



Adelaide Brighton Cement Ltd

ABN 96 007 870 199

ANNUAL NOISE MANAGEMENT REPORT FOR BIRKENHEAD WORKS

COMPLIANCE DATE: 15/02/24 - Annual Report - 2023

EPA Licence 1126: Noise Management Plan (U-787)

Licensed site: Adelaide Brighton Cement, Birkenhead Works

62 Elder Road, Birkenhead, SA 5015

Date of Submission: 15 February 2024

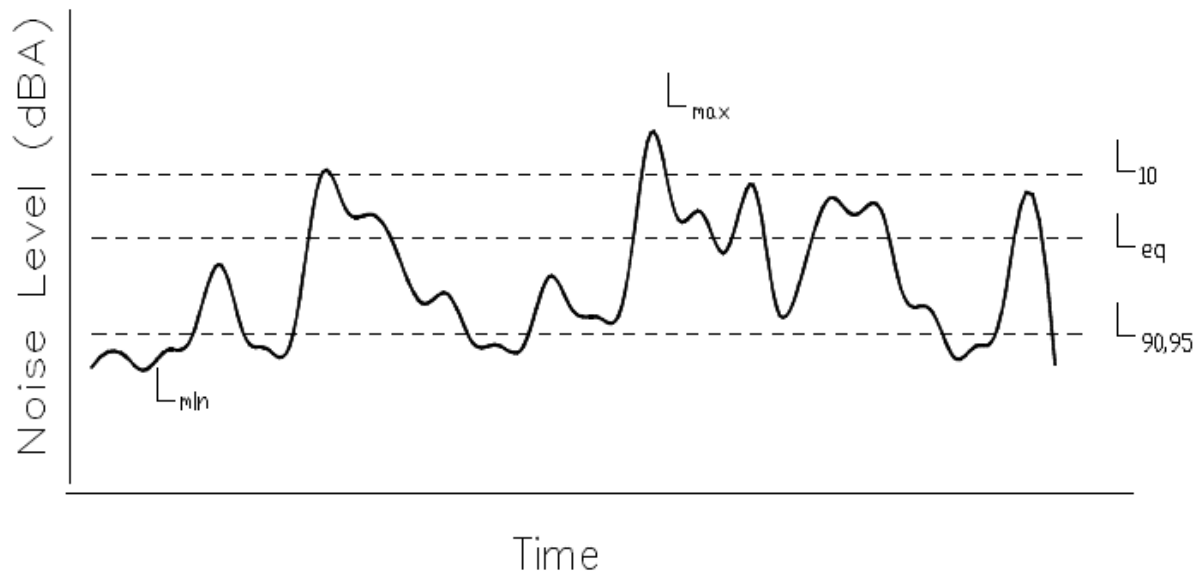
Version Number: 1



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. L₁ 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. L₁₀ 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. L₉₀ 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).



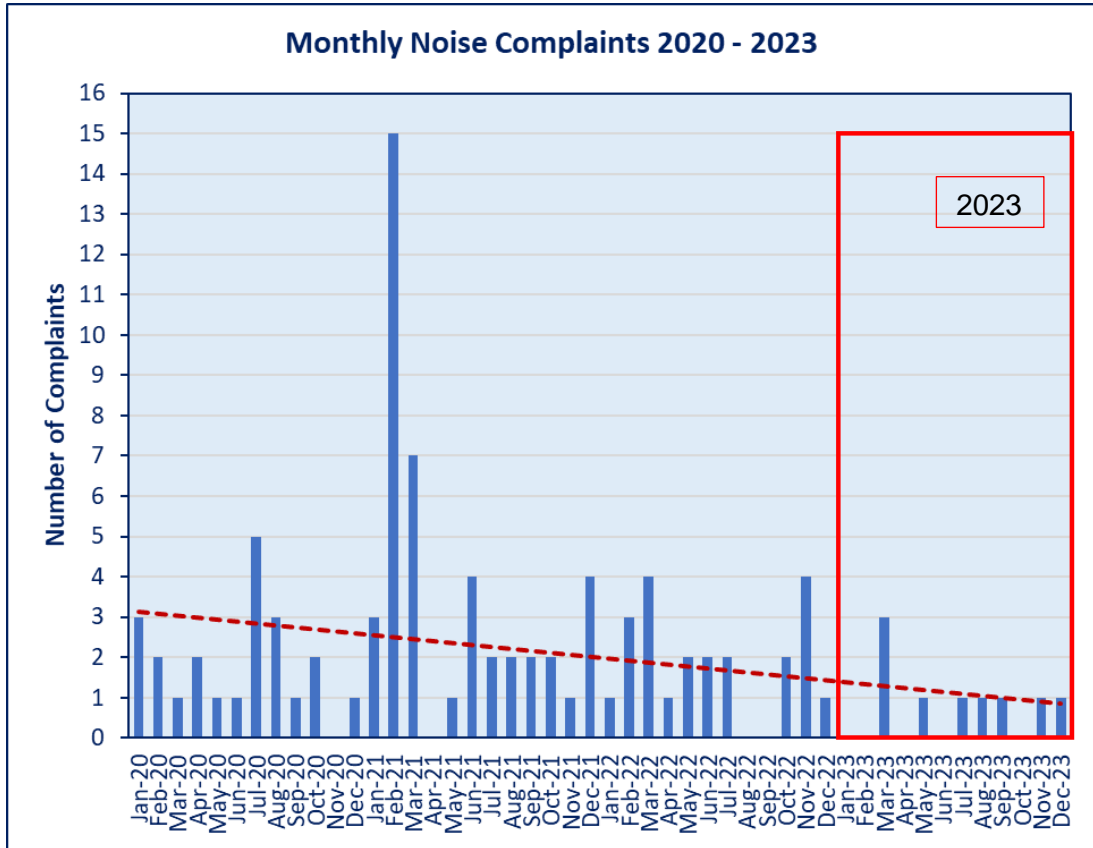
Note: *The subjective reaction or response to changes in noise levels can be summarised as follows:*

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>The annual report will include where applicable:</p> <ul style="list-style-type: none"> • Graph of noise complaints received for the year and trend report in noise complaints compared with the previous year • Summary of noise monitoring in the local community and an assessment of results against previous monitoring results to identify trends in noise levels. • Summary of noise minimisation actions and overall effectiveness • 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 2 August 2023 by the SA EPA.</p> <p>The Plan is available on the ABC Birkenhead Community Website: https://adelaidebrightoncommunity.com.au/</p>																										
Noise complaints	<p><u>2023 Complaints summary</u></p> <ul style="list-style-type: none"> • 9 complaints (total) – (includes 3 not related to site activity). • 4 complaints received from two residents (2 each) – (represents 45% of all complaints). • Source was not able to be identified for 5 of the 9 complaints investigated. • 1 complaint related to equipment (loose flag ropes) • No complaints related to plant shutdown maintenance activities. <p>Details of noise complaints and actions taken are reported in the 2022 quarterly noise reports.</p> <div> <table border="1"> <caption>Noise Complaints 2023</caption> <thead> <tr> <th>Month</th> <th>Number of Complaints</th> </tr> </thead> <tbody> <tr><td>Jan-23</td><td>0</td></tr> <tr><td>Feb-23</td><td>0</td></tr> <tr><td>Mar-23</td><td>3</td></tr> <tr><td>Apr-23</td><td>0</td></tr> <tr><td>May-23</td><td>1</td></tr> <tr><td>Jun-23</td><td>0</td></tr> <tr><td>Jul-23</td><td>1</td></tr> <tr><td>Aug-23</td><td>1</td></tr> <tr><td>Sep-23</td><td>1</td></tr> <tr><td>Oct-23</td><td>0</td></tr> <tr><td>Nov-23</td><td>1</td></tr> <tr><td>Dec-23</td><td>1</td></tr> </tbody> </table> </div>	Month	Number of Complaints	Jan-23	0	Feb-23	0	Mar-23	3	Apr-23	0	May-23	1	Jun-23	0	Jul-23	1	Aug-23	1	Sep-23	1	Oct-23	0	Nov-23	1	Dec-23	1
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The nine (9) noise complaints received in 2023, is 41% reduction in complaints compared to 2022.

There has been a steady decline in noise complaints in recent years, as shown in the graph below.



Community based noise monitoring & assessment against previous year

Attended daytime and night-time community noise monitoring survey, has been undertaken by acoustic consultants, Resonate. The results are detailed in the Resonate report “ABC Birkenhead Plant 2023—Environmental Noise Assessment”, November 2023, A230772RP1A Revision A, (attached).

ABC has undertaken regular attended daytime and nighttime noise monitoring surveys in the community to gain an understanding of how noise from the site impacts the community. Noise Measurements have been conducted in accordance with the Environment Protection Noise Policy, at defined measurement positions allowing for trends in noise levels at each location to be established over time. Table 2 provides details of the measurement locations, and their position relative to the Birkenhead site is shown in Figure 1.

Site Noise Criteria

Noise from the activities undertaken at the ABC Birkenhead site should comply with the provisions of the Environment Protection (Commercial & Industrial Noise) Policy 2023. (Noise EPP). However, in consultation with EPA, the criteria, provided in Table 1 has been agreed upon for noise emanating from ABC’s Birkenhead Plant.

Table 1: Environmental noise criteria

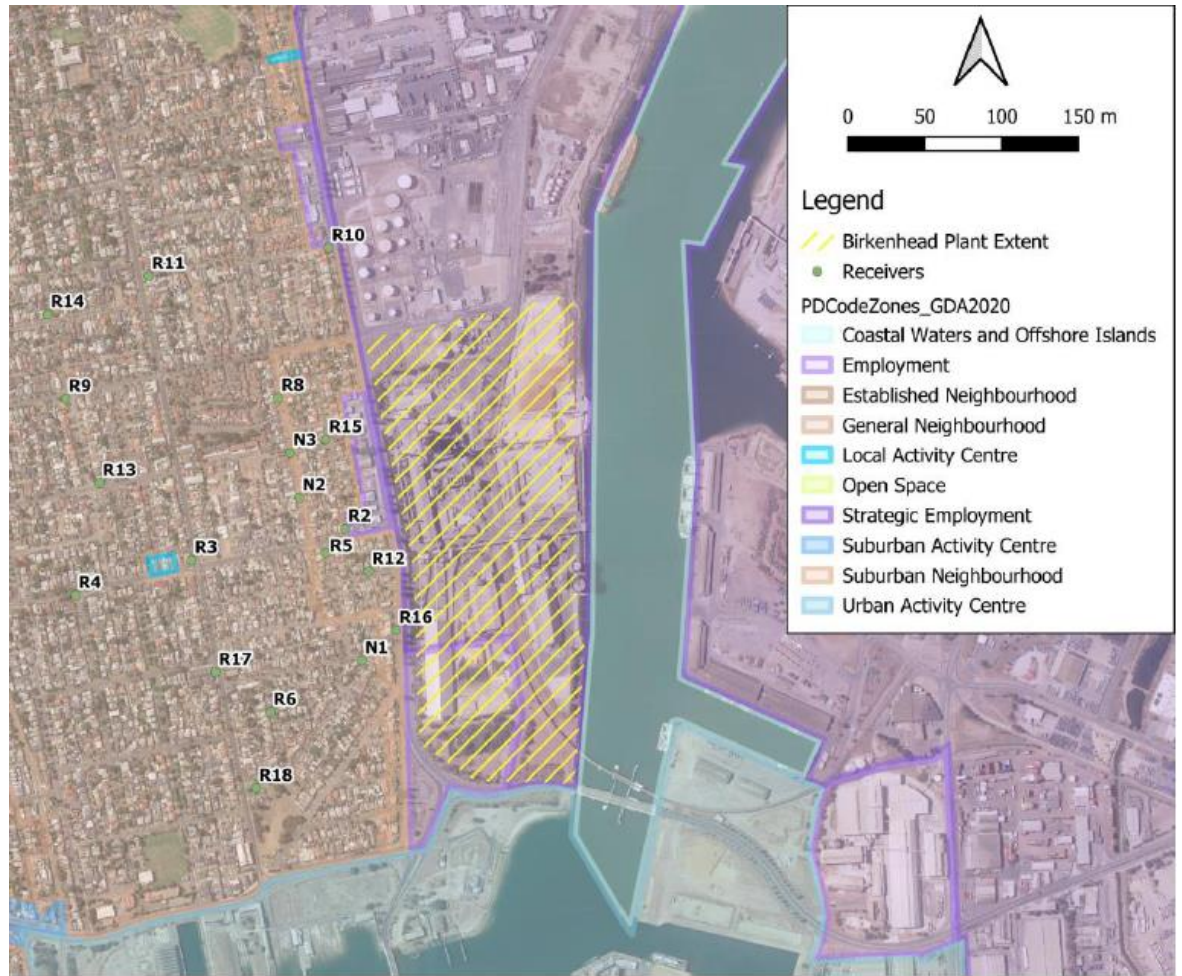
Location	Zone	Criteria dB(A)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
ABC Birkenhead Plant	Employment & Strategic Employment	N/A	N/A
R2, R5, R12, R15, R16	Suburban Neighbourhood zone	57	49
N1, N2, N3, R3, R4, R6, R8, R9, R10, R11, R13, R14, R17, R18	General Neighbourhood zone	57	49

Historically it has been observed that measurement positions closer to Victoria Road are inherently dominated by short-term/transient noise level events (such as intermittent passing road traffic), which impacts the Leq noise levels measured at these locations. As such, EPA has advised that a comparison of L90 noise level descriptor with the criteria presented above is acceptable for locations within 100 meters of the centre line of Victoria Road.

Table 2: Measurement Locations

Receiver ID	Zone	Survey Location
R2	Suburban neighbourhood zone (SN)	Corner of Alfred St and Hargrave St, Peterhead
R3	General Neighbourhood zone (GN)	Adjacent to 145 Hargrave St, Peterhead
R4	General Neighbourhood zone (GN)	Corner of Roberts St and Hargrave St, Birkenhead
R5	Suburban neighbourhood zone (SN)	Adjacent to 23 Levi St, Birkenhead
R6	General Neighbourhood zone (GN)	Adjacent to 19 Craigie St, Birkenhead
R8	General Neighbourhood zone (GN)	Adjacent to 39 Mary St, Peterhead
R9	General Neighbourhood zone (GN)	Corner of Wills St and Whyte St, Peterhead
R10	General Neighbourhood zone (GN)	Corner of Olive St and Victoria Rd, Largs Bay
R11	General Neighbourhood zone (GN)	Adjacent to 158 Fletcher Road, Largs Bay
R12	Suburban neighbourhood zone (SN)	Adjacent to 33 Hilton St, Birkenhead
R13	General Neighbourhood zone (GN)	Adjacent to 28 Whyte St, Peterhead
R14	General Neighbourhood zone (GN)	Adjacent to 15 Waverly St, Largs Bay
R15	Suburban neighbourhood zone (SN)	Adjacent to 9 Walton St, Peterhead
R16	Suburban neighbourhood zone (SN)	Adjacent to 77 Victoria Rd, Birkenhead
R17	General Neighbourhood zone (GN)	Corner of Fletcher Rd and Rose St, Birkenhead (adjacent to 53 Fletcher Rd)
R18	General Neighbourhood zone (GN)	Adjacent to 20 Fletcher Rd, Birkenhead (in the park)
N1	General Neighbourhood zone (GN)	Corner of Gunn and Well St, Birkenhead (adjacent to 39 Wells St)
N2	General Neighbourhood zone (GN)	Adjacent to 9 Mary St, Peterhead
N3	General Neighbourhood zone (GN)	Corner of Walton & Mary St, Peterhead (adjacent to 23 Mary St)

Figure 1: Aerial image of site, adjacent land, zoning and measurement locations



Summary of the noise survey results

Noise monitoring was undertaken in November 2023 and the results of the day time and night time survey, compared against the applicable environmental noise criteria and the historical noise survey data for the past 3 surveys, are summarised in the following tables below which highlights any significant noise source from the plant where applicable.

Table 3: Day time noise survey results

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L _{eq}	L ₉₀			
R2	56	54	57	✓	1
R3	54	51	57	✓	1
R4	47	43	57	✓	1
R5	51	49	57	✓	1
R6	44	38	57	✓	1
R8	48	45	57	✓	1
R9	49	38	57	✓	1
R10	71	60	57	✗	2
R11	48	37	57	✓	1
R12	57	53	57	✓	1
R13	53	40	57	✓	1
R14	50	45	57	✓	1
R15	53	50	57	✓	1
R16	74	63	57	✗	2
R17	53	46	57	✓	1
R18	51	46	57	✓	1
N1	54	49	57	✓	1
N2	49	46	57	✓	1
N3	49	46	57	✓	1

Day time survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Exceedance of noise criterion is observed at receivers R10 and R16. The exceedance at these locations is consistent with previous noise surveys (refer Section 5.2.2), as the background noise is inherently influenced by traffic noise from Victoria Road (designated Type A road providing major thoroughfare for heavy vehicles). It should also be noted that the plant is usually inaudible at these locations due to dominant traffic noise.

Table 4: Night time Survey results

Location	Measured noise level dB(A)		Night time criteria dB(A)	Compliance	Notes/Comments
	L _{eq}	L ₉₀			
R2	52	51	49	x	2
R3	45	43	49	✓	1
R4	40	38	49	✓	1
R5	52	51	49	x	2
R6	41	39	49	✓	1
R8	50	49	49	x	3
R9	39	38	49	✓	1
R10	48	47	49	✓	1
R11	39	37	49	✓	1
R12	54	53	49	x	4
R13	47	43	49	✓	1
R14	42	39	49	✓	1
R15	52	51	49	x	4
R16	54	53	49	x	5
R17	40	38	49	✓	1
R18	39	36	49	✓	1
N1	45	44	49	✓	1
N2	46	45	49	✓	1
N3	51	49	49	x	3

Nighttime survey notes/comments:

- Environmental noise criterion compliance is achieved at each location.
- Minor (2-3 dB(A)) exceedance was observed at this location. However, the measured levels are considered acceptable due to following reasons:
 - The levels are consistent with results from last 2 surveys (± 2 dB(A))
 - Even though the plant was audible at this location, the measured noise levels were influenced by traffic noise from Victoria Road and noise from the OTR operations.
- The noise criterion is exceeded by 1 dB(A). The background noise level, due to proximity to the plant, were dominated by plant noise levels, however, some traffic noise (heavy vehicle traffic) influence was observed, with Victoria in direct line of sight. Note that the L₉₀ levels achieved the noise criterion.
- The noise levels measured at this location were affected by traffic noise from Victoria Road. During the survey, however, plant noise was observed to be the dominant source. It should be noted that the measured noise levels are within ± 1 dB(A) in comparison to historical data (previous 2 years).
- The measured noise levels at this location are inherently dominated by traffic noise from Victoria Road, with noise from the plant barely audible.

Table 5: Day time noise survey results - historical comparison

Location	Day time criteria dB(A)	Measured day time levels, L ₉₀ dB(A)			Difference (2022/2023)
		2021	2022	2023	
R2	57	50	54	54	0
R3	57	42	43	51	8
R4	57	37	34	43	9
R5	57	47	48	49	1
R6	57	39	37	38	1
R8	57	44	44	45	1
R9	57	37	34	38	4
R10	57	59	61	60	-1
R11	57	41	38	37	-1
R12	57	51	53	53	0
R13	57	38	36	40	4
R14	57	37	32	45	13
R15	57	48	52	50	-2
R16	57	59	64	63	-1
R17	57	40	37	46	9
R18	57	42	48	46	-2
N1	57	47	46	49	3
N2	57	48	42	46	4
N3	57	47	46	46	0

With reference to the results presented above, the following is noted:

- Measured noise levels at R2, R5, R6, R8, R10, R11, R12, R15, R16, R18, N1 and N3 are similar to or within +/- 3 dB(A) of the 2022 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Measured noise levels at R9, R13 and N2 exceed the 2022 measured levels, however, are within +/- 3 dB(A) of the 2021 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Noise levels measured at R3, R4, R14 and R17 show significant change in comparison to 2021 and 2022 results. However, the measured levels do not exceed the environmental noise criterion (refer Table 6). Therefore, the measured levels are considered acceptable.

Table 7 Night time noise survey results - historical comparison

Location	Night time criteria dB(A)	Measured night time levels, L ₉₀ dB(A)			Difference (2022/2023)
		2021	2022	2023	
R2	49	53	52	51	-1
R3	49	47	47	43	-4
R4	49	43	41	38	-3
R5	49	49	48	51	3
R6	49	43	39	39	0
R8	49	46	47	49	2
R9	49	40	40	38	-2
R10	49	47	50	47	-3
R11	49	39	36	37	1
R12	49	52	52	53	1
R13	49	44	42	43	1
R14	49	40	39	39	0
R15	49	52	52	51	-1
R16	49	53	47	53	6
R17	49	43	40	38	-2
R18	49	44	38	36	-2
N1	49	46	43	44	1
N2	49	47	42	45	3
N3	49	49	48	49	1

With reference to the results presented above, the following is noted:

- Measured noise levels at locations are similar to or within +/- 3 dB(A) of the noise survey data from 2021 and 2022. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Measured noise levels at R16 exceed the 2022 measured levels by 6 dB(A), however, are same as the 2021 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.

Summary of Results

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

- Day time results—criterion exceedance at two locations, R10 and R16, is noted. These two locations are on Victoria Road and the noise levels at these locations are inherently dominated by traffic noise from Victoria Road.
- Night time results—criterion exceedance at 7 locations is noted. At locations R2, R5, R8 and N3 the exceedance was within 3 dB(A). Typically, in terms of human perception to noise, a 3 dB(A) change in noise level is just perceptible. Also, the measured noise levels are similar to levels measured in 2022 and 2021 survey. At locations R12, R15 and R16, major influence by traffic noise from Victoria Road was observed. However, the measured levels were similar to the levels measured in 2021, and 2022.

Overall, noise emissions from the plant have largely remained unchanged over the reporting period

Noise abatement projects arising from complaints

Noise complaints have been received from one resident who seems to be on some occasions picking up a noise from the 4B Conditioning Tower water spray nozzles. Increasing or decreasing the water flow rate appears to resolve the noise complaint at the time.

The intermittent and variable nature of this noise source makes it difficult to find an effective solution.

Various acoustic treatments have been installed on the spray nozzles, including wrapping with Kaowool insulation blanket and moulded rubber shrouds. The latest treatment Pyrotech Soundlag 4525C (a highly flexible foam-based composite acoustic pipe lagging product), was installed on the spray nozzle pipework in January 2021.



This solution appeared to be effective until a recurrence of complaints from 30/10/2021.

ABC installed noise abatement curtains in front of the lagged spray nozzles and there has been no recurrence of noise complaints since 5/3/2022.



Noise minimisation activities:

The following steps were taken to reduce the potential for noise impacts involved with the construction of a new 1000T silo on site.

- Implementation of a Construction and Environmental Management Plan
- Construction activities were constrained to Monday to Friday 7am to 5:30pm and Saturday 7am to 12pm.
- Use of equipment with noise suppression
- The foundations utilised continuous flight auger piling technique which minimises noise/associated with driven piles.



Photograph of silo nearing completion of installation

2023 Annual Plant Shutdown

During the annual plant shutdown, the following controls were put in place to reduce the noise associated with kiln refractory demolition:

- Remote controlled pneumatic breaker (Brokk) – allows for better control of the activity,
- A 14m high noise barrier was installed,
- Nighttime Jack hammering curfew (between 10pm – 7 am)
- Noisiest activities scheduled during the daytime period
- Site inductions and daily team briefings included community impact awareness.

There were no noise complaints during the shutdown.

Pneumatic Breaker – inside kiln	Noise Barrier

Photo of pneumatic breaker in the kiln and noise attenuation barrier

Plan Effectiveness

In general, noise levels comply with the day-time criterion applicable under the Noise EPP. For most noise sensitive receivers, night-time noise levels also meet the criterion applicable under the Noise EPP. Where noise levels exceed the 49 dB(A) night-time criterion, the exceedance is generally less than 3 dB(A) which subjectively, is a 'just perceptible change'.

ABC has been proactive in implementing noise abatement measures and practices associated with shutdown activities, and other noise sources.

Noise complaints in 2023 decreased by 41%, compared with the same period in 2022

Attended daytime and night-time offsite noise surveys confirms that where new plant and equipment has been installed, it has not resulted in any significant changes in noise levels. These results also confirm the effectiveness of the noise studies undertaken as part of project development assessment and approval process, which did not predict any significant change in noise levels.

This report demonstrates the continuous improvement approach to managing noise emissions embodied in the Noise Management Plan is effective.

Resonate

ABC Birkenhead Plant 2023

Environmental Noise Assessment

A230772RP1 Revision A

Tuesday, 28 November 2023



Document Information

Project	ABC Birkenhead Plant 2023
Client	Adelaide Brighton Cement
Report title	Environmental Noise Assessment
Project Number	A230772

Revision Table

Report revision	Date	Description	Author	Reviewer
0	28 November 2023	First issue	Saksham Garg	Darren Jurevicius
A	28 November 2023	Second Issue	Saksham Garg	Darren Jurevicius

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency or modulating characteristic of the noise that is determined in accordance with the Guidelines for the use of the Environment Protection (Noise) Policy (Noise Policy) to be fundamental to the nature and impact of the noise.
Continuous noise level	A-weighted noise level of a continuous steady sound that, for the period over which the measurement is taken using fast time weighting, has the same mean square sound pressure as the noise level which varies over time when measured in relation to a noise source and noise-affected premises in accordance with the Noise Policy
Day	Between 7 am and 10 pm as defined in the Noise Policy
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
Indicative noise level	Indicative noise level determined under clause 5 of the Noise Policy.
L ₉₀	Noise level exceeded for 90 % of the measurement time. The L ₉₀ level is commonly referred to as the background noise level.
L _{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L _{max}	The maximum instantaneous noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise Policy
Noise source	Premises or a place at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
Quiet locality	A locality is a quiet locality if the Planning & Design Code provisions that make land use rules for the locality principally promote land uses that all fall within either or both of the following land use categories: (a) Residential; (b) Rural Living;

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1 Introduction

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey at their Birkenhead plant as a part of their ongoing annual noise survey. The plant operates under the Environment Protection Authority (EPA) licence number 1126.

As a part of their EPA licence condition (U-787—Noise) the plant operators require to implement a noise management plan, which warrants the following minimum to ensure compliance with the EPA licence requirements:

- Annual Noise Survey—conduct an attended noise survey in the community area close to the plant on annual basis.
- Computer Noise Model—Develop and update the computer noise model on a regular basis to include new noise sources, remove redundant sources and update noise levels for existing sources.
- Noise Abatement—continuous identification of noise generating equipment and implementation of abatement solutions to control emissions from the plant.

This assessment focuses on the annual noise survey of the plant operations. The survey included attended noise survey in the community area (at 19 locations primarily identified by ABC and agreed upon by EPA). The survey was conducted during both day time (7 am - 10 pm) and night time (10 pm—7 am) periods.

This report summarises the results of the survey, compared against the applicable environmental noise criteria and the historical noise survey data for the past 3 surveys, and highlights any significant noise source from the plant where applicable.

The following guidelines, reports and standards were used in preparation of this report:

- Planning & Design Code
- *Environment Protection (Commercial & Industrial Noise) Policy 2023* (Noise Policy)
- ViPAC report 50B-20-0065-TRP-10950285-3 *Birkenhead Plant Noise Survey—May 2020*, dated 29 May 2020
- ViPAC report 50B-21-0078-TRP-21553-2 *Annual Noise Survey Report 2021*, dated 11 November 2021
- ViPAC report 50B-22-0069-TRP-34608-3 *Noise Survey Report—May 2022*, dated 29 June 2022
- Environment Protection Authority Licence Number 1126 *Adelaide Brighton Cement*
- AS 1055.1-1997 *Acoustics—Description and measurement of environmental noise—Part 1: General procedures*, Standard Australian (1997).

2 Plant details

2.1 Plant operation

The Birkenhead plant operates 24 hours, 7 days a week, with scheduled shut down at the beginning of the year (January) for maintenance works. The survey was conducted with the plant operating under normal operational conditions.

2.2 Location

The subject site is located at 62 Elder Road, Birkenhead SA 5015. The closest residential receptors along the western boundary of the plant, across Victoria Road.

Figure 1 shows an aerial image of the locality in relation to site location, sensitive receiver locations and applicable zoning.

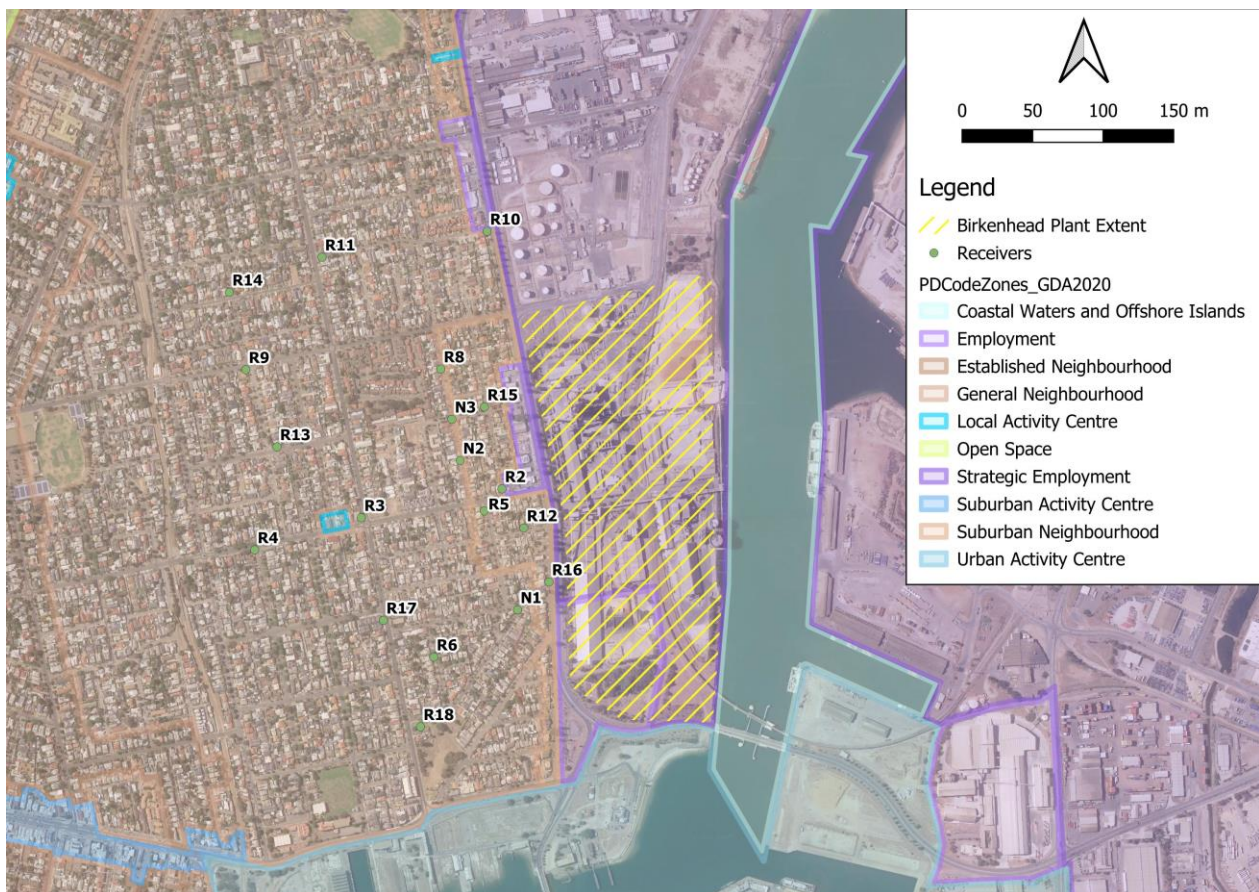


Figure 1 Aerial image of site, adjacent land, and zoning

2.3 Noise sensitive receivers

ABC, in agreement with EPA, have advised seven primary locations in the community for noise surveys. The locations and the applicable zones are provided in Table 1 and Figure 1.

Table 1 Noise sensitive receiver locations

Receiver ID	Zone	Survey Location
R2	Suburban neighbourhood zone (SN)	Corner of Alfred St and Hargrave St, Peterhead
R3	General Neighbourhood zone (GN)	Adjacent to 145 Hargrave St, Peterhead
R4	General Neighbourhood zone (GN)	Corner of Roberts St and Hargrave St, Birkenhead
R5	Suburban neighbourhood zone (SN)	Adjacent to 23 Levi St, Birkenhead
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R15	Suburban neighbourhood zone (SN)	Adjacent to 9 Walton St, Peterhead
R16	Suburban neighbourhood zone (SN)	Adjacent to 77 Victoria Rd, Birkenhead
R17	General Neighbourhood zone (GN)	Corner of Fletcher Rd and Rose St, Birkenhead (adjacent to 53 Fletcher Rd)
R18	General Neighbourhood zone (GN)	Adjacent to 20 Fletcher Rd, Birkenhead (in the park)
N1	General Neighbourhood zone (GN)	Corner of Gunn and Well St, Birkenhead (adjacent to 39 Wells St)
N2	General Neighbourhood zone (GN)	Adjacent to 9 Mary St, Peterhead
N3	General Neighbourhood zone (GN)	Corner of Walton & Mary St, Peterhead (adjacent to 23 Mary St)

3 Planning & Design Code

3.1 Zoning

3.1.1 Subject site

The subject site is located within Strategic Employment and Employment zone. The relevant Assessment Provisions and Desired Outcomes are outlined in Table 2.

Table 2 Relevant Desired Outcome—Strategic Employment and Employment zones

Desired Outcome	
Employment zone	
DO1	A diverse range of low-impact light industrial, commercial and business activities that complement the role of other zones accommodating significant industrial, shopping and business activities.
DO2	Distinctive building, landscape and streetscape design to achieve high visual and environmental amenity particularly along arterial roads, zone boundaries and public open spaces.
Strategic Employment zone	
DO 1	A range of industrial, logistical, warehousing, storage, research and training land uses together with compatible business activities generating wealth and employment for the state.
DO 2	Employment-generating uses are arranged to: <ul style="list-style-type: none"> (a) support the efficient movement of goods and materials on land in the vicinity of major transport infrastructure such as ports and intermodal freight facilities (b) maintain access to waterfront areas for uses that benefit from direct water access including harbour facilities, port related industry and warehousing, ship building and related support industries (c) create new and enhance existing business clusters (d) support opportunities for the convenient co-location of rural related industries and allied businesses that may detract from scenic rural landscapes (e) be compatible with its location and setting to manage adverse impacts on the amenity of land in adjacent zones.
DO 3	A pleasant visual amenity from adjacent arterial roads, adjoining zones and entrance ways to cities, towns and settlements.

3.1.2 Adjacent land

The closest noise-affected premises are located in Suburban Neighbourhood zone and General Neighbourhood zone. The location details of each receiver (as agreed upon by ABC and EPA) are provided in Table 1, and the relevant Desired Outcomes are provided in Table 3.

Table 3 Relevant Desired Outcomes

Desired Outcome	
Suburban Neighbourhood zone	
DO1	Low density housing is consistent with the existing local context and development pattern. Services and community facilities contribute to making the neighbourhood a convenient place to live without compromising residential amenity and character.
General Neighbourhood zone	
DO1	Low-rise, low and medium-density housing that supports a range of needs and lifestyles located within easy reach of services and facilities. Employment and community service uses contribute to making the neighbourhood a convenient place to live without compromising residential amenity.

3.2 Interface between land uses

Interface between Land Uses is a General Development Policy that is relevant to the subject site. The relevant Assessment Provisions relating to noise are outlined in Table 4.

Table 4 Relevant Assessment Provisions—Activities generating noise or vibration

Relevant Assessment Provisions	
Desired Outcome	
DO1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.
Performance Outcome	
Deemed-to-Satisfy Criteria / Designated Performance Feature	
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.

Relevant Assessment Provisions	
<p>PO 4.2</p> <p>Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including:</p> <ul style="list-style-type: none"> a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers c) housing plant and equipment within an enclosed structure or acoustic enclosure d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone. 	<p>DTS/DPF 4.2</p> <p>None are applicable.</p>

4 Noise criteria

4.1 Environmental noise policy

As noted in DTS/DPF 4.1, environmental noise emissions from the subject site should comply with the *Environment Protection (Noise) Policy 2007*. This policy has been superseded on 31 October 2023 by the *Environment Protection (Commercial & Industrial Noise) Policy 2023* (Noise Policy). As such, noise emissions from the site should be assessed under the 2023 Noise Policy.

However, in consultation with EPA, the following criteria (Table 5) has been agreed upon for noise emanating from ABC's Birkenhead Plant.

Table 5 Summary of EPA recommended environmental noise criteria

Location	Zone	Criteria	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
ABC Birkenhead Plant	Employment & Strategic Employment	N/A	N/A
R2, R5, R12, R15, R16	Suburban Neighbourhood zone	57	49
N1, N2, N3, R3, R4, R6, R8, R9, R10, R11, R13, R14, R17, R18	General Neighbourhood zone	57	49

Historically it has been observed that measurement positions closer to Victoria Road are inherently dominated by short-term/transient noise level events (such as intermittent passing road traffic), which impacts the L_{eq} noise levels measured at these locations. As such, EPA has advised that a comparison of L_{90} noise level descriptor with the criteria presented above is acceptable for locations within 100 meters of the centre line of Victoria Road.

This method is adopted to minimise/eliminate the influence of short-term/transient noise level events (such as intermittent passing road traffic) on the results. As such, the L_{90} descriptor is used for measurement positions N1, R2, R10, R12, R15 and R16. However, for all other locations, the use of L_{eq} descriptor is required.

Penalties can also be applied to a noise source for a variety of characteristics, such as impulsive, low frequency, modulating or tonal characters. For a characteristic penalty to be applied to a noise source it must be fundamental to the impact of the noise and dominate the overall noise impact. The application of the characteristic penalty is discussed in the noise emission assessment.

We note that under Part 5, Clause 20(6) of the Noise Policy, exceedance of the recommended criterion does not necessarily mean action is required under the Noise Policy. Some of the following matters should be considered when considering action:

- the amount by which the criterion is exceeded (in dB(A))
- the frequency and duration for which the criterion is exceeded
- the ambient noise that has a noise level similar to the predicted noise level
- the times of occurrence of the noise source
- the number of persons likely to be adversely affected by the noise source and whether there is any special need for quiet.

5 Attended noise survey

5.1 Survey details

5.1.1 Location details

The attended noise survey was conducted during day time and night time period at all receiver locations highlighted in Table 1 and Figure 1.

5.1.2 Instrumentation

Noise level measurements were conducted using a Brüel & Kjær Type 2250 sound level meter (B&K 2250 SLM) calibrated with a Brüel & Kjær Type 4231 calibrator. The B&K 2250 SLM is a National Association of Testing Authorities (NATA) calibrated Class 1 SLM in conformance with Australia Standard 1259 *Acoustics – Sound level meters* (AS 1259). Copies of the calibration certificates are available on request.

5.1.3 Procedure

Noise measurements were undertaken in accordance with the following:

- Noise measurements were undertaken for a period of up to 15 minutes.
- The microphone of the sound level meter was at a height of approximately 1.2 metres above the ground and at least 3.5 metres away from any wall or facade.
- The axis of maximum sensitivity of the microphone of the sound level meter was directed towards the noise source.
- A windshield was used during all measurements, and the measurements were undertaken during a calm, still night (for which the wind velocity did not exceed 5 m/s).
- Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration or electrical interference. To ensure this, where possible, the measurement was paused, and the 'back-erase' function of the B&K was used to remove any influence from extraneous noise sources during the measurements. Note that at locations with high traffic volumes (such as locations in proximity to Victoria Road and Fletcher Road), avoiding the influence of extraneous noise was not possible. In such cases, comments have been provided to reflect possible extraneous noise influence.

5.2 Noise survey results

5.2.1 Results

The results of the community noise survey conducted at the locations indicated in Table 1, during day and night time periods, have been presented in Table 6 and Table 7.

Note that the descriptor used for comparison against the noise criterion are indicated in shaded cells with bold text.

Further to below, a full set of survey noise data, including survey notes, is provided in Appendix A—Noise survey data & notes. As such, the results and discussion provided below should be read in conjunction with the survey notes.

Table 6 Community noise survey results—day time

Location	Measured noise level dB(A)		Day time criteria dB(A)	Compliance	Notes/Comments
	L _{eq}	L ₉₀			
R2	56	54	57	✓	1
R3	54	51	57	✓	1
R4	47	43	57	✓	1
R5	51	49	57	✓	1
R6	44	38	57	✓	1
R8	48	45	57	✓	1
R9	49	38	57	✓	1
R10	71	60	57	✗	2
R11	48	37	57	✓	1
R12	57	53	57	✓	1
R13	53	40	57	✓	1
R14	50	45	57	✓	1
R15	53	50	57	✓	1
R16	74	63	57	✗	2
R17	53	46	57	✓	1
R18	51	46	57	✓	1
N1	54	49	57	✓	1
N2	49	46	57	✓	1
N3	49	46	57	✓	1

Day time survey notes/comments:

1. Environmental noise criterion compliance is achieved at each location.
2. Exceedance of noise criterion is observed at receivers R10 and R16. The exceedance at these locations is consistent with previous noise surveys (refer Section 5.2.2), as the background noise is inherently influenced by traffic noise from Victoria Road (designated Type A road providing major thoroughfare for heavy vehicles). It should also be noted that the plant is usually inaudible at these locations due to dominant traffic noise.

Further comparison of the survey results has been provided in Section 5.2.2 and Appendix B—Results comparison.

Table 7 Community noise survey results—night time

Location	Measured noise level dB(A)		Night time criteria dB(A)	Compliance	Notes/Comments
	L _{eq}	L ₉₀			
R2	52	51	49	✘	2
R3	45	43	49	✓	1
R4	40	38	49	✓	1
R5	52	51	49	✘	2
R6	41	39	49	✓	1
R8	50	49	49	✘	3
R9	39	38	49	✓	1
R10	48	47	49	✓	1
R11	39	37	49	✓	1
R12	54	53	49	✘	4
R13	47	43	49	✓	1
R14	42	39	49	✓	1
R15	52	51	49	✘	4
R16	54	53	49	✘	5
R17	40	38	49	✓	1
R18	39	36	49	✓	1
N1	45	44	49	✓	1
N2	46	45	49	✓	1
N3	51	49	49	✘	3

Nighttime survey notes/comments:

- Environmental noise criterion compliance is achieved at each location.
- Minor (2-3 dB(A)) exceedance was observed at this location. However, the measured levels are considered acceptable due to following reasons:
 - The levels are consistent with results from last 2 surveys (± 2 dB(A))
 - Even though the plant was audible at this location, the measured noise levels were influenced by traffic noise from Victoria Road and noise from the OTR operations.
- The noise criterion is exceeded by 1 dB(A). The background noise level, due to proximity to the plant, were dominated by plant noise levels, however, some traffic noise (heavy vehicle traffic) influence was observed, with Victoria in direct line of sight. Note that the L₉₀ levels achieved the noise criterion.
- The noise levels measured at this location were affected by traffic noise from Victoria Road. During the survey, however, plant noise was observed to be the dominant source. It should be noted that the measured noise levels are within ± 1 dB(A) in comparison to historical data (previous 2 years).
- The measured noise levels at this location are inherently dominated by traffic noise from Victoria Road, with noise from the plant barely audible.

5.2.2 Results comparison—Historical data

A comparison of the noise survey results (L_{90} levels) with the historical data has been presented in Table 8 and Table 9 below. Note that the historical data has been sourced from Vipac's Report 50B-22-0069-TRP-34608-3.

Table 8 Community noise survey results comparison—Day time

Location	Day time criteria dB(A)	Measured day time levels, L_{90} dB(A)			Difference (2022/2023)
		2021	2022	2023	
R2	57	50	54	54	0
R3	57	42	43	51	8
R4	57	37	34	43	9
R5	57	47	48	49	1
R6	57	39	37	38	1
R8	57	44	44	45	1
R9	57	37	34	38	4
R10	57	59	61	60	-1
R11	57	41	38	37	-1
R12	57	51	53	53	0
R13	57	38	36	40	4
R14	57	37	32	45	13
R15	57	48	52	50	-2
R16	57	59	64	63	-1
R17	57	40	37	46	9
R18	57	42	48	46	-2
N1	57	47	46	49	3
N2	57	48	42	46	4
N3	57	47	46	46	0

With reference to the results presented above, the following is noted:

- Measured noise levels at R2, R5, R6, R8, R10, R11, R12, R15, R16, R18, N1 and N3 are similar to or within +/- 3 dB(A) of the 2022 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Measured noise levels at R9, R13 and N2 exceed the 2022 measured levels, however, are within +/- 3 dB(A) of the 2021 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Noise levels measured at R3, R4, R14 and R17 show significant change in comparison to 2021 and 2022 results. However, the measured levels do not exceed the environmental noise criterion (refer Table 6). Therefore, the measured levels are considered acceptable.

Table 9 Community noise survey results comparison—Night time

Location	Night time criteria dB(A)	Measured night time levels, L ₉₀ dB(A)			Difference (2022/2023)
		2021	2022	2023	
R2	49	53	52	51	-1
R3	49	47	47	43	-4
R4	49	43	41	38	-3
R5	49	49	48	51	3
R6	49	43	39	39	0
R8	49	46	47	49	2
R9	49	40	40	38	-2
R10	49	47	50	47	-3
R11	49	39	36	37	1
R12	49	52	52	53	1
R13	49	44	42	43	1
R14	49	40	39	39	0
R15	49	52	52	51	-1
R16	49	53	47	53	6
R17	49	43	40	38	-2
R18	49	44	38	36	-2
N1	49	46	43	44	1
N2	49	47	42	45	3
N3	49	49	48	49	1

With reference to the results presented above, the following is noted:

- Measured noise levels at locations are similar to or within +/- 3 dB(A) of the noise survey data from 2021 and 2022. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.
- Measured noise levels at R16 exceed the 2022 measured levels by 6 dB(A), however, are same as the 2021 measured levels. Therefore, the measured levels are considered acceptable and do not indicate any significant change in noise conditions.

5.3 Discussion

Based on the results presented in this report, the following is noted:

- Day time results—criterion exceedance at two locations, R10 and R16, is noted. These two locations are on Victoria Road and the noise levels at these locations are inherently dominated by traffic noise from Victoria Road.
- Night time results—criterion exceedance at 7 locations is noted. At locations R2, R5, R8 and N3 the exceedance was within 3 dB(A). Typically, in terms of human perception to noise, a 3 dB(A) change in noise level is just perceptible. Also, the measured noise levels are similar to levels measured in 2022 and 2021 survey.

At locations R12, R15 and R16, major influence by traffic noise from Victoria Road was observed. However, the measured levels were similar to the levels measured in 2021, and 2022.

Due to the presence and dominance of extraneous noise sources (traffic noise, petrol station noise, etc.) at most of the survey locations (specifically the ones closer to Victoria Road, Fletcher Road and Hargrave Street), it is noted that isolating plant noise from these sources is difficult. As such, the measured noise levels are not representative of the actual noise emissions from the plant operation. Additionally, ABC have implemented the following as part of their Noise Management Plan to improve noise conditions and minimise impact to the community:

- Undertaking annual noise survey to monitor noise conditions in the community.
- Undertaking noise survey during shut down period to monitor noise impact during maintenance works.
- Continuous community engagement to resolve noise complaints.
- Implementation of several Environment Improvement Plans (EIP Projects) to mitigate/reduce noise from major plant by undertaking comprehensive noise abatement projects.

With the above, continuous improvement in noise conditions has been observed in the community area (refer Appendix B—Results comparison). Overall, we understand that Adelaide Brighton Cement has implemented all practicable and reasonable measures to reduce noise emissions from the plant operation and aims to maintain these efforts in the future.



6 Conclusion

Resonate Consultants have been engaged by Adelaide Brighton Cement (ABC) to conduct an environmental noise survey at their Birkenhead plant as a part of their ongoing annual noise survey. The plant operates under the Environment Protection Authority (EPA) license number 1126.

As a part of their EPA licence condition (U-787—Noise) the plant operators are required to implement a noise management plan, which warrants an annual noise survey in the community area to meet the minimum EPA licence requirements. The survey included attended noise survey in the community area (at 19 locations primarily identified by ABC and agreed upon by EPA). The survey was conducted during both day time (7 am - 10 pm) and night time (10 pm - 7 am) periods.



Appendix A—Noise survey data & notes

Table 10 Day time noise survey results and notes

Project Name	Day/Time	L _{eq} dB(A)	L _{max} dB(A)	L ₉₀ dB(A)	Survey notes
R2	3/11/2023 12:20	56	69	54	Traffic noise from Victoria Road dominant source Plant slightly audible
R3	8/11/2023 17:03	54	62	51	Plant inaudible Traffic noise dominant source
R4	8/11/2023 18:19	47	67	43	Plant inaudible Traffic noise dominant source
R5	3/11/2023 12:40	51	65	49	Plant noise clearly audible (dominant source) Intermittent traffic noise from nearby roads
R6	3/11/2023 11:55	44	59	38	Plant noise faintly audible Traffic noise from nearby roads dominant source Intermittent dog barking, tool use noise
R8	3/11/2023 13:17	48	70	45	Plant noise clearly audible (dominant source) Intermittent traffic noise from nearby roads
R9	3/11/2023 12:19	49	64	38	Plant noise faintly audible Traffic noise from nearby roads dominant source Intermittent dog barking and resident noise
R10	8/11/2023 17:49	71	83	60	Plant barely audible Traffic noise (Victoria Rd) dominant source
R11	3/11/2023 12:52	48	70	37	Plant barely audible Traffic noise dominant source
R12	8/11/2023 17:04	57	67	53	Plant barely audible Traffic noise (Victoria Rd) dominant source
R13	3/11/2023 13:31	53	85	40	Plant inaudible Traffic noise from nearby roads dominant source Dog barking noise
R14	8/11/2023 16:47	50	65	45	Plant inaudible Traffic noise dominant source
R15	8/11/2023 16:46	53	63	50	Plant barely audible Traffic noise (Victoria Rd) dominant source
R16	8/11/2023 17:26	74	86	63	Plant barely audible Traffic noise (Victoria Rd) dominant source
R17	8/11/2023 17:54	53	69	46	Plant inaudible Traffic noise dominant source
R18	8/11/2023 17:27	51	63	46	Plant inaudible Traffic noise dominant source Intermittent dog barking noise
N1	3/11/2023 12:03	54	74	49	Traffic noise from Victoria Road dominant source Intermittent aircraft noise Plant inaudible Intermittent construction and dog barking noise
N2	3/11/2023 13:34	49	70	46	Plant noise clearly audible (dominant source) Intermittent traffic noise from nearby roads
N3	3/11/2023 12:58	49	62	46	Plant noise clearly audible (dominant source) Intermittent traffic noise from nearby roads Intermittent dog barking and resident noise from nearby properties

Table 11 Night time survey results and notes

Project Name	Day/Time	L _{eq} dB(A)	L _{max} dB(A)	L ₉₀ dB(A)	Survey notes
R2	2/11/2023 22:05	52	61	51	Continuous noise from plant some traffic noise influence from Victoria Road noise influence from OTR petrol station
R3	2/11/2023 22:28	45	56	43	Noise from plant inaudible Traffic noise dominant source
R4	2/11/2023 22:45	40	54	38	Noise from plant inaudible Traffic noise dominant source (nearby roads) Intermittent dog barking
R5	2/11/2023 22:26	52	59	51	Continuous noise from plant (dominant source) Intermittent noise from residents in nearby properties
R6	2/11/2023 23:09	41	55	39	Noise from plant inaudible Traffic noise dominant source (nearby roads)
R8	2/11/2023 22:45	50	62	49	Continuous noise from plant (dominant source)
R9	2/11/2023 23:45	39	57	38	Noise from plant inaudible Traffic noise dominant source (nearby roads)
R10	3/11/2023 1:20	48	58	47	Noise from plant faintly audible Traffic noise dominant source
R11	3/11/2023 0:18	39	46	37	Noise from plant faintly inaudible Traffic noise dominant source (nearby roads)
R12	2/11/2023 23:06	54	64	53	Continuous noise from plant (dominant source) some traffic noise influence from Victoria Road
R13	3/11/2023 0:52	47	53	43	Noise from plant audible Intermittent traffic noise
R14	3/11/2023 1:25	42	50	39	Noise from plant faintly inaudible Traffic noise dominant source (nearby roads)
R15	2/11/2023 23:29	52	57	51	Continuous noise from plant (dominant source) some traffic noise influence from Victoria Road
R16	3/11/2023 0:52	54	60	53	Traffic noise was the dominant source (heavy vehicle movements) Plant was intermittently audible during low traffic movements
R17	3/11/2023 1:51	40	62	38	Noise from plant faintly inaudible Traffic noise dominant source (nearby roads)
R18	3/11/2023 1:54	39	49	36	Noise from plant intermittently audible Traffic noise dominant source
N1	2/11/2023 23:53	45	56	44	Noise from plant intermittently audible (low frequency noise) Traffic noise dominant source
N2	3/11/2023 0:19	46	53	45	Continuous noise from plant (dominant source) some traffic noise influence from nearby roads
N3	3/11/2023 0:34	51	57	49	Continuous noise from plant (dominant source) some traffic noise influence from nearby roads and intermittent dog barking noise



Appendix B—Results comparison

The historical data for environmental noise surveys is presented below.

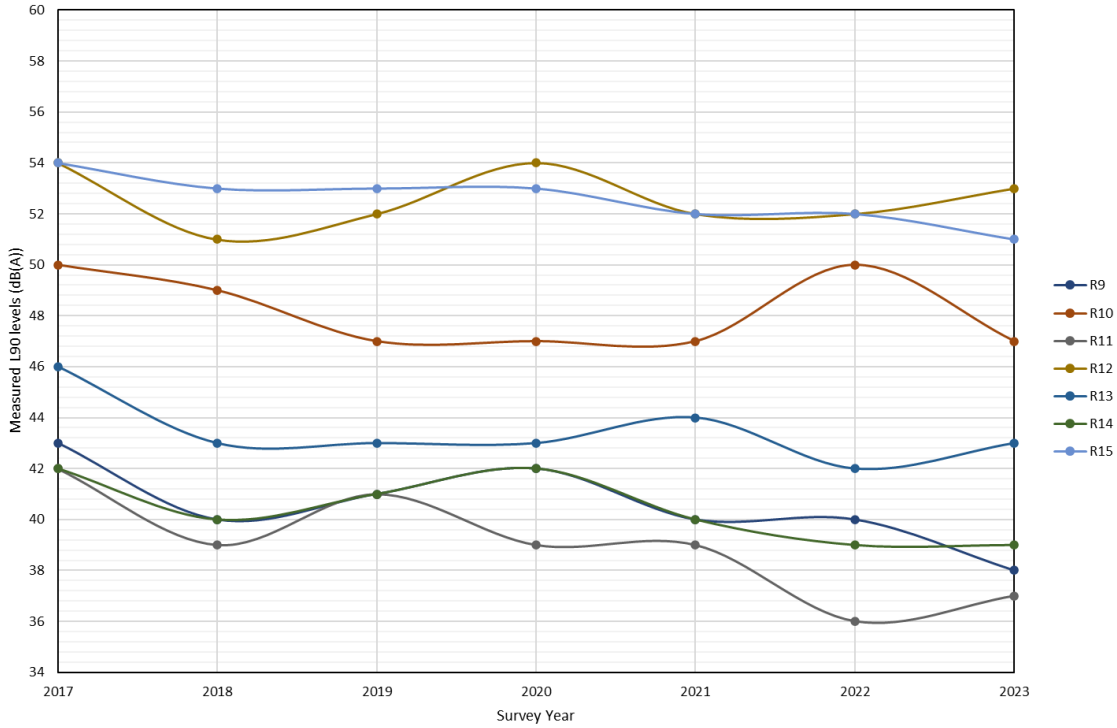
Table 12 Historical data—Measured L₉₀ levels dB(A)

Receiver Location	Measured L ₉₀ (dB(A)) levels during night-time period (10pm—7am)						
	2017	2018	2019	2020	2021	2022	2023
R2	55	55	54	54	53	52	51
R3	49	48	48	49	47	47	43
R4	44	43	41	44	43	41	38
R5	52	51	50	52	49	48	51
R6	45	44	46	46	43	39	39
R8	50	47	48	47	46	47	49
R9	43	40	41	42	40	40	38
R10	50	49	47	47	47	50	47
R11	42	39	41	39	39	36	37
R12	54	51	52	54	52	52	53
R13	46	43	43	43	44	42	43
R14	42	40	41	42	40	39	39
R15	54	53	53	53	52	52	51
R16	59	54	56	55	53	47	53
R17	47	43	43	45	43	40	38
R18	49	41	43	46	44	38	36
N1	51	48	48	49	46	43	44
N2	51	50	48	49	47	42	45
N3	52	51	50	50	49	48	49

Noise Level Comparison (R2, R3, R4, R5, R6, R8)



Noise Level Comparison (R9, R10, R11, R12, R13, R14, R15)



Noise Level Comparison (R16, R17, R18, N1, N2, N3)

