitive premises marked in red)

5 Environmental Noise Criteria

Noise from industrial activities (such as those conducted at the ABC Angaston site) is subject to the provisions of the *Environment Protection (Noise) Policy 2007* (Noise EPP) [1]. The Noise EPP outlines Noise Goals which provide one method for demonstrating compliance with the General Environmental Duty under Section 25 of the *Environment Protection Act 1993* (the Act) [2]. Compliance with the Noise Goals may be achieved by demonstrating compliance with the Indicative Noise Levels (INLs) applicable to the site, as determined in accordance with Clause 5 of the Noise EPP and the relevant council Development Plan provisions. It is noted that with the change in SA legislation, council development plans have been superseded by The Planning & Design Code ("The Code") [9].

Indicative Noise Levels have been calculated in accordance with the procedure outlined in Clause 5 of the Noise EPP and the relevant provisions of the Code [9]. With reference to the Code and the PlanSA website, the site is located partially within the "Strategic Employment (SE)" zone, and partially within the "Rural Extraction (RE)" zone. The nearest noise sensitive receptors (NSRs) are located within various zones, including:

- Rural Zone (Ru)
- Strategic Employment (SE)
- Rural Extraction (RE)
- Neighbourhood Zone (N)
- Rural Living Zone (RuL)

With reference to the *Code* [9] and *Guidelines for the Use of the Environment Protection (Noise) Policy 2007* [1], for the purposes of calculating INLs in accordance with the Noise EPP the following Land Use Categories are considered to be “principally promoted” by each of the relevant zones described above:

Table 5-1: Principally promoted Land Use Categories

Zone	Principally promoted land uses	Applicable Land Use Categories
Neighbourhood Zone	Residential character developments	Residential
Rural Living Zone	Rural residential character developments	Rural Living
Rural Zone	Primary production, warehousing etc.	Rural Industry
Strategic Employment	Primary production, horticulture, viticulture, wineries	General Industry
Rural Extraction	Mining and quarrying of minerals	General Industry

As such, in accordance with Clause 5 of the Noise EPP, Vipac derived the following Indicative Noise Levels applicable to noise emissions from ABC’s operations when assessed at Noise Sensitive Receptors (NSRs) within the relevant zones:

Table 5-2: Indicative Noise Levels

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Rural	Resident 1	61	53
Rural	Location #11	61	53
Rural	Location #21	61	53
Rural	Resident 3	61	53
Strategic Employment	Resident 4	65	55
Rural Living	Resident 5	56	48
Neighbourhood Zone	Resident 6	52	45

However, as per EPA’s letter to ABC (dated 09 January 2015), Vipac notes that EPA recommends the following criterion at each critical receiver. Please note that the following criteria was used by Vipac to conduct previous environmental noise assessment in 2019.

NOTE: A map showing the NSR’s and the applicable zoning in the Angaston area has been presented in Appendix E.

Table 5-3: EPA Recommended Criterion/INL

Receivers	Indicative Noise Levels (L_{eq} , dB(A))	
	Day-time (7am to 10pm)	Night-time (10pm to 7am)
Resident 1	60	52
Location #11	64	55
Location #21	60	52
Resident 3	60	52
Resident 4	62	54
Resident 5	55	47
Resident 6	52	45

Additionally, for new developments (in this case the CM 2 infrastructure), Part 5 Subclause 3 and Subclause 4 of Noise EPP [1] applies:

"(3) A predicted source noise level (continuous) for the development should not exceed the relevant indicative noise level less 5 dB(A)"

5.1 Adjustment for Characteristics

For a noise containing a characteristic (tonal, impulsive, low frequency or modulating), the following adjustments are to be made to the source noise level:

- Noise containing 1 characteristic; a 5dB(A) penalty must be added to the noise level (continuous),
- Noise containing 2 characteristics; an 8dB(A) penalty must be added to the noise level (continuous),
- Noise containing 3 or 4 characteristics, a 10dB(A) penalty must be added to the noise level (continuous).

6 On-Site Noise Survey

6.1 Survey Methodology

An attended noise survey of all noise sources within plant was conducted to obtain the actual/operational noise data for developing the computer noise model update. The following methodology was followed:

- Measurements were taken at distances varying between 1-5m, depending on the access to the equipment/machinery.
- Where possible, multiple measurements were taken around an equipment/machinery to appropriately analyse the emanating sound pressure levels.
- Due to the operational conditions in the plant (typical), it is usually difficult to isolate a single source from sources directly abutting the measured source. In such case, Vipac has taken measurements at several locations around the plant area in question. This enabled Vipac to verify the combined noise levels predicted from the noise model against the measured values i.e., adjusting source noise levels to comply against the measured noise levels at the measurement location.
- For model calibration, Vipac had conducted several measurements in the middle of the plant with all the nearby noise sources operating (further discussed in Section 7).

6.2 Survey Equipment

The following equipment were used to conduct the on-site noise survey. Please note that the sound level meters satisfy the requirements of AS IEC 61672.1-2004 [7].

- Equipment Details
 - Model – Brüel & Kjær Type 2250 Class 1 sound level meter.
 - Serial number – 3002257
 - Calibration – Due for calibration on March 2024
 - Spot calibration check – The calibration of the sound level meter was checked before and after measurements and no drift in sensitivity was detected.

6.3 On-Site Survey Data

The details of the noise survey, including noise sources and the associated noise levels have been presented in Appendix A. Please note that only the data used in the development of SoundPLAN model has been presented in the appendix, while the redundant measurements have been removed.

6.4 Survey Weather Conditions

Temperatures ranging between 22 – 28 degrees Celsius were observed throughout the survey, with wind speeds below 5m/s observed during the noise survey. No rainfall was observed.

7 Noise Modelling

Based on the site plans, the dxf model of the site (provided by FYFE [11]) and the noise survey conducted by Vipac, a comprehensive computer noise model was developed using SoundPLAN Software (version 8.0). Noise level predictions at each NSR was predicted, along with noise contour plots for “neutral” and “worst case” weather conditions. Details of the noise model, and the methodology followed in constructing the noise model and generating predictions are discussed below.

7.1 Modelling Assumptions

The following assumptions were relied upon in developing the 3D computer noise model (using SoundPLAN software) for the Angaston plant:

- The ground areas within and surrounding the ABC plant were assumed to be flat terrain.
- Ground absorption within the site was assumed to be fully reflective (based on on-site observations of the Angaston plant).
- Ground absorption outside of the site was assumed to be partially reflective grass terrain, with the exception of roads and other reflective surfaces which were assumed to be fully reflective.
- The heights and location of buildings and other on-site structures were generally based on the information provided by ABC (plant geometry provided in dxf format on 22 February 2022, by FYFE) and on-site observations.
- All doors and openings were assumed closed during operations.
- Traffic noise and other noise sources not included.
- Noise from Kiln 1 infrastructure has not been included in the model, as it has been inoperative for several years.
- Noise from other decommissioned equipment of the plant was not included in the model.
- Noise from truck movements within the plant was not included in the model.
- The entire plant assumed to be operating at the same time.
- Details of all noise sources included in the model, their sound power level, and position within the plant are provided in Appendix B.

7.2 Modelling Scenarios & Calibration

Noise predictions for the following operational scenarios were considered:

- Scenario 1 – Existing infrastructure noise
- Scenario 2 – Post CM2 Upgrade infrastructure noise

Noise predictions were generated for “neutral” and “worst-case” meteorological conditions corresponding to the recommended conditions detailed in the *Guidelines for the Use of the Environment Protection (Noise) Policy 2007* for each of the above modelling scenarios.

Prior to predicting incident noise levels at NSR's, Vipac calibrated the computer noise model. To calibrate the model, noise levels were predicted at the verification points mentioned in Section 6. The predicted levels were compared against the attended noise survey results, and the source noise levels were adjusted to achieved subsequent compliance. Please note that meteorological conditions corresponding to the day of on-site survey [12] (average wind speed of 2m/s) were used for calibration.

Once the model was calibrated, noise level predictions at each standard receiver position (refer NSR's in Table 5-3) were generated for the current situation (Scenario 1) and post CM 2 upgrade situation (Scenario 2). A comparison of the results, predicted using the model, against the noise criterion presented in Table 5-3 and the results of Vipac's 2-most recent attended noise surveys (both day-time & night-time) [12] [13] are presented in sections below.

7.3 Input Data

7.3.1 Existing Infrastructure

Sound power levels for each existing noise source were calculated using the on-site survey data. The attended survey data in terms of sound pressure levels (with location reference) is presented in Appendix A.

7.3.2 Proposed New Infrastructure

The proposed works at the plant include commission of the existing CM 2 infrastructure (currently de-commissioned), with the following noise generating components:

- Rotary slag drier
- 10m belt conveyor (10m)
- CM2 bucket elevator
- CM 2 Shell
- Dust Collector Fan inside Building 16, exhausting via Building 16 Roof.

It should be noted that the Dust Collector fan has not been proposed in the Development Approval documents. However, Vipac has included this noise source to consider the worst-case noise condition. Where noise data/specifications for certain new plant equipment was not available, Vipac based the noise levels on the existing plant equipment in Angaston and in Birkenhead Plant.

Vipac used the following noise levels for each noise generating plant equipment.

Table 7-1: CM 2 – Source Noise Data

Equipment	Quantity	Data Source	Sound Levels SWL/SPL ¹
Rotary Slag Drier	1	Raw Mill + Slurry Mill Noise Data	SPL ² – 80 dB(A)
CM 2 Shell	1	Raw Mill + Slurry Mill Noise Data	SPL ² – 80 dB(A)
Bucket Elevator	1	M151 Reclaim Elevator Motor	SWL – 85 dB(A)
New 10m Conveyor	1	Measured from existing CM 2 conveyor	SWL – 85 dB(A)
Existing Conveyor	1	Measured on site	SWL – 85 dB(A)
Dust Collector Exhaust	1	CM 4 Dust Collector Exhaust	SWL – 96 dB(A)

¹ **SPL** – Sound Pressure Level, **SWL** – Sound Power Level

² SPL's are reverberant levels, as the equipment is located inside the building.

8 Assessment Results

Based on the specifications provided above, Vipac developed a SoundPLAN model for the two scenarios discussed above and predicted the noise impact at each NSR for neutral and worst-case meteorological conditions. The results of the noise assessment are presented below, with corresponding Noise Contour Plots/Maps provided in Appendix C.

Please note that since the night-time criterion is more stringent, the predicted noise levels at each receiver have been assessed against the night-time criterion only.

8.1 Calibration - Model Results & NSR Survey Data

A comparison of the computer noise model predictions for existing infrastructure (neutral conditions) against the off-site noise measurements (night-time), has been presented below.

Table 8-1: Calibration Results

NSR	Scenario 1 ³ – Predicted Noise Levels dB(A) <i>Neutral Climatic Conditions</i>	Measured Noise Levels, dB(A) <i>2021 Survey [12]</i>	
		L _{Aeq}	L _{A90}
Location 11	41	42	36
Location 21	38	45	43
R1	40	53	51
R3	38	39	36
R4	46	49	47
R5	32	42 ⁴	29
R6	23	40	36

Based on the results presented above, the following is noted:

- Predicted noise levels at NSR locations, which are not affected by extraneous noise sources, show good agreement with the attended noise survey results. This includes NSR R3, R4, R5 and Location 11.
- Measured levels at Location 21 and R1 are inherently affected by traffic noise from Stockwell Road and nearby streets. This has been documented in Vipac's previous noise survey reports [12] [13] [14]. NSR R1 has added influence from APA Station across the road on Stockwell Road.
- The model predicted low incident levels at NSR R6 (in comparison to 2021 survey). This is mainly associated with the separation distance between the plant and R6, where Vipac has noted no audible noise influence from the ABC plant in all previous noise surveys.

Overall the results indicate good agreement between the predicted incident noise levels and the attended noise survey results, and therefore, is considered acceptable.

³ Existing Plant Emissions

⁴ 8 dB(A) penalty included for 2 noise characteristics [12]

8.2 Scenario 1 – Existing Plant Emissions

Table 8-2: Scenario 1 – Existing Plant Emissions Results

NSR	Environmental Noise Criteria, dB(A)	Predicted Existing Plant Noise Levels, dB(A)		Compliance		Measured Noise Levels ⁵ , L _{Aeq} dB(A)
	Night-time	Neutral Conditions	Worst Case Conditions	Neutral Conditions	Worst Case Conditions	
Location 11	55	41	43	Yes	Yes	42
Location 21	52	38	39	Yes	Yes	45
R1	52	40	41	Yes	Yes	53
R3	52	38	41	Yes	Yes	39
R4	54	46	46	Yes	Yes	49
R5	47	32	35	Yes	Yes	42
R6	45	23	28	Yes	Yes	40

Based on the assessment results, the following is noted:

- The environmental noise criterion is **achieved** at all the NSRs in both neutral and worst-case climatic conditions.
- The predicted L_{Aeq} levels, for worst-case climatic conditions, at Location 11 and Resident R3 are lower than the measured L_{Aeq} levels (~1-2 dB(A) difference). Vipac notes that the discrepancy is associated with noise influence from extraneous noise sources such as traffic noise, noise from Capral plant, etc. It has been documented in Vipac's previous noise survey reports that the ABC plant is not audible at Location 11, and the noise at R3 is dominated by noise from Capral plant and traffic noise from abutting road.

⁵ 2021 Survey Results [12]

8.3 Scenario 2 – Post CM2 Upgrade

The results are presented in Table 8-3 below.

Table 8-3: Scenario 2 Results: Post CM2 Upgrade

NSR	Environmental Noise Criteria, dB(A)	Predicted Existing Plant Noise Levels, dB(A)		Compliance		Measured Noise Levels ⁶ , L _{Aeq} dB(A)
	Night-time	Neutral Conditions	Worst Case Conditions	Neutral Conditions	Worst Case Conditions	
Location 11	55	41	43	Yes	Yes	42
Location 21	52	38	39	Yes	Yes	45
R1	52	40	41	Yes	Yes	53
R3	52	39	41	Yes	Yes	39
R4	54	46	46	Yes	Yes	49
R5	47	32	35	Yes	Yes	42
R6	45	24	28	Yes	Yes	40

Notes:

Based on the assessment results, the following is noted:

- The environmental noise criterion is **achieved** at all the NSRs in both neutral and worst-case climatic conditions.
- No apparent change in noise conditions is overserved with the added infrastructure. This is expected as the CM2 infrastructure is well shielded by surrounding structures and is mostly located within Building 16.

⁶ 2021 Survey Results [12]

8.4 Results Comparison

To appropriately assess the influence of the new CM2 infrastructure, Vipac has compared the results of Scenario 1 & Scenario 2, as presented below:

Table 8-4: Model Results Comparison

NSR	Environmental Noise Criteria, dB(A)	Scenario 1 Predicted Levels, dB(A)		Scenario 2 Predicted Levels, dB(A)	
	Night-time	Neutral Conditions	Worst Case Conditions	Neutral Conditions	Worst Case Conditions
Location 11	55	41	43	41	43
Location 21	52	38	39	38	39
R1	52	40	41	40	41
R3	52	38	41	39	41
R4	54	46	46	46	46
R5	47	32	35	32	35
R6	45	23	28	24	28

With reference to the results presented above, Vipac comments as follows:

- R3 & R6 Receivers – a 1 dB(A) increment is predicted (in neutral climatic conditions) at these receivers. Please note that in terms of human perception to noise, an increase of 2dB(A) is considered to be 'not noticeable', an increase of 3dB(A) is considered to be 'just noticeable', 5dB(A) is considered to 'clearly noticeable' and 10 dB(A) is perceived to be a 'doubling' in the noise levels. As such, the increase in noise levels at these locations is considered insignificant and is expected to not affect the amenity of the noise sensitive receivers.
- All other NSRs – No change in noise conditions is predicted.

Note: Even though Vipac considered the worst noise conditions, i.e., the entire plant operating at the same time, which seldom occurs, the impact to the nearest residential noise sensitive receivers is negligible. This can be confirmed with the attached Noise Contour Maps in Appendix C. Also, the predicted levels show good agreement with the existing background noise levels measured at all the residential receivers during previous noise surveys.

8.5 CM 2 Infrastructure Noise Contribution

To appropriately assess the influence of the new sources (CM 2 sources) Vipac predicted the incident noise levels due to their operation in isolation from other noise sources, considering worst case climatic conditions, and assessed it against the environmental noise criteria (criteria for new infrastructure only, i.e., criterion as per Table 5-3 minus 5 dB(A)), as presented in Table 8-5.

Table 8-5: CM 2 Infrastructure Noise Contribution

NSR	Noise Contribution, dB(A)	Noise Criterion ⁷ for New Infrastructure Night-time, dB(A)	Compliance
Location 11	29	50	Yes
Location 21	14	47	Yes
R1	26	47	Yes
R3	27	47	Yes
R4	29	49	Yes
R5	22	42	Yes
R6	14	40	Yes

As such, based on the results presented above, Vipac notes that proposed new infrastructure achieves the environmental noise criteria and therefore, requires no further acoustic treatment to control noise emissions. However, Vipac recommends a post-construction noise survey be conducted to measure the noise from the new sources and the computer noise model be subsequently updated. A community noise survey should also be conducted to further verify and update the model.

9 Conclusion

Vipac Engineers & Scientists (Vipac) were engaged by Adelaide Brighton Cement Limited (ABC) to undertake an on-site noise measurement survey of the existing plant and develop a comprehensive computer noise model (SoundPLAN model) to include the plant infrastructure and associated noise levels for each source. The model incorporated the currently de-commissioned Cement Mill 2 (CM 2), the associated CM 2 infrastructure and a new slag drier.

The results of the assessment indicate that the new infrastructure will result in no apparent increase in noise levels at all the noise sensitive receivers for neutral and worst-case climatic conditions. As such, Vipac notes that the new and re-commissioned CM 2 infrastructure would not change the existing noise environment in the vicinity of the ABC plant and would not affect the amenity of the nearest noise sensitive receivers.

⁷ Criterion as per Part 5 Subclause 3 and Subclause 4 of Noise EPP [1]

Appendix A Site Survey Data

Equipment	Location	Distance	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}
Bagging Plant	West Façade	2m	77	81	75	79
Bagging Plant	South Façade	2m	64	67	63	66
D115/112 Silo 4 Filter Fan	Fan	2m	79	93	72	80
D114/113 Silo 3 Filter Fan	Fan	2m	79	92	76	80
Silo 5,6,8,9 Building	South Façade	On top of Silo 6	57	61	55	58
D221 Filter Fan Silo 13	Fan	0.5m, on top of Silo 13	77	81	76	78
D207 Filter Fan Silo 5,6,8,9 Building Roof Top	Fan	2m	66	69	65	68
D226 Filter Fan Silo 12	Fan	2m	65	70	64	66
D225 Filter Fan Silo 11	Fan	2m	59	62	58	60
D224 Filter Fan Silo 10	Fan	2m	61	66	60	62
D239 Weigh Bridge South Dust Collector Fan Exhaust	Fan	2m, on top of Building 11	62	67	60	63
S11 Bulk Screw Conveyor	Conveyor	5m from conveyor	59	67	50	63
D329S11 Bulk Dust Collector Fan	Fan	1m, B8 Roof	73	81	66	76
H17 Hydrator Motor/Fan	Fan	1m	67	71	65	69
H17 Hydrator Exhaust	Exhaust Stack	2m	70	76	69	73
H19 Hydrator Silo 19 Fan	Fan	1m	76	82	74	77
Lime Hydrator Plant Building façade	Façade East	2m	56	66	51	57
Lime Hydrator Plant Building façade	Façade East	3m	46	49	45	47
Lime Hydrator Plant Building façade	Façade East	5m	46	65	37	39
Building 16 Façade	Façade West	2m	72	76	70	74
Gantry Pond Pumps 1 & 2	Both Pumps	2m	70	72	69	71

Equipment	Location	Distance	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}
Building 16 /17 Façade	Façade East	2m	81	84	79	82
Verification Point	-	-	79	81	78	80
Building 20 & 21 South Façade	Façade with doors open	2m	78	86	75	81
M115 Bag Filter Motor	Fan	1m	86	93	83	87
Verification point	-	-	73	78	71	75
Airslide Fan	Fan inside Silo	5m from Fan	77	83	75	78
Building 26 Jaw Crusher Building Façade	Façade	3m	81	88	76	84
Building 26 Jaw Crusher Building Façade	Façade	2m	76	78	75	77
Hammer Mill B-Conveyor Filter Fan Motor	Fan	1m	87	90	85	88
Building 26 Jaw Crusher Building Façade	Façade	2m	73	80	71	75
CM4 North Façade	Façade	2m	76	82	71	79
A2 Cooling Tower	Equipment	1m	77	81	75	78
A3 Cooling Water Pump Motor	Equipment	1m	79	81	79	80
CM4 West Façade	Façade	2m	58	70	54	61
CM4 South Façade	Façade	2m	73	79	62	77
CM4 East Façade	Façade	2m	60	65	57	62
CM4 Dust Collector Exhaust	Top of central B5	2m	79	83	73	81
A77 Silo 14 Dust Collector Motor	Top of Silo 14	1m	76	91	73	76
A62 Transfer Compressor Intake	Bottom of Silo 14, Compressor Building	8m	68	71	67	70
Building 6 Façade	Façade	2m	55	61	53	57
Building 6 Façade	Façade	2m	58	63	54	60

Equipment	Location	Distance	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}
Building 6 Façade	Façade	2m	51	57	49	54
A59 Chappel Filter Exhaust	B6 East Façade, 10m above ground	10m from truck	71	74	69	72
Building 29 Tool Use Noise	Outside	0.5m from façade	80	85	77	83
Building 30 Tool Use Noise	Outside, with open door	0.5m from façade	80	84	78	82
Building 32 Façade	Façade	1m	79	84	75	82
Building 32 Façade	Façade	1m	75	80	72	78
Building 32 Façade	Façade	1m	74	78	70	76
Q27 Kiln 2 Feed Slurry Pump	Bottom of B34 Silos	0.5m	71	74	70	73
B34 Silo Churning	at top of silo	3m	84	89	79	87
Q14 Kiln 2 Exhaust Fan Motor	Ground Level	0.5m	73	75	71	74
M141 Masonry Bin Dust Collector Fan	on top of silo	1m	82	84	81	83
M16 Blending Filter Fan	Outside building	5m	77	81	76	79
B21 Façade	Façade North	2m	72	78	65	75
M171 Kiln 3 Shell Cooling Fan	Ground Level	2m	78	81	77	80
M170 Kiln 3 Shell Cooling Fan	Ground Level	2m	78	81	77	79
Kiln 2	Along the kiln	1m	70	75	68	72
Kiln Drive Room Façade	Façade	1m	81	84	80	82
Kiln Drive Room Façade	Façade	1m	71	74	70	72
Kiln Drive Room Façade	Façade	1m	81	83	79	82
Q23 Kiln 2 Smoke Chamber Vent Fan Exhaust	2m from exhaust point	2m	78	80	77	79
Q10 Kiln 2 Hopper Drag Chain Motor	On top of kiln 2 infrastructure	1m	74	82	72	75

Equipment	Location	Distance	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}
Q21 Kiln 2 Dust Return Elevator Motor	On top of kiln 2 infrastructure	1m	70	74	68	71
D9 Dust Return Drag Chain	On top of kiln 2 infrastructure	1m	74	77	72	75
M91 Recirculation Water Feed Pump	Same for M90 & M31 pumps,@ ground level	1m	71	73	70	72
M92 Water Cooling Tower Fan	Located above M31, M90, M91 Pumps	1m	73	75	72	74
Verification Point	-	-	96	99	93	98
Raw Mill Reverb Level, only Raw Mill operating	Inside B16	Reverberant Level	92	95	90	93
Raw Mill + Slurry Mill Reverb Levels	Inside B17	Reverberant Level	80	89	75	83
CM2 Conveyor	Outside	1m	84	93	81	85
M158 Kiln 3 Conveyor Dust Collector	6m above ground	1m	77	82	75	79
M151 Kiln 3 Reclaim Elevator Motor	20m above ground	1m	94	96	92	95
Kiln 3 Reclaim Elevator Dust Collector	20m above ground	1m	56	62	54	58
Verification Point	-	-	72	82	69	73
Verification Point	-	-	82	85	81	83
Verification Point	-	-	80	81	79	80
Verification Point	-	-	87	89	86	88

Appendix B Noise Source Inventory

SNo	Building/ Group	Source Name	Object ID	Source Position UTM Co-ordinates (WGS84) Zone 54H			Sound Power Level (dB(A) re 1pW)																											
				X	Y	Z	Lw dB(A)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5l	16k	20k
1	Default industrial noise	CM 2 Conveyor	8414	319021	6180463	342	85	51	47	46	47	53	65	63	64	71	67	64	66	67	67	73	82	77	66	74	67	59	63	61	56	63	51	27
2	Default industrial noise	New CM 2 10m Conveyor	8429	319022	6180462	342	85	51	47	46	47	53	65	63	64	71	67	64	66	67	67	73	82	77	66	74	67	59	63	61	56	63	51	27
3	Default industrial noise	CM 2 Bucket Elevator	8430	319024	6180456	332	85	59	52	56	60	64	67	69	71	76	71	74	73	75	77	73	75	74	72	69	65	63	60	57	51	48	45	38
4	Default industrial noise	CM 2 Dust Extractor Fan Exhaust	8431	319016	6180463	353	96	68	73	68	70	73	73	73	77	78	82	87	89	86	85	87	86	85	83	81	79	78	74	65	56	48	40	32
5	Default industrial noise	S11 Bulk Screw Conveyor	8333	318898	6180447	332	78	43	45	46	55	55	56	59	63	60	66	73	69	71	66	66	64	62	60	58	54	52	47	43	39	35	32	30
6	Default industrial noise	Kiln 2 East Section	8404	319072	6180444	335	75	50	51	55	55	56	59	60	60	62	62	63	63	63	66	65	62	61	63	60	61	60	60	61	57	55	50	45
7	Default industrial noise	Kiln 2 West Section	8405	319113	6180455	335	75	50	51	55	55	56	59	60	60	62	62	63	63	63	66	65	62	61	63	60	61	60	60	61	57	55	50	45
8	Default industrial noise	D115 Silo 4 Filter Fan	8322	318959	6180454	353	96	68	63	65	65	68	75	75	74	80	80	78	77	75	76	77	78	79	82	84	85	88	88	86	85	85	82	80
9	Default industrial noise	D112 Silo 1 Filter Fan	8323	318963	6180461	353	96	68	63	65	65	68	75	75	74	80	80	78	77	75	76	77	78	79	82	84	85	88	88	86	85	85	82	80
10	Default industrial noise	D113 Silo 2 Filter Fan	8325	318966	6180456	353	96	65	67	66	65	73	80	73	73	77	78	87	85	81	80	91	78	78	77	78	80	82	86	83	81	81	78	73
11	Default industrial noise	D114 Silo 3 Filter Fan	8326	318958	6180459	353	96	65	67	66	65	73	80	73	73	77	78	87	85	81	80	91	78	78	77	78	80	82	86	83	81	81	78	73
12	Default industrial noise	D221 Filter Fan	8327	318942	6180442	352	82	50	46	44	47	56	64	62	64	64	62	60	81	67	69	69	61	63	62	57	54	56	56	54	51	50	46	41
13	Default industrial noise	D207 Filter Fan	8328	318938	6180452	366	83	45	50	54	63	63	68	63	63	66	72	76	73	73	76	72	70	67	64	61	58	55	52	48	44	40	35	30
14	Default industrial noise	D226 Filter Fan	8329	318893	6180435	356	82	59	46	49	54	47	60	60	55	57	66	81	66	64	71	62	64	57	57	58	57	57	55	57	56	57	54	51
15	Default industrial noise	D225 Filter Fan	8330	318901	6180437	356	76	52	50	50	52	53	61	61	64	69	58	62	67	68	68	65	61	58	57	54	53	53	55	54	50	47	45	40
16	Default industrial noise	D224 Filter Fan	8331	318909	6180440	356	78	50	47	49	55	53	60	66	64	59	62	70	64	63	65	64	64	64	66	68	67	66	66	64	62	58	54	49
17	Default industrial noise	D239 Weigh Bridge Dust Collector Exhaust	8332	318937	6180424	348	79	48	46	52	56	64	70	73	67	63	65	70	69	69	67	60	61	58	57	54	49	45	41	40	35	32	30	29
18	Default industrial noise	D329 S11 Bulk Dust Collector	8334	318905	6180429	336	84	52	42	47	54	54	60	62	64	64	69	82	72	69	71	68	69	62	61	60	60	62	64	63	59	59	56	56
19	Default industrial noise	H17 Hydrator Fan	8335	319071	6180434	338	78	37	34	41	45	48	58	75	71	68	63	63	61	62	62	60	61	58	56	55	54	53	55	56	52	49	47	39
20	Default industrial noise	H17 Hydrator Exhaust	8336	319070	6180433	355	87	56	60	61	65	65	73	83	79	68	70	76	76	72	77	68	69	64	63	61	59	57	56	52	49	46	43	37
21	Default industrial noise	H19 Hydrator Fan	8337	319070	6180434	350	86	50	48	51	56	57	69	80	77	68	70	79	74	70	79	69	73	64	63	61	59	59	59	55	54	53	51	47
22	Default industrial noise	Gantry Pond Pump 1	8338	318990	6180418	331	84	62	58	58	60	65	68	68	68	69	68	70	72	73	77	75	72	73	71	71	72	66	61	61	53	47	40	33
23	Default industrial noise	Gantry Pond Pump 2	8339	318993	6180419	331	84	62	58	58	60	65	68	68	68	69	68	70	72	73	77	75	72	73	71	71	72	66	61	61	53	47	40	33
24	Default industrial noise	M115 Bag Filter Motor	8340	319150	6180480	338	92	71	58	61	69	76	81	76	79	84	80	79	86	78	80	80	80	76	73	71	70	72	71	69	66	65	63	57
25	Default industrial noise	A2 Cooling Tower	8376	318844	6180357	331	88	50	54	58	65	71	73	76	75	73	75	83	79	76	76	76	74	73	70	69	67	64	62	58	54	49	44	37
26	Default industrial noise	A3 Cooling Water Pump Motor	8377	318845	6180357	331	90	50	52	56	58	68	67	69	71	72	75	86	80	79	78	78	78	78	74	74	74	70	69	66	63	60	54	47

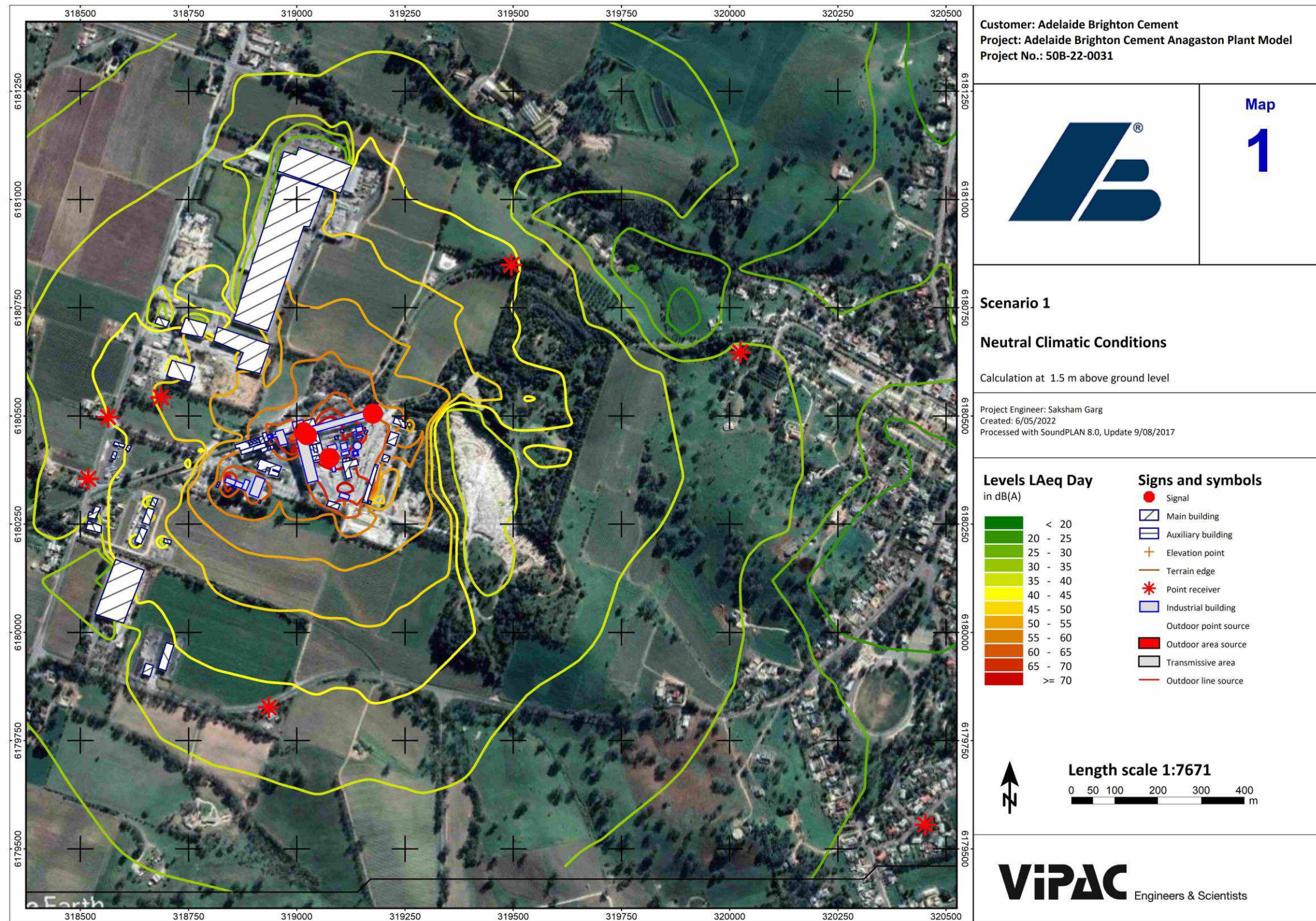
SNO	Building/ Group	Source Name	Object ID	Source Position UTM Co-ordinates (WGS84) Zone 54H			Sound Power Level (dB(A) re 1pW)																											
				X	Y	Z	Lw dB(A)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5l	16k	20k
27	Default industrial noise	CM4 Dust Collector Exhaust	8378	318869	6180340	354	93	65	70	65	67	70	70	70	74	75	79	84	86	83	82	84	83	82	80	78	76	75	71	62	53	45	37	29
28	Default industrial noise	A77 Silo 14 Dust Collector Fan	8379	318850	6180337	346	87	66	66	65	65	63	72	73	77	73	74	78	75	72	73	72	71	72	72	74	75	73	72	75	73	72	69	66
29	Default industrial noise	A62 Transfer Compressor Intake	8380	318853	6180333	334	94	73	73	72	72	70	79	80	84	80	81	85	82	79	80	79	78	79	79	81	82	80	79	82	80	79	76	73
30	Default industrial noise	A59 Chappel Filter Exhaust	8381	318915	6180336	340	94	59	57	55	57	62	65	73	75	68	70	74	92	80	78	83	80	77	77	77	76	75	73	71	67	63	57	50
31	Default industrial noise	Q27 Kiln 2 Feed Slurry Pump	8398	319136	6180415	331	76	39	44	47	51	56	64	61	60	59	60	66	68	63	62	63	64	65	65	63	63	60	62	59	49	50	48	37
32	Default industrial noise	Q14 Kiln 2 Exhaust Fan	8399	319151	6180455	331	78	50	46	47	51	53	58	65	64	61	63	66	68	63	64	62	63	61	63	73	69	65	62	54	50	49	44	42
33	Default industrial noise	M141 Masonry Bins Dust Collector Fan	8400	319172	6180499	346	93	70	59	59	61	63	74	68	74	81	76	79	85	77	75	90	78	75	77	73	71	68	68	65	62	60	55	49
34	Default industrial noise	M16 Blending Filter Fan	8401	319079	6180489	331	99	69	63	64	68	71	78	77	83	91	88	87	93	85	84	93	83	84	81	77	74	70	70	66	60	57	53	45
35	Default industrial noise	M170 Kiln 3 Shell Cooling Fan	8402	319067	6180488	332	95	67	68	73	78	83	80	82	83	84	81	89	85	82	82	83	85	81	77	74	70	68	65	62	59	55	51	45
36	Default industrial noise	M171 Kiln 3 Shell Cooling Fan	8403	319069	6180489	332	95	67	68	73	78	83	80	82	83	84	81	89	85	82	82	83	85	81	77	74	70	68	65	62	59	55	51	45
37	Default industrial noise	Q23 Kiln2 SMOke Chamber Vent Fan Exhaust	8406	319139	6180461	334	92	53	55	58	65	70	69	72	85	76	81	81	83	82	81	80	81	79	78	76	73	69	65	61	56	51	45	38
38	Default industrial noise	Q10 Kiln 2 Hopper Dust Return Motor	8407	319116	6180456	340	85	51	57	54	59	64	64	66	65	66	70	72	75	79	78	75	72	70	66	75	62	59	57	53	48	43	36	28
39	Default industrial noise	Q21 Kiln 2 Dust Return Elevator Motor	8408	319112	6180464	340	81	47	53	50	55	60	60	62	61	62	66	68	71	75	74	71	68	66	62	71	58	55	53	49	44	39	32	24
40	Default industrial noise	D9 Dust Return Drag Chain	8409	319124	6180466	340	85	51	57	54	59	64	64	66	65	66	70	72	75	79	78	75	72	70	66	75	62	59	57	53	48	43	36	28
41	Default industrial noise	M90 Recirculation Water Feed Pump	8410	319170	6180523	331	82	54	45	53	61	52	55	56	59	66	66	66	71	69	73	73	71	73	72	70	70	67	67	63	58	52	48	43
42	Default industrial noise	M91 Recirculation Water Feed Pump	8411	319171	6180522	331	82	54	45	53	61	52	55	56	59	66	66	66	71	69	73	73	71	73	72	70	70	67	67	63	58	52	48	43
43	Default industrial noise	M31 Noduliser Water Pump	8412	319171	6180523	331	82	54	45	53	61	52	55	56	59	66	66	66	71	69	73	73	71	73	72	70	70	67	67	63	58	52	48	43
44	Default industrial noise	M92 Cooling Tower Fan	8413	319170	6180522	334	84	56	50	54	64	58	60	63	65	69	76	73	72	70	71	72	71	72	73	73	73	72	71	68	64	61	57	52
45	Default industrial noise	M158 Kiln 3 Conveyor Dust Collector	8415	319040	6180391	342	95	66	67	60	65	72	76	82	78	80	83	88	86	83	86	82	81	78	77	77	78	82	82	80	78	78	74	70
46	Default industrial noise	M151 Kiln 3 Reclaim	8416	319024	6180456	349	88	62	55	59	63	67	70	72	74	79	74	77	76	78	80	76	78	77	75	72	68	66	63	60	54	51	48	41

SNo	Building/ Group	Source Name	Object ID	Source Position UTM Co-ordinates (WGS84) Zone 54H			Sound Power Level (dB(A) re 1pW)																											
				X	Y	Z	Lw dB(A)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5l	16k	20k
		Elevator Motor																																
47	Default industrial noise	Kiln 3 Reclaim Elevator Dust Collector	8417	319024	6180455	349	105	70	61	59	65	69	75	77	84	96	89	93	91	97	95	97	97	93	91	87	83	82	81	78	73	68	63	58
48	Default industrial noise	Air Slide Fan	8374	319176	6180505	331	91	59	52	58	62	67	71	74	76	77	78	83	83	80	77	80	80	79	78	76	76	77	76	73	67	63	57	52
49	Default industrial noise	Hammer Mill B-Conveyor Filter Fan Motor	8375	319076	6180403	332	98	63	60	60	64	74	80	83	82	88	82	86	96	83	82	82	83	77	76	74	72	69	67	64	60	55	51	45
50	Building 25 - Hammer Mill	Roof 01	8132	319081	6180403	334	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
51	Building 25 - Hammer Mill	Facade 01	8134	319079	6180398	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
52	Building 25 - Hammer Mill	Facade 02	8135	319077	6180401	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
53	Building 25 - Hammer Mill	Facade 03	8136	319080	6180406	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
54	Building 25 - Hammer Mill	Facade 04	8137	319085	6180404	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
55	Building 25 - Hammer Mill	Facade 05	8138	319084	6180400	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
56	Building 25 - Hammer Mill	Facade 06	8139	319081	6180399	332	90	57	51	52	54	60	64	68	67	66	77	78	77	79	84	84	83	77	72	66	62	55	50	47	40	32	26	19
57	Building 6 No 4 Clinker Store	Roof 01	7426	318903	6180338	339	60	37	39	42	45	50	49	50	49	47	48	50	49	49	48	48	46	43	46	39	37	34	31	28	22	17	12	9
58	Building 6 No 4 Clinker Store	Roof 02	7427	318913	6180334	339	60	37	39	42	45	50	49	50	49	47	48	50	49	49	48	48	46	43	46	39	37	34	31	28	22	17	12	9
59	Building 6 No 4 Clinker Store	Facade 01	7429	318916	6180358	335	60	37	39	42	45	50	49	50	49	47	48	50	49	49	48	48	46	43	46	39	37	34	31	28	22	17	12	9
60	Building 6 No 4 Clinker Store	Facade 02	7430	318919	6180332	332	81	58	61	63	67	71	70	71	70	68	69	71	70	70	70	70	67	65	67	61	58	55	52	50	43	38	33	30
61	Building 6 No 4 Clinker Store	Facade 03	7431	318900	6180315	335	83	60	62	65	69	73	72	73	72	70	71	73	72	72	72	71	69	66	69	62	60	57	54	51	45	40	35	32
62	Building 6 No 4 Clinker Store	Facade 04	7432	318898	6180340	332	81	58	61	63	67	71	70	71	70	68	69	71	70	70	70	70	67	65	67	61	58	55	52	50	43	38	33	30
63	Building 16 Raw Material/Clinker Gantry	Facade 02	8251	319032	6180422	341	87	62	71	67	70	76	82	76	76	73	74	76	75	74	71	71	70	69	68	66	66	64	61	58	52	45	36	27
64	Building 16 Raw Material/Clinker Gantry	Facade 04	8253	319007	6180415	341	87	62	71	67	70	76	82	76	76	73	74	76	75	74	71	71	70	69	68	66	66	64	61	58	52	45	36	27
65	Building 21 Kiln 3 Building	Facade 01	7484	319093	6180477	335	92	61	63	65	71	71	76	82	80	80	78	80	81	79	79	83	80	79	81	79	78	78	76	66	65	62	51	44
66	Building 21 Kiln 3 Building	Facade 03	7486	319089	6180491	335	92	61	63	65	71	71	76	82	80	80	78	80	81	79	79	83	80	79	81	79	78	78	76	66	65	62	51	44
67	Building 5 Cement Mill 4	Facade 01	7536	318844	6180344	344	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
68	Building 5 Cement Mill 4	Facade 02	7537	318835	6180353	345	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
69	Building 5 Cement Mill 4	Facade 03	7538	318848	6180354	344	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
70	Building 5 Cement Mill 4	Facade 04	7539	318858	6180345	345	97	65	64	65	72	78	80	84	92	86	84	86	86	86	86	87	83	81	79	77	73	68	65	61	56	52	46	39
71	Building 5 Cement Mill 4	Roof 01	7561	318885	6180340	357	94	62	60	62	68	74	77	80	89	82	81	83	82	82	83	83	80	78	76	73	69	64	61	57	52	48	42	35

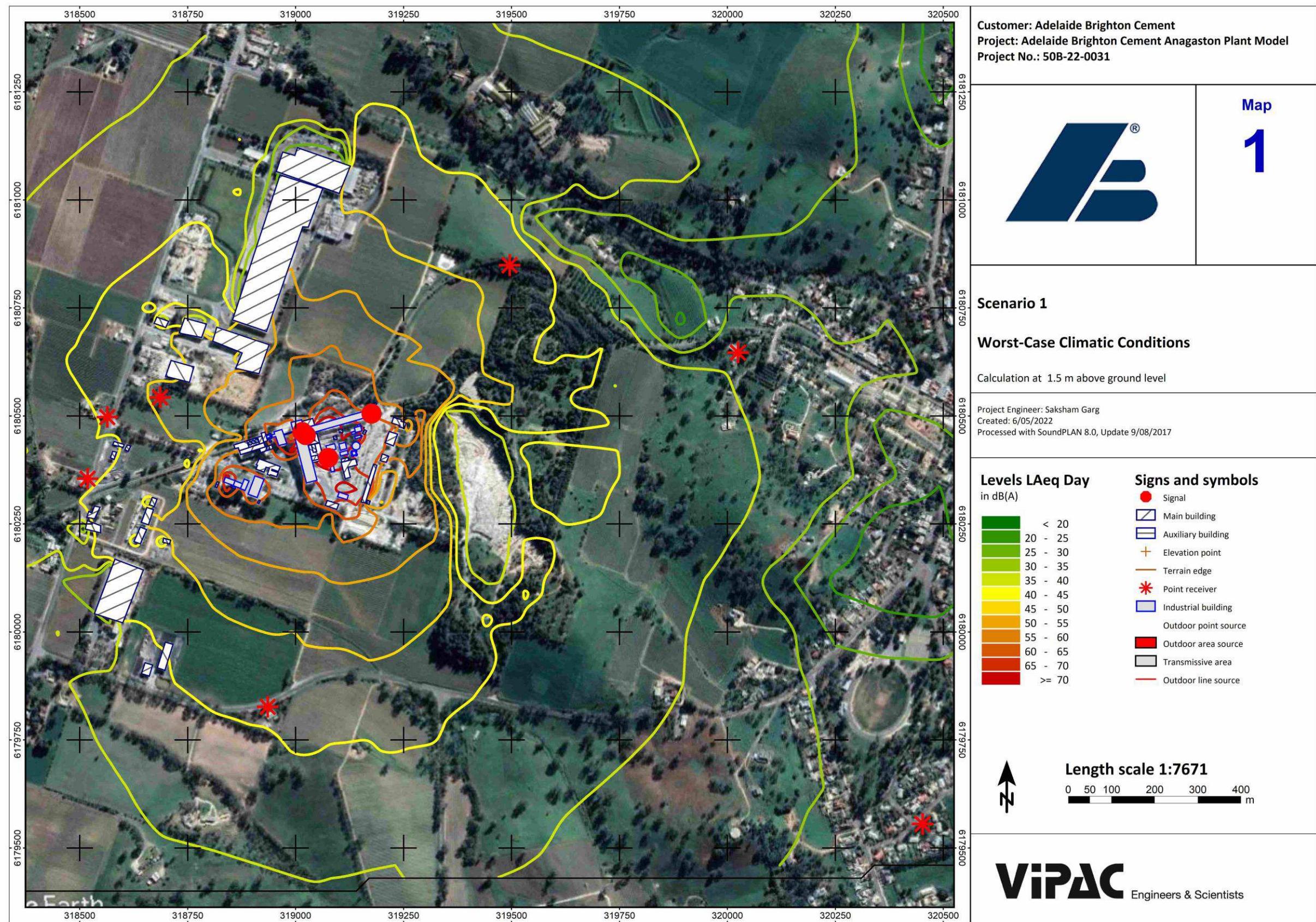
SNo	Building/ Group	Source Name	Object ID	Source Position UTM Co-ordinates (WGS84) Zone 54H			Sound Power Level (dB(A) re 1pW)																											
				X	Y	Z	Lw dB(A)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5l	16k	20k
72	Building 5 Cement Mill 4	Roof 02	7562	318879	6180342	357	94	62	60	62	68	74	77	80	89	82	81	83	82	82	83	83	80	78	76	73	69	64	61	57	52	48	42	35
73	Building 5 Cement Mill 4	Facade 01	7564	318877	6180343	343	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
74	Building 5 Cement Mill 4	Facade 02	7565	318887	6180352	344	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
75	Building 5 Cement Mill 4	Facade 03	7566	318887	6180339	343	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
76	Building 5 Cement Mill 4	Facade 04	7567	318877	6180330	344	72	40	39	40	46	53	55	59	67	61	59	61	61	61	61	62	58	56	54	51	48	42	39	36	31	26	21	14
77	Building 5 Cement Mill 4	Facade 01	7578	318868	6180347	342	90	58	57	58	64	71	73	77	85	79	77	79	79	79	79	80	76	74	72	69	66	60	57	54	49	44	39	32
78	Building 32 - Compressor Room	Roof 01	7596	319112	6180414	335	105	68	69	73	79	88	99	92	92	95	90	91	93	90	92	90	91	91	90	89	88	88	85	82	81	75	70	66
79	Building 32 - Compressor Room	Facade 01	7598	319113	6180410	332	83	46	48	51	58	66	78	71	71	74	68	69	71	68	70	69	69	69	68	67	66	66	63	60	59	53	48	44
80	Building 32 - Compressor Room	Facade 02	7599	319103	6180412	332	83	46	48	51	58	66	78	71	71	74	68	69	71	68	70	69	69	69	68	67	66	66	63	60	59	53	48	44
81	Building 32 - Compressor Room	Facade 03	7600	319111	6180418	332	83	46	48	51	58	66	78	71	71	74	68	69	71	68	70	69	69	69	68	67	66	66	63	60	59	53	48	44
82	Building 32 - Compressor Room	Facade 04	7601	319120	6180416	332	99	62	63	67	73	82	94	86	86	90	84	85	87	84	86	84	85	85	84	83	82	82	79	76	75	69	64	60
83	Building 34 - Slurry Basin & Silos	Roof 01	7850	319140	6180411	349	101	59	63	68	73	77	80	82	84	86	89	92	92	92	92	91	90	89	88	86	83	80	77	74	72	65	57	50
84	Building 34 - Slurry Basin & Silos	Roof 01	7884	319131	6180417	349	101	59	63	68	73	77	80	82	84	86	89	92	92	92	92	91	90	89	88	86	83	80	77	74	72	65	57	50
85	Building 26 - Jaw Crusher & Apron Feder	Facade 01	8447	319084	6180383	332	82	49	43	44	46	52	56	60	59	58	69	70	69	71	76	76	75	69	64	58	54	47	42	39	32	24	18	11
86	Building 26 - Jaw Crusher & Apron Feder	Facade 02	8448	319089	6180378	332	82	49	43	44	46	52	56	60	59	58	69	70	69	71	76	76	75	69	64	58	54	47	42	39	32	24	18	11
87	Building 26 - Jaw Crusher & Apron Feder	Facade 03	8449	319086	6180372	332	82	49	43	44	46	52	56	60	59	58	69	70	69	71	76	76	75	69	64	58	54	47	42	39	32	24	18	11
88	Building 26 - Jaw Crusher & Apron Feder	Facade 04	8450	319081	6180377	332	82	49	43	44	46	52	56	60	59	58	69	70	69	71	76	76	75	69	64	58	54	47	42	39	32	24	18	11
89	Building 24 Lime Hydration plant & Quick Lime Silo	Roof 01	8272	319082	6180428	340	87	58	59	62	66	68	70	72	73	74	74	76	76	76	76	76	75	75	74	73	72	71	68	63	58	53	50	
90	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 01	8274	319079	6180422	335	63	34	35	38	42	44	46	48	49	50	50	52	53	52	52	52	52	51	51	50	49	48	47	44	39	34	30	27
91	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 02	8275	319086	6180423	335	63	34	35	38	42	44	46	48	49	50	50	52	53	52	52	52	52	51	51	50	49	48	47	44	39	34	30	27
92	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 03	8276	319090	6180423	335	63	34	35	38	42	44	46	48	49	50	50	52	53	52	52	52	52	51	51	50	49	48	47	44	39	34	30	27
93	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 04	8277	319092	6180430	335	84	55	56	59	63	65	67	69	70	71	72	73	74	73	73	73	72	72	71	70	69	68	65	60	55	51	48	

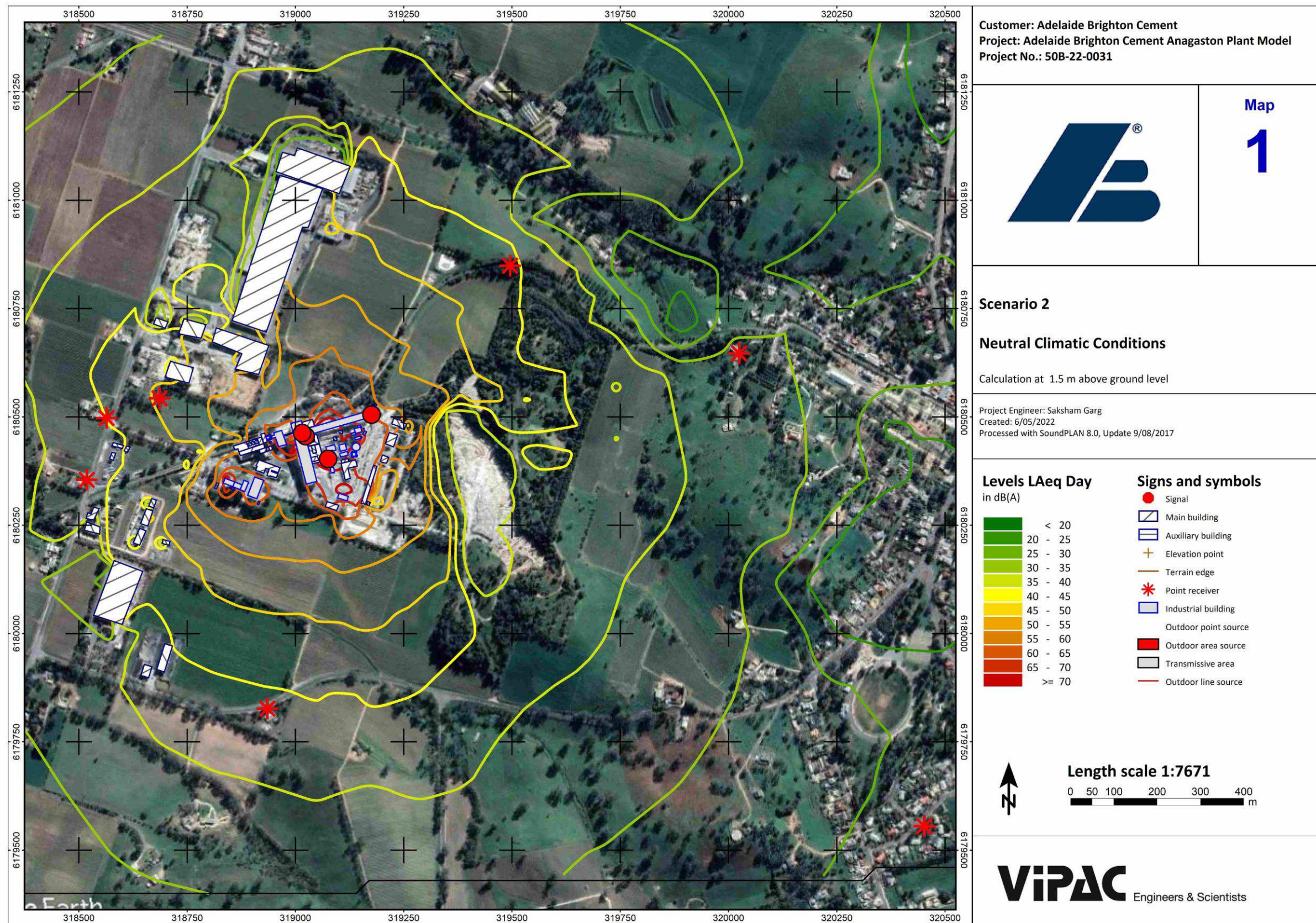
SNo	Building/ Group	Source Name	Object ID	Source Position UTM Co-ordinates (WGS84) Zone 54H			Sound Power Level (dB(A) re 1pW)																											
				X	Y	Z	Lw dB(A)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5l	16k	20k
94	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 05	8278	319080	6180434	335	63	34	35	38	42	44	46	48	49	50	50	52	53	52	52	52	52	51	51	50	49	48	47	44	39	34	30	27
95	Building 24 Lime Hydration plant & Quick Lime Silo	Facade 06	8279	319071	6180426	335	83	54	55	59	63	64	66	68	69	70	71	73	73	72	72	72	73	71	72	71	70	68	67	64	59	54	50	47
96	Building 23 Kiln Drive Room	Roof 01	8115	319134	6180461	336	89	49	60	55	55	64	63	65	65	73	74	73	74	73	80	86	70	68	68	73	77	72	73	74	72	70	67	62
97	Building 23 Kiln Drive Room	Facade 01	8117	319135	6180459	333	89	49	60	55	55	64	63	65	65	73	74	73	74	73	80	86	70	68	68	73	77	72	73	74	72	70	67	62
98	Building 23 Kiln Drive Room	Facade 02	8118	319138	6180462	333	89	49	60	55	55	64	63	65	65	73	74	73	74	73	80	86	70	68	68	73	77	72	73	74	72	70	67	62
99	Building 23 Kiln Drive Room	Facade 03	8119	319133	6180463	333	89	49	60	55	55	64	63	65	65	73	74	73	74	73	80	86	70	68	68	73	77	72	73	74	72	70	67	62
100	Building 23 Kiln Drive Room	Facade 04	8120	319130	6180460	333	89	49	60	55	55	64	63	65	65	73	74	73	74	73	80	86	70	68	68	73	77	72	73	74	72	70	67	62
101	Building 9	Roof 01	8227	318937	6180451	365	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
102	Building 9	Roof 02	8228	318936	6180454	365	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
103	Building 9	Facade 01	8230	318938	6180450	361	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
104	Building 9	Facade 02	8231	318933	6180451	361	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
105	Building 9	Facade 03	8232	318936	6180455	361	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
106	Building 9	Facade 04	8233	318940	6180454	361	71	42	34	44	43	52	59	67	57	59	57	60	62	58	57	57	56	52	50	49	46	42	40	36	34	31	28	26
107	Default industrial noise	Ground floor	8312	318963	6180450	330	0											0																
108	Building 10 Cement Bagging Plant	Facade 04	8316	318950	6180461	336	91	51	52	56	62	68	70	75	76	78	79	81	84	80	79	79	78	78	79	79	76	74	69	64	60	55	48	40
109	Building 10 Cement Bagging Plant	Facade 06	8318	318945	6180453	336	91	51	52	56	62	68	70	75	76	78	79	81	84	80	79	79	78	78	79	79	76	74	69	64	60	55	48	40
110	Building 10 Cement Bagging Plant	Facade 09	8321	318958	6180441	336	91	51	52	56	62	68	70	75	76	78	79	81	84	80	79	79	78	78	79	79	76	74	69	64	60	55	48	40
111	Building 29 - Electrical Workshop	Facade 01	8393	319108	6180310	333	82	46	48	45	50	51	54	60	58	55	62	65	66	73	68	67	69	68	70	72	71	73	73	72	63	57	50	42
112	Building 29 - Electrical Workshop	Facade 02	8394	319120	6180312	333	99	64	65	63	67	69	71	78	75	72	79	82	84	90	85	84	86	86	88	89	88	90	91	90	81	74	68	59
113	Building 29 - Electrical Workshop	Facade 03	8395	319111	6180320	333	103	67	68	66	70	72	75	81	79	76	83	85	87	93	88	87	89	89	91	93	92	94	94	93	84	78	71	62
114	Building 29 - Electrical Workshop	Facade 04	8396	319099	6180319	333	99	64	65	63	67	69	72	78	76	73	80	82	84	90	85	84	86	86	88	90	89	91	91	90	81	75	68	59

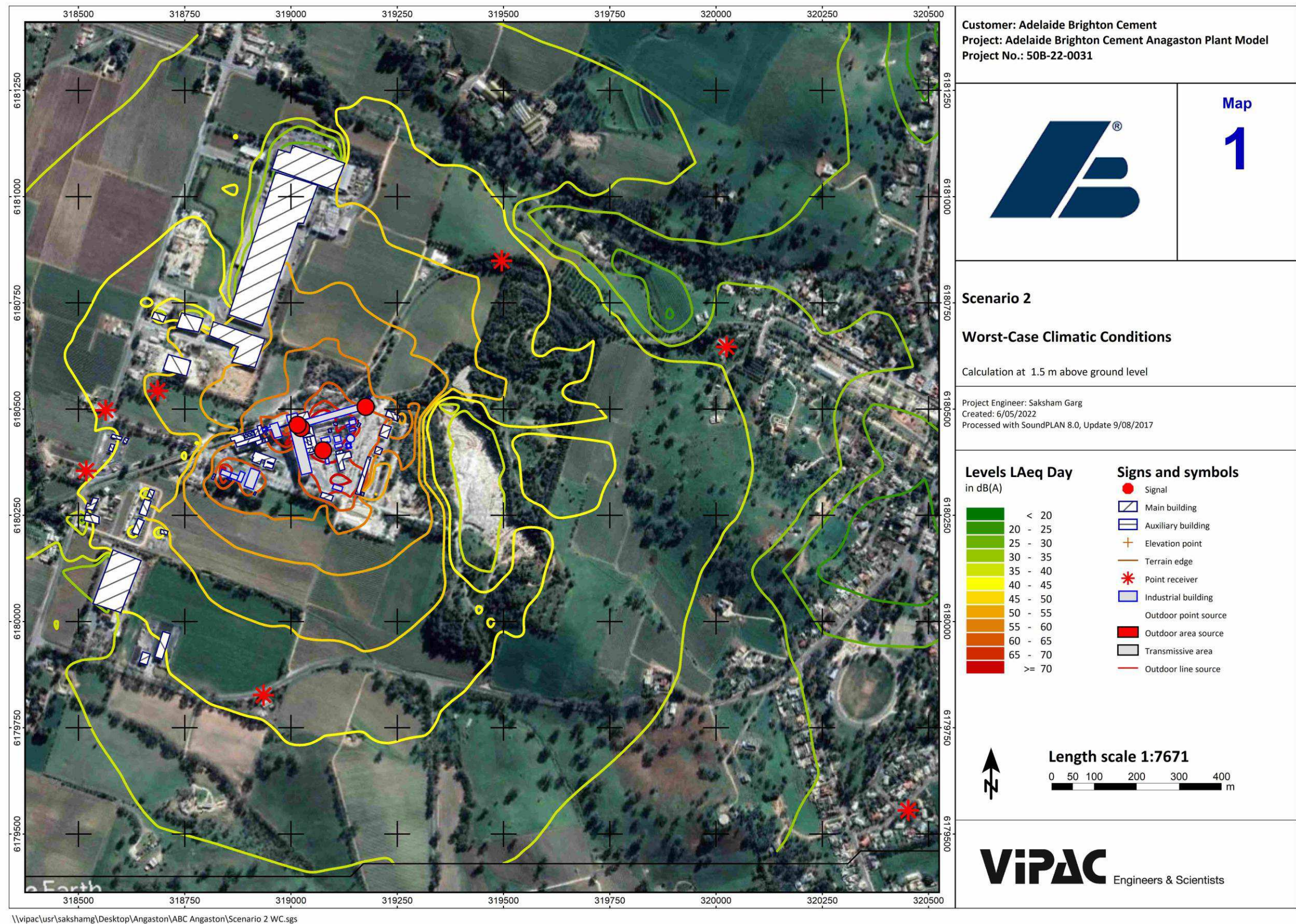
Appendix C Noise Contour Maps



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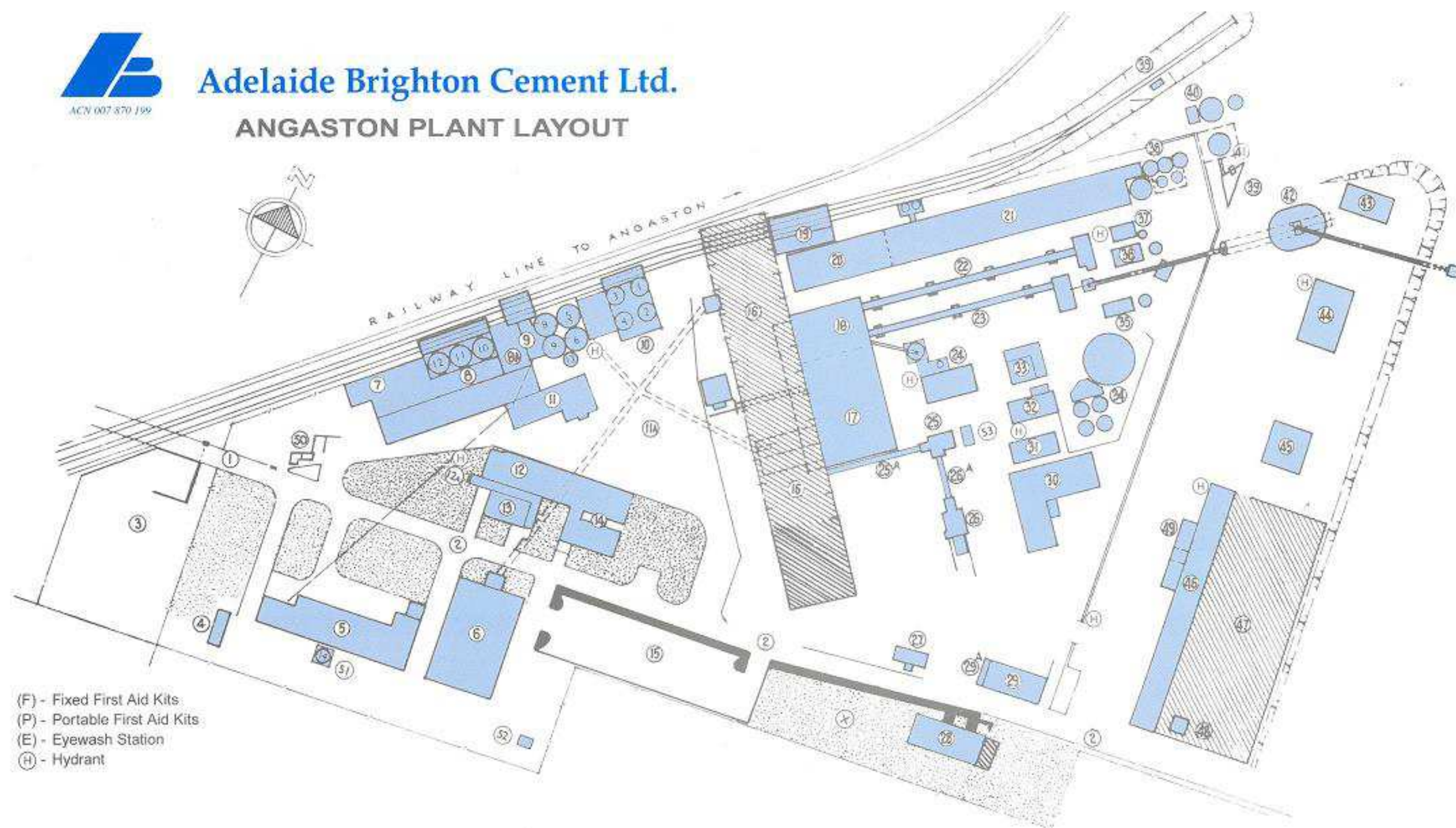


Appendix D Angaston plant Layout



Adelaide Brighton Cement Ltd.

ANGASTON PLANT LAYOUT



- X Emergency Assembly Point
- 1. Main entrance gate
- 2. Main plant roadway
- 3. Carpark
- 4. Intake sub-station
- 5. No. 4 cement mill building
- 6. No. 4 clinker store
- 7. Bagged products warehouse
- 8. Specials silos & bagging (F) (E)
- 8a. Palletiser
- 9. 1,000 tonne silos (E)
- 10. Cement bagging plant (E)

- 11. Bulk road-loading building
- 11a. Despatch yard
- 12. Chemical laboratories (F) (E)
- 12a. Chemical store
- 13. Physical testing laboratories
- 14. Administration offices (P)
- 15. Carpark
- 16. Raw materials/clinker gantry & crane
- 17. Mill building and motor room
- 18. Kilns 1 & 2 Firing platform (E)
- 19. Steel bins
- 20. No. 3 kiln clinker store

- 21. No. 3 kiln building
- 22. No. 1 kiln
- 23. No. 2 kiln
- 24. Lime hydration plant & quicklime silo (F) (E)
- 25. Hammer mill
- 25a. 'B' conveyor
- 26. Jaw crusher and apron feeder
- 26a. 'A' conveyor
- 27. Weighbridge
- 28. Canteen, training room (F) (E) (P)
- 29. Electrical workshop (F)
- 29a. Electrical Engineers office

- 30. Mechanical workshop (F) (F) (P)
- 31. Ablution block
- 32. Compressor room
- 33. Central control centre & shift laboratory (F) (P) (E)
- 34. Slurry basin and silos
- 35. No. 2 precipitator
- 36. No. 1 precipitator
- 37. No. 3 bag filter
- 38. Raw meal blending silos
- 39. Oil unloading station
- 40. Water cooling tower & tanks
- 41. Oil storage tank

- 42. Sand storage
- 43. Brick store
- 44. Automotive garage
- 45. Carpenters' store
- 46. Main store building (P)
- 47. Stores compound
- 48. Lubrication store
- 49. Greasers' workshop
- 50. Truck wash
- 51. Silo 14
- 52. Bike shed
- 53. Sep/first aid room (F) (P) (E)

Appendix E Angaston Zones & NSR Location

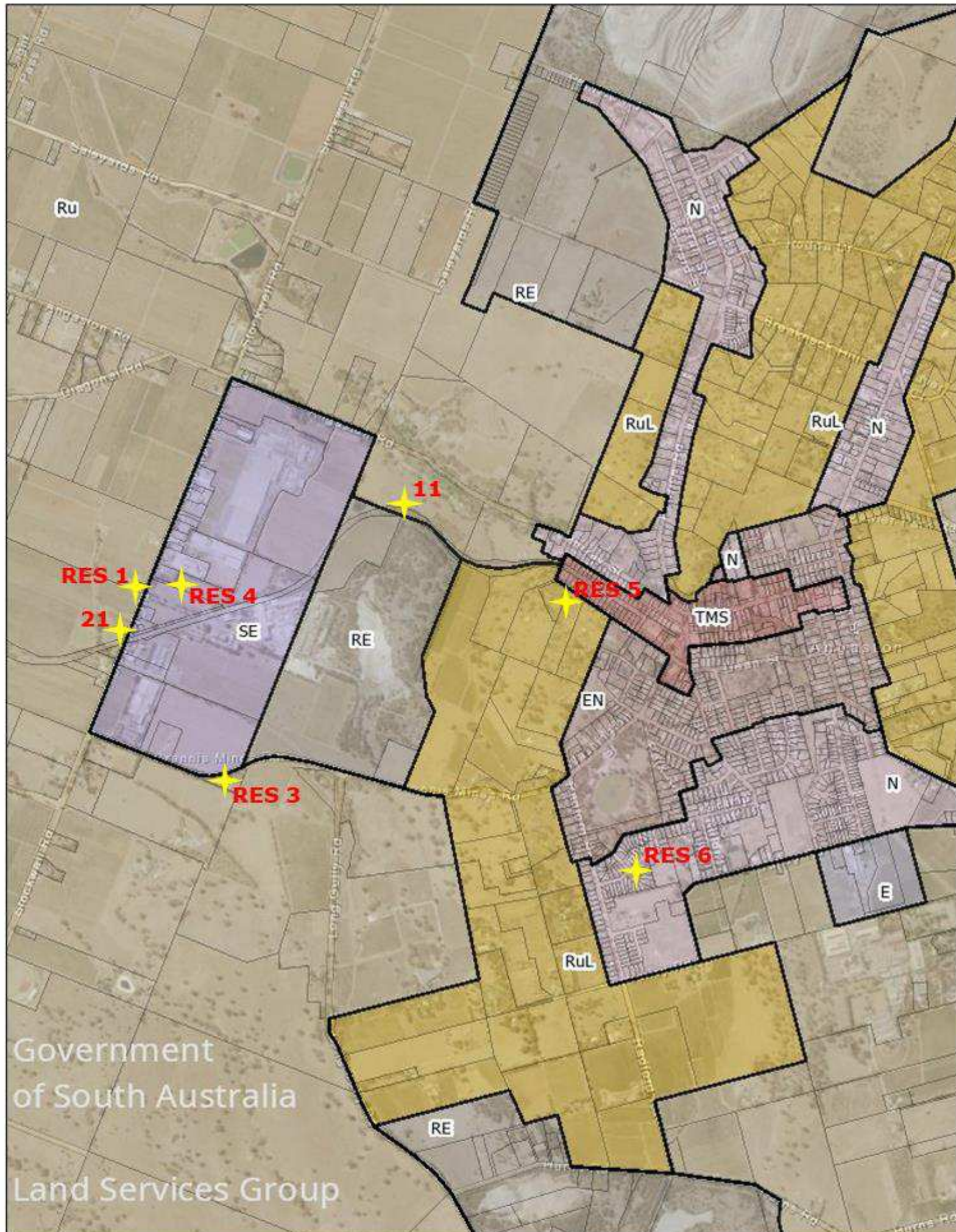
Zone Details

Zone ID	Zone Name
N	Neighbourhood Zone
RuL	Rural Living Zone
Ru	Rural Zone
SE	Strategic Employment
RE	Rural Extraction

SAPPA Report

The SA Property and Planning Atlas is available on the Plan SA website: <https://sappa.plan.sa.gov.au>

Date created:
May 26, 2022



Disclaimer: The information provided above, is not represented to be accurate, current or complete at the time of printing this report. The Government of South Australia accepts no liability for the use of this data, or any reliance placed on it.



Vipac Engineers and Scientists Ltd
33 Bacon St, Hindmarsh, SA 5007, Australia

t. +61 8 8334 0900 | e. adelaide@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627

MEMORANDUM

Job No.:	50B-21-0128	Doc. No:	25422-0
Attention:	Craig Mackenzie	Author:	Saksham Garg
Company:	Adelaide Brighton Cement Ltd	Reviewed by:	Mark Ogilvie
Email:	craig.mackenzie2@adbri.com.au	Issued by:	Saksham Garg
Subject:	ABC Angaston Hydrator Fan & Kiln 3 Blending Silo Fan Review		

Dear Craig Mackenzie,

As requested by Adelaide Brighton Cement, Vipac conducted an attended noise survey at their Angaston Plant to measure the noise emissions from the H17 Hydrator Scrubbing Fan and Kiln 3 Blending Silo following maintenance works in the past month.

The report intends to compare the current noise emissions from both the fans against the noise emissions measured during the May 2021 survey (ref: Vipac Report 50B-21-0128-TRP-11983-2) and assist ABC in developing appropriate noise mitigation solutions to reduce noise emissions.

Yours faithfully

Vipac Engineers & Scientists Ltd

Saksham Garg
Senior Engineer

1. Survey Details

An attended noise survey was conducted on 21 December 2021 within the Angaston Plant. The measurements were conducted during the normal operational conditions of the plant to measure the noise emanating from the H17 Hydrator Scrubbing Fan and Kiln 3 Blending Silo Fan. Following methodology and equipment were used to conduct the survey:

- Measurements using the noise descriptors L_{Aeq} and L_{A90} were taken.
- Where possible, measurements were paused to avoid influence from the extraneous sources (such as truck movements, ABC personnel talking, etc.).
- The wind conditions during the survey generally calm, with speeds below 2m/s.
- Equipment details:
 - Model – Brüel & Kjær Type 2250 Class 1 sound level meter (sound level meter satisfies the requirements of AS IEC 61672.1-2004)
 - Serial number – 3012267
 - Calibration – Due for calibrated on February 2022
 - Spot calibration check – The calibration of the sound level meter was checked before and after measurements and no drift in sensitivity was detected

2. Survey Data

The survey data compared against the data from previous surveys is presented in Table below:

Table 1: On-site Survey Results

Plant/Equipment	Measurement Distance from Plant/Equipment	Measured Levels dB(A)		
		December 2021 Survey	May 2021 Survey	2019 Survey
Kiln 3 Blending Silo Fan	1.5 from the fan (inside)	89	98	90
	3m from the exhaust outlet	79	79	76
H17 Hydrator Scrubbing Fan	1m from the fan (normal operation)	91	92	86
	1m from the fan (full load operation)	95	-	-
	1.5m from the exhaust outlet (normal operation)	87	90	80
	1.5m from the exhaust outlet (full load operation)	93	-	-

2.1. Kiln 3 Blending Silo Fan

The details of maintenance works conducted on Kiln 3 Blending Silo Fan are not known at this stage. Based on the results presented above, Vipac comments as follows:

- The casing break-out noise of the fan has shown reduction since the May 2021 survey and the noise levels are now similar to the 2019 survey.
- However, the exhaust outlet noise levels are same as the noise levels measured during the May 2021 survey and 6 dB(A) higher than the 2019 survey.
- Tonal Characteristic
 - Tones at 50Hz, 315Hz and 630Hz were observed near the fan housing during this survey. The 315Hz tone was not experienced during the previous surveys.
 - Tones at 50Hz and 315Hz were observed near the fan housing during this survey. The 100Hz tone was observed in 2019 survey, however, this tone was not observed during this survey.
- Low Frequency Characteristic – No low frequency characteristic was observed during this or previous surveys.
- Vipac analysed the spectral data (attached in Appendix A), which shows similar response with clear reduction in mid-high frequency noise near the fan housing. The spectral response at the exhaust end is same as the May 2021 survey.
- Overall, the fan housing noise has reduced (likely due to maintenance works), however, the exhaust noise has not reduced. Vipac believes that this may be associated with a blockage in the duct connecting the fan and the exhaust point.

2.2. H17 Hydrator Scrubbing Fan

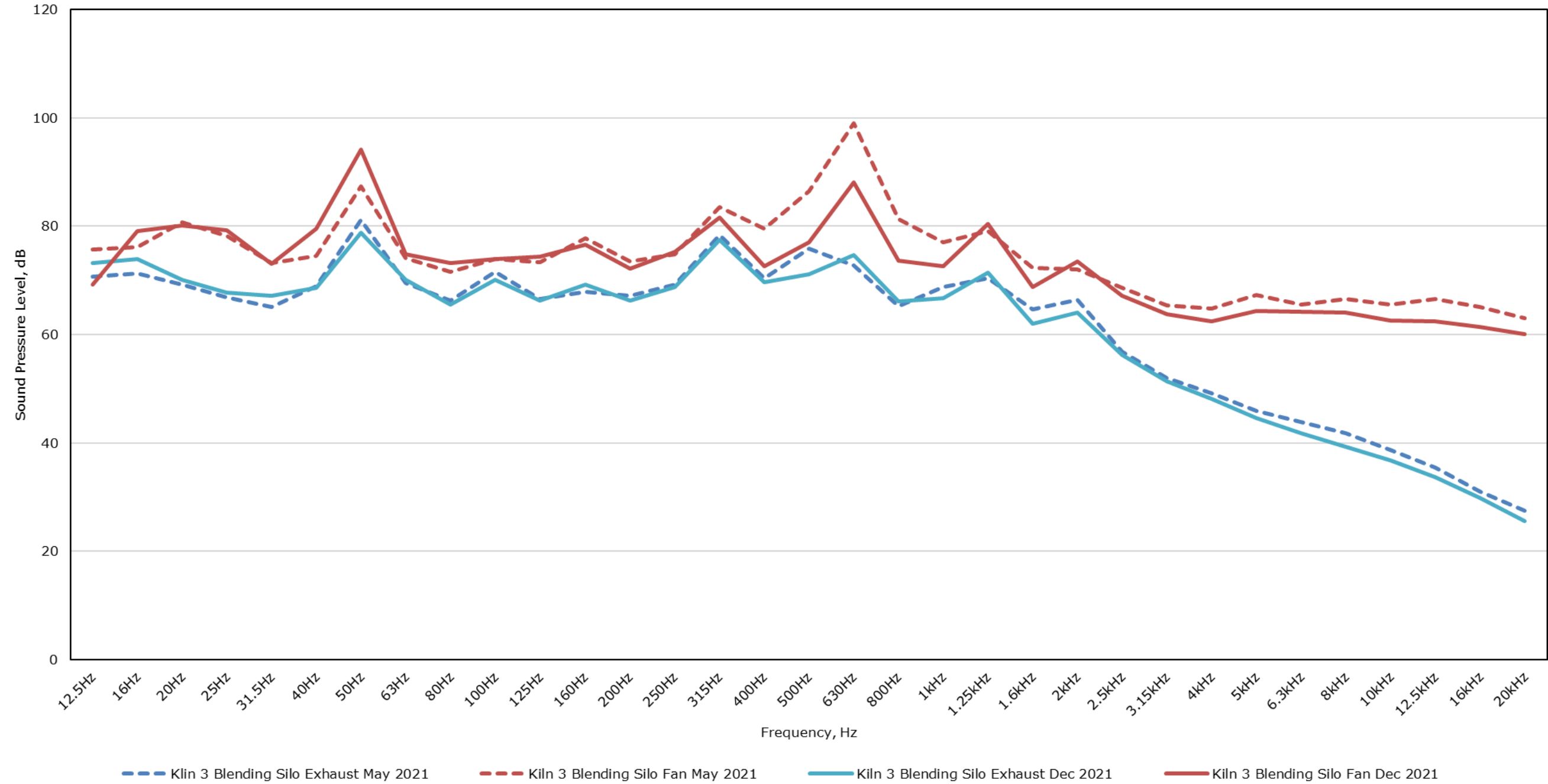
As a part of the maintenance work, the belt drive configuration for the fan was adjusted to reduce the fan speed. Based on the results presented above, Vipac comments as follows:

- The survey shows that the noise emanating from the H17 assembly has not shown any significant change in the noise levels since the May 2021 survey. The noise levels are still up to 13 dB(A) higher than the 2019 survey.
- Tonal Characteristic
 - Normal Operation
 - Tones at 630Hz observed at both casing and exhaust end of the assembly. The survey showed that the 250Hz and 500Hz tones were no longer present as compared to the previous surveys. However, a new 630Hz tone was observed.
 - Full Load Operation
 - Tones at 200Hz and 400Hz observed at both casing and exhaust end of the assembly and additional 630Hz tone observed at the exhaust end. The survey showed that the 250Hz and 500Hz tones were no longer present as compared to the previous surveys. However, new tones observed in this survey.
- Low Frequency Characteristic – No low frequency characteristic was observed during this or previous surveys.
- Vipac analysed the spectral data (attached in Appendix A), which shows similar response at the exhaust end and the fan casing end as compared to May 2021 survey.
- Overall, the fan assembly has shown no significant change in the noise conditions.
- Vipac believes that the increase in noise level may be associated with a blockage in the duct and the attenuator.

Appendix A

1/3 Octave Band Data Comparison

Kiln 3 Blending Silo Fan



H17 Hydrator Scrubbing Fan

