62 Elder Road
Angaston SA 5015

PO Box 77
Port Adelaide SA 5015

Telephone (08) 8300 0300
International +618 8300 0300
Facsimile (08) 8300 0597
www.adbri.com.au

Adelaide Brighton Cement Ltd

ABN 96 007 870 199

Noise Management Plan

Adelaide Brighton Cement Limited

Licence number: 35
Premises Address: Stockwell Road, Angaston5353 (Angaston Site)

ENVIRONMENT PROTECTION AUTHORITY

THIS IS THE APPROVED Plan

REFERRED TO IN CONDITION S-265

OF EPA AUTHORISATION NUMBER 35

DELEGATE _____ DATE 25/10/2019

August 2019

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- "ABC Angaston Environmental Noise Survey May 2019" dated 20 June 2019
- "ABC Angaston Noise Emissions and Assessment Summary" dated 12 June 2019

Glossary

General terminology

Abbreviations	Definition
ABC	Adelaide Brighton Cement
EP (Noise) Policy	South Australian Environment Protection (Noise) Policy 2007
NMP	Noise Management Plan
EPA	Environment Protection Authority
PO	Plant Operator
PSS	Production Shift Supervisor (includes senior production supervisor day shift)

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.

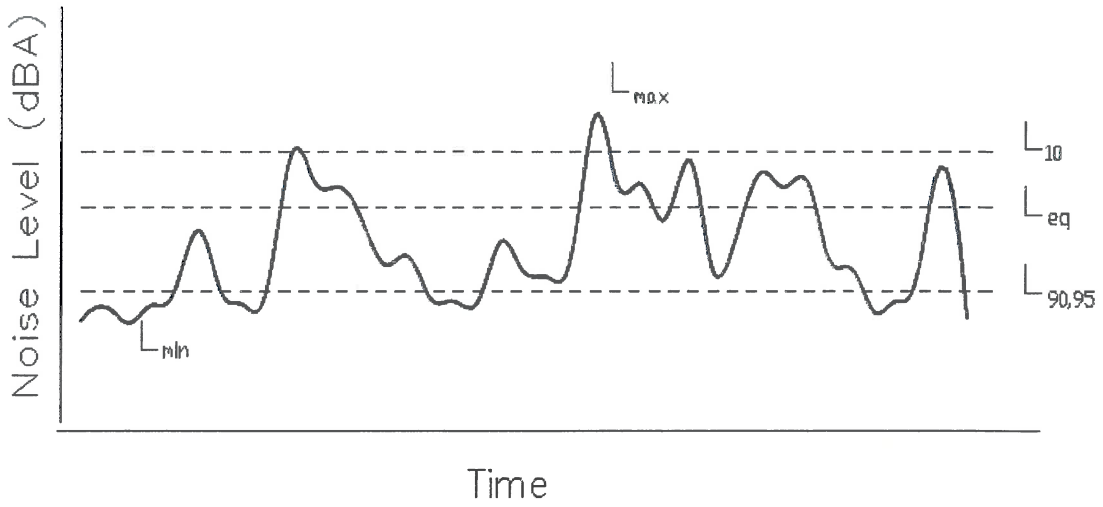
L_1 The noise level which is equalled or exceeded for 1% of the measurement period. L_1 is an indicator of the impulse noise level, and is used in Australia as the descriptor for intrusive noise (usually in dBA).

L_{10} 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).

L_{90} 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

Noise Management Plan

1.0 Purpose

This plan details how noise is managed at the Angaston site, to minimise impacts on the local community.

It outlines how Adelaide Brighton Cement Limited (ABC) assesses and manages the impacts of noise generated at the Angaston site, with the aim of ensuring that

- Noise impacts are considered as part of routine operations
- Noise emissions are controlled at source by good operational practices, physical and management controls
- Appropriate, reasonable and practicable measures are taken to reduce noise emissions from the site and the impact on nearby receptors in the local community

2.0 Scope

The Noise Management Plan (NMP) addresses

- Monitoring of noise emissions from the site
- Identification of major noise sources
- Provision of measures to manage the cumulative impact of noise sources on site
- Compliance with relevant legislative requirements
- Management of noise complaints
- Reporting on the implementation and effectiveness of the Plan
- Provision of public access to annual reports and this plan

3.0 Applicable legislative requirements and guidance

South Australian Environment Protection Act 1993
South Australian Environment Protection Regulations 2009
South Australian Environment Protection (Noise) Policy 2007 (EP (Noise) Policy)
Guidelines for the use of the Environment Protection (Noise) Policy 2007, June 2009, Environment Protection Authority
Barossa Council Development Plan, Consolidated – 1 November 2018
South Australian Development Act 1993
Adelaide Brighton Cement Ltd EPA Licence No 35, condition (S – 265)

NOISE PREVENTION (U - 265)

The Licensee must:

1. *take all reasonable and practicable measures to prevent noise from leaving the Premises;*
2. *develop a Noise Management Plan to the satisfaction of the EPA by the compliance date listed below; and*
3. *implement the Noise Management Plan approved in writing by the EPA (or any revised plan approved in writing by the EPA).*

Compliance date 30/08/2019

4.0 Background

4.1 Site context

The Angaston plant produces specialist cement and lime products (quicklime and hydrated lime).
The plant is located about 1.5 kilometres west of the town of Angaston and is located within the Barossa Industry zone. The plant's adjacent neighbours include Angaston Power Station, APA natural gas compression facility and Capral's aluminium manufacturing plant located to the South West. Metal fabricators, workshops and Vinpac wine bottling/packaging facility are located immediately to the north of the site.
The site has surrounding rural production zones to the west and north, rural landscape protection zoning to the south and extractive mining zone to the east of the site.
ABC's customers and suppliers use the major arterial roads servicing the Angaston plant for the delivery of goods and materials by road.

4.2 Noise

4.2.1 Introduction

Noise generation is an inherent part of most activities and has an almost unlimited range of sources including industrial activities, road traffic, and domestic activities.

The response to noise by individuals can be as wide and as varied as the number of activities that produce it.

A contemporary noise policy needs to have the flexibility to consider the range of factors that include the level of noise, time of day, how loud or quiet that area is expected to be, the history of the area in which the noise is located, the solutions that are applied to the noise in other similar situations and the capacity to deliver the solutions that result in noise reduction.

The Environment Protection (Noise) Policy therefore provides a set of appropriate guidelines for industry, acoustic consultants and regulators to manage the impact of noise emissions.

ABC uses acoustic noise specialists to undertake noise measurements on site, and in the local community in accordance with EPA noise measurement guidelines.

4.2.2 Assessment of site noise emissions

To provide context for the noise management plan, a noise assessment of the Angaston site was undertaken by Vipac Engineers and Scientists Limited (Vipac) in May 2019, "ABC Angaston Environmental Noise Survey May 2019" report 50B-19-0135-TRP-8950642-1, a copy of which is included in Appendix C. A summary report of noise management actions and assessments, undertaken since 2007 at the Angaston site has also been prepared by Vipac, "ABC Angaston Noise Emissions and Assessment Summary" report 50B-19-0135-TRP-8950504-1, a copy of which is included in Appendix C.

These reports provide a summary of measured noise emissions, identification and implementation of reasonable and practical noise mitigation projects undertaken by ABC to manage and minimise noise emissions from the Angaston site from 2007.

4.2.2.1 Indicative noise levels

The relevant indicative noise levels determined in accordance with the EP (Noise) Policy that are applicable for sensitive receivers near the site are contained in Table 1: Indicative Noise Levels. Maps of the relevant surrounding land use zones are contained in Appendix A.

Table 1: Indicative Noise Levels

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Primary Production (Barossa Valley Region) zone	Resident 1	60	52
Mineral Extraction Zone	Location #11	64	55
Primary Production zone	Resident 21	60	52
Rural (Landscape Protection) zone	Resident 3	60	52
Industry (Barossa Valley Region) zone	Resident 4	62	54
Rural Living zone	Resident 5	55	47
Residential zone	Resident 6	52	45

4.2.2.2 Noise emission profile

The noise emissions from the Angaston site operations are characterised as continuous broadband, steady-state noise, not comprising of any modulating or impulsive characteristics and the absence of tones.

Noise levels comply with the indicative noise levels for day-time and night-time periods for all receivers.

The May 2019, day-time and night-time noise levels are tabulated in tables 2 and 3. These noise levels are similar to the measured noise levels in the 2014 assessment and are in line with the noise levels predicted using the SoundPLAN modelling in 2007, confirming that previous noise attenuation projects are still effective.

Table 2: 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	48	45	- Minor influence due to traffic movements - Plant audible - No tones detected	60	*Complies*
Resident 3	68	48	- 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 - No tones detected	60	*Complies*
Resident 4	48	42	- Traffic noise influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Plant audible - No tones detected	62	*Complies*
Resident 5	42	38	- Minimum traffic noise influence - Dog barking at nearby property - Plant not audible - No tones detected	55	*Complies*
Resident 6	41	33	- Noise from the event taking place in the nearby Oval influenced the measurements - No traffic noise influence - Plant not audible - No tones detected	52	*Complies*
#11	43	39	- Traffic noise influence from nearby roads - Plant not audible - No tones detected	64	*Complies*
#21	58	49	- Traffic noise influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Plant audible - No tones detected	60	*Complies*

Note the noise levels at locations, Resident 3, 21, were affected due to traffic movements and the L_{A90} descriptor is more appropriate to measure noise influence from the Angaston site.

Table 3: 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	47	44	- Minor influence due to traffic movements - Plant audible (noise possibly from CM4 fan) - Noise influence from APA Compressor Plant - No tones detected	52	*Complies*
Resident 3	45	42	- Minor influence due to traffic movements - ABC plant audible - Major noise influence from CAPRAL plant - No tones detected	52	*Complies*
Resident 4	47	45	- Plant audible (noise possibly from CM4 fan) - No tones detected	54	*Complies*
Resident 5	37	31	- Plant not audible - No tones detected	47	*Complies*
Resident 6	38	35	- No tones detected - Plant faintly audible	45	*Complies*
#11	38	27	- No tones detected - Plant faintly audible	55	*Complies*
#21	48	44	- ABC plant audible - Major noise influence from CAPRAL plant and minor influence APA Compressor Station - No tones detected	52	*Complies*

4.2.3 Approach to noise management

The approach that ABC takes to noise management is twofold:

1. Ongoing daily management of operational activities to minimise the impact of noise emissions on sensitive receptors and includes:
    - 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

5.0 Responsibilities

The organisational chart presented in Figure 1 shows personnel with roles that have been assigned in the noise management plan

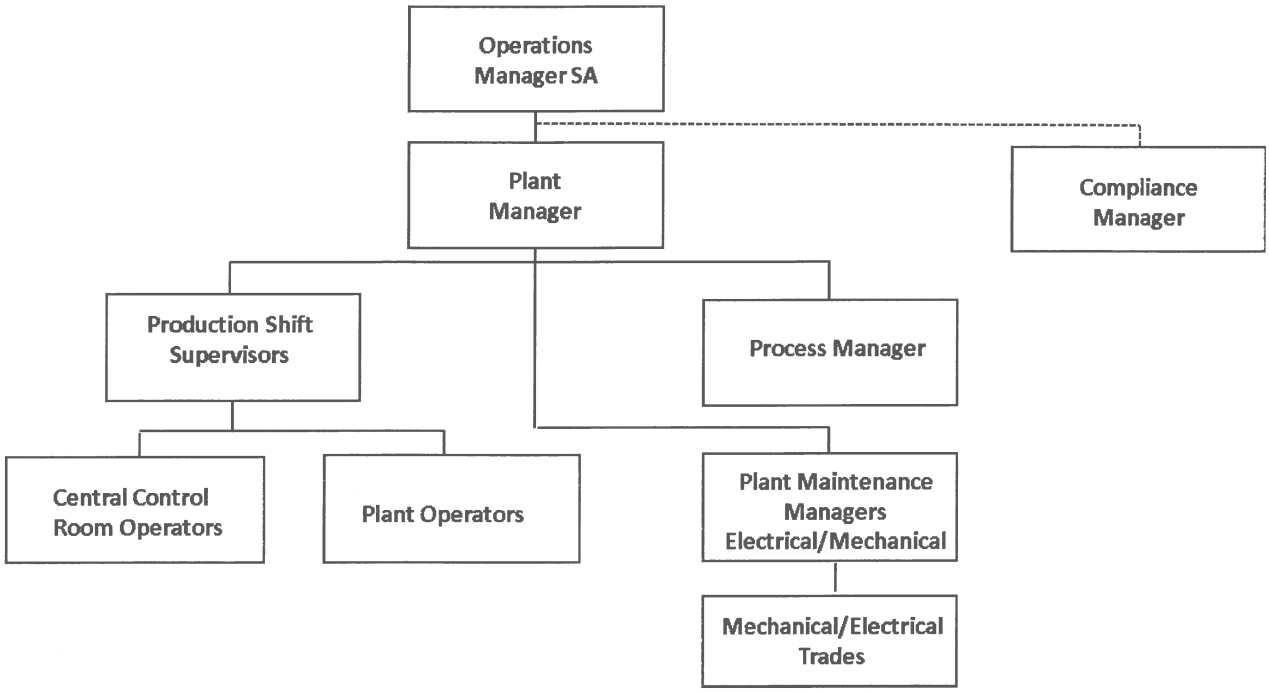


Figure 1 Organisation chart showing positions at the Facility with responsibilities under the NMP

All employees are responsible for complying with this plan, which includes:

- Taking action to minimise or prevent noise complaints
- Identifying and reporting noisy plant, equipment and activities

Table 4 General Responsibilities, details the responsibilities that apply in relation to this NMP.

Table 4: General Responsibilities

All Employees	Responsible for complying with the Noise Management Plan. This includes: • Taking action to minimise or prevent noise complaints • Reporting noisy plant, equipment and activities
Production Shift Supervisors	Responsible for minimising noise emissions from operational activities. This includes: • Monitoring operations and maintenance work to ensure noise emissions do not result in noise complaints • Investigating and responding to noise complaints received outside of business hours and taking immediate action (if possible) to reduce noise emissions • Identifying and reporting noisy plant, equipment and activities • Taking action to minimise or prevent noise complaints
Plant Manager, Process Manager, Plant Maintenance Managers	Responsible for minimising noise emissions from operational activities. This includes: • Ensuring employees and contractors are trained with respect to noise awareness, responsibilities, instructions, procedures • Monitoring operations and maintenance work to ensure noise emissions do not result in noise complaints • Timely plant and equipment maintenance to minimise noise emissions • Investigation of noise complaints, identification and implementation of corrective/preventative action • Developing and implementing contingency plans where there is a potential for nuisance noise complaints arising from activities such as demolition, construction, major shut down activities. • Noise impacts from plant modifications/equipment changes are assessed and appropriate controls identified before they are implemented • Reviewing operations and implementing noise reduction solutions.
Compliance Manager	Responsible for: • Ensuring noise monitoring is undertaken when there are changes to the plant process or equipment that could alter the noise profile of the site • Reviewing noise complaints to identify noise issues/trends • Undertake noise monitoring when required to resolve noise issues • Ensure noise monitoring, modelling and assessments are undertaken by qualified acoustic engineers • Identification of noise mitigation opportunities • Annual noise reporting requirements • Ensuring noise awareness is included in site induction and environmental training
Operations Manager	Responsible for: • Implementation of the Noise Management Plan Ensuring employees and contractors are aware of the site EPA licence, and other regulatory requirements relating to plant noise • Providing resources to reasonably and practically implement this plan

6.0 Measures to manage the cumulative impact of noise sources on site

6.1 Noise monitoring

Compliance noise monitoring is to be undertaken by qualified acoustic engineers in accordance with the EP (Noise) Policy and EPA noise measurement guidelines.

Noise measurements are to be undertaken for the following purposes:

- To determine the impact of plant operations on the local community
- Provide noise data at selected locations over time
- Provide baseline data
- Evaluation of the plant operations against EP(Noise)Policy goals
- Provide data for noise impact modelling (Sound PLAN 3D noise modelling)
- Where appropriate assist in resolution of noise complaints and issues
- On completion of significant changes to plant, equipment or process and confirm effectiveness of implemented noise attenuation/mitigation controls

Noise emissions from site operations will be reassessed against EP(Noise)Policy goals every three years.

To provide a consistent basis on which to evaluate noise impacts within the local community from plant operations and to evaluate effectiveness of mitigation measures, noise levels are to be measured at defined locations outside the plant boundary (refer to Appendix B).

6.2 Management control measures

6.2.1 Employee and contractor awareness and training

All employees and contractors should, through delivery of appropriate training and induction programmes, understand that noise arising from activities that are undertaken on site could impact on residents and the need to:

- Take action to report, minimise and prevent noise complaints
- Understand the most appropriate times to undertake high noise generating activities
- Keep doors closed on buildings containing noisy equipment
- Respond to conditions that can result in noise complaints
- Use suitable equipment and noise controls such acoustic enclosures when undertaking noisy activities
- Investigate and resolve noise complaints

ABC has an on-line site induction and inbuilt assessment package, which records relevant details (name, company, date of successful completion of the induction training) within the induction database. All contractors and employees are required to successfully complete the site induction training package on the following frequency: contractors annually, employees every 2 years.

6.2.2 Acoustic planning

Noise prevention and abatement controls will be considered in the planning process for;

- Activities that are likely to impact on the local community
- Plant shutdowns for maintenance
- Purchasing replacement plant and equipment

- Process improvements and modifications
- Appropriate training and supervision of employees and contractors

Assessment of noise impacts during planning activities will be undertaken through the use of appropriate assessment tools and processes that may include

- Risk assessments
- HAZOP studies
- Plant design and modification processes
- Acoustic modelling
- Use of Acoustic and engineering consultants
- Noise measurements
- Current practice, knowledge and experience of similar process or equipment

6.3 Physical measures

6.3.1 Overview of existing plant noise attenuation techniques

The majority of the site operations are undertaken in fully enclosed buildings that act as a noise barrier, attenuating noise emissions from the enclosed plant, process and operational activities.
Where reasonably practicable particularly noisy plant/equipment is located in acoustically designed enclosures, e.g. compressors. Identified noisy plant and equipment that has a high risk of off-site noise impact has noise attenuation measures applied such as silencers, lagging, vibration mountings, acoustic baffles etc.

6.3.2 Acoustic barriers /noise attenuation

Acoustic barriers / noise attenuation controls are to be applied primarily to fixed machinery and plant with identified noise issues. Acoustic barriers may include the following:

- Acoustically treated walls /panels etc. to absorb noise
- Enclosed rooms or enclosures for stationary machinery such as compressors
- Noise attenuating equipment e.g. white noise reversing alarms, vibration isolation mountings
- Silencers
- Where possible plant/equipment modifications

6.4 Noise Contingency Measures

6.4.1 Noise Complaints

ABC provides a range of ways in which it can be contacted by members of the public about any matter of concern which include:

- A 24 hour, 7-day hotline phone number 8561 3100, which provides access to the central control room and the on-site supervisor.
- By email: AngastonCommunity@adbri.com.au

Complaints are managed in accordance with EPA licence 35, condition S-1. Details of all noise complaints are logged into the complaints database and are communicated to the appropriate staff member to be investigated.

Immediate action is to be taken to mitigate identified sources of noise complaints and longer-term corrective action will be identified to minimise a reoccurrence.

Identified noisy plant, equipment and activities reported by site employees and contractors are logged into the complaints database and managed in the same way as external noise complaints.

6.4.2 Plant shutdowns/major site works

Planned events where the activity to be undertaken has the potential to change the characteristics of the normal plant background noise, such as plant shutdowns, demolition and construction activities, will be risk assessed and appropriate controls implemented to manage off site impacts. The manager with responsibility for the activity/project is to ensure a risk assessment appropriate to the nature of the activity and potential noise emissions impact is undertaken (refer section 6.2.2 Acoustic planning).

These controls may include;

- Where appropriate, the development of a specific noise minimisation plan for that activity
- Limiting particular activities to certain times of the day where this is reasonably practical
- Identification of controls to minimise noise from specific activities
- Noise measurements to ensure identified measures are effective

6.4.3 Emergency noise

Emergency alarms and sirens are used to alert people to a risk to their personal safety and plant process issues.

Metropolitan Fire Services personnel need to investigate fire alarms and assess that the situation/plant / building is safe, before fire alarms can be cancelled/silenced.

Audible pre-warning alarms that are a mandatory safety requirement to alert employees to imminent plant /equipment start-up are located within buildings close to the piece of equipment.

Plant process alarms are managed within the plant SCADA systems, which are, monitored 24/7 in a centralised control room manned by control room operators. Plant conditions giving rise to process alarms are addressed promptly to correct the process conditions generating the alarm. Most of the audible alarms are located within a building close to the relevant part of the process.

6.5 Noise Management Practices and Reporting Measures

Noise management practices are summarised in table 5

Table 5: Summary of noise management practices

Activity:	Description:
Noise monitoring	Attended noise monitoring is undertaken in the community to determine the effectiveness of noise mitigation projects, validate the noise model for the site, and to evaluate plant operations against EP(Noise)Policy goals. Noise monitoring at the same locations allows for trends over time to be observed with regard to noise impacts. Reassessment of site noise emissions every 3 years.
Ad-hoc noise monitoring	Ad-hoc noise monitoring may be undertaken, to address specific noise complaints.
On-site noise surveys	On-site noise surveys are undertaken to monitor equipment performance.to minimise noise emissions.
Procurement/process changes	Consideration of lower noise emission products when selecting new plant and equipment, or when process changes are made.
Management processes	Management and communication processes that help facilitate awareness of noise emissions and provide avenues for identifying, communicating, reporting, assessing, controlling and reducing site noise emissions, include: • Internal and external management system audits. • Certified ISO 14001 Environmental Management System • Internal process change requests • Equipment/Task risk assessments (safety/environment/quality) • Housekeeping /workplace inspections • Plant equipment preventative maintenance schedules • Production meetings & tool box talks • Weekly and monthly management meetings
Complaints management	ABC provides a range of options for members of the public to raise concerns about operations, including a 24/7 telephone hotline, email, and an online feedback form. All complaints are logged into ABC's database and are responded to within 72 hours. Immediate action to resolve the issue is taken if possible, and longer-term actions are taken to prevent recurrence.
Training	ABC ensures that employees and contractors are trained and aware of requirements relating to noise (including reporting and taking action when noisy plant, equipment or processes are identified) through site inductions and environmental awareness training.

6.5.1 Reporting

An annual report will be prepared detailing noise management activities for the year.

Annual reports will include where applicable:

- 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

Annual noise report will be submitted by 31 October of each calendar year. Following submission of the report to the EPA it will be made available on the ABC Community Web Site, within 7 days.

6.5.2 Public access

A copy of the current version of this Plan, once approved by the EPA, will be made available on the ABC Community Web Site within 7 days.

7.0 Plan review

The plan will be reviewed for ongoing effectiveness

- At the time of preparing the annual report:
- When significant changes in the process necessitate changes in noise management practice to minimise noise impacts on the local community

8.0 Plan submission

Submitted by:

Name

Position

Authorised on behalf of

ADELAIDE BRIGHTON CEMENT LTD.

Signed : .....

Dated : ...../...../.....

9.0 Plan approval

Approved by:

.....

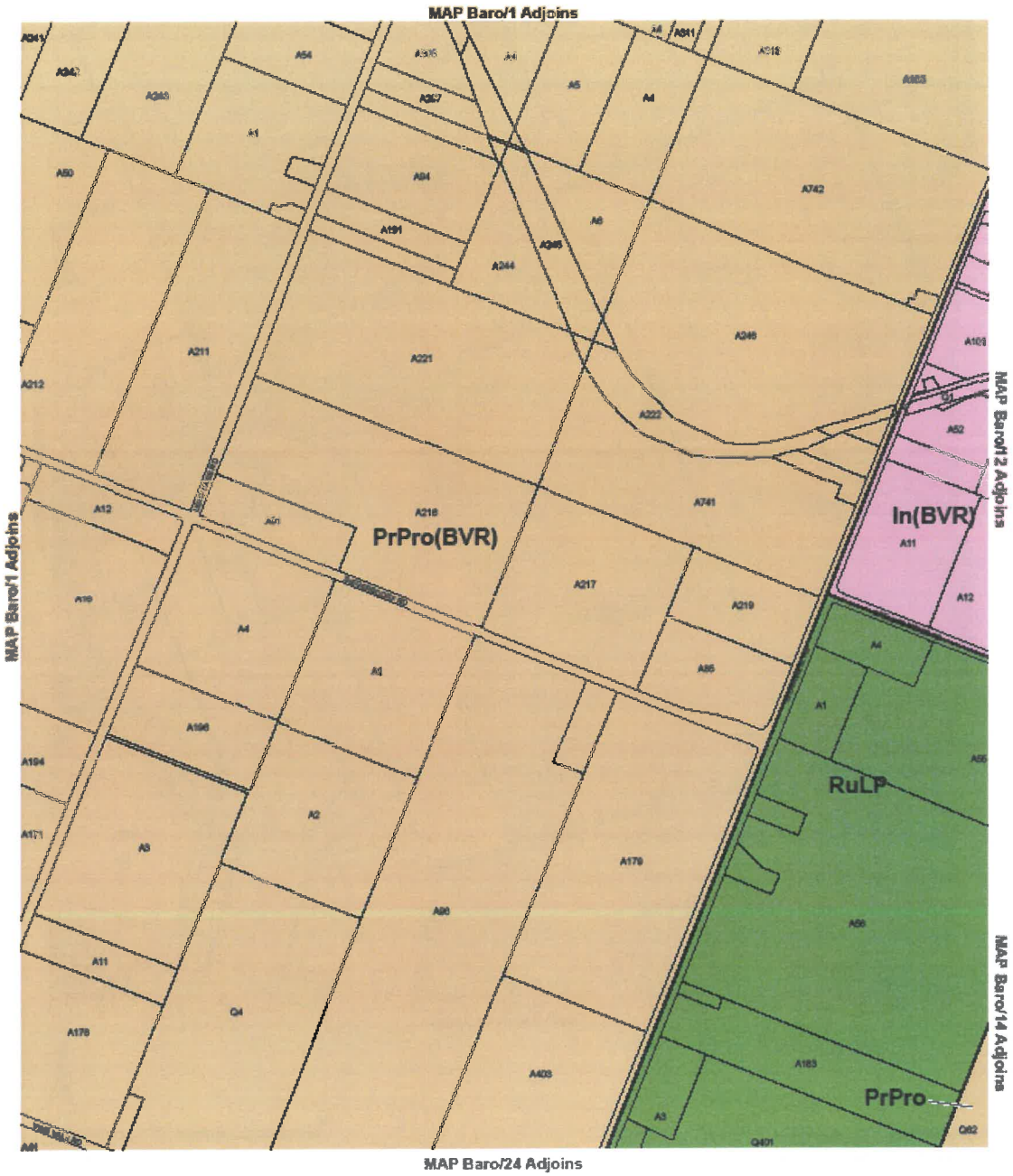
DELEGATE OF THE ENVIRONMENT PROTECTION AUTHORITY

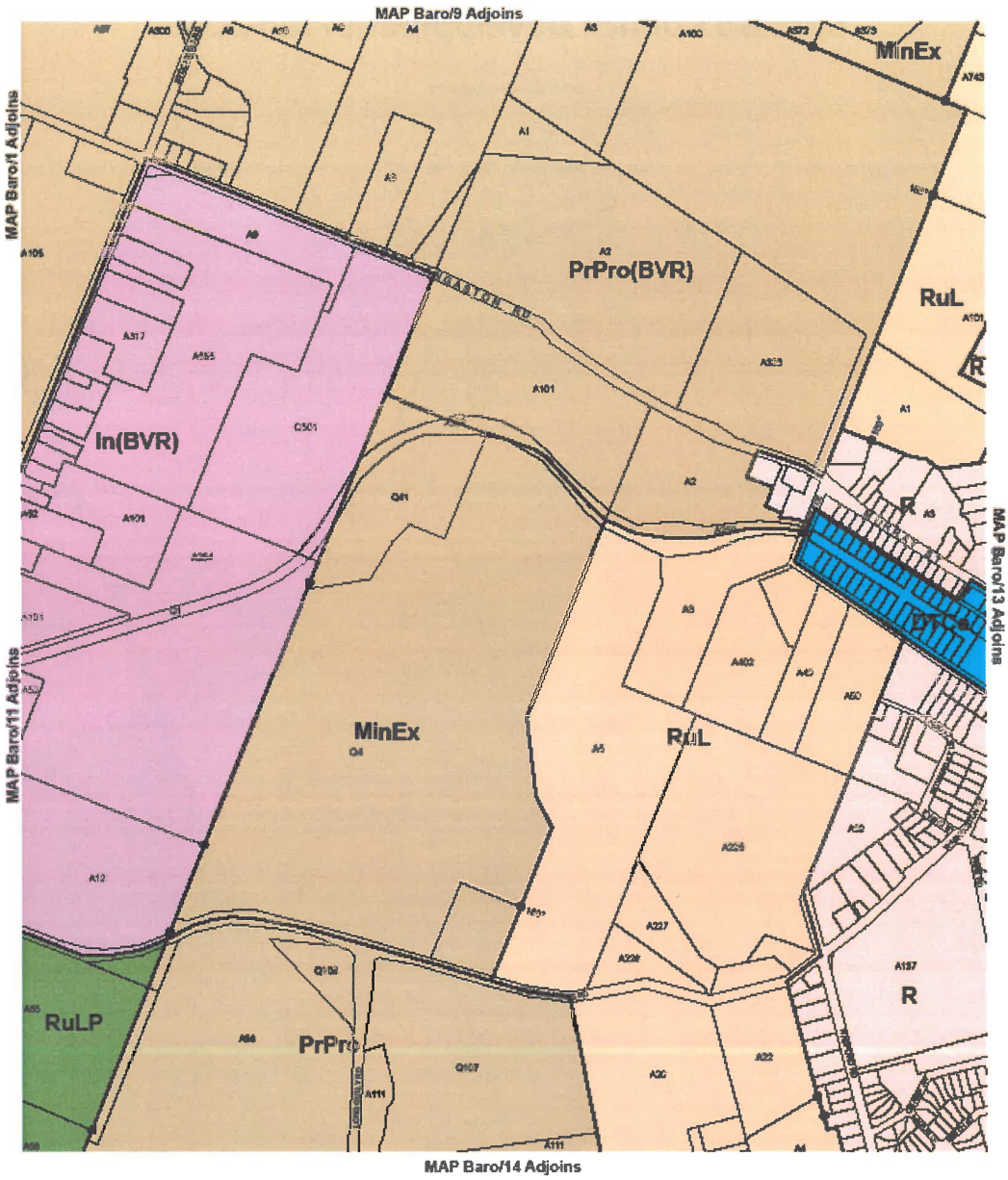
Signed : .....

Dated : ...../...../.....

Appendix A

Barossa Council Development Plan Zones





Zones

- DTCe — District Town Centre
- In(BVR) — Industry (Barossa Valley Region)
- MinEx — Mineral Extraction
- PrPro — Primary Production
- PrPro(BVR) — Primary Production (Barossa Valley Region)
- R — Residential
- RuLP — Rural Landscape Protection
- RuL — Rural Living
- Zone Boundary

ANGASTON

Zone Map Baro/12

BAROSSA COUNCIL
Consolidated - 1 November 2018

Angaston site and surrounding Barossa Council Development Zones

SA EPA Recommended Indicative Noise Factors for Angaston Site

(SA EPA 30 May 2019)

Table A1 – Derivation of Indicative Noise Factors for Noise Source Zone(s):

Zoning:	*Zone Description:*	*Principally promoted land uses:*	*INFs: (day/night):*	*INF for Zone: (day/night)*	*INF for Noise Source (day/night):*
Industry (Barossa Valley Region) Zone:	*"A zone accommodating a wide range of industrial, warehouse, storage and transport land uses of regional significance, particularly wineries and other activities which support the region's viticulture and wine making industry."*	Rural Industry General Industry Commercial	57/50 dBL_{Aeq} 65/55 dBL_{Aeq} 62/55 dBL_{Aeq}	61/53 dBL_{Aeq}	63/54 dBL_{Aeq}
Mineral Extraction Zone:	*"A zone comprising land intended for the mining and quarrying of minerals in a sustainable manner."*	General Industry	65/55 dBL_{Aeq}	65/55 dBL_{Aeq}	

Table A2 – Derivation of Indicative Noise Levels for Noise Sensitive Receiver Zone(s):

Zoning:	*Zone Description:*	*Principally promoted land uses:*	*INFs: (day/night):*	*INF for Zone: (day/night)*	*INL for Receivers in this Zone (day/night):*
Industry (Barossa Valley Region) Zone:	*"A zone accommodating a wide range of industrial, warehouse, storage and transport land uses of regional significance, particularly wineries and other activities which support the region's viticulture and wine making industry."*	Rural Industry General Industry Commercial	57/50 dBL_{Aeq} 65/55 dBL_{Aeq} 62/55 dBL_{Aeq}	61/53 dBL_{Aeq}	62/54 dBL_{Aeq}
Mineral Extraction Zone:	*"A zone comprising land intended for the mining and quarrying of minerals in a sustainable manner."*	General Industry	65/55 dBL_{Aeq}	65/55 dBL_{Aeq}	64/55 dBL_{Aeq}
Primary Production (BVR) Zone:	*"Economically productive, efficient and environmentally sustainable primary production."*	Rural Industry	57/50 dBL_{Aeq}	57/50 dBL_{Aeq}	60/52 dBL_{Aeq}*
Primary Production Zone:	*"Economically productive, efficient and environmentally sustainable primary production."*	Rural Industry	57/50 dBL_{Aeq}	57/50 dBL_{Aeq}	60/52 dBL_{Aeq}
Rural Landscape Protection Zone:	*"Low-intensity rural activities on large land holdings."* *"Small scale tourist accommodation that is secondary to farming and blends with the natural environment."*	Rural Industry	57/50 dBL_{Aeq}	57/50 dBL_{Aeq}	60/52 dBL_{Aeq}
Rural Living Zone:	*"A zone consisting of large allotments, detached dwellings and rural activities that do not adversely impact the amenity of the locality."*	Rural Living	47/40 dBL_{Aeq}	47/40 dBL_{Aeq}	55/47 dBL_{Aeq}
Residential Zone:	*"A residential zone comprising a range of dwelling types."*	Residential	52/45 dBL_{Aeq}	52/45 dBL_{Aeq}	58/50 dBL_{Aeq}*

*except where a zone greater than 100 metres in width separates the zone containing the noise source and the zone containing the noise sensitive receiver. In such cases the Indicative Noise Level is the Indicative Noise Factor for the noise sensitive receiver zone.

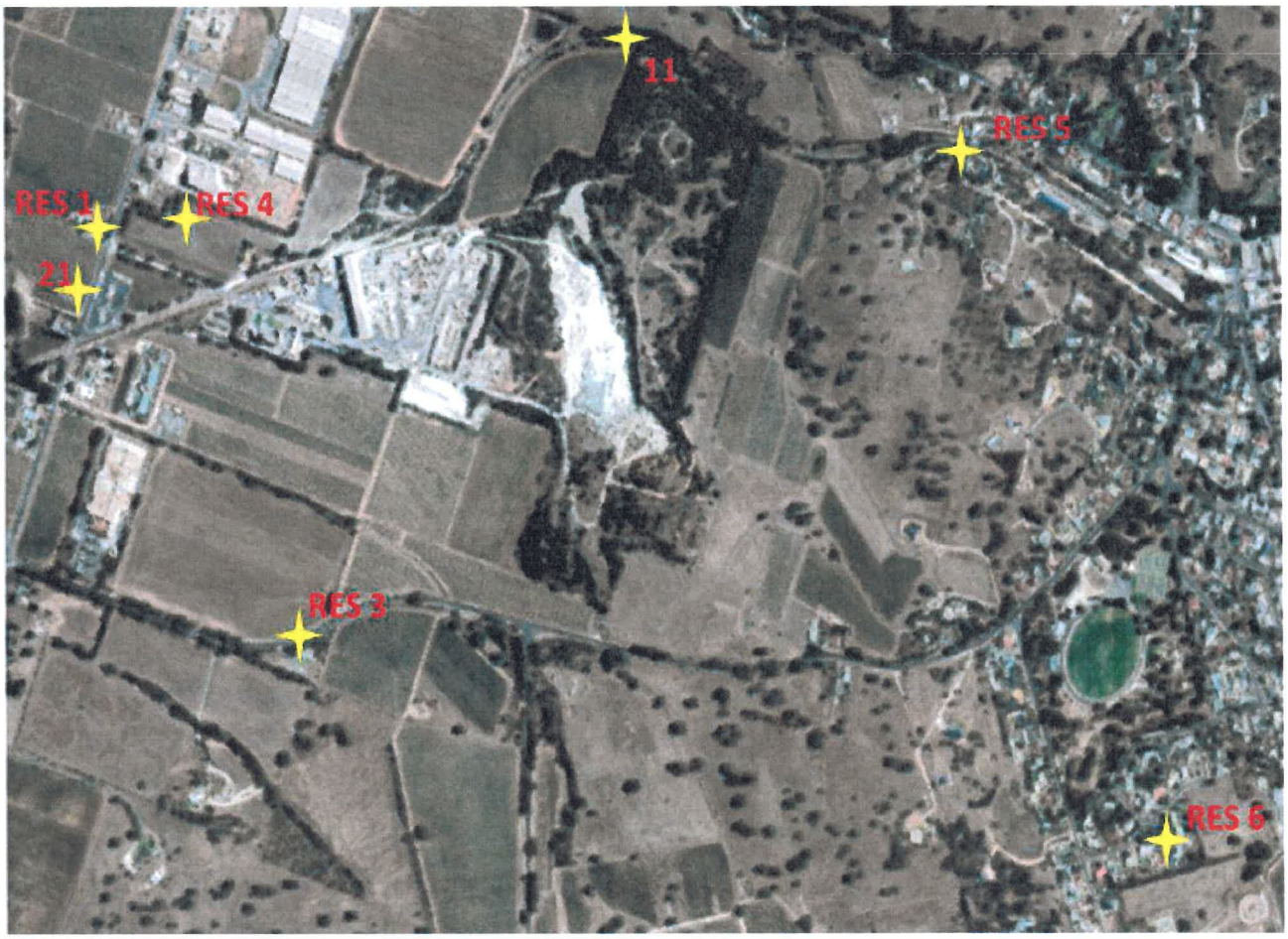
Appendix B

Noise Measurement Locations

Location ID	Location Description
Resident 1 (#20a)	Stockwell Rd opposite ABC main entrance at the Fiebiger property (830-846 Stockwell Rd)
Resident 3 (#27a)	At residents 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

(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.

Attended Noise Monitoring Locations:



Appendix C

Noise Reports

Vipac Engineers and Scientists Limited
215 Portrush Road, Maylands, SA 5069, Australia

t. +61 8 8334 0900 | **f.** +61 8 8362 0793 | **e.** adelaide@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627

Vipac Engineers & Scientists

Adelaide Brighton Cement Ltd

Adelaide Brighton Cement - Angaston Environmental Noise

ABC Angaston Environmental Noise Survey May 2019

50B-19-0135-TRP-8950642-1

20 June 2019

Report Title: ABC Angaston Environmental Noise Survey May 2019 Job Title: Adelaide Brighton Cement - Angaston Environmental Noise	
DOCUMENT NO: 50B-19-0135-TRP-8950642-1 **PREPARED FOR:** Adelaide Brighton Cement Ltd 62 Elder Road Port Adelaide, South Australia, 5015, Australia **CONTACT:** Tim Radimissis **Tel:** (08) 8300 0533 **Fax:** 61 8 83000431	**REPORT CODE:** TRP **PREPARED BY:** Vipac Engineers and Scientists Limited 215 Portrush Road, Maylands, SA 5069, Australia **Tel:** +61 8 8334 0900 **Fax:** +61 8 8362 0793
PREPARED BY: Author: Saksham Garg Acoustic Engineer	Date: 20 Jun 2019
REVIEWED BY: Reviewer: PMoncrieff Peter Moncrieff Team Leader	Date: 20 Jun 2019
AUTHORISED BY: PMoncrieff Peter Moncrieff Team Leader	Date:20 Jun 2019

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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 being due for renewal in 2019.

As a part of this process, 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 01 November 2018.

[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.

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.

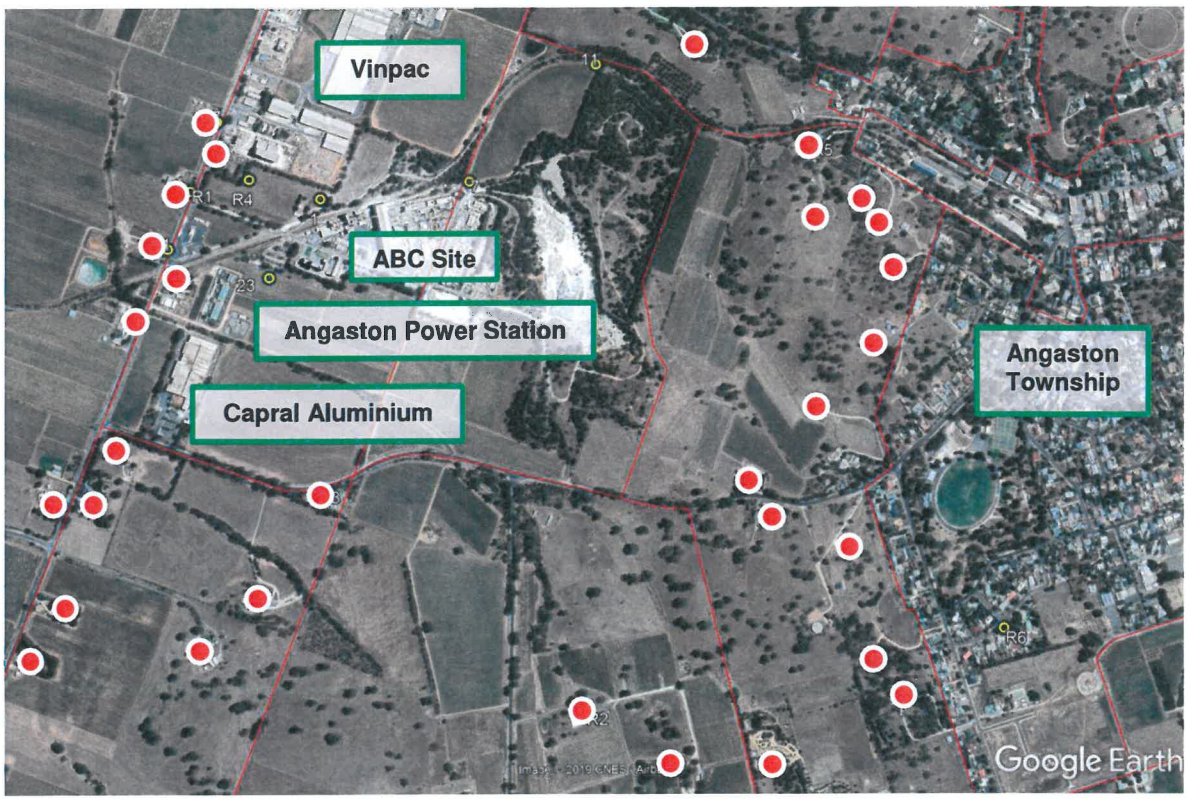


Figure 1: ABC Angaston Site and surrounding locality (rural noise sensitive premises marked in red)

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.

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 Barossa Council Development Plan (consolidated 1 November 2018) [3]. With reference to the Development Plan, the site is located partially within the "Industry (Barossa Valley Region)" zone, and partially within the "Mineral Extraction" zone (no policy areas or precincts apply to either locality). The nearest noise sensitive receptors (NSRs) are located within various zones, including:

- Primary Production (Barossa Valley Region) zone
- Primary Production zone
- Rural (Landscape Protection) zone
- Industry (Barossa Valley Region) zone
- Rural Living zone
- Residential zone

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
Primary Production (Barossa Valley Region) zone	Primary production, horticulture, viticulture, wineries	Rural Industry
Mineral Extraction zone	Mining and quarrying of minerals	General Industry
Industry (Barossa Valley Region) zone	Industrial, warehouse, storage and transport land uses particularly wineries.	General Industry
Rural (Landscape Protection) zone	Low intensity rural activities on large land holdings (farming, grazing and viticulture)	Rural Industry
Primary Production zone	Primary production	Rural Industry
Rural Living zone	Rural Living	Rural Living
Residential zone	Residential	Residential

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 zone:

Table 2: Indicative Noise Levels

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Primary Production (Barossa Valley Region) zone	R1, R7	61	53
Primary Production zone	R2	61	53
Rural (Landscape Protection) zone	R3	61	53
Industry (Barossa Valley Region) zone	R4	65	65
Rural Living zone	R5	56	48
Residential zone	R6	52	45

In comparison to the previous assessments conducted by Vipac, we note that the above INL's were found to be same as the INL's used in previous reports.

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 environmental noise assessment in 2019.

Table 3: EPA Recommended Criterion/INL

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Primary Production (Barossa Valley Region) zone	Resident 1	60	52
Mineral Extraction Zone	Location #11	64	55
Primary Production zone	Resident 21	60	52
Rural (Landscape Protection) zone	Resident 3	60	52
Industry (Barossa Valley Region) zone	Resident 4	62	54
Rural Living zone	Resident 5	55	47
Residential zone	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 regards 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 22 May 2019 and 23 May 2019 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 22 May 2019 between 04:15PM – 06:30PM and night-time measurements were conducted between 10:00PM on 22 May 2019 and 12:15AM 23 May 2019.
- Where possible, measurements were paused to avoid influence from the extraneous sources (such as traffic, etc.).

- Where heavy traffic were observed, 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* – 3002841
  - *Calibration* – Due for calibrated on 29 February 2020
  - *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 Fiebiger property (830-846 Stockwell Rd)
Resident 3 (#27a)	At residents 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

(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.

Figure 2: Attended Noise Monitoring Locations

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.

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	48	45	- Minor influence due to traffic movements - Plant audible - No tones detected	60	*Complies*
Resident 3	68	48	- 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 - No tones detected	60	*Complies*
Resident 4	48	42	- Traffic noise influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Plant audible - No tones detected	62	*Complies*
Resident 5	42	38	- Minimum traffic noise influence - Dog barking at nearby property - Plant not audible - No tones detected	55	*Complies*
Resident 6	41	33	- Noise from the event taking place in the nearby Oval influenced the measurements - No traffic noise influence - Plant not audible - No tones detected	52	*Complies*
#11	43	39	- Traffic noise influence from nearby roads - Plant not audible - No tones detected	64	*Complies*
#21	58	49	- Traffic noise influenced the measurements, as seen in the L_{Aeq} and L_{A90} measurements - Plant audible - No tones detected	60	*Complies*

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	47	44	- Minor influence due to traffic movements - Plant audible (noise possibly from CM4 fan) - Noise influence from APA Compressor Plant - No tones detected	52	*Complies*
Resident 3	45	42	- Minor influence due to traffic movements - ABC plant audible - Major noise influence from CAPRAL plant - No tones detected	52	*Complies*
Resident 4	47	45	- Plant audible (noise possibly from CM4 fan) - No tones detected	54	*Complies*
Resident 5	37	31	- Plant not audible - No tones detected	47	*Complies*
Resident 6	38	35	- No tones detected - Plant faintly audible	45	*Complies*
#11	38	27	- No tones detected - Plant faintly audible	55	*Complies*
#21	48	44	- ABC plant audible - Major noise influence from CAPRAL plant and minor influence APA Compressor Station - No tones detected	52	*Complies*

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

- The stipulated day-time and night-time criterion at each residential receiver was achieved.
- No tonal component was observed at any receiver, hence no penalty was applied.
- 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 noise levels were within the day-time limits.
  - Noise from CAPRAL plant was observed to be the major noise source at Resident 3 during the night-time measurements. Vipac believes that the noise was emitting from an exhaust fan on the roof (south-west corner).

- Location ID #21
  - The criterion for day-time and night-time was achieved, however, influence from the nearby CAPRAL plant and the APA Compressor Station (in front) was observed during the night-time measurements.
  - L_{A90} descriptor was considered more appropriate to measure noise influence from ABC plant for day-time measurements due to traffic noise influence.

5.3 COMPARISON WITH PREVIOUS MONITORING CAMPAIGN

Vipac assessed the noise levels measured during the survey against the 2014 noise survey results [5] and 2007 noise modelling data [8], as shown in Table 7 and Table 8 below:

Table 7: Day-time measurements comparison

Receiver Location	Measured Noise Levels, dB(A) Day-Time				September 2007 Predicted L_{Aeq} under worst meteorological conditions
	2019		2014		
	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	
Resident 1	48	45	-	-	46
Resident 3	68	48(2)	71	46(2)	49(1)
Resident 4	48	42	49	44	49
Resident 5	42	38	39	33	34(1)
Resident 6	41	33	42	36	-
Location #11	43	39	39	36	-
Location #21	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.).

Table 8: Night-time measurements comparison

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

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

- The noise levels measured at Resident 5 and Resident 6 (particularly at night-time) are slightly higher than the noise levels measured during the 2014 survey [5], however within the criterion.
- Noise levels measured at other locations were similar to the measured noise levels in 2014 survey and are lower than the noise levels predicted using the SoundPLAN modelling [8].

6 ATTENDED ON-SITE SURVEY

In addition to the environmental noise survey, a survey was conducted on-site (at ABC Angaston plant on 22 May 2019 between 02:00PM – 3:50PM) 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 9: On-site Survey Measurements

Plant/Equipment	Measurement Distance from Plant/Equipment	Measured Levels dB(A)	Notes
Kiln 3 Blending Silo Fan	1.5 from the fan (inside)	90	- Measurement taken inside the room housing the fan. - Tonal component observed at 630Hz, possibly due to the surrounding equipment as no tonal component was observed in the outdoor measurement at the exhaust outlet.
	3m from the exhaust outlet	76	- Noise transmitting through the gaps in the surrounding structure, as indicated in figure below  - No tones observed
H17 Hydrator Scrubbing Fan	1m from the fan	86	- Tonal component at 250Hz with low energy identified
	1.5m from the exhaust outlet	80	- No tone at 250Hz present at the exhaust outlet
Raw Mill Filter Exhaust R15 Fan	1m from fan (indoor)	86	- 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	67	- Noise influence from R15 and R16 was measured - No tones observed
Cement Mill 4 Fan	2m from the exhaust outlet	74	- Noise measurements taken on roof - No tones

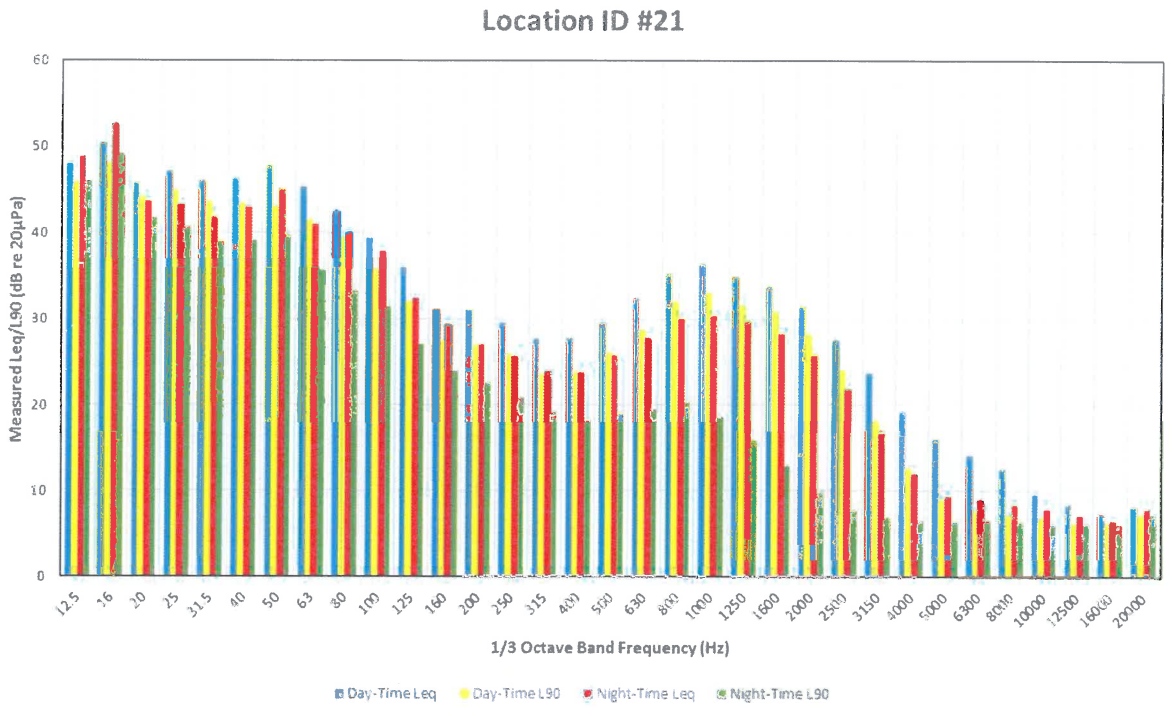
Based on the survey results above, Vipac comments as follows:

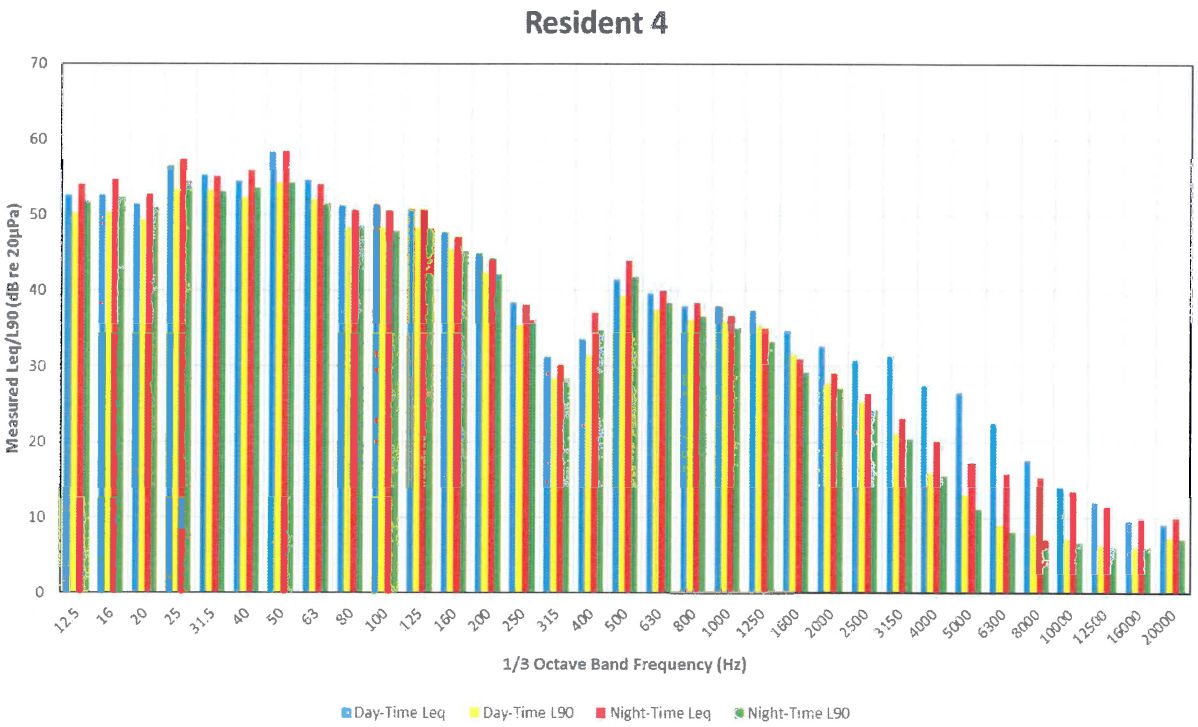
- Kiln 3 Blending Silo Fan – Tonal component (630Hz) was observed when the measurement was taken inside the building, however, no tonal component was observed when the measurement taken outside the building (near the exhaust outlet of the fan). Therefore, Vipac considers the tonality would have resulted 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.
- H17 Hydrator Scrubbing Fan – 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.
- No tones were measured for any other equipment at the plant.

7 CONCLUSION

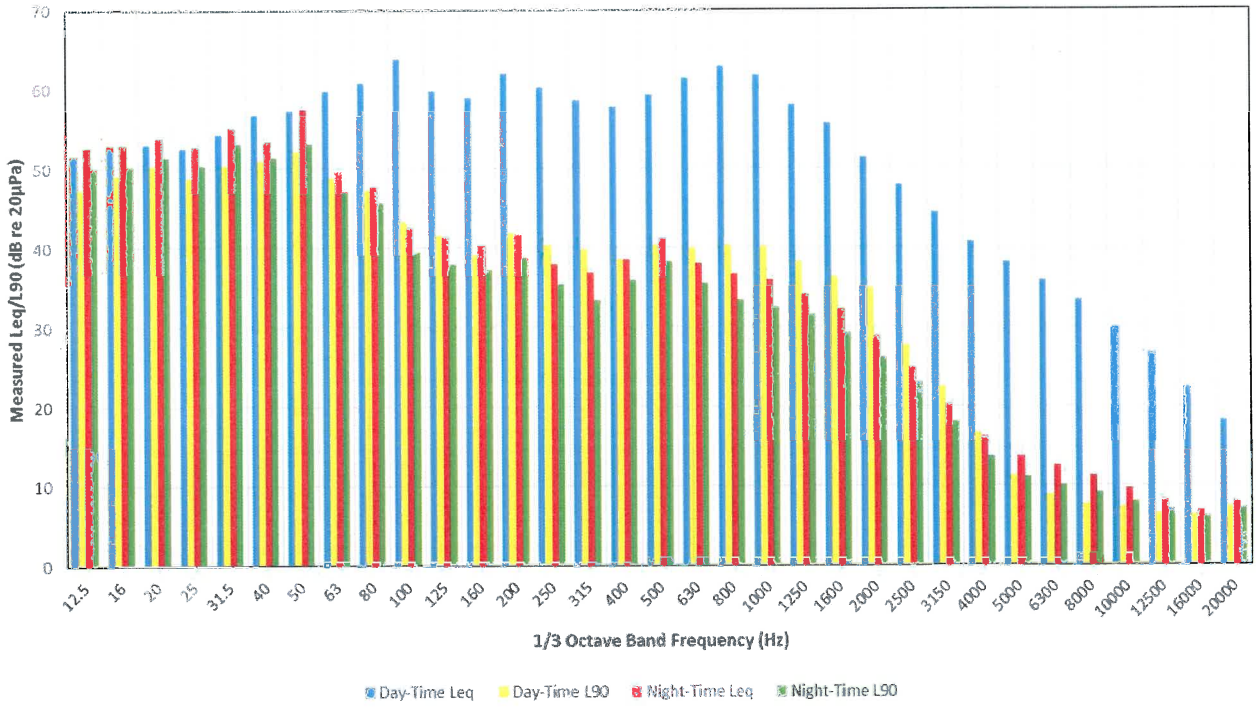
Vipac was engaged by Adelaide Brighton Cement to conduct on-site noise survey to measure noise levels from critical Angaston plant equipment/machinery and to conduct routine environmental noise survey at various residential noise sensitive receivers during EPA defined day-time and night-time period.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

Appendix A ENVIRONMENTAL NOISE SURVEY RESULTS

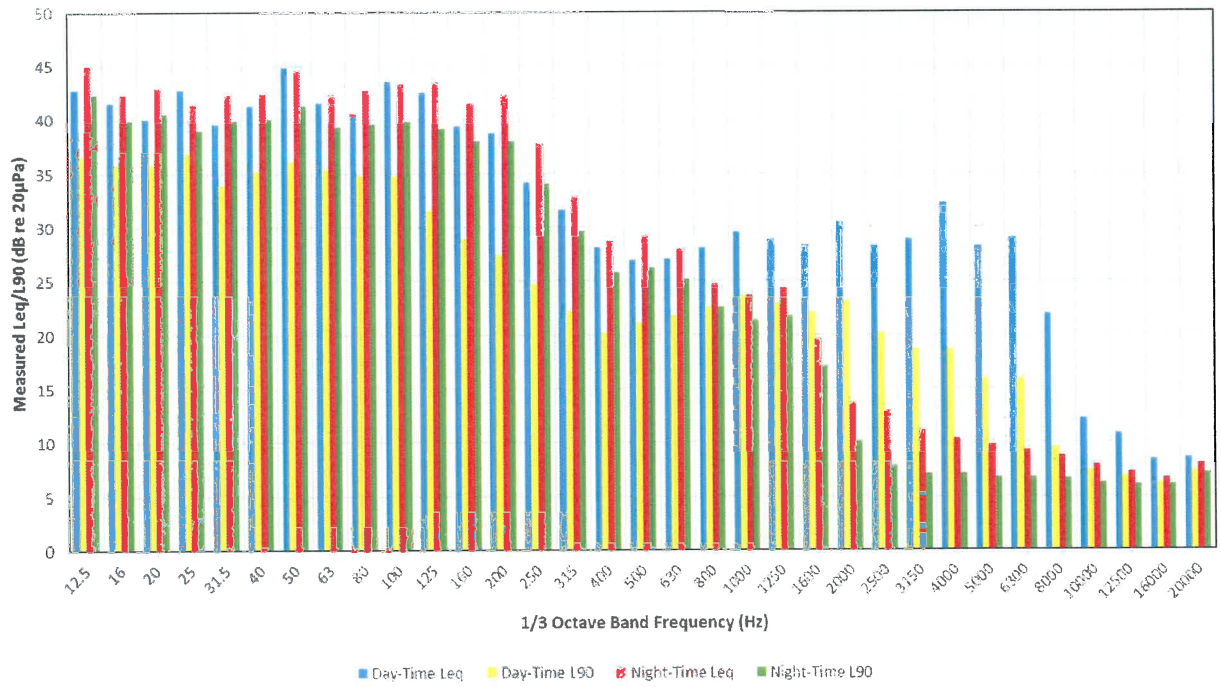




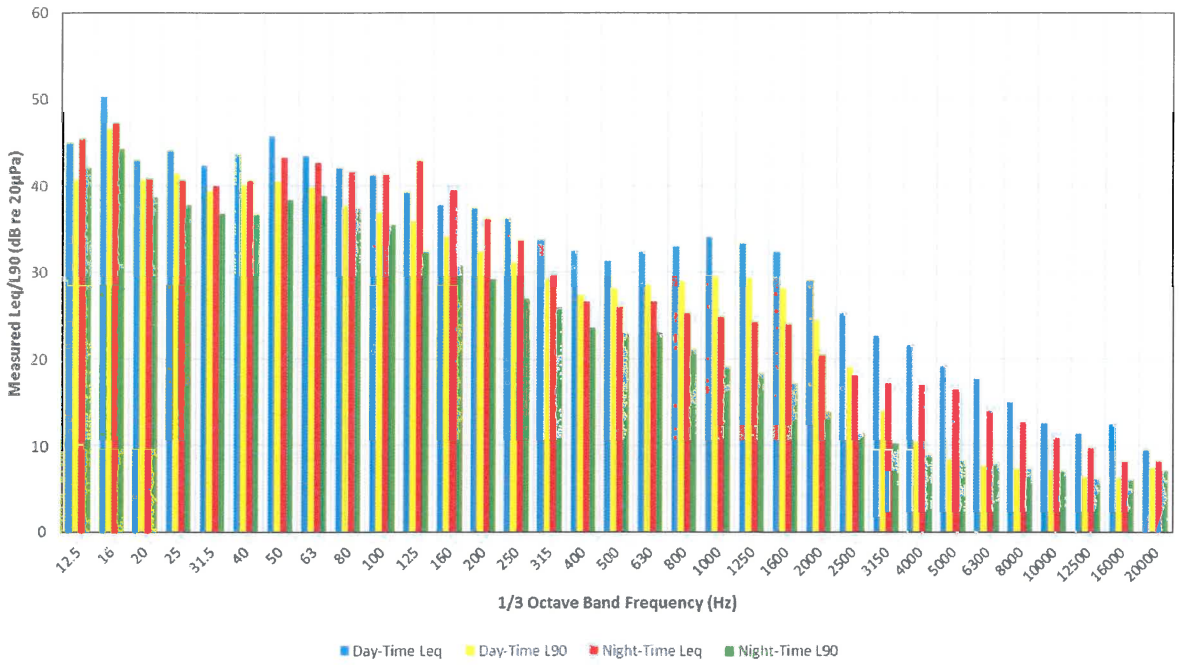
Resident 3



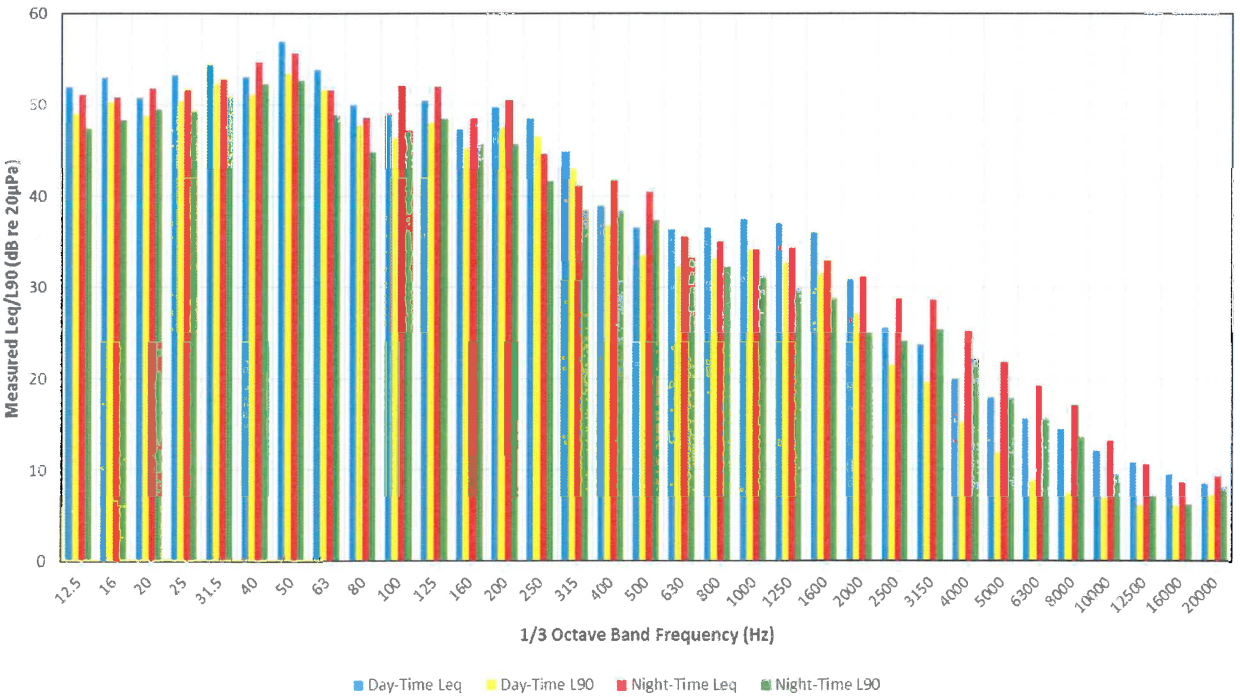
Resident 6



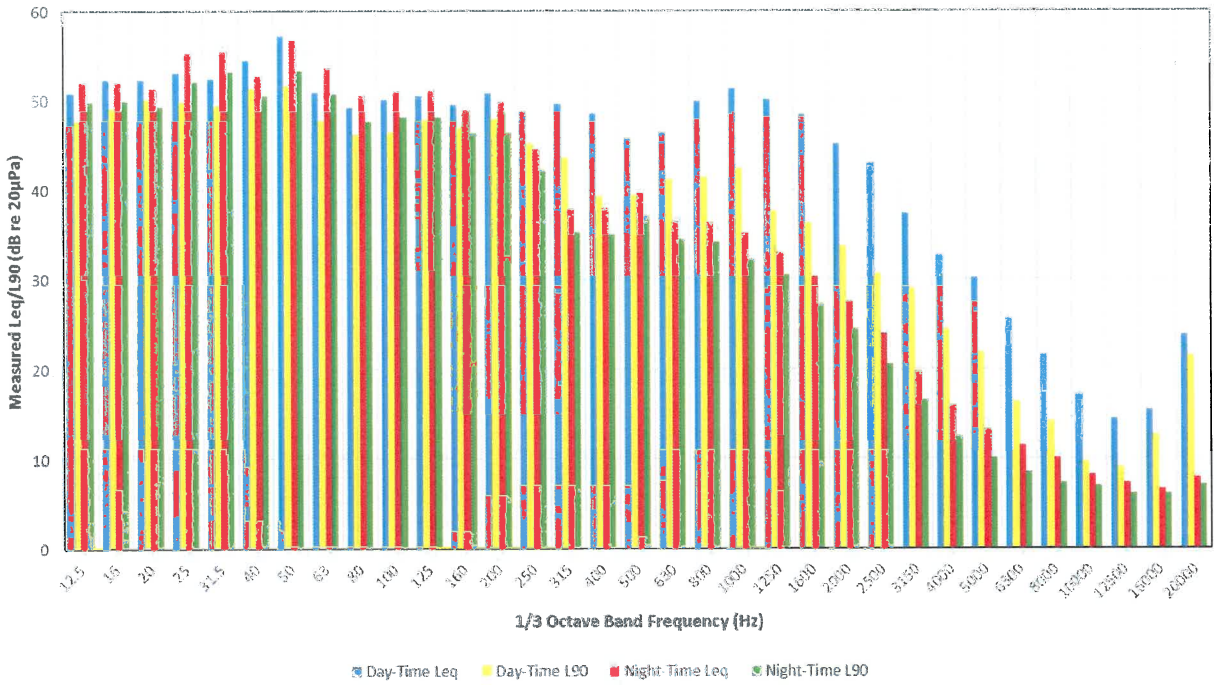
Resident 5



Resident 1



Location ID #21



Appendix B BUREAU OF METEOROLOGY DATA

Location: *Nuriootpa Pirsa (ID 023373)*

Date/Time	Wind Direction	Wind Speed (m/s)	Wind Gust (m/s)
23/01:00am	NNE	1.7	2.0
23/12:30am	NNE	2.5	3.1
23/12:00am	NE	2.0	2.5
22/11:30pm	CALM	0.0	0.0
22/11:00pm	NNE	1.7	2.0
22/10:30pm	NNE	0.6	2.0
22/10:00pm	NNE	0.6	2.0
22/09:30pm	NNE	2.0	2.5
22/09:00pm	NE	1.7	2.0
22/08:30pm	CALM	0.0	0.0
22/08:00pm	CALM	0.0	0.0
22/07:30pm	NE	2.0	3.1
22/07:00pm	CALM	0.0	0.0
22/06:30pm	CALM	0.0	0.0
22/06:00pm	ESE	2.0	2.5
22/05:30pm	ESE	1.1	2.0
22/05:00pm	SW	2.5	3.1
22/04:30pm	SW	3.1	3.6
22/04:00pm	WSW	3.6	4.8
22/03:30pm	WSW	3.6	4.8
22/03:00pm	WSW	2.5	4.8
22/02:30pm	WNW	4.2	5.6
22/02:00pm	N	2.5	4.2
22/01:30pm	NNW	1.7	3.1
22/01:00pm	N	1.1	3.1
22/12:30pm	SSW	1.7	2.5
22/12:00pm	E	1.7	3.1

Vipac Engineers and Scientists Limited
215 Portrush Road, Maylands, SA 5069, Australia

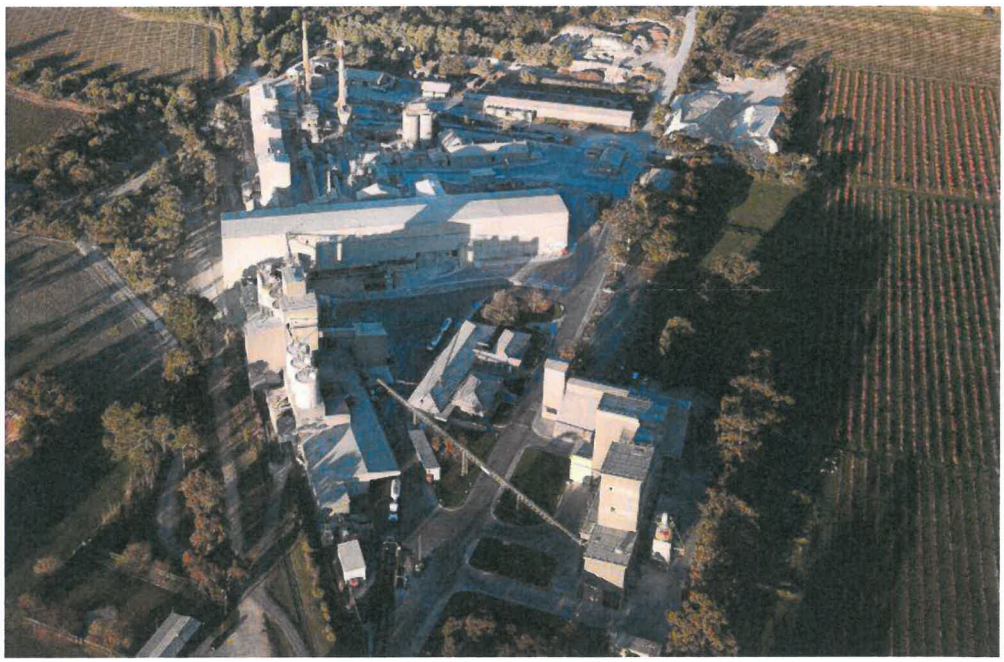
t. +61 8 8362 5445 | **f.** +61 8 8362 0793 | **e.** adelaide@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627

Vipac Engineers & Scientists

Adelaide Brighton Cement Ltd

Angaston Environmental Noise

Noise Emissions and Assessment Summary



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PREPARED BY: Author:	Saksham Garg Acoustic Engineer Date: 12 Jun 2019
REVIEWED BY: Reviewer:	Peter Moncrieff Team Leader Date: 12 Jun 2019
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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 being due for renewal in 2019. As part of this process, ABC has engaged Vipac to conduct a review of noise management actions conducted in relation to the Angaston site over the preceding 10 years, and provide a summary of the current situation with regard to noise emissions, comprising attended measurements at the Angaston site and in the surrounding locality.

Vipac previously conducted regular attended and unattended noise monitoring surveys commencing earlier than 2007, with the most recent survey conducted in 2014. The results of the most recent survey (2014) indicated that at that time noise emissions from the Angaston plant met the requirements of the *Environment Protection (Noise) Policy 2007* [1].

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 01 November 2018.

[4] Guidelines for the use of the Environment Protection (Noise) Policy 2007, EPA South Australia, June 2009.

[5] ABC Angaston, *'Stage 1 Report, Review, Measurements and Definition'*, 50H-07-0002-TRP-233396-0, dated 27 March 2007.

[6] *'Summary of Environmental Noise Activities'*, 50H-07-0002-TNT-420150-0, 03 March 2008.

[7] *Adelaide Brighton Cement Ltd (ABC) – EPA License 35 – Angaston Noise Survey – dated 26 November 2014"*, EPA Letter dated 09 January 2015.

[8] "ABC Angaston Routine Noise Survey", 50H-08-00220TRP-420681-0, dated 09 May 2008.

[9] "ABC Angaston – Environmental Noise Monitoring", 50H-08-0074-TRP-422907-0, dated 09 September 2008.

[10] "ABC Angaston 2009 Routine Noise Monitoring", 50H-09-0025-TRP-433089-0, dated 25 February 2009.

[11] "ABC Angaston 2009 Routine Noise Monitoring", 50H-09-0025-TRP-770440-0, dated 11 September 2009.

[12] "ABC Angaston 2009 Routine Noise Monitoring", 50H-09-0025-TRP-770921-0, dated 12 November 2009.

[13] "ABC Angaston 2010 Noise Monitoring", 50H-10-0043-TRP-773779-0, dated 01 November 2010.

[14] "Routine Noise Monitoring – April 2011", 50H-11-0041-TRP-775121-0, dated 05 May 2011.

[15] "Environmental Noise Survey – Dec 2011", 50B-11-0201-TRP-777378-0, dated 21 December 2011.

[16] "ABC Angaston July 2012 Noise Survey", 50B-12-0021-TRP-779068-0, dated 24 July 2012.

[17] "ABC Angaston May 2013 Noise Survey", 50B-13-0022-TRP-790693-0, dated 19 June 2013.

[18] "ABC Angaston November 2014 Noise Survey", 50B-13-0022-TRP-796481-2, dated 26 November 2014.

[19] "ABC Angaston SoundPLAN Modelling", 50H-07-0002-TRP-293536-0, dated 24 September 2007.

[20] "Specification of Cement Mill 4 Filter Fan Duct Treatments", 50H-07-0002-RDS-293615-0, dated 03 October 2007.

[21] "Kiln 3 Blending Fan – Preliminary Design", 50H-07-0002-TRP-383053-0, dated 07 November 2007.

[22] "ABC Angaston – R15 and R16 Silencer Design Specifications", 50H-07-0002-RDS-293432-0, dated 05 September 2007.

[23] "Acoustic Specification and Concept Design", 50H-07-0002-TRP-239553-0, dated 03 August 2007.

[24] "ABC Angaston R15 R16 Replacement Recommendation", 50H-08-0033-DRP-422406-0, dated 16 July 2008.

[25] "Summary of predicted variations", 50H-09-0108-TNT-772105-1, dated 05 July 2010.

3 SITE AND SURROUNDING LOCALITY

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, 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 and the ABC plant layout is presented in Appendix A.

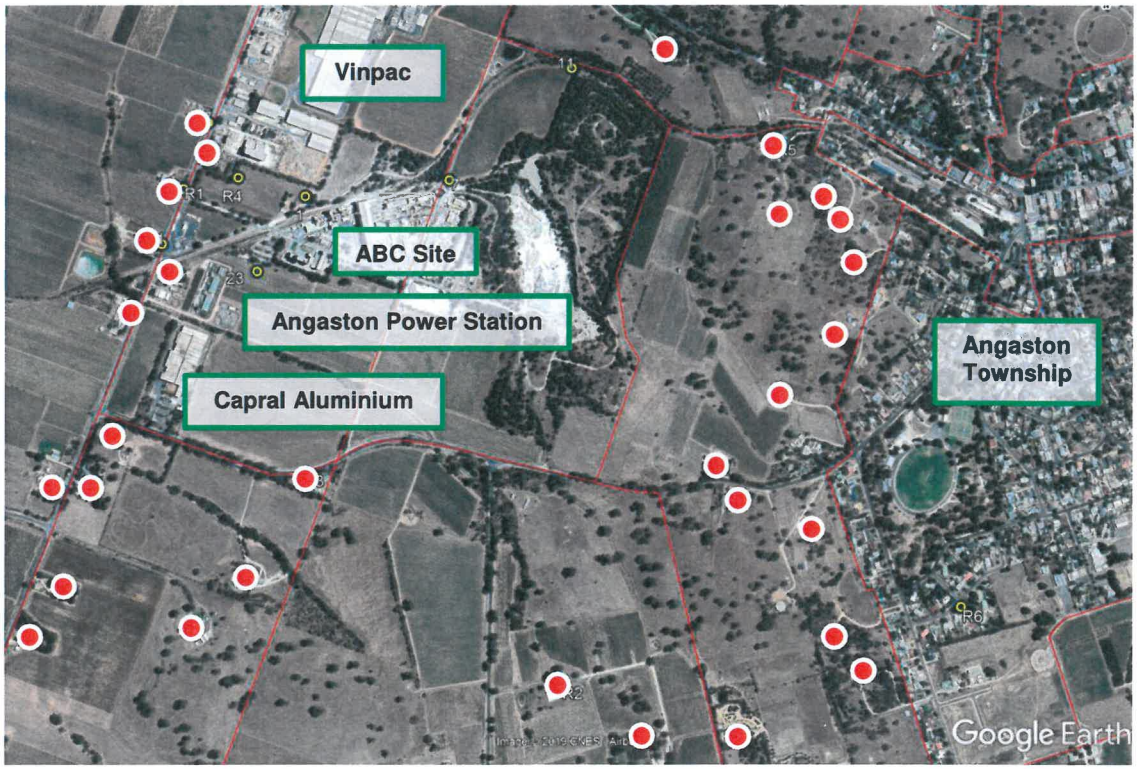

Figure 1: ABC Angaston Site and surrounding locality (rural noise sensitive premises marked in red)

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.

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 Barossa Council Development Plan (consolidated 1 November 2018) [3]. With reference to the Development Plan, the site is located partially within the "Industry (Barossa Valley Region)" zone, and partially within the "Mineral Extraction" zone (no policy areas or precincts apply to either locality). The nearest noise sensitive receptors (NSRs) are located within various zones, including:

- Primary Production (Barossa Valley Region) zone
- Primary Production zone
- Rural (Landscape Protection) zone
- Industry (Barossa Valley Region) zone
- Rural Living zone
- Residential zone

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
Primary Production (Barossa Valley Region) zone	Primary production, horticulture, viticulture, wineries	Rural Industry
Mineral Extraction zone	Mining and quarrying of minerals	General Industry
Industry (Barossa Valley Region) zone	Industrial, warehouse, storage and transport land uses particularly wineries.	General Industry
Rural (Landscape Protection) zone	Low intensity rural activities on large land holdings (farming, grazing and viticulture)	Rural Industry
Primary Production zone	Primary production	Rural Industry
Rural Living zone	Rural Living	Rural Living
Residential zone	Residential	Residential

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 zone:

Table 2: Indicative Noise Levels

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Primary Production (Barossa Valley Region) zone	R1, R7	61	53
Primary Production zone	R2	61	53
Rural (Landscape Protection) zone	R3	61	53
Industry (Barossa Valley Region) zone	R4	65	65
Rural Living zone	R5	56	48
Residential zone	R6	52	45

In comparison to the previous assessments conducted by Vipac, we note that the above INL's were found to be same as the INL's used in previous reports.

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 environmental noise assessment in 2019.

Table 3: EPA Recommended Criterion/INL

Zoning	Receivers	Indicative Noise Levels (L_{eq}, dB(A))	
		Day-time (7am to 10pm)	Night-time (10pm to 7am)
Primary Production (Barossa Valley Region) zone	Resident 1	60	52
Mineral Extraction Zone	Location #11	64	55
Primary Production zone	Resident 21	60	52
Rural (Landscape Protection) zone	Resident 3	60	52
Industry (Barossa Valley Region) zone	Resident 4	62	54
Rural Living zone	Resident 5	55	47
Residential zone	Resident 6	52	45

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 SUMMARY OF NOISE MONITORING CAMPAIGNS

5.1 NOISE MONITORING LOCATIONS

Routine noise monitoring has been undertaken at locations summarised in Table 4 and Figure 2 below:

Table 4: Routine Noise Monitoring Locations

Location ID	Location Description
Resident #1 #20a	Stockwell Rd opposite ABC main entrance at the Fiebiger property
Resident #2	Lambert's Property 100m north of house adjacent to septic tank vent
Resident #3 #27a	At residents 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
#1	Corner of ABC boundary fence opposite to Bagged products warehouse
#7	Intersection of old railway line with the ABC plant boundary fence
#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
#23	Adjacent settling ponds, east of the intersection of the railway line with the plant boundary
#26	ABC boundary fence near electrical pole
#28	Intersection of the Crennis Mines Rd with the creek (near access rd to vineyard)
Resident 5	53 Fife Street (rear lawn facing Angaston)
Resident 6	3 Hague Street, Angaston
Resident 7	On footpath opposite bus depot on Stockwell Road

The number of measurement locations have varied through the years, with 11 locations in the first year (2007) and 6 locations in last monitoring period (2014). The locations at which measurements were conducted in each monitoring campaign is presented in Table 5.

Figure 2: Routine Monitoring Locations

Table 5: Measurement locations for previous monitoring campaigns

Monitoring Campaign Year	Measurement Locations	Total Number of Locations
2007 [5]	Residents - 1, 2, 3, 4 Location ID's - 1, 7, 11, 21, 23, 26, 28	11
2008 (May) [8]	Residents - 1, 2, 3, 4 Location ID's - 1, 7, 11, 21, 23, 26, 28	11
2008 (September) [9]	Residents - 1, 2, 3, 4 Location ID's - 1, 7, 11, 21, 23, 26, 28	11
2009 (February) [10]	Residents - 1, 2, 3, 4 Location ID's - 1, 7, 11, 21, 23, 26, 28	11
2009 (September) [11]	Residents - 1, 2, 3, 4, 5 Location ID's - 1, 7, 11, 21, 23, 26, 28	12
2009 (November) [12]	Residents - 1, 2, 3, 4, 5, 6 Location ID's - 1, 7, 11, 21, 23, 26, 28	13
2010 [13]	Residents - 1, 2, 3, 4, 5, 6 Location ID's - 1, 7, 11, 21, 23, 26, 28	13
2011 (May) [14]	Residents - 1, 2, 3, 4, 5, 6, 7 Location ID's - 1, 7, 11, 21, 23	12
2011 (December) [15]	Residents - 1, 2, 3, 4, 5, 6, 7 Location ID's - 1, 7, 11, 21, 23	12
2012 [16]	Residents - 3, 4, 5, 6 Location ID's - 11, 21	6
2013 [17]	Residents - 3, 4, 5, 6 Location ID's - 11, 21	6
2014 [18]	Residents - 3, 4, 5, 6 Location ID's - 11, 21	6

5.2 NOISE MONITORING CAMPAIGN

Noise monitoring was last conducted on 31 October and 7 November 2014 with report issued on 26 November 2014 [18]. A subset of the results (day and night time measurements) for each monitoring campaign, compared against the 2014 monitoring campaign and the noise criterion derived in accordance EPA letter to ABC (dated 09 January 2015 and dated 30 May 2019), are presented in Table 6 and Table 7 below:

Table 6: Day-time noise measurement results

Location	Day-time $L_{Aeq,15min}$, dB(A)												
	2007	2008 May	2008 Sep	2009 Feb	2009 Sep	2009 Nov	2010	2011 May	2011 Dec	2012	2013	2014	Day-time Criteria
Resident 1	67	55*	57*	65*	55*	55*	53	61*	56	-	-	-	60
Resident 2	47*	38*	43	39	42*	49*	-	47*	41	-	-	-	61
Resident 3	51*	51*	50*	60*	53	53*	47	52*	53	55	48	71**	60
Resident 4	68	61*	62*	63*	56*	63*	49	64	48	54	55	49	62
Resident 5	-	-	-	41*	44*	46*	48*	46	38	49*	39	39	55
Resident 6	-	-	-	-	-	47*	-	40*	36	48	42	42	52
Resident 7	-	-	-	-	-	-	-	62*	52	-	-	-	61
#1	59*	57	63*	65*	58*	64*	65	62	52*	-	-	-	62
#7	59*	59	63*	63*	63*	62*	62*	67*	56*	-	-	-	62
#11	-	44	52*	45*	51*	50*	53*	47	37	57*	41	39	64
#21	52	52	56*	54*	56*	53*	52*	56	50	48	53	67***	60
#23	-	49	60*	62*	60*	60*	60*	58*	56*	-	-	-	62
#26	-	48	51*	53*	55*	56*	54*	-	-	-	-	-	64
#28	54*	50*	47*	63*	52*	56*	-	-	-	-	-	-	60

** Values adjusted by 5 dB(A) to account for tonal penalty.*

*** Noise levels affected by heavy traffic volumes. L_{A90} of 46 dB(A) indicate compliance.*

**** Noise levels affected by heavy traffic volumes. L_{A90} of 43 dB(A) indicate compliance.*

Table 7: Night-time noise measurement results

Location	Night-time $L_{Aeq,15min}$, dB(A)												
	2007	2008 May	2008 Sep	2009 Feb	2009 Sep	2009 Nov	2010	2011 May	2011 Dec	2012	2013	2014	Night-time Criteria
Resident 1	56	55*	56*	56*	59*	58*	61*	64*	50	-	-	-	52
Resident 2	42*	44*	42	35*	39*	49*	41*	47*	45	-	-	-	53
Resident 3	55*	52*	45*	49*	44*	42	45	53*	43*	46*	44	61**	52
Resident 4	54	60*	58	61*	63*	63*	63	64	48	47*	49	47	54
Resident 5	-	-	-	36*	34*	46	33*	29	40	28	44*	32	47
Resident 6	-	-	-	-	-	40*	28	38*	38	27	30	33	45
Resident 7	-	-	-	-	-	-	-	57	47	-	-	-	53
#1	57*	61*	-	65*	64*	64*	66	62	52*	-	-	-	54
#7	63*	58*	63*	65*	62*	63*	61*	68*	56*	-	-	-	54
#11	40*	50*	51*	49*	50*	48*	50*	40	40	45*	48*	40	55
#21	50	55	53*	55*	54*	56*	54*	50	45*	43	46	64***	52
#23	49	57*	60*	62*	55	58*	59*	55*	57*	-	-	-	54
#26	-	46	49*	52*	52*	53*	57*	-	-	-	-	-	55
#28	54*	53*	44*	47*	39	52*	54*	-	-	-	-	-	52

** Values adjusted by 5 dB(A) to account for tonal penalty.*

*** Noise levels affected by heavy traffic volumes. L_{A90} of 44 dB(A) indicate compliance.*

**** Noise levels affected by heavy traffic volumes. L_{A90} of 41 dB(A) indicate compliance.*

As such, based on the results presented above, Vipac notes that the noise criterion for day-time and night-time measurements were achieved during the last survey conducted in 2014.

6 NOISE MODELLING

During the 2007 noise survey [5], measurements were carried out to determine the existing noise sources within the ABC Angaston plant. Following the survey, an acoustic model of the existing plant was set up using the SoundPLAN acoustic modelling software based on the results of our noise survey and the information (engineering drawings, layout, etc.) provided by ABC.

The CONCAWE noise propagation algorithm was used to predict noise due to the operation of ABC Angaston plant. Validation of the acoustic model was carried out by predicting the noise levels at locations of the noise sensitive receiver and comparing the results with measured noise levels at the corresponding locations.

After the acoustic model was validated, a new acoustic model with the proposed noise control measures (silencers) installed was set up and noise levels at the noise-sensitive recipients were predicted for neutral and worst-case meteorological conditions.

The modelling results were assessed against the appropriate criterion. The results showed compliance against the stipulated criterion with the noise control methods in place [19]. The results, methodology and criteria were presented in Vipac's Acoustic Report #50H-07-0002-TRP-293536-0, "ABC Angaston SoundPLAN Modelling" [19].

7 NOISE ABATEMENT PROJECTS

Various noise abatements projects were undertaken throughout the previous monitoring periods to attenuate/minimise noise impact and reduce/eliminate tonal influence from plant equipment at ABC site. The plant equipment rectified in past years are summarised below:

- Cement Mill 4 (CM4) Fan

Table 8: Summary of Noise Abatement Projects for CM4 Fan

Year	Issues/Problems Identified	Noise Abatement Recommendations
2007	Broadband energy ~1kHz measured at Resident 1 [5]	Specifications including target noise reduction due to the turning vanes and subsequent flow improvements and an outline of the turning vane curvature and location within the bend, provided by Vipac in Acoustic Report #50H-07-0002-RDS-293615-0 [20]
2008	- Low frequency noise rectified with 2007 abatement project - Regenerated noise from the silencer (> 500Hz) identified as major noise source	No noise abatement project undertaken
2009	Broadband noise continues to be present [12]	No noise abatement project undertaken
2010	Broadband noise continues to be present [13]	Recommendations to modify the silencer provided by Vipac in acoustic report #50H-09-0108-TNT-772105-1 [25]
2011	Broadband noise continues to be present [14]	Recommendations to modify the silencer provided by Vipac in acoustic report #50H-09-0108-TNT-772105-1 [25] Peter Madden & Associates provided Acoustics design in report PM:FM:5169
2011	- Vipac treatment not implemented - New silencer installed as per Peter Madden & Associates - No tonal characteristics identified [15]	No noise abatement project undertaken
2012	No tonal component identified [16]	No noise abatement projects undertaken
2013	No tonal component identified [17]	No noise abatement projects undertaken
2014	No tonal component identified [18]	No noise abatement projects undertaken

- Kiln 3 Blending Silo Fan

Table 9: Summary of Noise Abatement Projects for Kiln 3 Fan

Year	Issues/Problems Identified	Noise Abatement Recommendations
2007	148 Hz tone identified at Resident 2, 3 & 4 [5]	Specifications for attenuator design provided in Vipac's Acoustic Report #50H-07-0002-TRP-383053-0 [21]
2008	- Tone present at Resident 2, 3 Location 28 and 7. - Attenuator installed as per Vipac's specifications [21] - Holes identified in surround structure [8]	No noise abatement project undertaken, however, recommendations to seal holes in structure provided [8]
2008	- Tones identified (1238 Hz) at Location 7 - Gaps above the silencer and windows with no panes identified as noise propagation path	- No noise abatement project undertaken - Weekly maintenance/checks conducted by ABC
2009	Tone at 1238Hz [12]	No noise abatement project undertaken, but recommendation to conduct scheduled maintenance provided.
2010	- Weekly maintenance/checks to keep silencer clean showed low noise levels - Tone at 1238Hz, however at reduced energy [13]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.
2011	- Weekly maintenance/checks to keep silencer clean showed low noise levels - Tone at 1238Hz, however at reduced energy [14]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.
2011	- Weekly maintenance/checks to keep silencer clean showed low noise levels and attenuation of tonal component - No tonal component identified [15]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.
2012	- Weekly maintenance/checks to keep silencer clean - No tonal component identified [16]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.
2013	- Weekly maintenance/checks to keep silencer clean - No tonal component identified [17]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.
2014	- Weekly maintenance/checks to keep silencer clean - No tonal component identified [18]	No noise abatement project undertaken, but recommendation to conduct scheduled (weekly) maintenance provided.

- Raw Mill Filter Exhaust R16 Fan

Table 10: Summary of Noise Abatement Projects for R16 Fan

Year	Issues/Problems Identified	Noise Abatement Recommendations
2007	- 90.6 Hz tone identified at Resident 3 - 181.3 Hz tone identified at Resident 2, 3 & 4 - 271.9 Hz tone identified at Resident 2 [5]	Specifications for silencer design provided in Vipac's Acoustic Report #50H-07-0002-RDS-293432-0 [22]
2008	- Silencer recommended in 2007 not installed - Rain hat removed - No reduction in noise emissions and tones still present [8]	Fan replacement proposed with specifications provided in Vipac's Report #50H-08-0033-DRP-422406-0 [24]
2009	- Vipac's recommendation to replace the fan not implemented [24] - Tone at 181 Hz present at Location 28 & Resident 2 [12]	No noise abatement project undertaken, however, Vipac recommended to replace fan as per Vipac's 2008 Report #50H-08-0033-DRP-422406-0 [24]
2010	- Fan impellers replaced - Tonal component eliminated at all receivers	No noise abatement project undertaken
2011	No tonal component identified [15]	No noise abatement project undertaken
2012	No tonal component identified [16]	No noise abatement projects undertaken
2013	No tonal component identified [17]	No noise abatement projects undertaken
2014	No tonal component identified [18]	No noise abatement projects undertaken

- Raw Mill Filter Exhaust R15 Fan

Table 11: Summary of Noise Abatement Projects for R15 Fan

Year	Issues/Problems Identified	Noise Abatement Recommendations
2007	High noise observed during the survey [5]	Specifications for silencer design provided in Vipac's Acoustic Report #50H-07-0002-RDS-293432-0 [22]
2008	- Silencer recommended in 2007 not installed - Rain hat removed - No reduction in noise emissions and tones still present [8]	Fan replacement proposed with specifications provided in Vipac's Report #50H-08-0033-DRP-422406-0 [24]
2009	- Vipac's recommendation to replace the fan not implemented [24] - Tone at 146 Hz present at Location 28 & Resident 2 [12]	No noise abatement project undertaken, however, Vipac recommended to replace fan as per Vipac's 2008 Report #50H-08-0033-DRP-422406-0 [24]
2010	- Fan impellers replaced - Tonal component eliminated at all receivers	No noise abatement project undertaken
2011	No tonal component identified [15]	No noise abatement project undertaken
2012	No tonal component identified [16]	No noise abatement projects undertaken
2013	No tonal component identified [17]	No noise abatement projects undertaken
2014	No tonal component identified [18]	No noise abatement projects undertaken

- H17 Hydrator Scrubbing Fan

Table 12: Summary of Noise Abatement Projects for H17 Hydrator Scrubbing Fan

Year	Issues/Problems Identified	Noise Abatement Recommendations
2007	250.8 Hz tone identified at Resident 2 & 3 [5], possibly due to clogging of the silencer	Replacement of the existing silencer proposed in Vipac's Acoustic Report #50H-07-0002-TRP-239553-0 [23]
2008	Continued presence of tone at 250 Hz.[8]	No noise abatement projects undertaken.
2009	- Silencer material replaced - Tones present at 250 Hz [12]	No noise abatement projects undertaken.
2010	Tones present at 250 Hz identified at various locations with increased energy and harmonics [15]	No noise abatement projects undertaken
2011	Tones present at 250 Hz identified at various locations with increased energy and harmonics	- No noise abatement projects undertaken by Vipac - Peter Madden & Associates provided recommendation to install muffler box attenuator on stack
2012	- Muffler box attenuator installed as per Peter Madden & Associates design - No tonal component identified [16]	No noise abatement projects undertaken
2014	- Fan speed was lowered to reduce tonality - No tonal component identified [18]	No noise abatement projects undertaken

Note: The criteria derived from the Environment Protection (Noise) Policy 2007 were achieved at all measurement locations during the 2014 noise survey [18].

Appendix A ADELAIDE BRIGHTON CEMENT – ANAGASTON PLANT LAYOUT