Boral Cement Limited

Berrima Cement Works

Annual Environmental Management Review

Development Consents Addressed:	Development Consent No. 401-11-2002-i (Kiln 6) Development Consent No. 85-4-2005-i (Mill 7)
Review Period:	1 May 2023 - 30 April 2024
Approved By:	Environmental Manager - Cement

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1 ANNUAL REVIEW INFORMATION

Table 1 AEMR authorisation

Name of operation	Berrima Cement Works
Name of operator	Boral Cement Limited
Development consent no.	Development Consent No. 401-11-2002-i (Kiln 6) Development Consent No. 85-4-2005-i (Mill 7)
Name of holder of development consents	Boral Cement Limited
AEMR start date	1 May 2023
AEMR end date	30 April 2024

I, Sharon Makin, certify that this audit report is a true and accurate record of the compliance status of the Berrima Cement Works for the period 1 May 2023 to 30 April 2024 and that I am authorised to make this statement on behalf of Boral Cement Limited.

Note.

a) *The AEMR is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual $250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/ information/ documents – maximum penalty 2 years imprisonment of $22,000, or both).*

Name of authorised reporting officer	Sharon Makin
Title of authorising reporting officer	Environment Business Partner South Coast and southern Highlands
Signature of authorised reporting officer	
Date: 29 June 2024	

2 STATEMENT OF COMPLIANCE

This annual environmental management review (AEMR) summarises compliance with the following development consents applicable to the Berrima Cement Works (the Works):

- Development Consent No. DA 401-11-2002-i - approved in 2003 to upgrade and increase the capacity of Kiln 6 at the Works; and
- Development Consent No. DA 85-4-2005-i - approved in 2005 for the establishment and operation of a new cement mill (Mill 7).

It has been prepared in accordance with the *Post-approval requirements for State significant mining developments Annual Review Guideline* (NSW Government 2015) (the Guideline).

The compliance status of the Works is shown in Table 2.

Table 2: Statement of compliance

Were all conditions of the relevant development consents complied with?	
Development Consent No. No. 401-11-2002-i (Kiln 6)	NO
Development Consent No. No. 85-4-2005-i (Mill 7)	YES

Table 3 summarises non-compliances with the development consents, based on the key in Table 4.

Table 3 Non-compliances

Relevant approval	Condition	Condition summary	Compliance status	Comment	Where addressed in AEMR?
Air Quality Discharge	3.10	The applicant shall install and operate equipment in line with best practice to ensure that the Development complies with all load limits, air emission limits and air quality monitoring requirements as specified in the EPL for the site.	Low	The average 24 hour particulate emission from Kiln 6 (Point 2) exceeded the daily criteria over 3 different days. Levels were 51.5mg/Nm3, 75.7mg/Nm3 and 63.7mg/Nm3 against a criteria of 50mg/Nm3	Section 7 Incidents and Non-compliances
Air Quality Discharge	3.10	The applicant shall install and operate equipment in line with best practice to ensure that the Development complies with	Low	Monitoring frequency for location 17 (deposition dust bottle 9) requires 12 samples over the reporting period. Only 9	Section 7 Incidents and non compliances

		all load limits, air emission limits and air quality monitoring requirements as specified in the EPL for the site.		samples were obtained. Samples not able to be obtained for December (stolen funnel), March (stolen bottle) and April (stolen stand)	
Air Quality Discharge	3.10	The applicant shall install and operate equipment in line with best practice to ensure that the Development complies with all load limits, air emission limits and air quality monitoring requirements as specified in the EPL for the site.	Low	Intermittent release of steam and limestone dust from the dust collector and failure to notify of the event to the EPA	Section 7 Incidents and non compliances

Table 4 Compliance status key for Table 3

Risk level	Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium	Non-compliant	Non-compliance with: ● potential for serious environmental consequences, but is unlikely to occur; or ● potential for moderate environmental consequences, but is likely to occur.
Low	Non-compliant	Non-compliance with: ● potential for moderate environmental consequences, but is unlikely to occur; or ● potential for low environmental consequences, but is likely to occur.
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (eg submitting a report to government later than required under approval conditions).

3 INTRODUCTION

3.1 Overview

Boral Cement Limited (Boral Cement) operates the Berrima Cement Works located off Taylor Road, New Berrima.

The facility is located south of New Berrima in the Southern Highlands of NSW in the Wingecarribee LGA (Figure 1). Access is via Taylor Avenue, which connects the facility with the Hume Highway, approximately 2.5km to the west.

The facility is located on Boral owned land, which comprises approximately 135 ha. The area to the south east of the Cement Works between New Berrima and Moss Vale is part of the Moss Vale Enterprise Corridor (MVEC) set aside for employment generating development under the *Wingecarribee Local Environmental Plan 2010* (Wingecarribee LEP).
The closest residential zone to the works site is located in New Berrima, approximately 650m north of the No 6 kiln stack at the closest points. Residential zones are also located in New Berrima, approximately 2,150m north of the No. 6 kiln stack. New Berrima residential area is flanked to the south and east by “Private Recreation” areas.

The site is zoned Heavy Industrial (IN3). The land to the immediate east and south is zoned General Industrial (IN1).

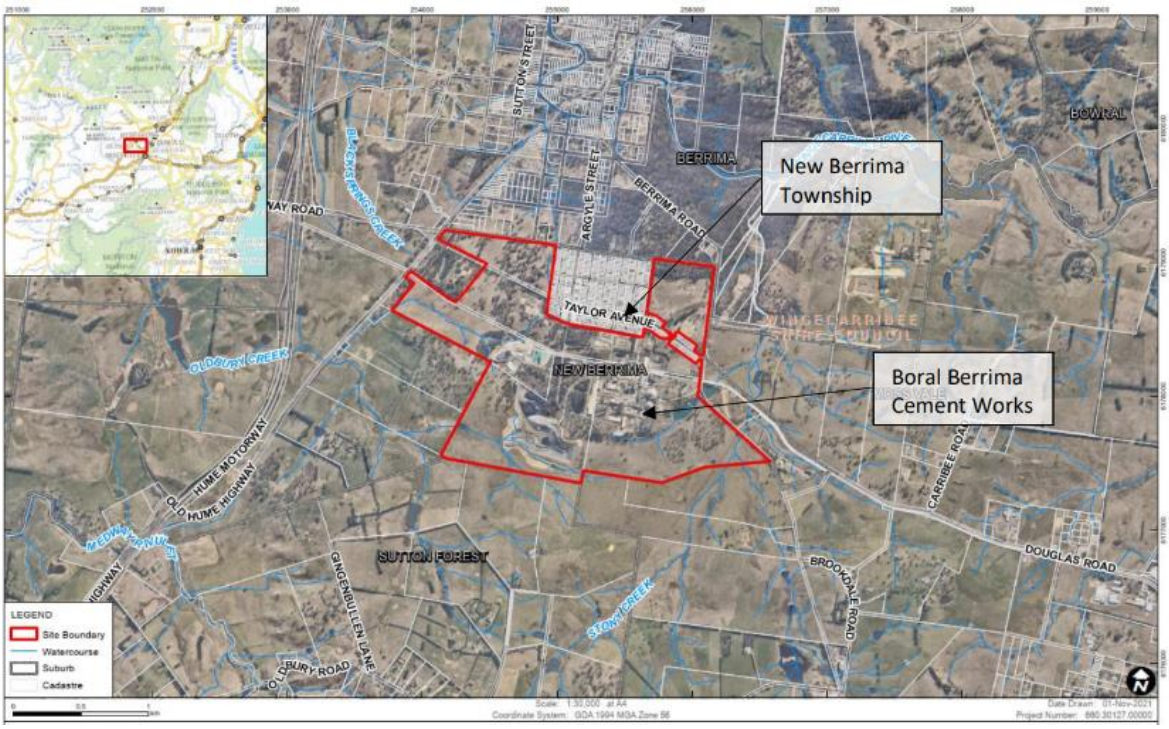


Figure 1 Berrima Cement Works Location

The Works was built in 1929 and has operated continuously ever since predominantly on the basis of continuing use rights and two development consents issued under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

The Works produces cement products (cement and clinker) for sale in NSW, the ACT and for export. The Works has approval to produce up to 1.56 million tonnes per annum (tpa) of cement products. Cement products are transported to domestic customers (both internal to Boral companies, and external), by train and truck and historically to international customers through Port Kembla. Clinker is also transported to Boral Cement's Maldon Cement Works by rail which also produces cement products, including premixed dry concrete.

The Works operates 24 hours per day, 365, six days per year, including various maintenance periods.

Operational infrastructure includes one kiln (Kiln 6) and two cement mills (Mill 6 and 7), and storage and stockpiling facilities.

The main raw material inputs to the production of cement and clinker are limestone, sourced from Boral Cement's Marulan South Limestone Mine (transported via rail), and shale, sourced both on site at a shale quarry or from off-site, steel slag from BlueScope Steel in Port Kembla and granulated blast furnace slag from Bluescope Steel in Port Kembla and historically international sources.

The limestone, shale and slag are blended together, ground into a fine powder (also known as a meal) and fused at a very high temperatures (up to 1,500 degrees Celsius (˚C)) in the kiln (Kiln 6). The fused material is called clinker.

Clinker is either stored ready for reclamation or distribution to customers by road and rail transport or is mixed with gypsum and mineral addition (limestone) into one of two cement mills (Mill 6 and 7), where it is crushed to produce cement. It is then fed into cement silos from where it is despatched by either road tanker or rail tanker/wagon for delivery to Boral Cement's customers (internal Boral customers or external).

Refer to the process flow diagrams in Figure 2 and Figure 3.

Cement manufacture is an energy intensive process due to the high temperatures required for the production of clinker. Prior to the introduction solid waste derived fuels, up to 225,000 tonnes per year of coal was generally used to heat the kiln. Up until 2013 coal was sourced from the nearby Medway Colliery (also known as the Berrima Colliery) but since the colliery's closure, coal has been sourced mainly from mines in the Illawarra area. As outlined in Table 5 below the Works has approval to use standard fuels such as natural gas, fuel oil, diesel and coke fines to heat the kiln along with a number of non-standard fuels.

Table 5 Approved Kiln fuels

Fuel	Category	Tonnes Per Annum	
Natural Gas, Fuel Oil, Diesel	Standard Fuel	No Limit	
Coal	Standard Fuel	No Limit	
Coke Fines	Standard Fuel	No Limit	
HiCal50	Non-Standard Fuel	10,000	
AKF1	Non-Standard Fuel	20,000	
AKF5	Non-Standard Fuel	30,000	≤ 250,000 combined
Wood Waste	Non-Standard Fuel	100,000	
RDF	Non-Standard Fuel	200,000	

SWDFs used include wood waste and refuse derived fuel (RDF) which are combustible materials recovered and processed from waste streams, such as papers, cardboards, packaging, and construction and demolition materials.

Primarily the fuel mix is made up of coal, diesel (kiln start-up), a small amount of HiCal50 (carbon anode) and SWDFs. The business will be progressively increasing its use of SWDFs and other non-standard fuels to lower its reliance on coal and to reduce the embodied carbon in its cementitious products.

Commencing in August 2018 the Works commenced the use of SWDFs, with a Proof of Performance Trial undertaken as required as per the consent. The PoPT six monthly report was approved by both the EPA and the Secretary on 23/04/2019 which permitted the continued use if SWDFs up to 40% of total fuel. During the previous reporting period, Boral continued engagement with the DPE and EPA on increasing this to the 50% approval, with approval granted on 8 December 2022.

During the current reporting period, Boral has been granted approval to further increase the % of SWDF above 50% on the condition that Proof of Performance trials are conducted and approved for every 10% increase over the 50%.

The Works supports a direct workforce of 130 employees, a further 20 in engineering and procurement, as well as many indirect jobs in the region through logistics, contractors and suppliers.

The Works is located on a 149 hectare (ha) site immediately south of the village of New Berrima and approximately 2.5 km east of the Hume Highway. The village of New Berrima was initially developed by Boral Cement's predecessors to provide housing for employees of the Works.

The Works is the most physically dominating feature of the New Berrima area, being roughly equivalent in size to the adjacent village, with the tallest structure on the site being a pre-heater tower, which is approximately 85 m high. The closest residential dwellings in the village of New Berrima are approximately 650 m north of Kiln 6.

The site is zoned IN3 Heavy Industrial in the Wingecarribee Local Environmental Plan 2010.

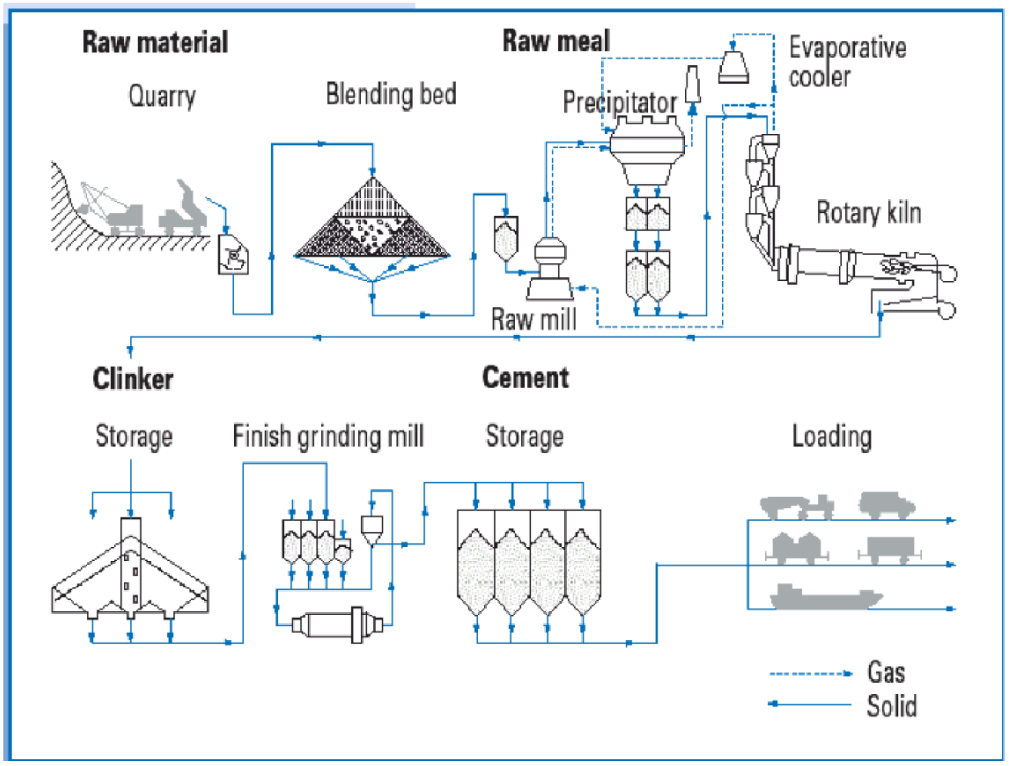
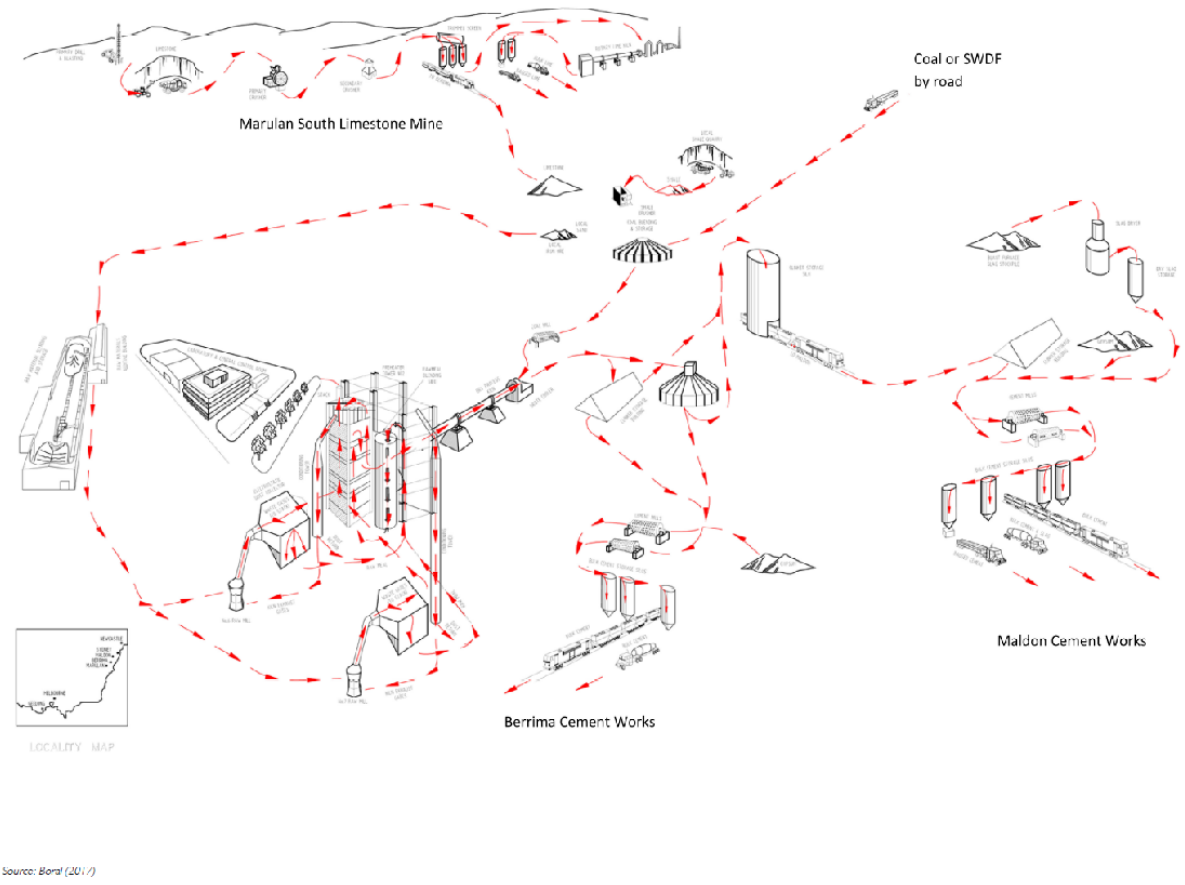


Figure 2 Process flow diagram



Source: Boral (2017)

Figure 3 Process flow diagram incorporating receipt of materials and dispatch of products

3.2 Key personnel

Details of key personnel who are responsible for environmental management at the Works are provided in Table 6.

Table 6 Key personnel responsible for environmental management

Name	Role	Phone number	Email address
Waqas Ali	Operations Manager (NSW) Boral Cement	(02) 4860 2222	Waqas.ali@boral.com.au
Greg Johnson	Senior Environmental Business Partner	0401 893 420	greg.johnson@boral.com.au
Sharon Makin	Environmental Business Partner	0401 894 185	sharon.makin@boral.com.au

3.3 Approvals

The Works operates under a combination of continuing use rights and two development consents under the EP&A Act. It also operates under an environment protection licence (EPL) issued under the NSW *Protection of the Environment Operations Act 1997* (POEO Act).

Water used at the Works is drawn from the Wingecarribee River which is regulated by five mining purpose leases (MPLs) issued under the NSW *Mining Act 1906*. In addition, one MPL regulates the provision of power to the Works.

Shale used at the Works is extracted from a quarry on the site which is regulated under a mining lease (ML) issued under the NSW *Mining Act 1992*.

3.3.1 Consents

The Works operates under a combination of continuing use rights and the following two development consents approved by the NSW Minister for Planning:

- Development Consent No. DA 401-11-2002-i - approved in 2003 to upgrade and increase the capacity of Kiln 6 at the Works; and
- Development Consent No. DA 85-4-2005-i - approved in 2005 for the establishment and operation of a new cement mill (Mill 7).

Continuing existing use rights are available to the Works given it commenced operations in 1929, before any planning approvals were required.

The development consent for Mill 7 has never been modified.

Subsequent modifications to the development consent for Kiln 6, approved by delegates of the NSW Minister for Planning, have allowed the trialling and use of certain non-standard fuels, the use of alternative 'low cost' raw materials in the manufacture of clinker (such as granulated blast furnace slag), the use of rail for coal deliveries, and the stockpiling of coal on the site. Table 7 outlines the various modifications to the development consent.

Figure 4 outlines the site and consent boundary. The consented area also includes land not currently used for operational purposes. These areas are shown in Figure 4 with the green dotting.

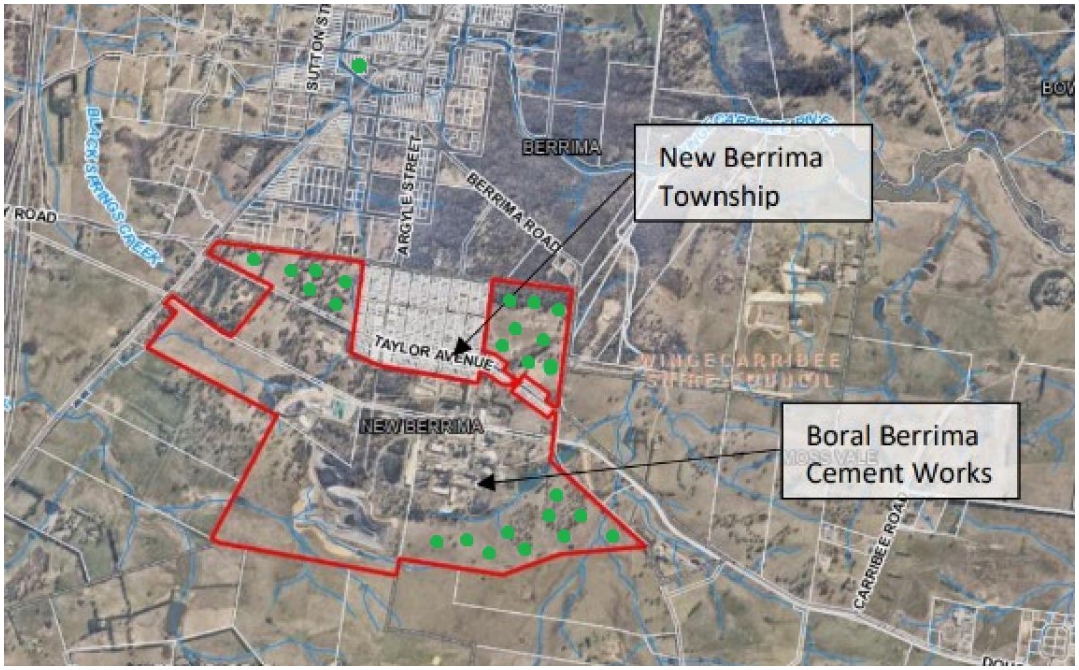


Figure 4 Consent Boundary and areas of current operational use.

Table 7 Approvals for Kiln 6

Application	Description	Date approved
DA 401-11-2002-i	Upgrade of Kiln 6 to allow for burning of non-standard fuels, installation of continuous monitoring equipment, increase in Kiln 6 output, upgrade of coal mill capacity and intermittent use of Kiln 5.	12 May 2003
MOD 1	Use of non-standard fuels, including used tyres, liquid oil residues and spent aluminium electrode carbon.	26 September 2005
MOD 2	Removal of prohibition on the acceptance of materials classified as hazardous waste under the EPA's waste guidelines.	22 September 2006
MOD 3	Small scale trial use of tyre chips over a six month period.	13 February 2007
MOD 4	Increase in usage of coal fines from 1.5 tonnes per hour (tph) to 10 tph.	8 May 2008
MOD 5	Approval to use rail for coal deliveries.	31 August 2009
MOD 6	Stockpiling of coal from Berrima Colliery for sale and transport to Port Kembla Note: As part of MOD 9, conditions relating to MOD 6 (the stockpiling of coal from Berrima Colliery for sale and transport to Port Kembla) were deleted	20 June 2012
MOD 7	Trial and use of granulated blast furnace slag as a raw material additive, not exceeding 150,000 tpa.	16 April 2012
MOD 8	Administrative changes to align consent and EPL conditions.	5 August 2012
MOD 9	The use of up to 100,000 tpa of SWDF as a non-standard fuel for Kiln 6, including the construction of a fuel storage and kiln feeding system, and the deletion of conditions relating to MOD 6.	5 October 2016

MOD 10	SWDF Fuel storage shed extension	11 April 2019
MOD 11	Use of HiCal 50 during start-up conditions	25 October 2019
MOD 12	Isotainer handling and whole of site noise limit.	7 April 2020
MOD 13	Chloride Bypass System and approval to consume wood chips sourced from fire impacted plantation forestry operations as a standard fuel.	31 May 2021
MOD 15	Construction and operation of AKF5 storage and feed infrastructure.	27 March 2023
MOD 14	Increase volume of SWDF received and used as a non-standard fuel in Kiln6, permit 24/7 delivery of SWDF, construct a new site access road and additional SWDF storage infrastructure.	28 November 2023

3.3.2 Licenses

The Works operates under EPL 1968 issued by the EPA which has been subject to numerous variations. The EPL permits the following scheduled activities listed in Schedule 1 of the POEO Act:

- cement or lime works;
- extractive activities; and
- resource recovery.

The Works also operates under a ML and six MPLs as summarised in Table 8.

Table 8 Mining leases

Mining title	Purpose	Expiry date
ML 1723	Extraction of blue shale from the quarry and rehabilitation of previously disturbed land.	18 December 2036
MPL 559	Water supply access.	20 September 2028
MPL 592	Water supply access.	20 September 2028
MPL 622	Water supply access.	20 September 2028
MPL 623	Water supply access.	20 September 2028
MPL 628	Power supply.	20 September 2028
MPL 654	Water supply access.	20 September 2028

The Annual Mining Lease Review for these licences is due annually for the previous Calendar year at the end of February. The 2023 report was submitted to the Resources Regulator in January 2024.

3.4 Operations summary

Table 9 provides a summary of production at the Works for the 2023/24 reporting period (May 2023 and April 2024) compared to the previous 5 reporting periods.

Table 9 Production summary

Material	Approval limit	18/19 Reporting Period	19/20 Reporting Period	20/21 Reporting Period	21/22 Reporting Period	22/23 Reporting Period	23/24 Reporting Period
Limestone used	Nil	2,008,50	1,803,196	1,803,564	1,682,298	1,674,677	1595011
Shale used	Nil	201,990	142,586	145,521	156,944	175,651	165861
Slag used	Nil	113,510	129,640				
Other Raw Materials			153,150		194,030	427,635	413650
Gypsum used	Nil	81,250	70,276				
Coal used	Nil	208,610	184,446	176,070	169,388	167,540	155013
SWDFs used	250,000 t	21,870	28,997	34,767	34,654	54,396.67	64185185
Clinker production	1,560,000 t	1,443,830	1,314,466	1,292,278	1,256,016	1,351,448	1292675
Cement production	1,560,000 t	1,209,500	1,104,195	1,043,993	1,087,963	1,104,655	1038381

Coal is predominantly used as a fuel for the kiln at the Works. However, small amounts of diesel are used during kiln start-ups.

The Works is approved to produce up to 1.56 Mtpa of cement products per annum. In the 2023/24 reporting period the Works produced 1292675 tonnes of clinker. Of this clinker, 1038381 tonnes of cement was produced onsite. Clinker is also sent to Maldon and other customers.

Boral continued the use of SWDFs during the 2023/24 reporting period. A total of 64815 of SWDF was consumed during the reporting period which is an increase to the previous reporting period.

Commissioning of the Chloride Bypass System (CBS) associated with MOD 13 commenced in September 2023. MOD 15 was approved on 27 March 2023. Construction of the AKF5 storage infrastructure occurred mid 2023 with the addition of AKF5 to the operations commencing in November 2023 MOD 14 was approved on 28 November 2023. This approved an increased volume of SWDF received and used as a non-standard fuel in Kiln6, 24/7 delivery of SWDF, and approval to construct a new site access road and additional SWDF storage infrastructure.

3.5 Environmental management

The Guideline requires that AEMRs focus on the environmental outcomes of a reporting period that are intended by the relevant approval. As such, this AEMR addresses the outcomes of the relevant conditions of the development consents rather than focus on management plans and monitoring data. Notwithstanding this, addressing environmental outcomes is a result of analysing monitoring data, and this has been undertaken in this AEMR, particularly for key environmental areas at the Works, including air quality and noise.

Consent Conditions 6.1 to 6.8 outline requirements for updates of CEMPs and OEMPs associated with modifications to the consent.

All plans have been prepared, updated and approved in line with the conditions except for Conditions 6.4D and 6.4E. These conditions require that various management plans associated with the OEMP be updated and approved prior to the construction of Mod 14 facilities (road and SWDF storage facility). The plans are yet to be updated and issued, with the installation works not yet planned to proceed.

Berrima Cement Works – Operational Environmental Management Plan (Boral 2018) (OEMP) and subordinate plans received their three yearly review and were revised in accordance with conditions 6.3A and 6.4A of DA 401-11-2002-i. The OEMP was submitted to DPE for approval on 5 April 2018 and received approval in a letter dated 21 May 2018.

Boral undertook a review of the OEMP, and the sites Air Quality Management Plan & Noise Management Plan in April 2020 to reflect the recent Mod 11 and 12 to the consent and changes to the EPL completed by the EPA on 18 December 2019. These were submitted to the Department on 5 June 2020 and approved on the 29 June 2020.

The OEMP was determined to be fit for purpose for MOD 13 as operations are generally still in accordance with the associated plans. Condition 6.1, 6.1A and 6.1B required the CEMP to be updated to reflect the requirements of MOD 13. The MOD 13 CEMP was approved on 24 February 2022.

A Mod 15 CEMP was prepared and approved by DPE on the 15th May 2023.

The Mod 15 OEMP was prepared and approved by DPE on the 27th July 2023.

A copy of the updated OEMP is available on the Boral Berrima Cement website along with the approval letter from the Department of Planning, Industry and the Environment.

https://www.boral.com.au/locations/boral-cement-works-berrima

4 ACTIONS REQUIRED FROM PREVIOUS AEMR

The 2022/23 AEMR was submitted to the DPIE on 30th June 2023 with the DPIE completing their assessment on 08 September 2023. The Department considered that the Annual Report generally satisfied Conditions 7.3 and 6.3 of the approvals.

Note: The approval of the Annual Report by the Department is not an endorsement of the compliance status of the project.

Table 10 Identified Actions from Previous AEMR 2022/23

Action required from previous AEMRs	Action taken
Commence commissioning of the Chloride By Pass.	Installation of the Chloride Bypass system was completed with commissioning commencing in late 2023.
Commence a pilot carbon capture system and use project to improve the quality of recycled concrete, masonry and steel slag aggregates as part of a $2.4m grant from the Federal Government Carbon Capture, Use and Storage Development Fund.	Carbon Capture pilot system has been installed. Pilot yet to be commenced
Continue with MOD 14 application for a new entrance road and an increase in SWDF	Mod 14 application approved by DPE as of 28 November 2023.
Commence installation of Tyre Chip Storage area infrastructure and use of Tyre Chips.	Construction of the storage area was completed mid 2023, with the use of Tyre chips commencing on the 11th September 2023.
Update the OEMP to reflect recent Modifications to the consent.	OEMP was updated to reflect Mod 15 conditions and operations. DPE approval was received on the 27th July 2023.

5 ENVIRONMENTAL PERFORMANCE

5.1 Overview

This section reports performance against the environmental performance conditions in Development Consent No. 401-11-2002-i (Kiln 6) and Development Consent No. 85-4-2005-i (Mill 7). It is divided into sections based on the environmental matters in the consents and comprises a conditions table and Boral's reporting against the conditions.

5.2 Noise

The consent requirements for noise for Kiln 6 are in conditions 3.1 to 3.6 of Development Consent No. 401-11-2002-i and for Mill 7 in conditions 2.1 to 2.6 of Development Consent No. 85-4-2005-i, which are replicated in Table 11. Noise was monitored and reported against the Kiln 6 and Mill 7 contribution criteria in December 2023 (see Appendix A – Boral *Cement Berrima - Annual Environment Noise Assessment, December 2023,).*

Performance against the Consent Requirements are described in Table 12.

Boral manages noise on site in accordance with the *Berrima Cement Works – Noise Management Plan* (Boral 2023), which describes the monitoring points, frequency and criteria.

The Executive Summary of the Annual Noise Assessment noted the following:

The Berrima Cement works of Boral Cement has a single noise limit condition of LA90,15-minute not to exceed 58 dBA at monitoring Location 20 in the Store Yard, as part of it's Pollution Control Licence for the total site. To assess compliance with this condition, monitoring for total site emissions at Location 20 over a 14-day period was made from 1 to 14 December 2023. The results of this monitoring have confirmed that total site emissions are in compliance with the licence condition at Location 20. The nine 15-minute periods when that sound level limit was exceeded at the monitoring site in the late night of 9 December, was caused by high wind speeds at the time and extraneous temporary plant noise sources north-east of the monitoring site, possibly in the car-park near the main truck gate. Also, the long-term average sound level objective of LA90,period not to exceed 54 dBA was achieved.

Sound levels at the plant and in the residential community affected by the noise emissions from the total site have been measured regularly since 2002 and since the completion of each of the Kiln 6 Upgrade and Cement Mill No.7 projects. Monitoring of both site source sound levels and residential receiver sound levels on an annual basis from 2008 to 2021 confirmed that both of the projects were in compliance with their noise limit conditions at the time. Sound levels measured close to the plant at Location 20 and on the Control Building roof in 2022 and 2023 indicate that these projects continue to achieve their objectives. A separate assessment of the Chloride Bypass Plant indicated that it was in compliance with its sound level contribution objectives.

The annual environmental noise assessment has evaluated noise emission from the Cement Plant by the following methods:
• Monitoring of sound levels at Location 20 for compliance assessment;
• Monitoring of sound levels in one residential receiver location with unattended monitoring over long-term periods of two weeks and attended monitoring in daytime at three residential receiver locations to compare with long-term averages from previous years and assess the audible acceptability of the received sound levels.
• Monitoring of sound levels at the North Fence location over the same two-week period to assess the potential for sleep disturbance and low-frequency noise emissions

The finding of this 2023 annual environmental noise assessment is that total site noise emissions are considered to be in compliance with the licence condition.

Sound levels from the two major completed projects (Kiln 6 Upgrade and Cement Mill No.7) are also considered to be in compliance with their noise objectives at the nearest residential receiver locations.

It is also the finding of this assessment that the long-term average statistical sound levels have not increased and indicates that the Cement Plant is not increasing its emissions.

Table 11: Noise conditions

Number	Condition
K3.1 Noise	Construction activities associated with the cement works upgrade shall only be carried out: a) between 7:00 am and 6:00 pm, Monday to Friday inclusive, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site; b) between 7:00 am and 1:00 pm on Saturdays, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site; c) at no time on Sundays or public holidays, during periods when the cement works is shutdown, and construction noise is audible at the boundary of the site; d) at any time during periods in which the cement works is in operation; and e) at any time if construction noise is inaudible at the boundary of the site.
K3.1A	The Development shall be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). All feasible and reasonable noise mitigation measures shall be implemented and any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the CEMP. Note: The Interim Construction Noise Guideline identifies 'particularly annoying' activities that require the addition of 5dB(A) to the predicted level before comparing to the construction NML
K3.1B	Where Feasible and Reasonable, operation noise mitigation measures shall be implemented at the start of Construction (or at other times during construction) to minimise construction noise impacts.
M2.1 Noise Impacts	Construction activities associated with the cement works upgrade shall only be carried out: a) between 7:00 am and 6:00 pm, Monday to Friday inclusive, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site; b) between 7:00 am and 1:00 pm on Saturdays, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site;

	c) at no time on Sundays or public holidays, during periods when the cement works is shut-down, and construction noise is audible at the boundary of the site; d) at any time during periods in which the cement works is in operation; and e) at any time if construction noise is inaudible at the boundary of the site.
K3.2 Operational Noise	Subject to compliance with the requirements of this consent, the cement works upgrade may be operated 24 hours per day, 7 days per week.

K3.3

Noise generated at the site must not exceed the noise limits at the times and location specified in Table 2 below.

Former Limits

Table 2 – Maximum Allowable Noise Contribution Limit (dB(A))

Receiver Location	Day[a] $L_{Aeq(15\ minute)}$	Evening[b] $L_{Aeq(15\ minute)}$	Night[c] $L_{Aeq(15\ minute)}$
4 Melbourne Street	37	37	37
Chelsey Park Farm	30	30	30
Candowie Farm	37	37	37

New Limits (MOD 12) 7 April 2020

Table 2 – Maximum Allowable Noise Limit (dB(A))

Location	Day[a] $L_{A90(15\ minute)}$	Evening[b] $L_{A90(15\ minute)}$	Night[c] $L_{A90(15\ minute)}$
The Noise Compliance Point (Point 20) – Store Yard Close	58	58	58

a. Day is defined as the period from 7:00am to 6:00pm Monday to Saturday and 8:00am to 6:00pm on Sundays and public holidays.

b. Evening is defined as the period from 6:00pm to 10:00pm.

c. Night is defined as the period from 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am on Sundays and public holidays.

Note: Noise contributions specified in Table 2 are to be interpreted as contributions from the new and upgraded components forming part of cement works upgrade only and not as noise limits for the site as a whole. (Footnote: 2 Incorporates EPA General Terms of Approval (L6.1 and L6.2)

K3.3A	Any new or upgrade development projects the subject of any modification to this consent must give consideration to the Project Specific Noise Levels identified in the document titled 'PRP-7 Response – Identifying Environmental Noise Objectives For Berrima Cement Plant' dated 27 March 2018, prepared by Recognition Research.
K3.4	All vehicles associated with the isotainer loading operations at the site must use a broad-band type reversing alarm instead of tonal beeper reversing alarm.

K3.5	The locomotive of the train transporting isotainers to the site must be relocated to the eastern end of the train as soon as practically possible after arrival during daytime to avoid such movements in evening or night-time periods.
K3.6	The applicant must implement best practice technology with respect to the isotainer reach stacker to reduce LAmax noise events.
K3.6A	A Noise Verification Report must be submitted to the satisfaction of the Planning Secretary at the following stages of the development: (a) prior to the commencement of construction of the chloride bypass system for Kiln 6 (b) within three months of the commencement of operation of the chloride bypass system
K3.6B	The Noise Verification Reports required by condition 3.6A must be prepared by a suitably qualified and experienced acoustic consultant and include: (a) verification of compliance with noise limits specified in condition 3.3 in accordance with the Noise Policy for Industry (EPA, 2017) (b) a detailed analysis of annoying noise characteristics in accordance with Fact Sheet C of the Noise Policy for Industry (EPA, 2017) to confirm the plant and equipment associated with the chloride bypass system does not exhibit annoying noise characteristics
M2.1	Construction activities associated with the cement works upgrade shall only be carried out: a) between 7:00 am and 6:00 pm, Monday to Friday inclusive, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site; b) between 7:00 am and 1:00 pm on Saturdays, during periods in which the cement works is shut-down, and construction noise is audible at the boundary of the site; c) at no time on Sundays or public holidays, during periods when the cement works is shut-down, and construction noise is audible at the boundary of the site; d) at any time during periods in which the cement works is in operation; and e) at any time if construction noise is inaudible at the boundary of the site.

M2.2

Subject to compliance with the requirements of this consent, the cement works upgrade may be operated 24 hours per day, 7 days per week.

M2.3

[2]The Applicant shall design, construct, operate and maintain all new and upgraded components forming part of the cement works upgrade to ensure that for each receiver location listed in Table 1 below, the noise level at each receiver location does not exceed the maximum allowable noise contribution limit at the receiver location specified.

Table 1 – Maximum Allowable Noise Contribution Limit (dB(A))

Receiver Location	Day[a] $L_{Aeq(15\ minute)}$	Evening[b] $L_{Aeq(15\ minute)}$	Night[c] $L_{Aeq(15\ minute)}$
Adelaide Street, near Taylor Avenue, New Berrima	43	43	40
Argyle Street, near Taylor Avenue, New Berrima	43	43	40
Candowie Farm House	43	43	40

a. Day is defined as the period from 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm on Sundays and public holidays.

b. Evening is defined as the period from 6.00pm to 10.00pm.

c. Night is defined as the period from 10.00[pm to 7.00am Monday to Saturday and 10.00pm to 8.00am on Sundays and public holidays.

Note: Noise contributions specified in Table 1 are to be interpreted as contributions from the new and upgraded components forming part of cement works upgrade only and not as noise limits for the site as a whole. (Footnote: 2 Incorporates EPA General Terms of Approval (L4.1 and L4.2))

M2.4

[3]The maximum allowable noise contributions identified in condition 2.3 apply under all meteorological conditions, except:

a) during wind speeds greater than 3ms-1 measured at 10 metres above ground level; or

b) during temperature inversion conditions of greater than 3oC/100m and wind speeds of greater than 2ms-1 measured at 10 metres above ground.

(Footnote: 3 Incorporates an EPA General Term of Approval (L4.4))

M2.5

[4]For the purpose of assessment of noise contributions specified under condition 2.3, noise from the cement works upgrade shall be:

	a) measured at the most affected point on or within the receptor site boundary or at the most affected point within 30m of the dwelling (rural situations), where the dwelling is more than 30m from the property boundary; and b) where applicable, subject to the modification factors provided in Section 4 of the New South Wales Industrial Noise Policy (EPA, 2000). (Footnote: 4 Incorporates an EPA General Term of Approval (L4.3))
M2.6	Notwithstanding condition 2.5 of this consent, should direct measurement of noise from the site be impractical, the Applicant may employ an alternative noise assessment method deemed acceptable by the EPA (refer to Section 11 of the New South Wales Industrial Noise Policy (EPA, 2000)). Details of such an alternative noise assessment method accepted by the EPA shall be submitted to the Director-General prior to the implementation of the assessment method.

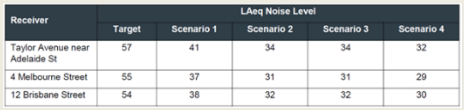
Note: (K = Kiln 6, M = Mill 7)

Table 12: Response to noise conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.1	CBS construction commenced March 2022 and continued in the 22/23 reporting period. Trye Chip storage infrastructure commenced mid 2023. All construction was undertaken during the allowed times.	Construction is a short-term activity which cannot be used to establish long-term trends. The noise verification report required under K3.6A and K3.6B was completed to provide verification of compliance prior to construction. The annual noise assessment shows construction noise was not identifiable.	CEMP for CBS and Tyre storage was approved by DPIE (now DPHI) to address construction specific management controls. Operational staff and contractors involved in the construction were tool boxed on environmental requirements.
K3.1A	As above	As above	Section 8.4.5 of the CEMP addresses noise management and mitigation measures.
K3.1B	as above	As above	The CEMP was approved by the DPIE (now DPHI) to address construction specific controls. The predicted construction noise levels for the CBS were well below the targets nominated for all scenarios within the construction of the CBS • Scenario 1 - Civil works – Foundations and Concrete pads • Scenario 2 - Structure steel erection • Scenario 3 - Bag Filter / Dust Silo erection and installation

<table>
<tr><td></td><td></td><td></td><td>

- Scenario 4 - Dust transfer installation



Receiver	LAeq Noise Level				
	Target	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Taylor Avenue near Adelaide St	57	41	34	34	32
4 Melbourne Street	55	37	31	31	29
12 Brisbane Street	54	38	32	32	30

</td></tr>
<tr><td>K3.2</td><td>The noise assessment and annual monitoring demonstrated that Kiln 6 operated within the objectives required to achieve contribution criteria during the reporting period and should be allowed to continue operating 24 hours/day, 7 days/week.</td><td>Overall, the sound levels associated with Kiln 6 sources were calculated to be less than the objective at Location 20. They are also considered to not exceed the contribution objectives at the nearest residential receivers to the northern and southern sides of the plant. (refer Annual Noise assessment report)</td><td>Existing management measures effectively contain noise levels below contribution criteria.</td></tr>
<tr><td>K3.3</td><td>The noise assessment demonstrated that Kiln 6 operated within the objectives required to achieve contribution criteria at the residential locations during the reporting period.</td><td>As above</td><td>As above</td></tr>
<tr><td>K3.3A</td><td>Any new MOD must give consideration to the PSNL in the PRP dated March 2018</td><td>Assessment reports to give consideration to the PSNL</td><td>Implemented for recent modifications</td></tr>
<tr><td>K3.4</td><td>All vehicles associated with the isotainer operation must use a broad-band type reversing beeper alarm.</td><td>Broadband alarms installed. Site procedure prepared and incorporated into Noise Management Plan</td><td>Implemented</td></tr>
<tr><td>K3.5</td><td>Locomotive must be relocate to eastern end of train as soon as practical to avoid such movements at night</td><td>Site procedure prepared and incorporated into Noise Management Plan</td><td>Implemented</td></tr>
<tr><td>K3.6</td><td>Best practice technology implemented with respect to reach stacker to reduce noise events</td><td>Site procedure prepared and incorporated into Noise Management Plan. Operators trained.</td><td>Implemented</td></tr>
</table>

K3.6A	The verification report was finalised on 22 September 2021 prior to the commencement of construction of the CBS. . Commissioning of the CBS was undertaken from November 2023 with the noise verification monitoring undertaken on the 14th December 2023. The report has submitted to DPE.	Operational verification report concluded that.. *"Sound levels around the CBP were found to be affected significantly by emissions from the other parts of the cement plant. This is to be expected because the noise specification sound levels for the new CBP were intended to be relatively low, compared to other sources at the plant* *Based on the two calculation methods, it is the assessment of this report that the noise emissions form the operational CBP are in compliance with the recommended objectives of the Pre-construction Verification Report"*	The final verification report concluded that noise emissions from the CBS are in compliance with the levels recommended objectives in the preconstruction Verification report.
K3.6B	The preconstruction verification report was completed by John Sleeman at SLR and is a suitably qualified acoustic consultant. The post verification report was completed by Steve Collings and Colin Tickell at Recognition Research. Both Steve and Colin are suitably qualified acoustic consultants.	Compliant	Compliant
M2.1	Although no construction activities are occurring in areas designated with Mill 7, the CBS construction for Kiln 6 continued in 2023. Construction of the tyre chip storage facility was also commenced	The CEMP controls for the CBS and Tyre Chip storage facility refer to the whole site to limit of cumulative impacts	CEMP was approved by DPIE (now DPHI) o address construction specific management controls.
M2.2	The noise assessment predicted and monitoring confirmed that Mill 7 operated within the contribution criteria during the reporting period and should be allowed to	See Appendix 1 for Noise Assessment Report	Compliant

	continue operating 24 hours/day, 7 days/week.		
M2.3	The noise assessment predicted that Mill 7 operated within the contribution criteria at the residential locations during the reporting period, including for the worst case weather scenario.	See Appendix 1 for Noise Assessment Report	Compliant
M2.4	Monitoring has shown compliance with limits.	See Appendix 1 for Noise Assessment Report	Compliant
M2.5	Noise was measured at the following locations: ● 72 Taylor Avenue (near Adelaide St); ● 12 Brisbane Street; ● 4 Melbourne Street; ● Northern Boundary; and ● Store Yard (close).	See Appendix 1 for Noise Assessment Report	Compliant
M2.6	Section 11 of the INP provides the following alternate methods for determining compliance: 1. measuring existing noise levels with and without the premises operating; 2. measuring the noise emissions from each of the premises at reference locations and then calculating the noise-emission levels back to the receiver; and	This method has been used in previous AEMRs for the site with the results accepted by DP&E. (now DPHI)	No management measures required.

	3. using an accepted noise model calibrated for the particular locality and source. Method 2 was used for Mill 7.		

Note: (K = Kiln 6, M = Mill 7)

5.3 Air quality

Boral Cement is acutely aware that elevated fugitive dust emissions from the site can occur and to combat this has active dust management controls in place as set out in the *Berrima Cement Works – Dust Management Plan* (Boral 2023), which is operated across the site.

During the reporting period the site continued the use of the real-time dust monitor which links directly to the control room along with the site Trigger Action Response Management Plan (TARP) for dust which the site monitors current and forecast weather to manage potentially dust generating activities on site.

Table 13 sets out the relevant air quality conditions for the site within the two development consents. Table 14 sets out the site's performance during the past year relating to air quality and the key management measures that are used to minimise dust being generated and leaving the site which include:

- controlling dust from stockpiles using methods including the compaction of stockpile batters (being pushed up with a loader), wetting down with a water cart in dry weather conditions and stopping loading/unloading operations in high winds;
- controlling vehicles (ensuring they are covered and have used wheel washes for example);
- revegetating areas and planting trees to act as wind breaks;
- sealing roads or closing off unused roads;
- using a road sweeper and water carts to minimise traffic generated and windblown dust from trafficable areas; and
- modifying its activities such as loading, unloading and crushing of materials in open areas to minimise windblown dust by the use of a water carts, stopping or postponing the activities during times of high wind, modifying the process to take place under cover where possible.
- Baghouses at key transfer points within the cement mill and raw material processing areas.

In addition to controlling fugitive dust emissions by implementing the actions outlined above, Boral Cement operates its plant to ensure point source emissions meet required standards. The continuous monitoring data of particles (Kiln 6) showed compliance with agreed standards. The specialised testing of Kiln 6 and Mill 7 throughout the year showed no non-compliances with agreed standards.

Boral Cement maintains a dust deposition monitoring program, currently consisting of seven dust deposition gauges and one high volume air sampler (HVAS) located around the perimeter of the site. Samples are collected from each gauge monthly to assess compliance against the EPA's dust deposition guidelines.

Results are published, as required by the EPL, on the Boral Berrima Cement website.

As discussed in the body of this section, average dust deposition data for dust gauges for the reporting period have values well below the EPA guideline of 4g/m2/month. These results confirm that the current dust control measures on site are generally working well.

During the reporting period, the site received 16 complaints relating to dust concerns.

All the complainants, where possible were contacted after the complaints were received. Further details are provided in Appendix 2 Complaints Summary.

Table 13: Air quality conditions

Number	Condition
K3.7	The Applicant shall design, construct, operate and maintain the cement works upgrade in a manner that minimises dust emissions from the site and complies with the EPL.
K3.7A	The Applicant shall apply all reasonable and feasible measures to minimise the generation of dust from coal stockpiles, including but not necessarily limited to: a) compaction of stockpile batters to minimise pick up of dust; b) installation of water sprays or use of a water cart to keep stockpile surfaces wet, if dust is being generated; and c) cessation of stockpile generation during periods of high wind, if dust generation cannot be controlled.
K3.8	The Applicant shall take all practicable measures to ensure that all vehicles entering or leaving the site and carrying a load that may generate dust are covered at all times, except during loading and unloading. Any such vehicles shall be covered or enclosed in a manner that will prevent emissions of dust from the vehicle at all times.
K3.9	All trafficable areas and vehicle manoeuvring areas on the site shall be maintained in a condition that will minimise the generation or emission of wind blown or traffic generated dust from the site at all times.
K4.1A	Continuous monitoring equipment for emissions, temperature and fuel feed rate, as required to meet the conditions of this consent and as agreed to by the EPA must be installed prior to receipt at the site of and use of non-standard Fuels in the upgraded Kiln 6
K4.1B	Prior to the commencement of the use of Non Standard Fuels, the applicant shall develop and implement an Ambient Air Quality monitoring program.
K4.1C	From the time of commencement of the use of Non Standard Fuels the applicant shall continuously monitor the following process parameters a. Gas temperature b. Carbon monoxide and volatile organic compounds c. Rates of feed for Non Standard Fuels AKF1 and AKF5 and the derived rate of feed for Hi CAL 50 in the coal feed d. Rates of feed of SWDF and e. Nitrogen oxides, hydrogen chloride, sulphur dioxide, carbon monoxide, solid particles (total) and volatile organic compounds.

K4.2	If the results of the monitoring required under conditions 4.1A, 4.1B and 4.1C and EPL no 1698 indicate that the operation of any component of the cement works upgrade, when operating under design loads and normal operating conditions, exceeds the limits imposed , the applicant shall provide details of remedial measures to be implemented to reduce air quality limits to the levels required.
M2.7 Dust Emissions	[5]The Applicant shall design, construct, operate and maintain the cement works upgrade in a manner that minimises dust emissions from the site. The raw material storage bunker associated with the cement works upgrade shall be maintained in a condition that effectively eliminates wind generated dust emissions. Dust collection systems shall be provided to all potential sources of dust production associated with the cement works upgrade. (Footnote: 5 Incorporates EPA General Terms of Approval (O2.1 and O2.2))
M2.8	The Applicant shall take all practicable measures to ensure that all vehicles entering or leaving the site and carrying a load that may generate dust are covered at all times, except during loading and unloading. Any such vehicles shall be covered or enclosed in a manner that will prevent emissions of dust from the vehicle at all times.
M2.9	All trafficable areas and vehicle manoeuvring areas associated with the cement works upgrade shall be maintained in a condition that will minimise the generation or emission of wind blown or traffic generated dust from the site at all times.
K3.10 Air Quality Discharges	The Applicant shall install and operate equipment in line with best practice to ensure that the Development complies with all load limits, air emission limits and air quality monitoring requirements as specified in the EPL for the site.
K3.10A	Deleted
M2.10 Discharge Limits	[6] The Applicant shall design, construct, operate and maintain the cement works upgrade to ensure that total solid particle emission from the exhaust stack on Cement Mill No.7 (EPA Identification Point 10) does not exceed 20mg/m^3 (100% concentration limit). The concentration limit specified above is based on 101.3 kPa, 273 K, dry reference conditions and shall be determined in accordance with the monitoring requirements described under condition 3.1. To avoid any doubt, this condition does not authorise the discharge or emission of any other pollutants. (Footnote: 6 Incorporates EPA General Terms of Approval (P1.1, L2.1 and L2.2))

Note: (K = Kiln 6, M = Mill 7)

Table 14: Response to air quality conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.7	**Dust monitoring** There are seven dust monitoring gauges and one HVAS around the perimeter of the site and in New Berrima. The locations of the gauges are shown on Figure 5. Samples are collected from the dust gauges each month and each week for the HVAS. The samples are assessed for compliance against the dust deposition and total suspended particulates (TSP) guidelines in *Approved Methods and Guidance for Analysis for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005) and *National Environment Protection Measure for Ambient Air Quality* (NEPC 1998) PM_{10} guideline. As there is no emission limit specified in the Licence, the following guidelines have been adopted: ● EPA dust deposition guideline of 4 g/m_2/month (expressed as a 12-month rolling average). ● NEPM PM_{10} 24 hr standard of 50 $\mu g/m^3$. ● EPA TSP annual goal of 90 $\mu g/m^3$. As can be seen in figure 6 and 7, the dust gauges and HVAS have values below the guidelines for the reporting period. **Stack Emissions**	Figure 6 shows the results of the analysis of the HVAS from May 2018 to April 2024. The trend during the year has been down. As can be seen, the current data shows that we remain below the EPA guideline of 4 g/m_2/month. Figure 7 shows the results of the analysis of the dust gauges located around the site and the New Berrima community from May 2018 to April 2024. As can be seen, the current data shows that we remain below the EPA guideline of 4 g/m_2/month. Boral Cement Berrima will continue to respond rapidly to, thoroughly investigate, and rectify any dust complaints received from the local community.	Dust control is a fundamental part of the operational management of this site. Dust is controlled through the implementation of the Dust Management Plan. As sound control measures are in place and this is supported by monitoring data, these operations will continue. During 2020/21 the site commissioned the real-time dust monitor and embedded the use of the new site Dust Trigger Action Response Plan. The data from the real time monitor is used as a management tool to notify staff when TARP triggers are met to enact the corresponding management response. Discussions have been held with the EPA regarding the installation of a network of real time

	Yearly stack emission monitoring for Kiln 6 as required by the EPL was undertaken in October 2023 and April 2024. Figure 8 shows that the Works maintained emissions well under the EPA limits. 16 complaints were received from the community and via the EPA in relation to the deposition of dust on vehicles and properties. The complainants were contacted, where possible after the complaints were received. Further details are provided in Appendix 2.		monitors. A report has been prepared outlining the locations and management of the future network. The network will be installed and commissioned over 2024 and 2025.
K3.7A	See K3.7 above under Dust monitoring.	Reasonable and feasible measures are being implemented to minimise fugitive dust from coal stockpiles. This includes compaction of stockpile batters (being pushed up with a loader), wetting down with a water cart in dry weather conditions and stopping loading/unloading operations in high winds. The site's re-vegetation program is maturing in the areas surrounding the stockpiles to create a windbreak and a dust screen.	
K3.8	No complaints were received during this period regarding dust associated with vehicle movements and no related issues arose during this period.	All transport contractors are made aware of this requirement during site inductions. Section 3 of the *Driver Code of Conduct – Truck and Heavy Vehicles Operator*, which is part of the *Berrima Cement Works – Traffic Management Plan* (Boral 2017) includes requirements for all drivers of heavy vehicles on site to ensure they cover their loads and prevent spillages.	
K3.9	See K3.7 above under Dust monitoring. During this reporting period Boral Cement has continued to actively work to reduce the generation	Some of the unsealed roads on site have been sealed in the previous years and some have been closed off and recently re-vegetated. Two wheel wash stations were installed in 2016, one at the exit	Boral Cement continues to investigate opportunities to reduce fugitive dust throughout the site. Issues

	of dust from vehicles and internal haul roads through implementation of the Dust Management Plan.	of a shale pad, the other at the end of Quarry Road. The wheel wash stations continue to be routinely used. Boral Cement operates a road sweeper and water carts to minimise traffic generated and windblown dust from trafficable areas and vehicle manoeuvring areas. Mechanical sweepers undergo regular maintenance to ensure sweepers are working efficiently. Boral Cement modified its activities such as loading, unloading and crushing of materials in open areas to minimise windblown dust. Actions included the use of a water cart, stopping or postponing the activities until wind subsides, modifying the process to take place under cover where possible, etc.	are managed through immediate corrective action and reporting through the incident management database SEQuence. The real-time dust monitor is an extra tool to alert the site to potential fugitive dust events that could impact the New Berrima village residents. A proposed broader network of Real time dust monitors will also allow potential dust to be managed depending on wind directions.
M2.7	Covered under KK3.7 and K3.7A		
M2.8	Covered under K3.8		
M2.9	Covered under K3.9		
K3.10	Stack emission monitoring for Kiln 6 was conducted by Ektimo in October 2023 and April 2024 in accordance with the sampling methods specified under EPL 1698. The reports demonstrated compliance with the emission limits for standard fuels for all monitoring parameters (see Figure 8).	No exceedances were demonstrated from stack emission monitoring for Kiln 6 from 1st May 2023 to April 2024 as demonstrated in Figure 8. No exceedances were demonstrated from continuous particulate stack monitoring with the exception of exceedances of the daily limits on 3 separate days in July 2023 as outlined in Section 7.	

M2.10	Ektimo monitored solid particle emissions from the Mill 7 stack in October 2023 in accordance with the sampling methods specified under EPL 1698. The report demonstrated compliance with the emission limit as shown in Figure 8		

Figure 5 Air Quality Monitoring locations

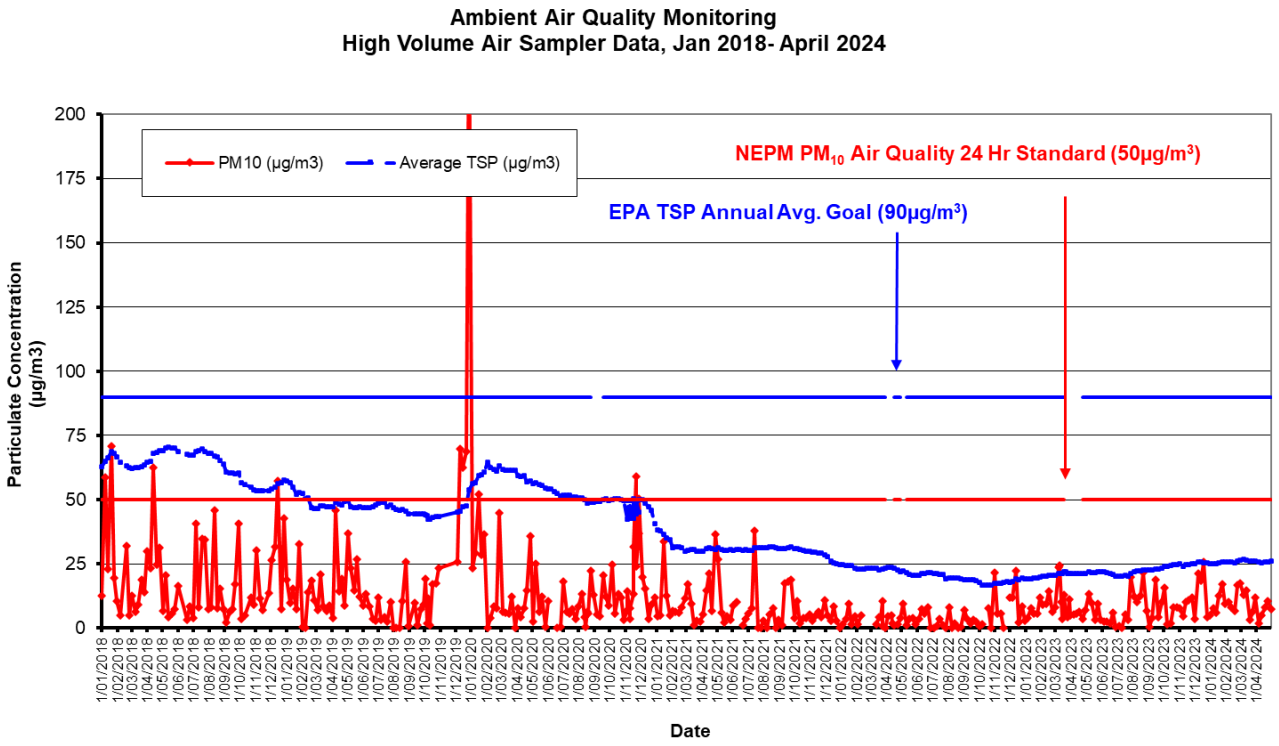


Figure 6 Ambient air quality monitoring January 2018 – April 2024

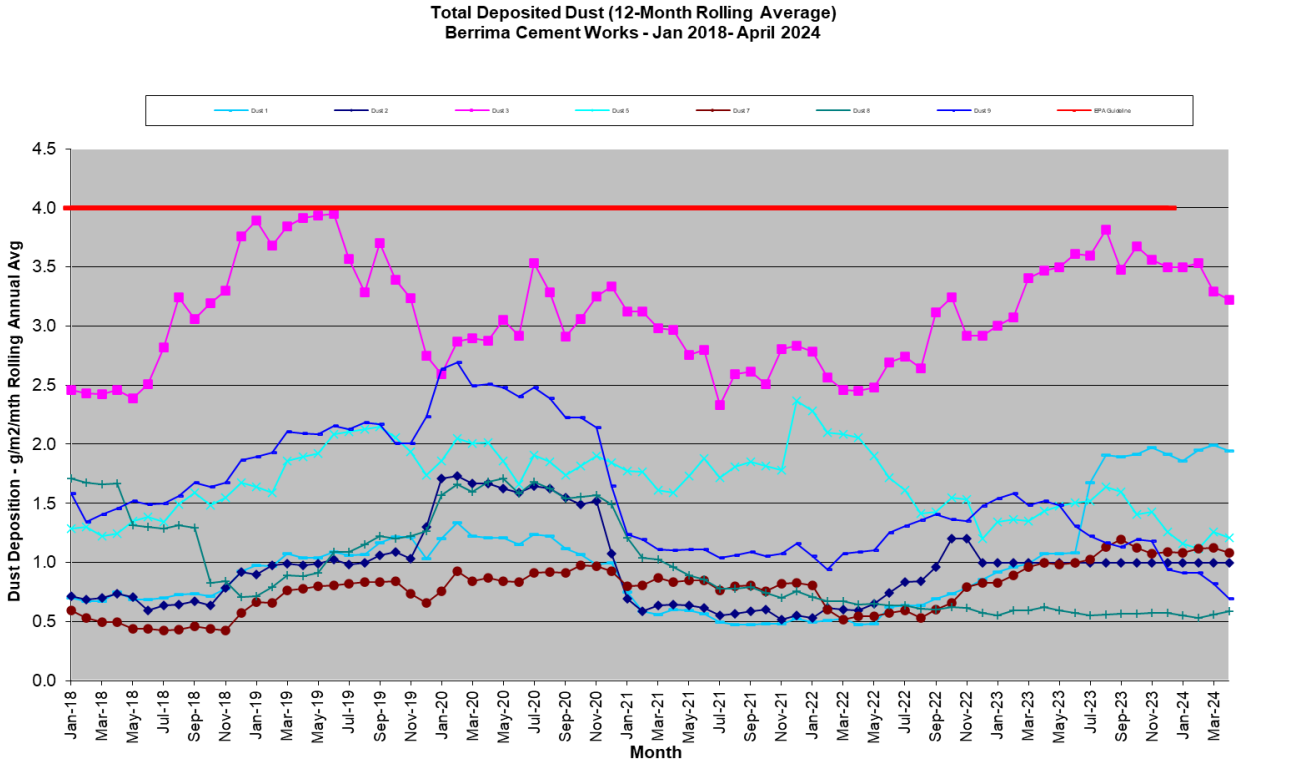


Figure 7 Total deposited dust (12-month rolling average) January 2018-April 2024)

Report ID	EPA 2	Kiln Stack	RO15613-1	R016899-1	R016899
Pollutant	**Unit of Measure**	**Licence Limit**	**Oct-2023**	**Apr-2023**	**Apr-2023 NPI**
Vol flowrate (wet)	M3/sec		230	130	200
Velocity	m/s		32	28	28
Temp	C		114	127	127
Nox	mg/m3	1250	1100	750	750
Solid Particles	mg/m3	50	42	30	30
Moisture	%		11	14	14
Molecular wgt stack gases	g per g mole		30.1	29.6 wet	29.6
Dry das density	kg/m3		1.41	1.41	1.41
Carbon dioxide	%		18.9	18.7	19.7
Oxygen (O2)	%		9.8	9.9	9.1
Type 1 & 2 aggregate	mg/m3	0.5	<0.054	0.08	0.08
Cadmium	mg/m3	0.05	<0.003	0.0007	0.0007
Mercury	mg/m3	0.05	0.02	0.02	0.02
Chlorine	mg/m3	50	0.33	0.49	0.49
Carbon monoxide	%		580	350	350
Dioxins & Furans	nanograms/m3	0.1	0.0027	0.0033	0.0033
Chromium (hexavalent)	mg/m3		0.002	0.022	0.022
Hydrogen Chloride	mg/m3	10	0.19	0.96	0.96
Hydrogen fluoride	mg/m3	1	0.088	0.04	
Sulphur dioxide	mg/m3	50	0.057	0.031	0.031
Sulfuric mist (SO3)	mg/m3	50	0.06	0.064	0.064
VOC	ppm	40	2.6	1.9	1.9
Thallium	mg/m3	0.05	0.002	0.004	0.004
arsenic	mg/m3		0.002	0.004	0.004
fine particulates	mg/m3				20
coarse particulates	mg/m3				21
benzene	mg/m3		2.8	1.7	1.7
Benzo(a)pyrene	mg/m3				<10
lead	mg/m3		0.0019	0.003	0.003

Figure 8 Stack testing license comparison tables

5.4 Soils and water quality

The consent requirements for soils and water quality for Kiln 6 are in conditions 3.11 to 3.14 of Development Consent No. 401-11-2002-i and for Mill 7 in conditions 2.11 to 2.14 of Development Consent No. 85-4-2005-i, which are replicated in Table 15. The consents refer to EPL 1698, however, there are no water discharge limits in the EPL.

Table 16 sets out the site's performance during the past year relating to soils and water quality and the key management measures that are used at the site.

Boral manages water on site in accordance with the *Berrima Cement Works – Water Management Plan* (Boral 2023), which describes the monitoring points, frequency and parameters. Storm water and residual process water from all areas of the Works (including Kiln 6 and Mill 7) is harvested and used on site with water quality in the storages (Lake Quality and Lake Breed) tested monthly, and water quality in the receiving waterway (Wingecarribee River) tested every three months. Water is only discharged from site during very heavy rainfall, with two overflow events during the reporting period.

Three of the conditions relate to construction, with the Chloride Bypass System completing construction mid 2023 and tyre storage facilities constructed late 2023. CEMPs required under Mod 13 and Mod 15 detailed the specific water management requirements.

Approval of Modification 15 for the Tyre Chip Storage Area required the management of Fire water and the construction of a Fire Water catchment bund. This was detailed in the CEMP prepared for this modification. The Water Management plan has been updated to reflect this requirement.

It is demonstrated in Table 16 that the overall water management performance of the site is good. This indicates that the water management performance at Kiln 6 and Mill 7 is also good and that the conditions have been complied with during the reporting period.

The site continues to source a large portion of its daily usage requirements from waters collected within the shale pit voids as well as water harvested onsite and managed in Lake Quality and Lake Breed.. The business will continue to prioritise waters harvested onsite, however as a large consumer of water this will require the Wingecarribee River to be the main source of water, in times of low volumes onsite.. In the longer term the aim will be to source waters from the former Berrima Colliery.

Table 15: Soils and water quality conditions

Number	Condition
K3.11 Construction Soil and Water Management	Soil and water management measures consistent with Managing Urban Stormwater – Soils and Construction Vol.1 (Landcom, 2004) (the Blue Book) shall be employed during construction of the Development to minimise soil erosion and the discharge of sediment and other pollutants to land and/or waters.
K3.12	All construction vehicles exiting the site, having had access to unpaved areas, shall depart via a wheel-wash facility.
K3.13	All erosion and sedimentation controls required as part of this consent shall be maintained for the duration of the construction works, and until such time as all ground disturbed by the construction works, has been stabilised and rehabilitated so that it no longer acts as a source of sediment.
K3.14 Water Discharge Limits	The Applicant shall ensure that all surface water discharges from the site comply with the: a) discharge limits (both volume and quality) set for the development in any EPL; or b) relevant provisions of the POEO Act.
K3.14A Water Crossing	The Applicant must design and construct the watercourse crossing on the site access road approved under MOD 14 in accordance with the Department's Fact Sheet Controlled Activities – Guidelines for watercourse crossings on waterfront land (2022) and the design in the Roadworks and Drainage Layout Plan – Sheet 3 prepared by SLR dated 20 February 2023, Revision P3, Drawing Number 660.30247-CI-1103.
M2.11 Water Quality Impacts	[7]Except as may be expressly provided by a licence under the Protection of the Environment Operations Act 1997 in relation to the cement works upgrade, section 120 of that Act (pollution of waters) shall be complied with in, and in connection with, the carrying out of the cement works upgrade. (Footnote 7: 7 Incorporates an EPA General Term of Approval (L1.1))
M2.12 Erosion and Sediment Control	All construction vehicles exiting the site, having had access to unpaved areas, shall depart via a wheel-wash facility.
M2.13	All erosion and sedimentation controls required as part of this consent shall be maintained for the duration of the construction works, and until such time as all ground disturbed by the construction works, has been stabilised and rehabilitated so that it no longer acts as a source of sediment.

M2.14 Site Drainage and Stormwater	The Applicant shall ensure that the cement works upgrade does not lead to an increase in the volume or flow rate of stormwater leaving the site over and above pre-development flow conditions.

Note: (K = Kiln 6, M = Mill 7)

Table 16: Response to soils and water quality conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.11	There were two overflows from Lake Quality during the reporting period (20/02/2024 and 06/04/2024)). Water was sampled at the overflow point (EPA Point 9), which had the following results: ● Biochemical oxygen demand (mg/L) – 3 & <2 (guideline:20) ● Oil and grease (mg/L) – <5 for all samples (guideline: 10) ● pH – 8.3- & 8.2 ● Total suspended solids (mg/L) – <5 & 10 (guideline: 30-50) The results were within guideline values and were reported as part of the site POELA monthly reports.	The discharge water quality is similar to previous years, with only two overflow events for the year, as a result of several periods of substantial rain in short periods of time. .	In order to ensure sufficient capacity in Lake Quality in the event of a rain event, water for production will primarily be taken from Lake Quality prior to extracting water from Wingecarribee River. The approved CEMP for MOD 13 and Mod 15 details specific water management measures and specifically references *Managing Urban Stormwater – Soils and Construction Vol.1 (Landcom, 2004)* (the Blue Book)

K3.12	Construction vehicles exited the site via a wheel wash.	NA	
K3.13	Refer to K3.11.	Construction is a short-term activity which cannot be used to establish trends. Two overflow events have occurred since construction of the Tyre chip storage facility commenced during the reporting period of the AEMR, but with no impact on water quality.	Refer to K3.11
K3.14	No water volume and quality discharge limits are specified in EPL 1698. Notwithstanding, the EPL requires monitoring at the Lake Quality overflow point during overflows. There were two overflows from Lake Quality during the reporting period (20/02/2024 and 06/04/2024)). Water was sampled at the overflow point (EPA Point 9), which had the following results: ● Biochemical oxygen demand (mg/L) – 3 & <2 (guideline:20) ● Oil and grease (mg/L) – <5 for all samples (guideline: 10) ● pH – 8.3- & 8.2 • Total suspended solids (mg/L) – <5 & 10 (guideline: 30-50) The results were within guideline values and were reported as part of the site POELA monthly reports.	The water in Lake Quality is reused in site processes and the lake only overflows during heavy rainfall. There were two overflow events during the reporting period. Sampling demonstrated that water quality met the typical NSW discharge criteria. .	*Berrima Cement Works – Water Management Plan* (Boral 2023) is implemented at the Works, which includes the Kiln 6 area and is reviewed every three years or after an incident and is revised/improved as deficiencies become apparent.
K3.14A	Not yet commenced		
M2.11	No water volume and quality discharge limits are specified in	Refer to K3.14.	*Berrima Cement Works – Water Management Plan* (Boral 2020) is

	EPL 1698.		implemented at the Works, which includes the Mill 7 area and is reviewed every three years or after an incident and is revised/improved as deficiencies become apparent.
M2.12	Refer to K3.11.	Construction is a short-term activity which cannot be used to establish trends.	Two overflow events have occurred since construction of the Tyre Chip storage facility commenced in the reporting period. Construction has had no impact on water quality.
M2.13	Refer to K3.12.	Construction is a short-term activity which cannot be used to establish trends.	Two overflow events have occurred since construction of the Tyre Chip storage facility commenced in the previous reporting period. Construction has had no impact on water quality.
M2.14	Refer to K3.11.	Construction is a short-term activity which cannot be used to establish trends.	Two overflow events have occurred since construction of the Tyre Chip storage facility commenced in the previous reporting period. Construction has had no impact on water quality.

Note: (K = Kiln 6, M = Mill 7)

5.5 Traffic and transport

The requirements for traffic and transport for Kiln 6 are in conditions 3.15 to 3.16D of Development Consent No. 401-11-2002-i and for Mill 7 in conditions 2.15 to 2.17 of Development Consent No. 85-4-2005-i, which are replicated in Table 17 including the additional traffic management conditions were added as part of Approval of Modification 14.

Table 18 summarises the site's performance during the past year relating to traffic and transport and the key management measures that are used at the site.

Boral manages traffic on site in accordance with the Traffic Management Plan

Condition 3.15 and 3.16 related to the initial construction of Kiln 6 and are no longer directly applicable, however Condition 3.16 is applied to other construction works such as the CBS and Tyre Chip storage facility undertaken in the reporting period.

CEMPs prepared for both projects detail specific traffic management protocols.

The Site Vehicle and Pedestrian Management Plan has been updated to reflect Modification 13 and 15, and is an Appendix to the OEMP.

Two of the conditions relate to parking provision and truck queuing. Sufficient car parking has historically, and continues to be, provided to accommodate employee and visitor vehicles on site without the need to park on surrounding public roads. Deliveries of fuel and ingredient materials for Kiln 6, and ingredient materials for Mill 7, have not historically, and continue to not, require queuing of trucks along Taylor Avenue. Therefore, operations at Kiln 6 and Mill 7 complied with the traffic and transport consent conditions during the reporting period.

Table 17: Traffic and transport conditions

Number	Condition
K3.15	Traffic and Transport Impacts The Applicant shall establish a bus transport system generally consistent with that identified in section 6.9 of the SEE to transport construction employees to and from the site during the construction period.
K3.16	The Applicant shall ensure that vehicles associated with the cement works upgrade do not stand or park on any public road or footpath adjacent to the site. Measures provided by the Applicant shall include sufficient parking for all employees and contractors during construction and operation of the cement works upgrade and management measures to ensure that heavy vehicles entering the site are not permitted to queue on Taylor Avenue at any time.
K 3.16A 3.16B 3.16C 3.16D 3.16E Port Kembla Coal Haulage Campaigns Deleted.	
K3.16A	The Applicant shall pay a road maintenance levy to Council of 4 cents/tonne/km for the transport of SWDF.
K3.16B	The Applicant must ensure the maximum number of heavy vehicle trips per day for the delivery of raw materials and Kiln 6 fuels does not exceed a maximum total of 256 trips (128 total heavy vehicle deliveries) as stated in Table 1 of Boral Limited's correspondence to the Department dated 21 September 2023 (Attachment 1 of the Amendment Request prepared by Boral Limited dated 27 October 2023, submitted as part of MOD 14). Note: For the purposes of this condition and condition 3.16C of this consent, "heavy vehicle trip" means a one-way heavy vehicle movement from one point to another, excluding the return journey.
K3.16C	Notwithstanding condition 3.16B of this consent, the Applicant must ensure the maximum number of heavy vehicle trips per day for the delivery of raw materials and Kiln 6 fuels does not exceed 212 trips (106 total heavy vehicle deliveries) until such time the requirements of condition 1.4AA of this consent have been satisfied.
K3.16D	The Applicant must record and maintain a log of the total number of heavy vehicle movements per day associated with the receipt of raw materials and Kiln 6 fuels. The log must: a) be kept on site and be available for inspection by either Council or Transport for NSW upon request; and b) be published on the project website every six months.
M2.15 Traffic and	The Applicant shall establish a bus transport system generally consistent with that identified in section 6.6.7 of the SEE referred to in condition 1.2b to transport construction employees to and from the site during the construction period.

Transport Impacts	
M2.16	The Applicant shall ensure that vehicles associated with the cement works upgrade do not stand or park on any public road or footpath adjacent to the site. Measures provided by the Applicant shall include sufficient on-site parking for all employees and contractors during construction and operation of the cement works upgrade and management measures to ensure that heavy vehicles entering the site are not permitted to queue on Taylor Avenue at any time.
M2.17	The Applicant shall install an advance warning signage along Taylor Avenue to advise vehicles approaching the entrance to the site of turning truck traffic in the area. This signage is to be installed prior to the commencement of operations of the cement works upgrade. Details of the design and installation of this signage are to be provided to the satisfaction of the Director-General prior to the commencement of operations at the cement works upgrade.

Note: (K = Kiln 6, M = Mill 7)

Table 18: Response to traffic and transport conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.15	Only a small workforce was required to construct the alternative waste facility with employees travelling to site from different directions. Therefore, a bus service was not implemented for construction during this reporting period as it was not required nor practical.	Construction timeframes are short and no performance trends can be established.	The Construction Traffic Management Plan was approved as an Appendix of the CEMP for the CBS facility on 24 February 2022 .
K3.16	No construction vehicles stood or parked on public roads or footpaths as there is sufficient room on roads within the site and parking areas to accommodate vehicles. Employee car parking was extended three years ago. The employee car park has unused capacity.	Construction timeframes are short and no performance trends can be established.	The Construction Traffic Management Plan was approved as an Appendix of the CEMP for the CBS facility on 24 February 2022
K3.16A	64185 tonnes of SWDF were used in the reporting period, at the time of writing the levy has yet to be paid to Council. The levy payable should = (Reporting Year SWDF tonnes x 0.04) x 2.6 Invoice cannot be issued by Council until Annual Report completed.	SWDF vehicles travel 2km from the highway to the site entrance and return to the highway. Based on 21869t in 2018/19 a levy of $2274.31 was payable. Based on 28997t in 2019/20 a levy of $3015.69 was payable. Based on 34767t on 2020/21 a levy of $3615.78 is payable Based on 34654t on 2021/22 a levy of $3,604.02 is payable Based on 54396t on 2022/23 a levy of $5657.18 is payable	All prior invoices have been paid. A copy of this Annual Report will be made available for Council to enable the 23/24 invoice to be issued.

		Based on 64815t on 2023/24 a levy of $6740.76 is payable	
K3.16B	Heavy Vehicle movements have not exceeded the maximum total of 256 trips	Movements are managed with the suppliers and tracked via log and weighbridge	
K3.16C	Not yet triggered		
K3.16D	Log in place and is available. Report available on website as of June 2024.	Movements are managed with the suppliers and tracked via log and weighbridge	Ongoing tracking and reporting on a 6 monthly basis June and November with report to website.
M2.15	NA	NA	NA
M2.16	No construction vehicles stood or parked on public roads or footpaths as there is sufficient room on roads within the site and parking areas to accommodate vehicles. Employee car parking was extended three years ago. The employee car park has unused capacity.	Construction timeframes are short and no performance trends can be established.	NA
M2.17	As previously reported, warning signage was installed along Taylor Avenue.	This was a one-off activity with no associated trends.	Signs will be replaced if damaged or defaced.

Note: (K = Kiln 6, M = Mill 7)

5.6 Waste management

The consent requirements relating to waste management for Kiln 6 are in conditions 3.17 to 3.17C of Development Consent No. 401-11-2002-i and for Mill 7 in Condition 2.18 of Development Consent No. 85-4-2005-i, which are replicated in Table 19.

The consents refer to EPL 1698, which provides requirements on the management of alternative fuels in conditions L4, O5, O6.1/2/3/4/5/6/7/8/9/11 and 12

Section 8.2 of the Chloride Bypass System CEMP details the Construction and Demolition Waste Management Plan. This was approved on 24 February 2022.

A similar plan was prepared as part of the Modification 15 CEMP.

Table 20 sets out the site's performance during the past year relating to waste management and the key management measures that are used at the site.

Boral manages waste on site in accordance with *Berrima Cement Works – Waste Management Plan* (Boral 2023), which describes recycling and disposal requirements for the different waste categories generated and used on site.

The waste conditions and the EPL 1698 specifically detail what wastes can be received on site for storage, treatment, processing, reprocessing or disposal such as granulated blast furnace slag (slag). These conditions exclude non-standard fuels approved for use at Kiln 6.

Table 19: Waste conditions

Number	Condition
K3.17 Waste Management Impacts	Except as otherwise permitted by this consent and a licence issued under the Protection of the Environment Operations Act 1997 the Applicant shall not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing or disposal, or any waste generated at the site to be disposed of at the site.
K3.17A	Condition 3.17 of this consent only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require a licence under the Protection of the Environment Operations Act 1997 (POEO Act), and does not include: a) any Non-Standard Fuels approved for use at the upgraded Kiln 6 under this consent; b) any material normally brought to the site for the purpose of cement clinker production (as detailed in the documents listed under condition 1.2 of this consent); c) any material normally recycled or reused within the cement works; and d) any material that is subject to a specific waste recovery exemption (RRE) issued by the EPA to exempt that material from the specific clauses of the Protection of the Environment (Waste) Regulation 2005.
M2.18 Waste Management Impacts	[8]The Applicant shall not cause, permit or allow any waste generated outside Cement Mill 7 to be received at Cement Mill 7 for storage, treatment, processing, reprocessing or disposal, or any waste generated at Cement Mill 7 to be disposed of at Cement Mill 7, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997. This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if it requires an environment protection licence under the Protection of the Environment Operations Act 1997. (Footnote 8: 8 Incorporates an EPA General Term of Approval (L3.1 and L3.2))
K3.17AB Alternative Raw material Trial - Granulated Blast Furnace Slag (GBFS)	Prior to the receipt of GBFS on-site, the Applicant must obtain a specific waste Resource Recovery Exemption (RRE) for GBFS from the EPA.
K3.17AC GBFS Trial Requirements	Provided that the specific waste RRE is obtained for GBFS, the Applicant shall trial the use of up to 3,000 tonnes of GBFS as an alternate raw material in Kiln 6. The Applicant shall: a) undertake the trial over a continuous 3 day period, unless otherwise agreed in writing by the Secretary;

	b) conduct stack testing of all relevant air emissions and trace elements, to the satisfaction of the EPA; and c) use quality controlled GBFS only.
K3.17AD GBFS Trial Verification Report	Within 1 month of the completion of the GBFS trial, the Applicant shall prepare and submit a Verification Report to the Department to the satisfaction of the Director-General and the EPA. The Verification Report shall include: (a) stack emissions monitoring data measured for the duration of the trial; (b) copies of all analytical test reports for all substances sampled and tested; (c) a comparison of monitoring results from the trial with the relevant EPA standards and requirements, as determined by the EPA.
K3.17AE	Provided the results of stack testing for the GBFS trial confirm that the air pollutants emitted from the cement Kiln 6 meet the relevant EPA standards and requirements, the Applicant may commence full-scale usage of GBFS as a raw material additive in Kiln 6 at a maximum usage rate that is determined in writing by the Secretary in consultation with the EPA. Note: the Applicant must not commence full-scale usage of GBFS as a raw material additive in Kiln 6 until it has received written approval from the Secretary. In addition, the maximum usage rate per annum of GBFS in cement Kiln 6 must not exceed 150,000 tonnes per annum.
K3.17B	Except as provided by any condition of a licence under the Protection of the Environment Operations Act 1997, only the following 'Group A' waste may be stored at the site: a) AKF1.
K3.17C	Except as provided by the condition of a licence under the Protection of the Environment Operations Act 1997, the Applicant must assess, classify and dispose of all wastes generated as a result of the use of Non-Standard Fuels in a accordance with the NSW EPA's Waste Classification Guidelines.

Note: (K = Kiln 6, M = Mill 7)

Table 20: Response to waste conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.17	Except for raw materials and SWDF non-standard fuels and HiCal 50 approved in EPL 1698 no waste generated outside the Works was received at the site during the reporting period.	The Operational Environmental Management Plan was updated in April 2018 in accordance with Condition 6.7 to incorporate measures for management of nonstandard fuels prior to their use at the site (approval letter received from DPE on 21/05/2018).	Boral undertook a review of the OEMP, to reflect the Mod 11 and 12 to the consent and changes to the EPL completed by the EPA on 18 December 2019. These were submitted to the Department on 5 June 2020 and approved on the 29 June 2020. A further review of the OEMP occurred in 2023 to include management and use of tyre chips. The CEMP was updated in response to MOD 13 to include the construction of the CBS and was approved on 24 February 2022, with construction occurring during the reporting period. The CEMP was further updated in response to Modification 15, in 2023.
K3.17A	As described above and prohibited by Condition L4.1 of the EPL, no waste generated outside the Works was received at the site during the reporting period.	The Operational Environmental Management Plan was updated in April 2018 in accordance with Condition 6.7 to incorporate measures for management of nonstandard fuels prior to their use at the site (approval letter received from DPE on 21/05/2018).	Boral undertook a review of the OEMP, to reflect the Mod 11 and 12 to the consent and changes to the EPL completed by the EPA on 18 December 2019. These were submitted to the Department on 5 June 2020 and approved on the 29 June 2020. A further review of the OEMP occurred in 2023 to include management and use of tyre chips.

			The CEMP was updated in response to MOD 13 to include the construction of the CBS and was approved on 24 February 2022, with construction occurring during the reporting period. The CEMP was further updated in response to Modification 15, in 2023.
M2.18	Landfilling of waste is prevented by crushing and recycling old refractory bricks through the kiln.	No waste materials are disposed on site.	
K3.17AB	The site-specific resource recovery exemption for full-scale GBFS use was issued by EPA on 19 September 2012.	The use of GBFS since 2012 has not resulted in an increase in stack emissions (see responses to air quality).	Current management measures for the use of GBFS are achieving desired outcomes.
K3.17AC	Compliance with this condition was detailed in the AEMR for 2013 – the trial was conducted between 14-16 May 2012 with stack testing on 15 May, the use of quality controlled GBFS and provision of a report on 13 July 2013.	The use of GBFS since 2012 has not resulted in an increase in stack emissions (see responses to air quality).	Current management measures for the use of GBFS are achieving desired outcomes.
K3.17AD	Compliance with this condition was detailed in the AEMR for 2013 – the verification report was provided on 13 July 2013 which reported that there were no stack contributions from the GBFS, coal use decreased and CO_2/CO emissions decreased.	The use of GBFS since 2012 has not resulted in an increase in stack emissions (see responses to air quality).	Current management measures for the use of GBFS are achieving desired outcomes.
K3.17AE	Compliance with this condition was detailed in the AEMR for 2013 – the Secretary	Boral has been using less GBFS than the approved rate of 150,000 tonnes per annum.	Current management measures for the use of GBFS are achieving desired outcomes.

	approved the ongoing use of GBFS in a letter dated 7 September 2012.		
K3.17B	No AKF1 or other Group A wastes were stored on site during the reporting period.	The Operational Environmental Management Plan was updated in April 2018 in accordance with Condition 6.7 to incorporate measures for management of nonstandard fuels prior to their use at the site (approval letter received from DPE on 21/05/2018).	Boral undertook a review of the OEMP, to reflect the Mod 11 and 12 to the consent and changes to the EPL completed by the EPA on 18 December 2019. These were submitted to the Department on 5 June 2020 and approved on the 29 June 2020. A further review of the OEMP was undertaken in relation to the approval of Modification 15 for the storage of AKF5 (tyre chips).
K3.17C	There has been no generation of wastes from the use of the SWDF non-standard fuels. No wastes can be generated when consumed in the kiln as any ash forms part of the clinker product. Minor spillages near the shed entrance are either swept into the shed or if contaminated with other materials such as aggregates etc this material is swept up and placed into the site skip bins used for other site waste. These skip bins are sent to Resource Co who intern make SWDF to supply to site.	Wastes generated from the use of nonstandard fuels on site will be classified using the NSW EPA's Waste Classification Guidelines in accordance with EPL Condition L4.2.	Wastes generated from the use of nonstandard fuels on site will be classified using the NSW EPA's Waste Classification Guidelines in accordance with EPL Condition L4.2.

Note: (K = Kiln 6, M = Mill 7)

5.7 Non-standard fuels

The non-standard fuels consent requirements for Kiln 6 are in conditions 1.4A to 1.45J as well as 3.20 to 3.28 of Development Consent No. 401-11-2002-i, which are replicated in Table 21 and considered in Table 22. The consent refers to EPL 1698, which provides non-standard fuel requirements in conditions O5, O6.1/2/3/4/5/6/7/8/9/11 and 12 and E4.

In August 2018 Boral Cement commenced the use of Solid Waste Derived Fuels (SWDF) including Wood Waste (WW) and Refuse Derived Fuels (RDF). As per condition 3.25 a Proof of Performance Trial was undertaken with the six month report submitted to the Department for approval on 28 February 2018.

On the 23 April 2019 the Secretary approved the ongoing use of SWDF subject to:

a) limiting the amount of SWDF to be fired in Kiln 6 to 40%, as a percentage of total fuel,
b) periodic stack testing being undertaken every three months for the first 12 months of use of SWDF. The monitored pollutants must be consistent with the requirements of the Environment Protection Licence (EPL 1698)
c) provision of a monitoring report that outlines the results of the quarterly stack testing required in (b) above and provides an assessment of compliance against the air emissions limits for the facility, to the satisfaction of the Secretary
d) periodic measurements of hydrogen chloride (HCl) taken every three months until such time the Secretary agrees the accuracy of the HCl CEMS is confirmed through successful calibration audits undertaken in accordance with the USEPA Performance Specification 18.

The EPA updated the licence to reflect these changes in December 2019.

On the 16 November 2018 Boral sought approval from the Department to store up to 17 500t of carbon anode material (Hi Cal 50), sourced from the former Hydro Aluminium Kurri Kurri smelter for a period of 36 months. The Department reviewed the request and the additional information provided in consultation with the EPA and on 4 April 2019 confirmed approval of:

- the 'Hi Cal 50 Storage and Handling Procedure', Version 3 dated 27 March 2019 and
- the 'Hi Cal 50 (Carbon anode ex-Hydro Kurri Kurri) Recovered Resource Specification Version 3 dated 27 March 2019

During the 2019/20 reporting period (October 2019) MOD 11 was approved to permit the use of Hi Cal 50 during start up conditions. The site consumed 2951t of Hi Cal during the 2021/22 reporting period.

During the 2022/23reporting period, Modification 15 was approved for the construction and operation of AKF5 storage and feed infrastructure. Construction and operation commenced in the current reporting period.

In November 2023 Modification 14 was approved for the increase of volume of SWDF received and used as a non standard fuel in Kiln 6 and with 24/7 delivery of SWDF, via the construction of a new site access road and associated additional SWDF storage.

During the reporting period SWDF usage increased slightly going from 54 396t to 64 815t.

As per Condition 4.6, an annual audit on non-standard fuels was undertaken by Robert Byrnes of International Environmental Consultants covering the period of 30th September 22 to 1st October 2032. The audit found "*that each of the current three SWDF suppliers comply with the approved QA/QC system. Each supplier understands the requirements of the QA/QC system and the need to maintain a consistent product which meets the required specification. Boral's cross checking of SWDF quality using the same laboratory provides sufficient verification "*.

The audit recommended that:…

- as there is a considerable delay in receiving the results from the laboratory, consideration should be given to ensuring that results are provided in a timely manner to allow corrective

actions to occur quickly. Although the turnaround time has reduced it is recommended that the time be reduced further.

- Boral should continue the analysis of NSF delivered by each supplier and provide regular feedback on performance.
- Transport operators should be encouraged to stagger deliveries to the cement plant to avoid congestion when unloading at the NSF shed.

Efficiencies in lab turnarounds and management of truck movements are being reviewed.

Table 21: Non-standard fuels conditions

<table>
<tr><th>Number</th><th>Condition</th></tr>
<tr><td>K1.4A Use of non standard fuels</td><td>Subject to meeting the requirements of this consent, and the requirements of a licence issued under the Protection of the Environment Operations Act 1997 for the site, the following fuels are permitted to be received at the site for use at the upgraded Kiln 6 development at the quantities, firing rates and proportions specified in Table 1.

Table 1 – Permitted Fuels for use in upgraded Kiln 6
<table><tr><th>Fuel</th><th>Category</th><th colspan="2">Tonnes per annum</th></tr><tr><td>Natural Gas, Fuel Oil, Diesel</td><td>Standard Fuel</td><td colspan="2">No limits</td></tr><tr><td>Coal</td><td>Standard Fuel</td><td colspan="2">No Limit</td></tr><tr><td>Coke Fines</td><td>Standard Fuel</td><td colspan="2">No Limit</td></tr><tr><td>Hi Cal 50</td><td>Non-Standard Fuel</td><td colspan="2">10,000</td></tr><tr><td>AKF1</td><td>Non-Standard Fuel</td><td colspan="2">20,000</td></tr><tr><td>AKF5</td><td>Non-Standard Fuel</td><td colspan="2">30,000</td></tr><tr><td>Wood Waste</td><td>Non-Standard Fuel</td><td>100,000</td><td rowspan="2">≤ 250,000 combined</td></tr><tr><td>RDF</td><td>Non-Standard Fuel</td><td>200,000</td></tr><tr><td>Woodchips</td><td>Standard Fuel</td><td colspan="2">150,000</td></tr></table>
Note: The consent, as modified, permits only the use of the fuels listed above at the specified quantities. The use of any additional fuels would be the subject of appropriate assessment and determination under the Act. This consent, as modified, does NOT approve the establishment of a protocol for general use of Non-Standard Fuels.</td></tr>
<tr><td>K1.4AA</td><td>Notwithstanding condition 1.4A of this consent, the Applicant must not receive any woodchips at the site for any purpose until:

a) the new site access road approved under MOD 14 is constructed and operational; and

b) the Applicant has notified the Planning Secretary in writing via the NSW Planning Portal that the site access road has been constructed in accordance with the consent and is operational; and

c) the Planning Secretary has indicated in writing that it is satisfied the site access road has been constructed in accordance with the consent and is operational.</td></tr>
</table>

K1.4AB	Notwithstanding condition 1.4A of this consent, the Applicant must: a) limit the combined annual usage of SWDF to no more than 50% of total fuel mass until appropriate Proof of Performance Trials are undertaken to the satisfaction of the EPA and the Planning Secretary for each 10% incremental increase in SWDF usage above 50%; and b) not co-fire non-standard fuels permitted by condition 1.4A of this consent unless compliance with the air emission limits on the EPL has been demonstrated for that combination of fuel types through a Proof of Performance Trial to the satisfaction of the EPA and the Planning Secretary.
K1.4B	AKF5 is approved for use at the development under this consent subject to the necessary approvals under the Act being obtained for storage facilities and kiln feeding infrastructure. Use of AKF5 at the development must be carried out in compliance with the following No AKF5 is permitted to be received at the site until the necessary storage facilities and kiln feeding infrastructure have been constructed in accordance with any such approvals. Storage of AKF5 must be in accordance with Fire & Rescue NSW (Fire Safety Branch) Guidelines for Bulk Storage of Rubber Tyres. If the Applicant proposes to exceed the stockpile sizes and heights within the above Guidelines, the Applicant must obtain written approval from Fire and Rescue NSW, to the satisfaction of the Secretary. Any AKF5 stored outside or in storage bunkers mut be roofed to exclude rainwater
K1.4BA	Notwithstanding condition 1.4B of this consent, the Applicant must undertake an air emissions stack test within three months of the commencement of use of AKF5 as a fuel in Kiln 6, or as otherwise agreed to by the Planning Secretary. The Applicant must: a) carry out the air emissions stack test to the satisfaction of the Planning Secretary; b) undertake the air emissions stack test at a high feed rate of 4.5 tonnes per hour of AKF5, or as otherwise approved by the EPA; c) engage a suitably qualified and experienced person(s) to carry out the air emissions stack test; d) notify the Planning Secretary and EPA prior to the commencement of the air emissions stack test; and e) report the outcomes of the trial and stack test to the Planning Secretary and the EPA within one month of the conclusion of the test period, unless otherwise agreed by the Planning Secretary.
K1.4BB	The air emissions stack test report required by condition 1.4BA must include the following information: a) the dates and times when the air emissions stack test was carried out;

	b) the rates of feed of AKF5 during the air emissions stack test; c) the results of the air emissions stack test, including identification of any non-compliance with the conditions of this consent and the EPL; and d) details of additional measures to be implemented to address any non-compliance
K1.4C	Hi Cal 50 and AKF1 are approved for use at the development under this consent subject to the detailed design for any necessary storage facilities and kiln feeding infrastructure being approved to the Secretary. In particular, the detailed design shall: a) demonstrate that the storage facilities would be appropriately bunded in accordance with the relevant Australian Standards, especially Australian Standard AS1940-2004 (for AKF1, this would include having a minimum capacity sufficient to accommodate catastrophic failure of the tank and that adequate measures are in place to ensure a catastrophic failure of a tanker during transfer was adequately contained to ensure no off-site discharge; b) include appropriate measures to ensure liquids draining from the bund (and other containment areas) are kept separate and adequately treated prior to discharge to the onsite stormwater management system, and demonstrate that these measures were developed in consultation with the Sydney Catchment Authority and Wingecarribee Shire Council; and c) include a Fire Safety Study prepared in accordance with the Department's guideline Hazardous Industry Planning Advisory Paper No. 2: Fire Safety Study and in consultation with Fire and Rescue NSW. A construction certificate must not be issued in relation to any necessary storage facilities and kiln feeding infrastructure until the Secretary has approved the detailed design parameters. No Hi Cal 50 or AKF1 is permitted to be received at the site under this consent until any necessary storage facilities and kiln feeding infrastructure have been constructed in accordance with the detailed design parameters approved by the Secretary.

K1.4CA	Notwithstanding condition 1.4C of this consent, the Applicant is permitted to undertake a single trial of chipped tyres in the development, ahead of the construction of storage facilities and kiln feeding infrastructure for AKF5, provided that the trial meets the following requirements: a) no more than 205 tonnes of 2” chipped tyres is to be received at the site for the trial; b) the trial shall be conducted over no more than six months from the date of first receipt of the trial materials, after which any remaining trial materials shall be removed from the site to a facility lawfully permitted to accept the materials; c) the trial shall be undertaken for the purpose of investigating design and operational aspects of the full-scale use of AKF5; d) the trial shall be undertaken in full compliance with the environmental performance standards stipulated in this consent, and the requirements of the Environmental Protection Licence for the site; e) the Applicant shall consult with and meet the requirements of the EPA with respect to undertaking the trial, and shall not commence the trial without the prior written approval of the EPA; f) trial materials shall be stored in an area that is sealed, or otherwise treated to the satisfaction of the Secretary, and away from all potential ignition sources; g) the Applicant shall notify Fire and Rescue NSW prior to the receipt of trial materials on the site, and address any requirements with respect to the safe storage of the trial materials; h) the Applicant shall notify the Secretary, the EPA and the Community Liaison Group prior to the commencement of the trial; and i) the Applicant shall report the status and outcomes of the trial to the Secretary and the EPA on a monthly basis from the date that trial materials are first received on the site until conclusion of the trial.
K1.4D	Only Standard Fuels and the Group 1 Non-Standard Fuel, Hi Cal 50, are permitted to be used at the development during start-up and shut-down.
K1.4E	Non-Standard Fuels are not permitted to be stored at the site for longer than 3 months, except with the written permission of the Secretary.

K1.4F	No Non-Standard Fuel is permitted to be received at, or used at the development, unless it complies with: a) the handling, transporting, sampling, analysis and quality control requirements of this consent; b) any requirements of a licence issued under the Protection of the Environment Operations Act 1997 for the site; and c) the fuel specification for that specific fuel.
K1.4G	Prior to the receipt of the first batch of a Group 1 Non-Standard Fuel from a particular supplier, the Applicant shall certify in writing to the Secretary that the supplier has implemented appropriate quality control and quality assurance procedures to ensure the Applicant's responsibilities under this consent can be met. At the request of the Secretary, the Applicant shall forward a copy of the supplier's quality control and quality assurance procedures to the Department demonstrating how those procedures cause the Applicant to meet the requirements of this consent.
K1.4H	Prior to the receipt of the first batch of a Group 2 Non-Standard Fuel from a particular supplier, the Applicant shall certify in writing to the Secretary that the supplier has met the pre-qualification requirements set out in the approved Quality Assurance and Control Procedure for Receipt and NSW Government Department of Planning and Environment 8 Use of Solid Waste Derived Fuels (Appendix 1 of this consent) and that the Applicant's responsibilities under this consent can be met. At the request of the Secretary, the Applicant shall forward a copy of the supplier's quality control and quality assurance procedures to the Department demonstrating how those procedures cause the Applicant to meet the requirements of this consent.
K1.4I	Prior to the receipt of the first batch of SWDF the Applicant shall develop and submit operational procedures for co-firing SWDF to ensure that the temperature of gas generated in the process is raised to a minimum temperature of 8500C for a minimum of two seconds. Operational procedures must include interlocks in the process control system.
K1.4J	Hi Cal 50 must only be used in Kiln 6 when blended with coal to create a homogenous blend. The concentration of Hi Cal 50 in the blend must not exceed 4%.
K3.20 Non-Standard Fuel Specifications	For each Group 1 or Group 2 Non-Standard Fuel approved for use at the development the Applicant shall provide a fuel specification, to be approved by the Secretary and the EPA prior to the use of that Non-Standard Fuel at the development under this consent. The Non-Standard Fuel specification shall include, but not be limited to, the minimum calorific value and the maximum quantity of all relevant pollutants, particularly the listed pollutants.
K3.21	Based on the Non-Standard Fuel specification specified in condition 3.20 the following Non-Standard Fuel specification criteria are required to be met:

	a) deleted MOD-109-9-2006-i; b) for Hi CAL 50 a mercury specification no greater than 1 mg/kg and a cadmium specification no greater than 10 mg/kg; c) for AKF1 a mercury specification no greater than 2 mg/kg and a cadmium specification no greater than 5 mg/kg; d) organohalogen compounds, expressed as chlorine, in any Non-Standard Fuel not to exceed 1% by weight; and e) the waste materials to be used as Non-Standard Fuels must not be diluted or blended to meet any of the fuel specification requirements.
K3.22 Non-Standard Fuels Pollution Tracking	Prior to the use of any Group 1 or Group 2 Non-Standard Fuels at the development in accordance with this consent, the Applicant shall implement a Tracking Program that meets the requirements of the Secretary. The Tracking Program shall include, but not be limited to, the identification and recording of the following information in accordance with the time periods specified in condition 3.23: a) batch analyses of Non-Standard Fuels received at the development as provided by the suppliers, and the results of any check analyses carried out by the Applicant as part of the quality control management procedures required under condition 6.7 and condition 6.8 of this consent; NSW Government Department of Planning and Environment 13 b) a mass inventory of each listed pollutant entering the process in raw materials, conventional fuels and Non-Standard Fuels, with particular attention to, but not limited to chlorine, mercury, cadmium and chromium; c) emission factors for each listed pollutant calculated from inputs, outputs, and measured air emissions, variance in the emissions factors from period to period and an assessment with regards to the reasons for any such variance; and d) any adjustments that may be necessary to Non-Standard Fuel specifications arising from the Tracking Program analysis.
K3.23	The Applicant shall submit a Report that details and assesses the results of the Tracking Program prescribed in condition 3.22 of this consent to the Secretary. The Report shall be submitted to the Secretary: a) every three months in the first year of operation using Non-Standard Fuels under this consent, (to be synchronised with stack monitoring); and b) thereafter every six months, or as otherwise agreed to by the Secretary.
K3.24 Process Parameters	The Applicant shall cease to burn Non-Standard Fuels in Kiln 6 if: a) the temperature is below 8500C in the zone where Non-Standard Fuels are fired or in the vicinity of the pre-calciner; or

	b) the temperature is below 3000C at the outlet of the preheater strings.
K3.24A	The temperature requirement of Condition 3.24(b) does not apply to the Group 1 Non-Standard Fuel Hi Cal 50, when Hi Cal 50 is blended with coal in accordance with the requirements of condition 1.4J.
K3.24B	Notwithstanding Condition 3.24A, the feed rate of the Group 1 Non-Standard Fuel, Hi Cal 50, must not exceed 400kg/hr when the temperature is below 300^0C at the outlet of the preheater strings.
K3.25	The Applicant must undertake PoP trials for the burning of SWDF. The maximum length of the trial will be eight months. At least one month prior to the PoP trials, the Applicant shall submit a detailed plan(s) for the PoP trials, to the satisfaction of the Secretary. The plan(s) must be prepared for the co-incineration of each permitted SWDF and be prepared in consultation with the EPA. The plan(s) must, as a minimum: a) verify the residence time, the minimum temperature and the oxygen content of the exhaust gas which will be achieved during normal operation and under the most unfavourable operating condition anticipated; b) establish all criteria for operation, control and management of the abatement equipment to ensure compliance with the emission limit values specified in the EPL; c) assess the performance of any monitors on the abatement system and establish a maintenance and calibration program for each monitor; d) establish criteria for the control of all alternative fuel input including the maximum flow and maximum calorific value; e) confirm that all measurement equipment of devices (including thermocouples) used for the purpose of establishing compliance with this approval have been subjected, in situ, to normal operating temperatures to prove their operation under such conditions; f) detail procedures for testing the performance of all major process components and emission control systems associated with the processing and burning of SWDF; and g) address all relevant requirements of the EPL for the project.
K3.26	The PoP trials shall: a) be carried out in accordance with a detailed PoP plan(s) approved by the Secretary; b) be undertaken by a suitably qualified and experienced person(s);

	c) test performance of all major process components including emission control systems using no SWDF, and representative fuels containing SWDF designed to cover the range of materials and compositions of SWDF; d) identify changes to the Kiln 6 emission control system that may be necessary to achieve compliance with the consent and the EPL; and e) demonstrate compliance with the relevant requirements of the EPL, development consent and relevant environmental and safety criteria.
K3.27	The Applicant is to report on each PoP trial to the Secretary and EPA. The reports shall be submitted at: a) monthly intervals during the PoP trial. The information to be contained in these reports is to be determined in consultation with the EPA as part of the PoP Trial Plan required under condition 3.25; and b) six months after the commencement of the PoP trial. The six month report shall contain but not be limited to the following information: i. the total quantity of SWDF used during the previous six months; ii. the dates and times when the trial commenced and will conclude; iii. the results of stack emissions testing for the analytes and properties specified in any relevant trial plan and baseline emissions for comparison, where applicable; iv. all monitoring data collected for the project during the previous six months; v. identification of any non-compliance with the conditions of this consent and the EPL; vi. details of additional measures to be implemented to address any non-compliance; and vii. an assessment of the suitability of the SWDF for ongoing use. Copies of the POP Trial Reports shall be made available to the public upon request.
K3.28	Use of SWDF is not permitted (outside of the approved PoP trials) until such time as the Secretary has indicated in writing that it is satisfied with the results of the six month PoP trial report specified under condition 3.27 b) for an individual SWDF.

K7.3A	In each Annual Management Report submitted after the First Year Monitoring and Modelling Assessment Report required in accordance with condition 7.6 has been submitted, the applicant shall include details of the use of all Non-Standard fuels at the development including but not limited to: a) the nature, quantity and quality of Non-Standard Fuels used at the development b) details of any fuels that did not meed the Fuel Specification, including the source of the fuels and how the rejected fuels were managed or disposed of; c) a review of the results of the Non-Standard Fuels Tracking Program and Non-Standard Fuels Quality Control Management Procedures; and d) the results of all monitoring undertaken in accordance with the requirements of this consent and an assessment of these monitoring results, including comparison of stack emissions against the concentration limits set in condition 3.10.
K7.6	One year after the commencement of the use of Non-Standard Fuels in accordance with this consent, the Applicant shall prepare a First-Year Monitoring and Modelling Assessment Report. The Report shall be submitted to the Secretary, the NSW Department of Health and the EPA not more than 15 months after the commencement of the use of Non-Standard Fuels in accordance with this consent.

Note: (K = Kiln 6, M = Mill 7)

Table 22: Response to non-standard fuels conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K1.4A	The majority of fuel consumed was coal. Small amounts of diesel are used during kiln start-ups. The site commenced the use of SWDF's in August 2018 and continued during the reporting period.	SWDF are now in use. Usage has increase from 21 809t in 2018/19 28 997t in 2019/20 34 767t in 2020/21 34 654t in 2021/22 54 396t in 2022/23 64 815t in 2023/24	Boral undertook a review of the OEMP, to reflect the Mod 11 and 12 to the consent and changes to the EPL completed by the EPA on 18 December 2019. These were submitted to the Department on 5 June 2020 and approved on the 29 June 2020. A further review of the OEMP was undertaken in relation to the approval of Mod 15. Tonnages of SWDF are tracked and managed.
K1.4AA	No woodchip has bee received as the new road has yet to be constructed.	NA	Requirements of Mod 14 to be met prior to the receival of woodchip.
K1.4AB	SWDF currently limited to <50%	PoP trials to be undertaken should increase above 50% be required. Tests will be undertaken for every 10% increase.	PoP trials to be undertaken should increase above 50% be required. Tests will be undertaken for every 10% increase.
K1.4B	Storage facilities for AKF5 were approved and constructed in 2023 with the use of tyre chips commencing in September 2023. Stockpile sizes and heights have not exceeded the guideline requirements. Storage is in accordance with the FR NSW requirements and are roofed. All documents as required were approved.	Ongoing management of tyre chips receival and storage facilities.	OEMP was updated and approved by DPE in line with mod 15 requirements. Management systems in place to track tonnages brought to site to ensure compliance with stock piling requirements.

K1.4BA	Use of tyre chips commenced in September 2023 with Stack emission testing undertaken in late November 2023. The report once received was submitted to the DPE.	Emission report found no changes in emission parameters in relation to the usage of tyre chips as an alternative fuel.	6 monthly stack emission testing to be undertaken as per current monitoring plan.
K1.4BB	as above	As above	as above
K1.4C	Compliance was confirmed in the 2007-2008 AEMR.	The site recommenced the use of HiCal50 in 2020/21	
K1.4CA	Boral commenced tyre chip trial in January 2022.	Trials are one-off events that do not display reportable trends.	The trial completed, with Modification 15 approved for the installation and operation of a Tyre Chip Storage area..
K1.4D	No non-standard fuels, apart from the approved HiCal 50, were used during start-up or shut-down conditions.	Apart from HiCal 50, SWDF are currently the only non-standard fuels in use. These are fed into the Calciner and are easily removed during start-up and shut down conditions	Modification 11 was approved on 25 October 2020 which permits the use of HiCal50 when blended with coal at 4% HiCal 50 to 96% coal during start-up and shut down conditions.
K1.4E	Written approval from the Secretary received (4/4/2019) to store up to 17 500t of HiCal 50.	NA	Manage as per approved HiCal50 Storage and Handling Procedure and Hi Cal 50 Recovered Resource Specification.
K1.4F	All non-standard fuels received and used at site are tested to ensure compliance with approved specifications.		Continue use of standard operating procedure and quality controls that are already in place. Continue Annual independent audit of suppliers.
K1.4G	Boral provided and had approved from the Secretary their own procedures for the Group 1 HiCal 50 Specification and Storage procedures as Boral are processing and testing for supply.	NA	NA

K1.4H	Boral provided in writing to the Secretary advice on an existing suppliers change in ownership and that the new owners had implemented appropriate quality control and quality assurance procedures with correspondence from DPIE acknowledging receipt of review.		Boral will continue to review suppliers prior to the receipt of the first batch SWDFs from a particular supplier.
K1.4I	Operational procedures were submitted as part of the PoPT plan process.		
K1.4J	HiCal will be blended within the coal blending plant when in use.		
K3.20	HiCal50 specification was approved on 4/4/2019. PoPT for SWDF including specification approved 28/8/2018.		
K3.21	All non-standard fuels have met the specified non-standard fuel specifications.	Laboratory results received and reviewed on a regular basis with a process in place where materials are assessed prior to being received if out of specification.	Annual audit to continue to review specification data, with ongoing testing and review in place with regular supplier feedback.
K3.22	The Non-Standard Fuels pollutant tracking procedure (SP10-01-10 Non-Standard Fuels Pollutant Tracking Procedure) was issued on 1 March 2003 and a copy was provided to DP&E by email on 2 March 2003. The procedure addresses all requirements of Condition 3.22.		
K3.23	The first Tracking Program report was submitted within two weeks of the first quarterly stack test post PoPT trial approval then every six months following receipt of stack test results.	Six monthly reports continue to be prepared and have been provided.	Reports will continue to be prepared as per the Conditions and supplied to the DPE.

K3.24	This is complied with.	NA	Online system in place and independent audit assesses performance.
K3.25	PoPT plan was approved in consultation with the EPA		
K3.26	The PoPT was approved by the DPE 28/8/2018	PoPT originally was completed during the 2019/20 reporting period.	Further PoPT undertaken increasing to 50%.
K3.27	All PoPT monthly reports and the six monthly report were submitted to the Secretary and the EPA. The reports are available on request.	The PoPT six month report was accepted and approved by the DPE with continual use (with conditions limiting to 40%) of SWDF approved by the Secretary on 23/4/2019.	On 8 October 2021 Boral met with the EPA, including representatives of their air branch to discuss the POPTs. Three PoPT were completed. The submission of the PoPTs was provided on 31 March 2022 and a response to a RfI was provided on 12 May 2022. Further PoPT was completed in June/July 2022 to enable the finalisation of the request to 50%. This has been approved by the DPE, with an EPL licence variation pending.
K3.28	The continual use of SWDF was approved by the Secretary on 23/4/2019.		
K3.24B	HiCal is used at the approved rate.		
K7.3A	SWDFs were in use during the reporting period. This material came from the four approved suppliers. Two Wood Waste, one Refuse Derived Fuel and one tyre chip approved suppliers . A total of 64 185t was used during the reporting period. Weekly meetings are held with suppliers to provide updates on operational demands and to review quality and the contracted		

	specifications. All material met the consented specification during the reporting year. . An independent 3rd party audit was undertaken on QC management procedures of all suppliers in April 2024, with no non-compliances raised. Figure 8 under section 5.3 summarises stack emission test results against the licence limits. All stack tests undertaken during 2023/24 were compliant with licence limits.		
K7.6	A first year assessment report was submitted in November 2019 to the DPIE.		

Note: (K = Kiln 6, M = Mill 7)

5.8 Visual amenity

The visual amenity consent requirements for Kiln 6 are in conditions 3.18 to 3.19A of Development Consent No. 401-11-2002-i and for Mill 7 in Condition 2.19 of Development Consent No. 85-4-2005-i, which are replicated in Table 23.

Compliance with the construction requirements of the second Kiln 6 pre-heat tower was demonstrated in previous AEMRs. It is demonstrated in Table 24 that the community has not historically lodged complaints about the visual amenity of the site and this continues for the current reporting period.

Table 23: Visual amenity conditions

Number	Condition
K3.18 Visual Amenity Impacts	The Applicant shall ensure that all external lighting associated with the cement works upgrade, and including those lights already erected, is mounted, screened, and directed in such a manner so as not to create a nuisance to surrounding properties or roadways. The lighting shall be the minimum level of illumination necessary and shall comply with AS 4282(INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.
K3.19	The second pre-heater tower shall be designed, constructed, operated and maintained in a manner that minimises the visual impact to surrounding properties and roadways. Note: The second pre-heater tower shall be built in a manner consistent with that described in the additional information provided (identified in condition 1.2 f)). This includes using the building materials identified and minimising the height of the pre-heater tower.
K3.19A	Operational stockpiling of RDF in the external bale material storage area (identified on Drawing No.GE-B-2278-01 Revision DP, dated 15 January 2015) is limited to periods of extended kiln downtime for maintenance or repair only. RDF for stockpiling must be delivered in plastic wrapped 1 cubic metre bales. Stockpiles must not exceed a maximum height of five metres.
M2.19 Visual Amenity	Impacts The Applicant shall ensure that all external lighting associated with the cement works upgrade, and including those lights already erected, is mounted, screened, and directed in such a manner so as not to create a nuisance to surrounding properties or roadways. The lighting shall be the minimum level of illumination necessary and shall comply with AS 4282(INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.

Note: (K = Kiln 6, M = Mill 7)

Table 24: Response to visual amenity conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K3.18 Visual Amenity Impacts	Provision of lighting at the Berrima Cement Works complies with AS 4282(INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.	No community complaints regarding light spill have been received during the reporting period – the community has not previously complained about light spill from the site.	A minimum amount of lights must be on during nigh time for safety, however, management measures are implemented to prevent significant light spill from the site.
K3.19	Compliance with this condition has been confirmed previously.	No community complaints regarding light spill have been received during the reporting period – the community has not previously complained about light spill from the site.	Planting of trees for visual screening is effectively shielding the tower from sensitive receivers – this screening will become more effective as plantings mature.
K3.19A	Managed by the site EMP	No community complaints were received in relation to stockpiling	N/A
M2.19 Visual Amenity	Provision of lighting at the Berrima Cement Works complies with AS 4282(INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.	No community complaints regarding light spill have been received during the reporting period – the community has not previously complained about light spill from the site.	A minimum amount of lights must be on during nigh time for safety, however, management measures are implemented to prevent significant light spill from the site.

Note: (K = Kiln 6, M = Mill 7)

5.9 Rehabilitation

The Guideline requirement for reporting on rehabilitation activities focuses on mining, however, Development Consent No. 401-11-2002-i and Development Consent No. 85-4-2005-i relate to activities in a cement production facility. Areas disturbed during construction of the SWDF facility are being rehabilitated in accordance with *Construction Environmental Management Plan – Solid Waste Derived Fuels Project* (Boral 2017).

5.10 Community

The community relations conditions for Kiln 6 are in conditions 5.1 to 5.5 of Development Consent No. 401-11-2002-i and in conditions 4.1 to 4.3 of Development Consent No. 85-4-2005-i for Mill 7 (Table 25). Performance for both consents are reported under the conditions for Kiln 6 in Table 26 because the conditions are the largely the same in both consents.

16 community complaints were received during the reporting period, with 4 of the complaints coming via the EPA with the remainder, made directly through to the site. The complaints were related to dust generation and deposition. These were addressed individually with each complainant or the EPA.

The Community Liaison Group (CLG) was re-established during the 2019/20 reporting period with the members endorsed by the DPIE on 30 August 2019.

Two CLG meetings were held during the reporting period on 14 July 2023 and 14 November 23. No whole of community meeting was held during the reporting period.

Details of these meetings are held on the (**www.boral.com.au/berrimacement**) website.

Table 25: Community conditions

Number	Condition
K5.1	Subject to confidentiality, the Applicant shall make all documents required under this consent available for public inspection upon request. This shall include provision of all documents at the site for inspection by visitors, and in an appropriate electronic format on the Applicant's internet site, should one exist.
K5.2	Prior to the commencement of construction for the cement works upgrade, the Applicant shall ensure that the following are available for community complaints for the life of the cement works upgrade (including construction and operation): a) a telephone number on which complaints about operations on the site may be registered; b) a postal address to which written complaints may be sent; and c) an email address to which electronic complaints may be transmitted, should the Applicant have email capabilities. The telephone number, the postal address and the email address shall be displayed on a sign near the entrance to the site, in a position that is clearly visible to the public. These details shall also be provided on the Applicant's internet site, should one exist.
K5.3	The Applicant shall record details of all complaints received through the means listed under condition 5.2 of this consent in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to: a) the date and time, where relevant, of the complaint; b) the means by which the complaint was made (telephone, mail or email); c) any personal details of the complainant that were provided, or if no details were provided, a note to that effect; d) the nature of the complaint; e) any action(s) taken by the Applicant in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the Applicant in relation to the complaint, the reason(s) why no action was taken. The Complaints Register shall be made available for inspection by the EPA or the Secretary upon request.
K5.4	Prior to the use of Non-Standard Fuels at the development the Applicant shall establish a Community Liaison Group that has access to all environmental management plans and monitoring data, environmental reporting and tracking and audit reports required by this consent. The Group shall: a) be comprised of the following, whose appointment has been approved by the Secretary: i) 1 or 2 representatives from the Applicant, including the person responsible for environmental management at the development; ii) 1 representative from Council; and iii) 3 or 4 representatives from the local community. b) be chaired by a representative agreed to by the Group and approved by the Secretary; c) meet a minimum of once in every 6 month period; and d) review and provide advice on the environmental performance of

	the development, including providing comment where necessary on any environmental management plans, monitoring results, audit reports, or complaints.
K5.5	The Applicant shall at its own expense: a) ensure that 1 or 2 of its representatives attend the Group's meetings; b) provide the Group with regular information on the environmental management and performance of the development; c) provide access to independent scientific/technical support to assist member in understanding and interpreting information provided, if requested; d) provide meeting facilities for the Group, where necessary; e) arrange site inspections for the Group, if requested; f) take minutes of the Group's meetings and make these minutes available to the public for inspection within 14 days of the Group meeting, or as agreed to by the Group; g) respond to any advice or recommendations the Group may have in relation to the environmental management or performance of the development; and h) maintain a record and a copy of the minutes of each Group meeting, and any responses to the Group's recommendations, to be provided to the Secretary upon request. Note: The above condition's also cover all elements of conditions 4.1 to 4.3 of the conditions set out for the development on Cement Mills 7.

Note: (K = Kiln 6, M = Mill 7)

Table 26: Response to community conditions

Condition / EIS prediction	Performance during reporting period	Trend / management implications	Implemented / proposed management actions
K5.1	Development Consent No. 401-11-2002-i, Development Consent No. 85-4-2005-i and EPL 1698 are available for inspection on request at the Berrima Cement Works. Current environmental monitoring data under the EPL is available at https://www.boral.com.au/our-commitment/environmental-reporting The site's environmental management plans and some previous AEMRs are available at (**www.boral.com.au/berrimacement**)	Boral historically and continues to make information available on request at the site and on the site's website.	Boral will continue to make information available on request at the site and on the site's website.
K5.2	Berrima Cement Plant's complaints procedures are documented in the operational environmental management plan and subordinate plans. Contact details for Boral Cement Berrima are included on all site entrance signage, and include a telephone number, postal address and email address. Additionally, contact details are provided on the website (**www.boral.com.au/berrimacement**)	Boral historically and continues to provide contact information on signs and on the site's website.	Boral will continue to make information available on request at the site and on the site's website.
K5.3	Berrima Cement Plant's complaints procedures are documented in the Operation Environmental Management Plan and subordinate plans. A summary of all complaints (by type) received during this reporting period of 1/05/2023 – 30/04/2023 is provided in Appendix 2. There were 16 complaints, each of which related to dust.	The number of complaints has increased for this reporting period.	Boral will continue to implement the Operational Environmental Management Plan to prevent nuisance impacts on neighbouring properties and implement the real-time dust monitor.

K5.4	The community liaison committee (CLC) was originally established in April 2004. Since 2010, the CLC was converted to public meetings, including invitations to the CLC members, as, at the time the CLC format proved unsuccessful in communicating meeting contents and outcomes to the broader community. In 2019/20 the Community Liaison Group was re-established. In 2023/24 the Community Liaison Group met twice. . Notes of meetings and copies of presentations made at the community meetings are sent to all meeting participants and are displayed in the community section of the Berrima website: (**www.boral.com.au/berrimacement**)	The aim is for the CLG to meet 6 monthly and there will be one whole of community meeting held annually, as required	The CLG met twice during the reporting period.
K5.5	The Berrima Cement Management Team is represented by the Site Operations Manager and the Environmental Sustainability Manager, together with Boral's Stakeholder Relations Manager - Southern Region (NSW/VIC/TAS/SA), and a representative from Boral Cement's Group Engineering Team. Minutes from the CLG meetings have been posted on the website.	Boral has historically, and will continue to, respond to requests from CLG members and post the meeting minutes on the website.	Boral will continue to respond to requests from CLG members and post the meeting minutes on the website.

Note: (K = Kiln 6, M = Mill 7)

6 Independent Audit

Condition 4.5 of the Kiln 6 development consent and Condition 3.3 of Cement Mill 7 development consent require Boral Cement to undertake an independent audit of the site once every three years. Both conditions are nearly identical and the audit is undertaken as a single operation. Condition 4.5 of the Kiln 6 development consent states:

Within three years of the commencement of operation of the cement works upgrade, and every three years thereafter or as otherwise required by the Director-General, the Applicant shall commission an independent person or team to undertake an Environmental Audit of the cement works upgrade. The independent person or team shall be approved by the Director-General, prior to the commencement of the Audit. An Environmental Audit Report shall be submitted for comment to the Director-General, the EPA and Council, within one month of the completion of the Audit. The Audit shall:

- *be carried out in accordance with ISO 14010 - Guidelines and General Principles for Environmental Auditing and ISO 14011 - Procedures for Environmental Auditing;*
- *assess compliance with the requirements of this consent, and other licences and approvals that apply to the cement works upgrade;*
- *assess the cement works upgrade operations against the predictions made and conclusions drawn in the SEE and other documents listed under conditions 1.2a to 1.2q inclusive; and*
- *review the effectiveness of the environmental management of the cement works upgrade, including any environmental impact mitigation works.*

The Secretary may, having considered any submission made by the EPA and/or Council in response to the Environmental Audit Report, require the Applicant to undertake works to address the findings or recommendations presented in the Report. Any such works shall be completed within such time as the Director-General may agree.

The above wording is replicated in Condition 3.3 of the Mill 7 development consent.

The previous 3 year audit was conducted in November 2020 by Robert Byrnes from International Environmental Consultants.

A subsequent independent audit was commenced in late November 2023 in line with the 3 year period. This audit has included a statistical review of performance data as well as assessment of compliance against conditions of concern. A draft has been issued by the consultant with the final report pending issue.

7 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

There were three non-compliances reported during the reporting period relating to non-compliances with the sites Environmental Protection Licence 1698 conditions.

Details of non-compliances submitted to the EPA are below.

Exceedance of the average 24 hour particulate emission from Kiln 6

A Formal Warning was received from the EPA in response to this incident

Licence condition number not complied with ▼
L3.2 and O2.1
Summary of particulars of the non-compliance ▼
The average 24 hour particulate emission from Kiln 6 (Point 2) exceeded the the daily criteria over 3 different days. Levels were 51.5mg/Nm3, 75.7mg/Nm3 and 63.7mg/Nm3 against a criteria of 50mg/Nm3. EPA notified at time of issue.
Further details on particulars of non-compliance, if required ▼
Number of times occurred ▼
3
Date(s) when the non-compliance occurred, if applicable ▼
10, 12 and 13th July 2023
Cause of non-compliance ▼
Over the week, the Electrostatic precipitator suffered intermittent operational issues associated with voltage across the internal plates.
Action taken or that will be taken to mitigate any adverse effects of the non-compliance ▼
flow rates to the kiln were reduced to manage the particulate levels, with the kiln subsequently being brought offline to allow precipitator and cable repairs.
Action taken or that will be taken to prevent a recurrence of the non-compliance ▼
ESP and associated cabling will be inspected routinely at the annual maintenance shut down to assess any possible issues.

Monitoring frequency (deposition dust gauge) not achieved due to broken bottle

Licence condition number not complied with ▼
M2.1 and M2.2
Summary of particulars of the non-compliance ▼
Monitoring frequency for location 17 (deposition dust bottle 9) requires 12 samples over the reporting period. Only 9 samples were obtained due to vandalism of sample jars and equipment. EPA informed of issue.
Further details on particulars of non-compliance, if required ▼
Number of times occurred ▼
3
Date(s) when the non-compliance occurred, if applicable ▼
December 2023, March 2024 and April 2024
Cause of non-compliance ▼

The dust deposition gauge is located at the front entrance to Berrima Cement and is accessible to the general public. The sample was unable to be obtained for the following reasons... In December 2023 the funnel went missing from the gauge. In March 2024, the bottle was taken. In April 2024, the complete stand and bottle were taken.
Action taken or that will be taken to mitigate any adverse effects of the non-compliance ▼
EPA advised. There are no adverse effects and data is available from the real time monitor in place
Action taken or that will be taken to prevent a recurrence of the non-compliance ▼
A new stand and arrangement with the gauge to be relocated to the vicinity of the real time monitoring within the Berrima Cement premises.

Failure to maintain equipment.

Licence condition number not complied with ▼
O2.1
Summary of particulars of the non-compliance ▼
Intermittent release of steam and limestone dust from the dust collector and failure to notify of the event to the EPA
Further details on particulars of non-compliance, if required ▼
Number of times occurred ▼
5
Date(s) when the non-compliance occurred, if applicable ▼
18 to 19 November 2023
Cause of non-compliance ▼
Following maintenance on raw feed mill baghouse (DC204), the dampeners and valves were de-isolated, however the bag filter purging valve was left isolated due to an employee oversight. The isolated valve within DC204 caused the system to purge. The purging resulted in the intermittent release of a combination of dust and some steam.
Action taken or that will be taken to mitigate any adverse effects of the non-compliance ▼
operation personnel commenced a systematic review of the operations to identify the source of the emission. As it was intermittent, it took some time to identify the issue. Impacts associated with the non compliance were predominantly visual.
Action taken or that will be taken to prevent a recurrence of the non-compliance ▼
A review of the root cause of the issue associated with DC204 has been undertaken. Modifications have been made to the process to ensure the correct deisolation of the operations is undertaken. This has included updates to the maintenance worksheet to ensure a line item to review both sides of the paperwork.
Uploaded Document Name ▼

Boral received a Penalty Notice for the failure to comply with Licence Condition O2 – Maintenance of plant and equipment.

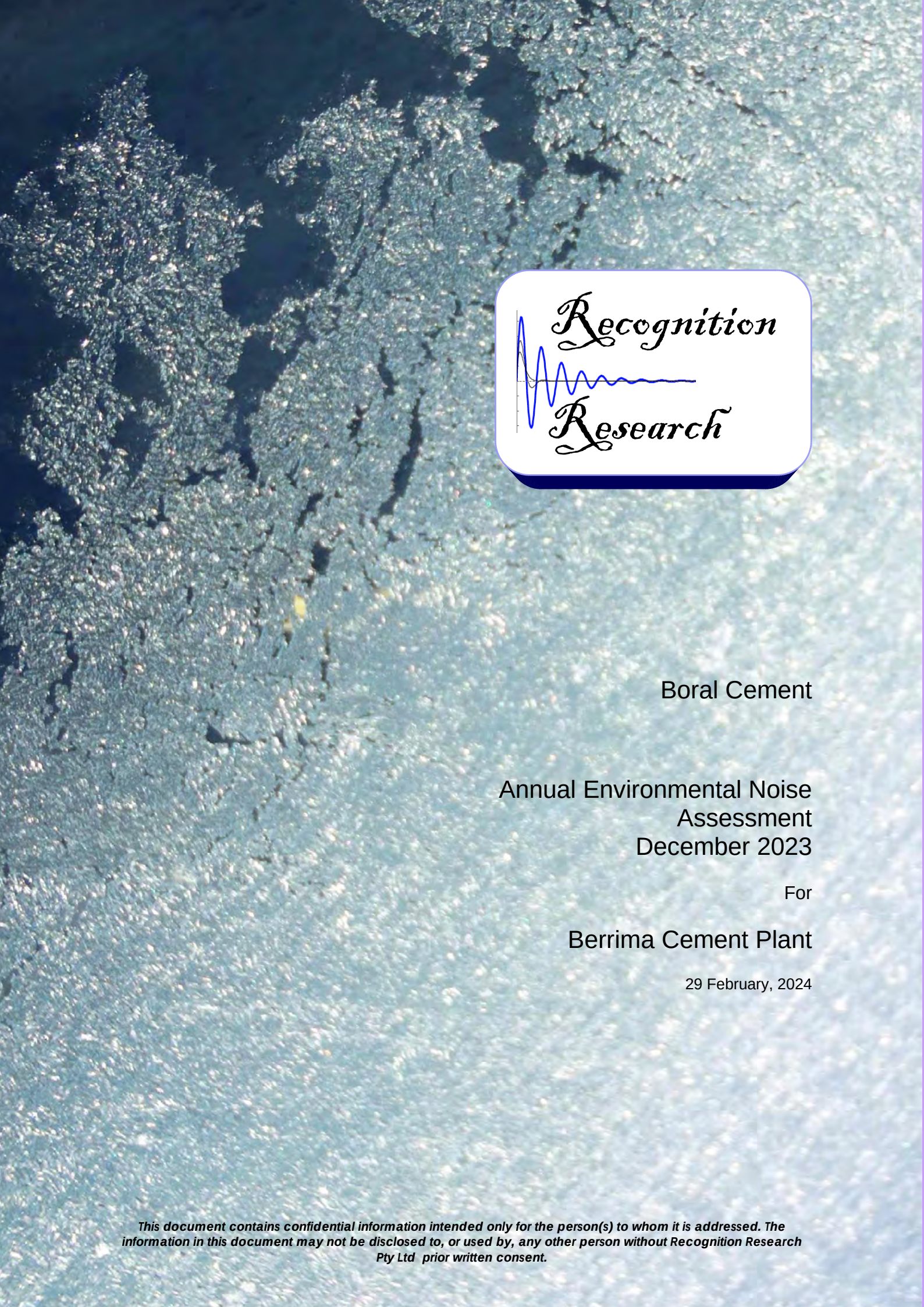
A formal warning was also received from the EPA for failure to notify the EPA of the emissions.

8 ACTIVITIES TO BE COMPLETED DURING THE NEXT REPORTING PERIOD

During the 2024-25 reporting period, in addition to the annual kiln shutdowns, the following projects will be undertaken or be progressed:

- Review and update OEMP in line with Modification 14 approval.
- Implement other Modification 14 approval requirements to allow installation of new road and SWF storage infrastructure, when required.
- Progress installation and operation of real time dust monitoring and alert system.

APPENDIX 1 – ANNUAL ENVIRONMENTAL NOISE ASSESSMENT (SEE ATTACHED)



Recognition Research

Boral Cement

Annual Environmental Noise Assessment December 2023

For

Berrima Cement Plant

29 February, 2024

Recognition Research Pty Ltd
Unit 2 No 5 Thalassa Ave
East Corrimal NSW 2518

ABN: 25 153 946 064
ACN: 153 946 064

Boral Cement Berrima

Annual Environmental Noise Assessment
December 2023

Report of assessment

29 February 2024

RRRep:064

2024.04.15	1	Final Report	Colin Tickell	Stephen Collings		Sharon Makin
2024.02.29	0	Final Draft	Colin Tickell	Stephen Collings		Gabriel Paicu
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
Recognition Research						**Client**

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Disclaimer

This report was prepared Recognition Research Pty Ltd, for the sole and exclusive benefit of Boral Cement (the "Owner") for the purpose of assisting the Owner to assess noise at the owner's site at Berrima Cement works, and may not be provided to, relied upon or used by any third party. Any use of this report by the Owner is subject to the terms and conditions of the agreement provided with the proposal RRPR-062 between Recognition Research and the Owner dated 19 October 2023, including the limitations on liability set out therein.

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This report contains the expression of the professional opinion of Recognition Research, based upon information available at the time of preparation. The quality of the information, conclusions and estimates contained herein is consistent with the intended level of accuracy as set out in this report, as well as the circumstances and constraints under which this report was prepared.

However, this report is a review of an existing facility and, accordingly, all estimates and projections contained herein are based on limited and incomplete data. Therefore, while the work, results, estimates and projections herein may be considered to be generally indicative of the nature and quality of the Project, they are not definitive. No representations or predictions are intended as to the results of future work, nor can there be any promises that the estimates and projections in this report will be sustained in future work.

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Executive Summary

The Berrima Cement works of Boral Cement has a single noise limit condition of $L_{A90,15\text{-minute}}$ not to exceed 58 dBA at monitoring Location 20 in the Store Yard, as part of it's Pollution Control Licence for the total site. To assess compliance with this condition, monitoring for total site emissions at Location 20 over a 14-day period was made from 1 to 14 December 2023. The results of this monitoring have confirmed that total site emissions are in compliance with the licence condition at Location 20. The nine 15-minute periods when that sound level limit was exceeded at the monitoring site in the late night of 9 December, was caused by high wind speeds at the time and extraneous temporary plant noise sources north-east of the monitoring site, possibly in the car-park near the main truck gate. Also, the long-term average sound level objective of $L_{A90,period}$ not to exceed 54 dBA was achieved.

Sound levels at the plant and in the residential community affected by the noise emissions from the total site have been measured regularly since 2002 and since the completion of each of the Kiln 6 Upgrade and Cement Mill No.7 projects. Monitoring of both site source sound levels and residential receiver sound levels on an annual basis from 2008 to 2021 confirmed that both of the projects were in compliance with their noise limit conditions at the time. Sound levels measured close to the plant at Location 20 and on the Control Building roof in 2022 and 2023 indicate that these projects continue to achieve their objectives. A separate assessment of the Chloride Bypass Plant indicated that it was in compliance with its sound level contribution objectives.

The annual environmental noise assessment has evaluated noise emission from the Cement Plant by the following methods:

- Monitoring of sound levels at Location 20 for compliance assessment;
- Monitoring of sound levels in one residential receiver location with unattended monitoring over long-term periods of two weeks and attended monitoring in daytime at three residential receiver locations to compare with long-term averages from previous years and assess the audible acceptability of the received sound levels.
- Monitoring of sound levels at the North Fence location over the same two-week period to assess the potential for sleep disturbance and low-frequency noise emissions

The finding of this 2023 annual environmental noise assessment is that total site noise emissions are considered to be in compliance with the licence condition.

Sound levels from the two major completed projects (Kiln 6 Upgrade and Cement Mill No.7) are also considered to be in compliance with their noise objectives at the nearest residential receiver locations.

It is also the finding of this assessment that the long-term average statistical sound levels have not increased and indicates that the Cement Plant is not increasing its emissions.

Measurements at the North Fence boundary location also assessed potential sleep disturbance and low-frequency impacts according to the NSW Noise Policy for Industry, by calculations of $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ at night-time to provide comparisons with recommended maximum values for night-time of 60 dBA for $\mathbf{L_{A01.1\text{-minute}}}$ night-time for the North Fence Boundary location and not greater than 15 dB difference for $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$. From the analyses it is considered that the number or times that the objectives of $\mathbf{L_{A01,1\text{-minute}}}$ greater than 60 dBA and $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ difference results

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greater than 15 dB are relatively low and the noise emissions from the Cement Plant have a low potential for sleep disturbance. Site measurements and analyses indicate that the most likely site noise sources to exceed criteria are rail-movement associated noise, but not all rail events cause exceedances. Noise from birds and other sources cause a greater number of events exceeding the criteria.

For low frequency assessment, an initial screening test is made of the C-weighted minus A-weighted (L_C-L_A) period sound level exceeding more than 15 dB. This is done for both the North Fence and 4 Melbourne St logger results, as well as attended monitoring results at all locations. If the screening value is exceeded a one-third octave band frequency analyses is then made of un-weighted (or Z-weighted L_Z) sound levels in the low-frequency bands from 10 Hz to 160 Hz, compared to a specific value.

From the measurements in the residential receiver locations, the low frequency assessment was made on both $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$ values. Exceedances were identified for L_{Aeq} on seven occasions at 4 Melbourne St and one occasion for 12 Brisbane St. At the Northern Fence, analysis of low-frequency sound levels for the times they occurred at 4 Melbourne St indicated they were lower than those measured at 4 Melbourne St, indicating it is more likely that low-frequency sources which cause the objectives to be exceeded are external to the Cement Plant. No exceedances were identified for $L_{A90,15\text{-}min}$ sound levels.

From the assessment of this survey, it is considered that the main source of low-frequency noise events exceeding the policy objectives is from road traffic noise associated with trucks, either from within New Berrima or on distant roads and the freeway. The plant can be a source at times but this is not considered to be significant.

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1 Introduction

Boral Cement Limited operates the New Berrima cement works near Berrima and Moss Vale in the New South Wales' Southern Highlands region. In 2003, approval was granted to construct and operate an upgrade to Kiln 6 at the Site. In 2005, approval was granted to construct and operate No.7 Cement Mill at the site. Both of these developments had conditions of approval which included contribution noise objectives for different receiver areas in the adjacent residential and rural areas. Demonstration of compliance with these contribution objectives was required as a condition of approval for both projects.

Contribution noise objectives for the total Berrima cement works are included in a consolidated Pollution Control Licence for the site, issued in 2019, and revised approval conditions for the projects, issued in early 2020. The licence condition is for sound levels at just one single location. The location is known as Monitoring Location No.20 at the south-eastern corner of the western storage yard. Figure 1.1 shows an aerial view of the cement works and surrounding area, with the locations of Kiln 6 and No.7 Cement Mill and monitoring Location 20 indicated. Figure 1.2 shows an aerial view of the plant immediate locality with boundary environmental noise monitoring locations shown. A site layout plan of the works is shown in Figure 1.3.

Compliance assessment is now based on not exceeding the licence and approval condition of $L_{A90,15\text{-}min}$ not greater than 58 dBA.

Noise monitoring of environmental noise and source noise is undertaken regularly on an annual basis in the neighbourhood of the plant and on site. Annual reporting of compliance assessments for the two projects was made from 2007 to 2019. In 2020, compliance assessment included results of monitoring at the single Location 20. Annual environmental noise assessments are provided to the NSW EPA and other statutory authorities.

In November 2023 a new project was commissioned at the site – the Chloride Bypass Plant (CBP). This was subject to an environmental approval with its own contribution sound level limits, which has been reported on separately as part of an operational noise verification report. The noise level compliance limits for the total plant did not change.

As in previous assessment, attended monitoring is made at three residential receiver locations during daytime. Unattended monitoring occurs at Location 20 (monitored since 2015), the North Fence location (monitored since 2008) and the residential receiver at 4 Melbourne Street (monitored since 2002). Sound recordings of 15-minute periods during evening and night-time at each location are also reviewed for different day, evening and night periods during the monitoring period to provide a pseudo attended monitoring assessment.

Measurements of sound levels in residential areas of New Berrima and inside the site boundary were obtained from 1 to 14 December 2023.

During the period of measurements, the Kiln was operating for almost all of the monitoring period with two longer periods not operating of 12 hours on the morning of 8 December and 13 hours 40 minutes from mid-day on 8th to early morning on 9th December. All major plant items were not operating between 6:00am and 10:15am on 8 December, including both cement mills. The CBP was off for about half of the period totalling 6 days 13.75 hours, but did have continuous operation for most of 1st and 2nd, 9th and 10th and 13th and 14th December.

Operational outages of major plant items during the monitoring period from the morning of 1 December to the afternoon of 14 December are shown in Table 1.1 and summarised in Table 1.2 below. Figure 1.4 shows the operating times for the whole period and Figures 1.5 to 1.8 show operations for subsequent 4-day periods.

Table 1.2: Operating outages for major plant items 1 to 14 December 2023

Plant item	Total Period off-line	Percent of time off-line From 8am 1st to 6pm 14th Dec	No. of stops	Longest off-line
Kiln 6	29 hrs 52 min	9.3%	7	13 hrs 41 min
Raw Mill 6 (RM6)	53 hrs 38 min	16.6%	25	27 hrs 54 min
Raw Mill 7 (RM7)	59 hrs 33 min	18.5%	20	28 hrs 40 min
Cement Mill 6 (CM6)	90 hrs 58 min	28.2%	18	31 hrs 14 min
Cement Mill 7 (CM7)	98 hrs 34 min	30.6%	14	31 hrs 34 min
Chloride Bypass Plant	157 hrs 47 min	49.0%	16	50 hrs 31 min

Some of these periods may have affected measured sound levels at the residential receivers but most will not. For example, for the 4 Melbourne St results, on 8 December 7:45am $L_{A90,15\text{-min}}$ (when all major plant items were not operating), sound levels are 2 to 7 dB lower than those of all previous days but higher than those for 9 December by 2 dB (see Appendix B).

Measurements of continuous sound levels over the period 1 to 14 December were taken with logging sound level meters at site Location 20, Northern Boundary and residential location 4 Melbourne Street.

Measurements of attended sound levels were made during 15-minute periods in daytime within the monitoring period. Locations monitored were the same as used in previous years. These were:

Residential Receivers:

- 4 Melbourne Street;
- 12 Brisbane Street
- Corner Adelaide and Taylor at 20m back from the edge of Taylor Ave to be in-line with the front of houses. This location provides the same immission as 72 Taylor Avenue used previously.

Cement Plant Site locations

- Northern Boundary
- Location 20 Store Yard (close)

This report provides an assessment of compliance of the current operation of the total Cement Plant site.

Table 1.1: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Operating times for major plant items

Kiln 6	Status	RM6	Status	RM7	Status	CM6	Status	By-pass Fan	Status
12/1/23 14:00	ON	12/1/23 14:00	ON	12/1/23 14:00	ON	12/1/23 14:00	ON	12/1/23 14:00	ON
12/4/23 8:20	OFF	12/1/23 20:58	OFF	12/3/23 21:06	OFF	12/1/23 22:26	OFF	12/3/23 7:45	OFF
12/4/23 8:52	ON	12/1/23 21:12	ON	12/3/23 21:54	ON	12/1/23 22:42	ON	12/3/23 10:28	ON
12/7/23 16:29	OFF	12/4/23 1:52	OFF	12/4/23 8:19	OFF	12/3/23 11:23	OFF	12/3/23 16:42	OFF
12/7/23 17:40	ON	12/4/23 2:04	ON	12/4/23 14:19	ON	12/4/23 12:59	ON	12/4/23 3:25	ON
12/7/23 23:36	ON	12/4/23 8:17	OFF	12/4/23 18:21	OFF	12/4/23 22:55	OFF	12/4/23 3:47	OFF
12/7/23 23:37	OFF	12/4/23 10:49	ON	12/4/23 18:41	ON	12/5/23 0:04	ON	12/4/23 5:16	ON
12/8/23 2:20	OFF	12/4/23 14:59	OFF	12/5/23 1:20	ON	12/6/23 5:50	OFF	12/4/23 5:38	OFF
12/8/23 11:35	ON	12/4/23 15:31	ON	12/5/23 6:55	OFF	12/6/23 6:22	ON	12/4/23 5:41	ON
12/8/23 12:47	OFF	12/4/23 18:16	OFF	12/5/23 7:55	ON	12/6/23 13:39	OFF	12/4/23 8:20	OFF
12/9/23 2:28	ON	12/4/23 19:00	ON	12/5/23 11:18	OFF	12/6/23 18:14	ON	12/4/23 11:59	ON
12/10/23 22:18	OFF	12/5/23 7:04	OFF	12/5/23 13:52	ON	12/7/23 9:43	OFF	12/4/23 16:47	OFF
12/10/23 22:50	ON	12/5/23 7:16	ON	12/7/23 9:54	OFF	12/7/23 11:25	ON	12/4/23 17:59	ON
12/13/23 8:14:27	OFF	12/5/23 22:10	OFF	12/7/23 11:06	ON	12/7/23 15:11	OFF	12/4/23 20:33	OFF
12/13/23 9:00:28	ON	12/5/23 22:27	ON	12/7/23 16:28	OFF	12/7/23 23:39	OFF	12/5/23 11:32	ON
12/14/23 17:02:44	OFF	12/6/23 8:35	OFF	12/7/23 21:16	ON	12/7/23 23:51	OFF	12/5/23 11:48	OFF
12/14/23 18:25:45	ON	12/6/23 9:14	ON	12/7/23 21:21	OFF	12/8/23 22:25	ON	12/5/23 0:00	ON
		12/6/23 16:21	OFF	12/7/23 21:31	ON	12/9/23 1:13	OFF	12/5/23 0:43	OFF
CM7	**Status**	12/6/23 16:39	ON	12/7/23 23:51	OFF	12/9/23 1:29	ON	12/7/23 3:13	ON
12/1/23 14:00	ON	12/7/23 10:21	OFF	12/9/23 4:31	ON	12/9/23 11:29	OFF	12/7/23 4:38	OFF
12/1/23 16:49	OFF	12/7/23 10:57	ON	12/9/23 8:38	OFF	12/9/23 22:01	ON	12/7/23 5:24	ON
12/1/23 18:50	ON	12/7/23 16:28	OFF	12/9/23 9:04	ON	12/10/23 20:13	OFF	12/7/23 6:39	OFF
12/3/23 15:49	OFF	12/7/23 21:12	ON	12/10/23 16:44	OFF	12/11/23 16:50	ON	12/9/23 9:10	ON
12/4/23 13:59	ON	12/7/23 23:51	OFF	12/10/23 17:31	ON	12/11/23 16:55	OFF	12/10/23 22:18	OFF
12/4/23 22:55	OFF	12/9/23 3:45	ON	12/10/23 22:16	OFF	12/11/23 17:01	ON	12/11/23 22:47	ON
12/4/23 23:14	ON	12/9/23 16:34	OFF	12/11/23 0:34	ON	12/11/23 20:50	OFF	12/13/23 7:43:27	OFF
12/5/23 14:00	OFF	12/9/23 18:52	ON	12/11/23 11:39	OFF	12/11/23 21:08	ON	12/13/23 12:06:28	ON
12/6/23 2:58	ON	12/9/23 20:23	OFF	12/11/23 12:05	ON	12/12/23 10:01	OFF	12/13/23 17:43:28	OFF
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12/8/23 10:22	ON	12/11/23 8:58	OFF	12/12/23 13:01	ON	12/13/23 14:04:31	OFF	12/15/23 11:30:45	OFF
12/8/23 15:12	OFF	12/11/23 9:14	ON	12/12/23 13:38	ON	12/13/23 18:26:38	ON		
12/8/23 16:12	ON	12/11/23 16:55	OFF	12/13/23 7:44:27	OFF	12/13/23 18:29:38	OFF		
12/8/23 22:34	ON	12/11/23 17:01	ON	12/13/23 10:04:28	ON	12/13/23 23:31:40	ON		
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12/9/23 22:13	ON	12/11/23 21:08	ON	12/13/23 14:29:30	ON	12/14/23 8:43:43	OFF		
12/10/23 11:11	OFF	12/12/23 14:01	OFF	12/14/23 2:37:39	OFF	12/14/23 8:54:43	ON		
12/11/23 16:52	OFF	12/12/23 14:19	ON	12/14/23 3:15:39	ON	12/14/23 9:33:43	ON		
12/11/23 18:45	ON	12/13/23 7:44:29	OFF	12/14/23 17:00:44	OFF	12/15/23 15:53:54	OFF		
12/11/23 20:47	ON	12/13/23 10:15:30	ON	12/14/23 20:52:45	ON	12/15/23 16:06:54	ON		
12/12/23 9:06	OFF	12/13/23 15:15:32	OFF						
12/12/23 11:59	ON	12/13/23 15:25:37	ON						
12/13/23 7:45:28	OFF	12/13/23 15:27:37	OFF						
12/13/23 8:12:27	ON	12/14/23 4:19:41	ON						
12/13/23 8:15:27	OFF	12/14/23 17:01:46	OFF						
12/13/23 8:33:28	ON	12/14/23 21:13:47	ON						
12/14/23 11:45:42	OFF	12/14/23 21:51:48	OFF						
12/14/23 12:01:42	ON	12/14/23 22:02:48	ON						
12/15/23 6:12:49	OFF	12/15/23 22:36:56	OFF						
12/15/23 12:03:51	ON	12/15/23 22:47:56	ON						
		12/15/23 23:59:57	ON						

Figure 1.1: Boral Cement Berrima Works - Locality and major plant items

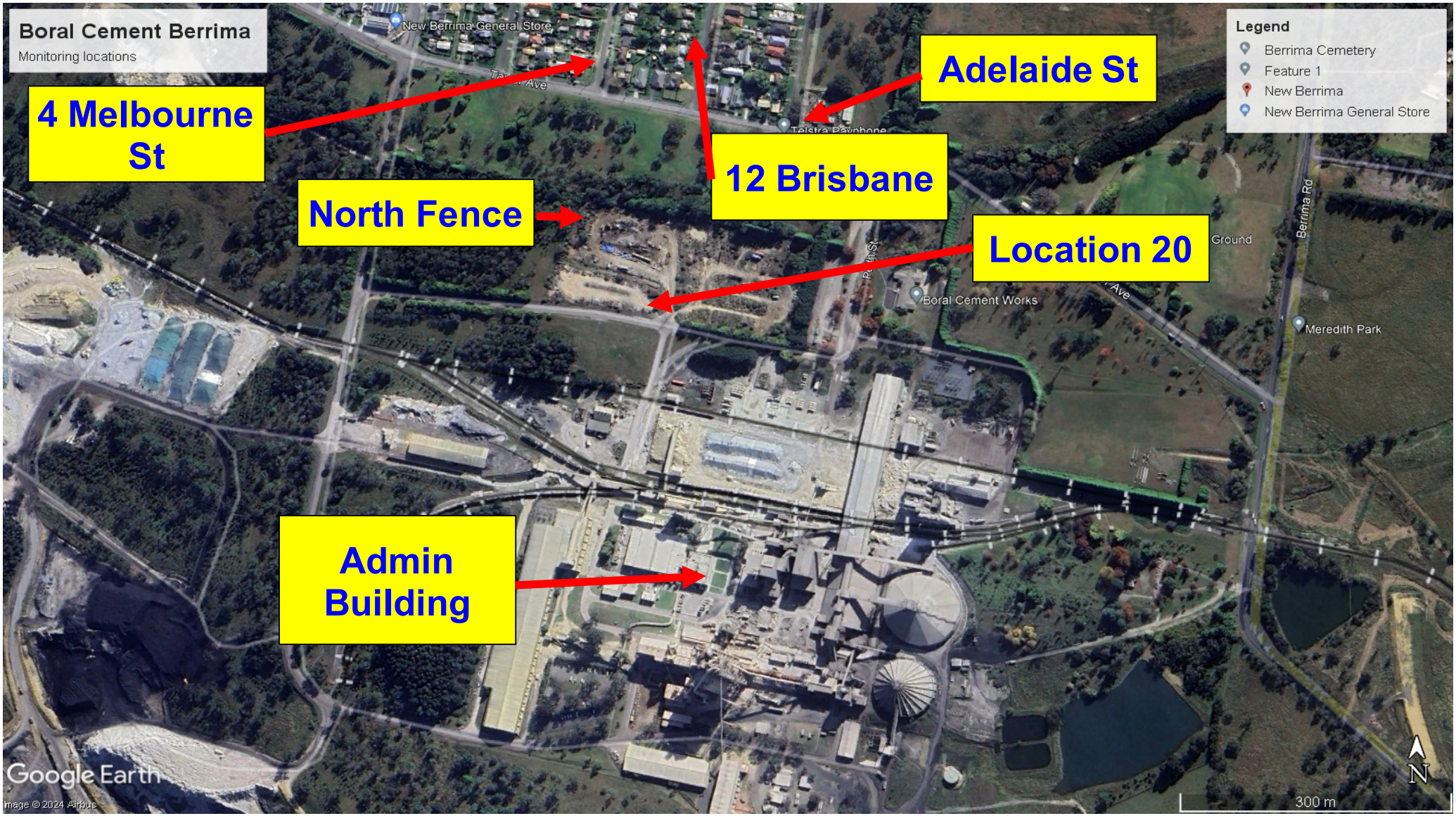


Figure 1.2: Boral Cement Berrima Works - monitoring locations

2023 report location figures.xlsx

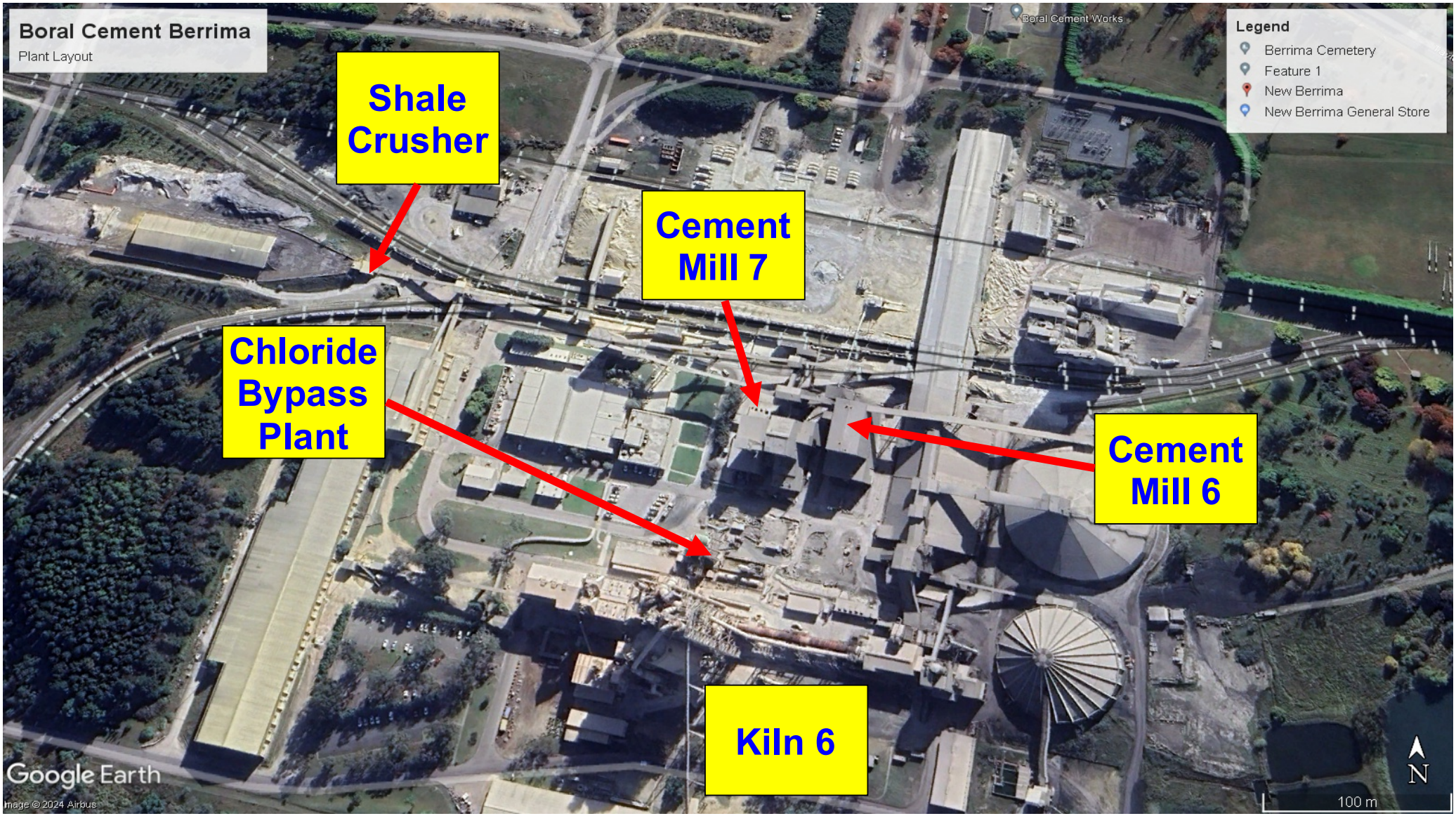
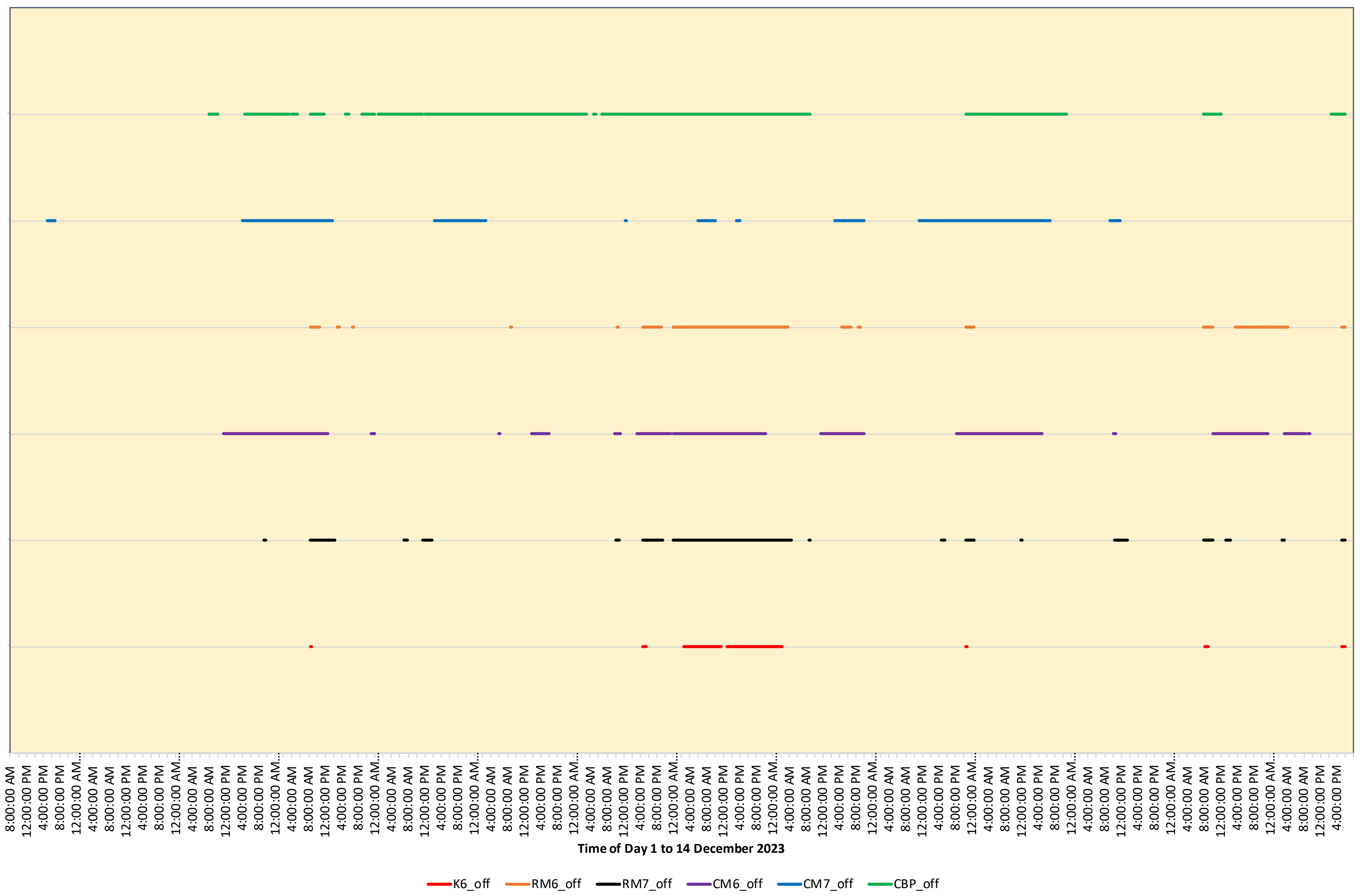


Figure 1.3: Boral Cement Berrima Works - plant layout aerial view

2023 report location figures.xlsx

Figure 1.4: Boral Cement Berrima Annual Environmental Noise Assessment 2023: Non-operational times of major plant items 1 to 14 December 2023



Run Time CM6,CM7, RM 6, RM7, K6 & Chl Bypass.xlsx

Figure 1.5: Boral Cement Berrima Annual Environmental Noise Assessment 2023: Non-operational times of major plant items 1 to 14 December 2023

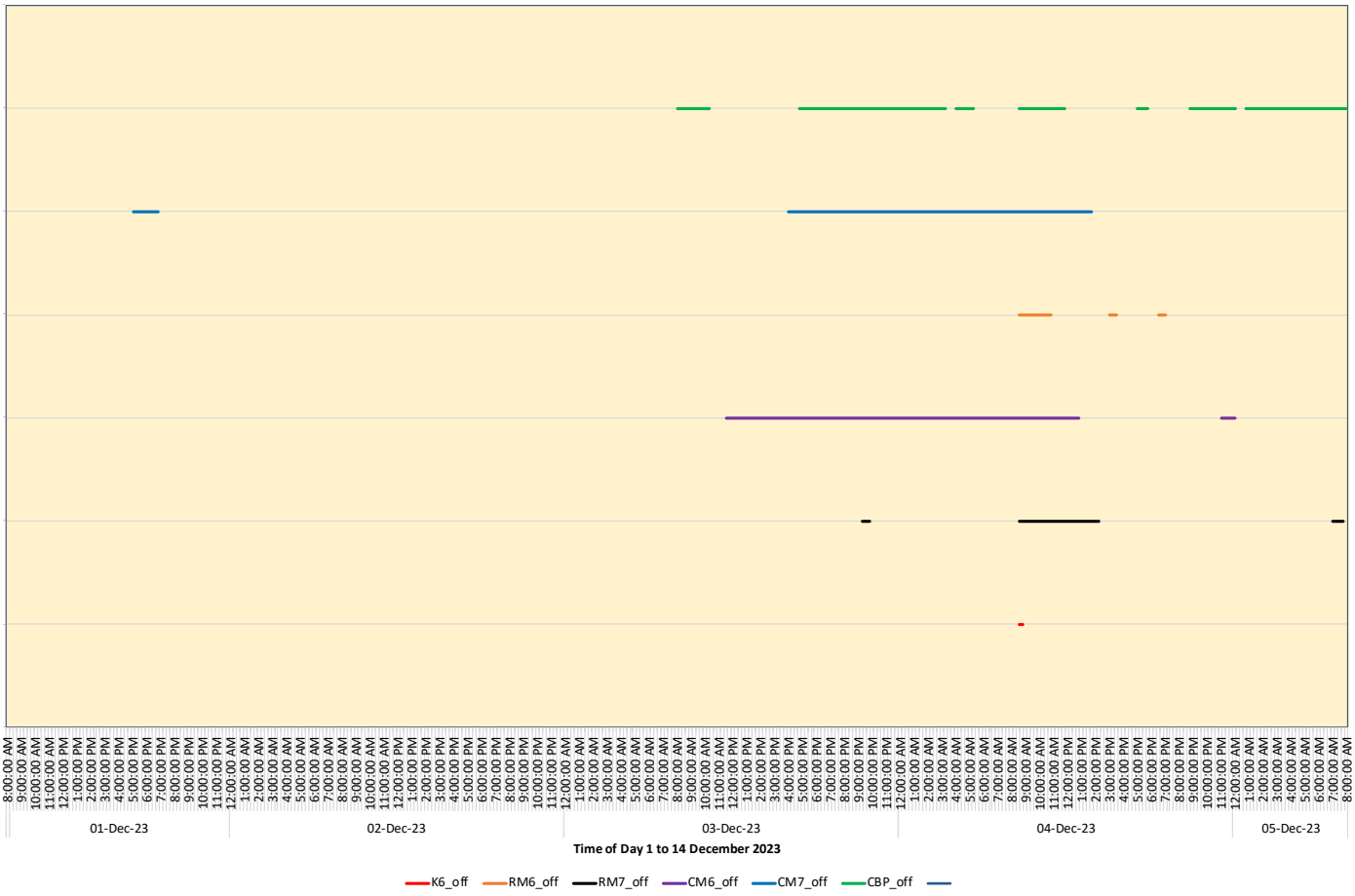


Figure 1.6: Boral Cement Berrima Annual Environmental Noise Assessment 2023: Non-operational times of major plant items 1 to 14 December 2023

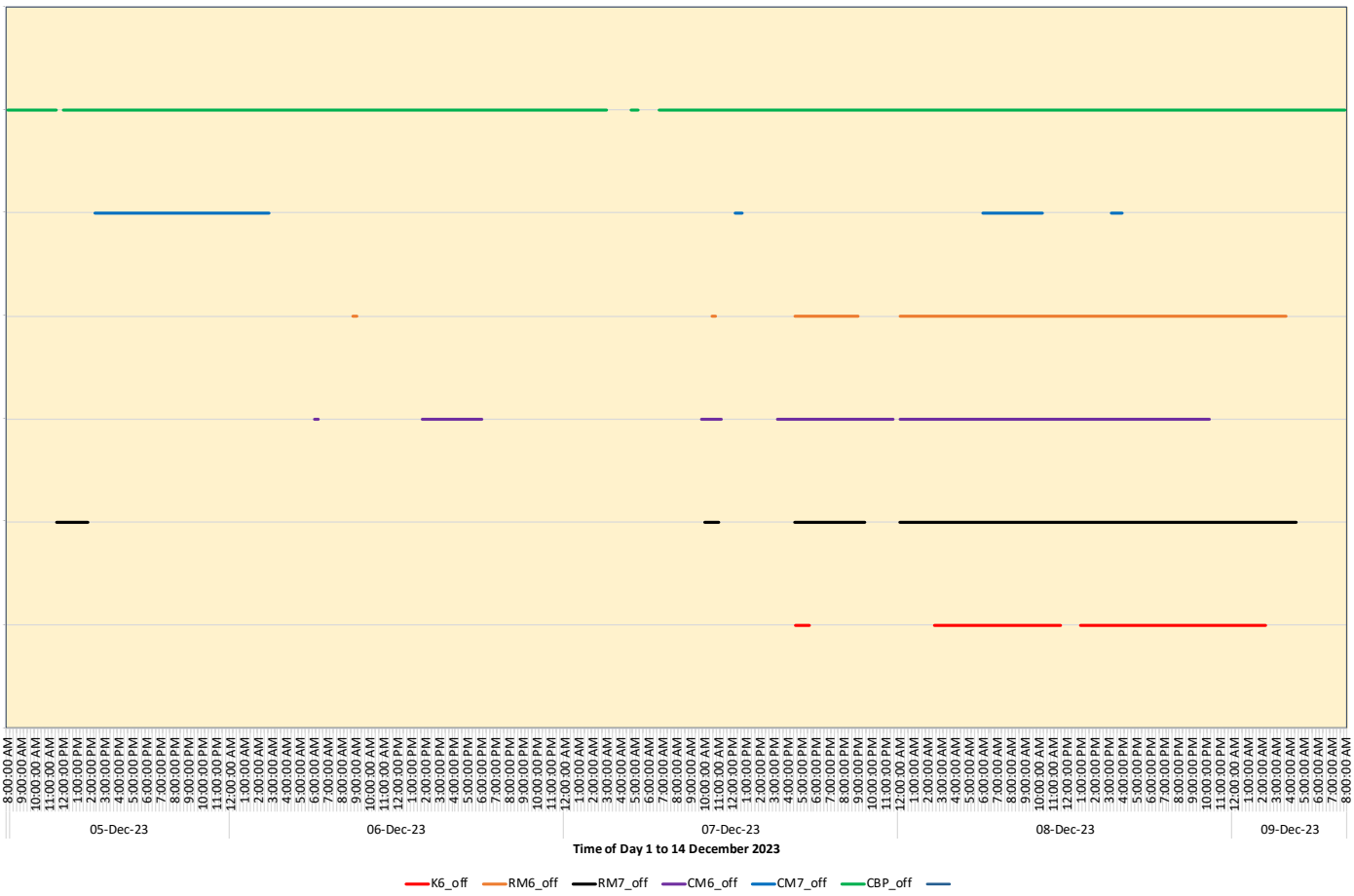


Figure 1.7: Boral Cement Berrima Annual Environmental Noise Assessment 2023: Non-operational times of major plant items 1 to 14 December 2023

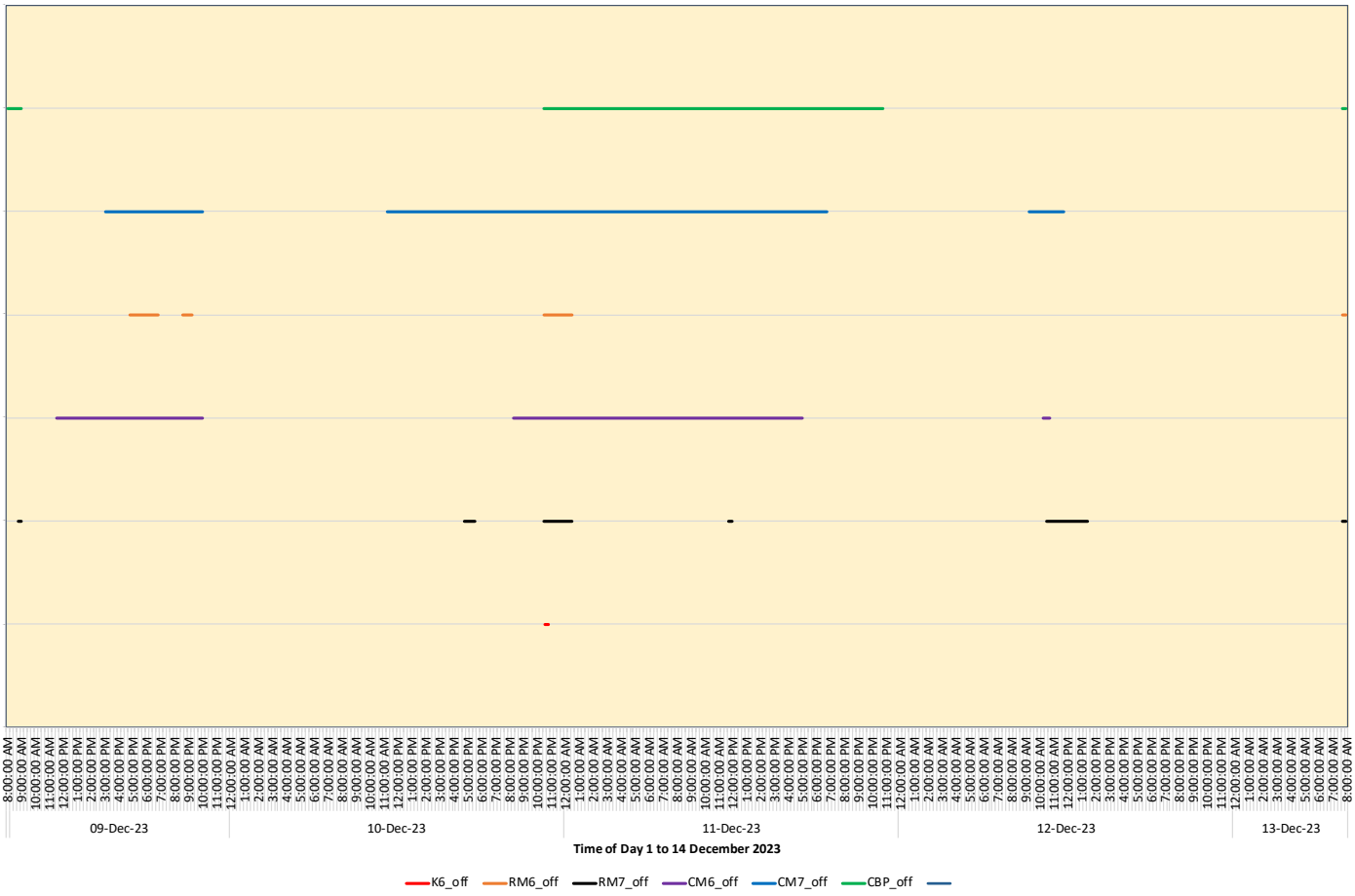
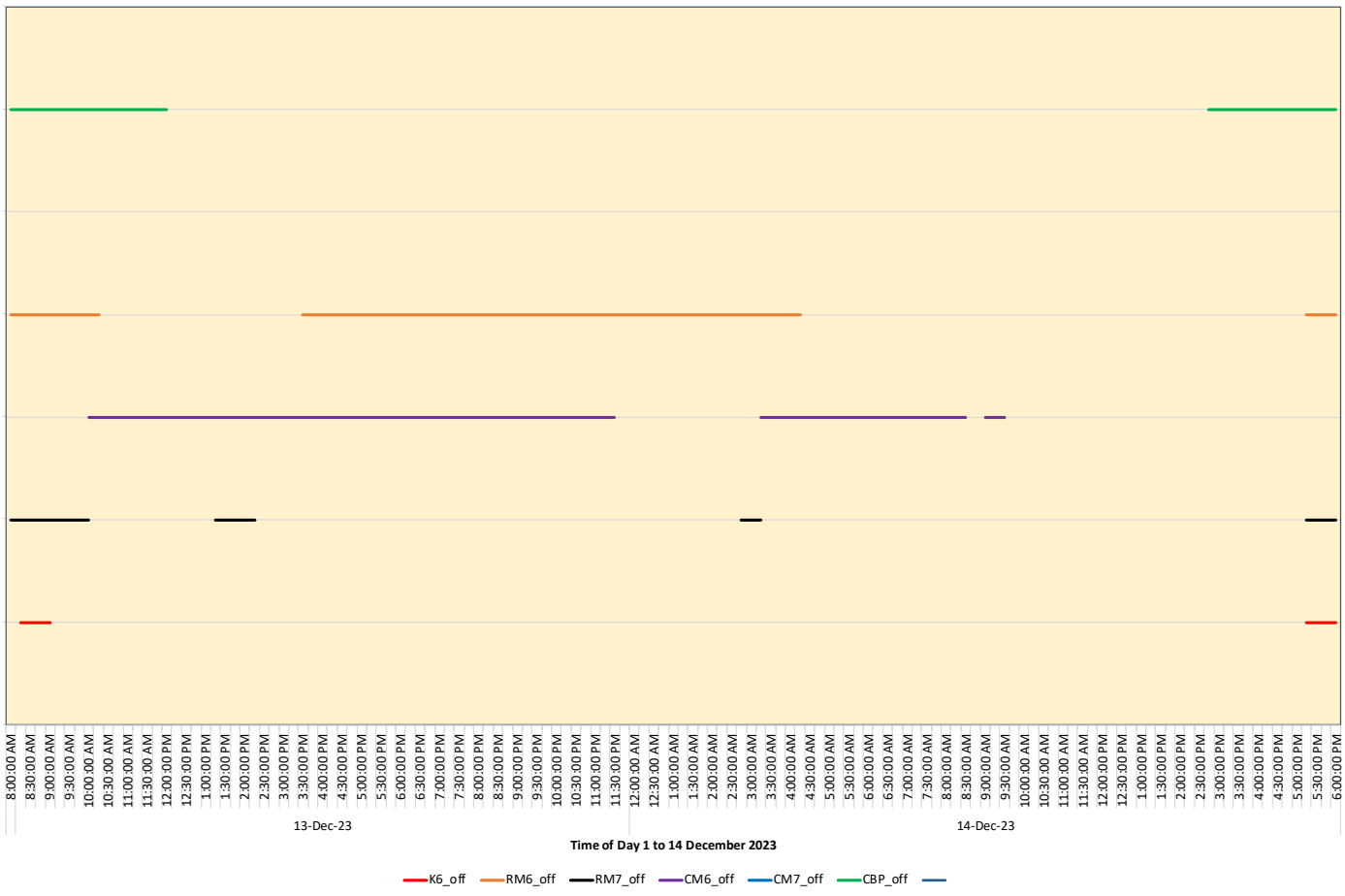


Figure 1.8: Boral Cement Berrima Annual Environmental Noise Assessment 2023: Non-operational times of major plant items 1 to 14 December 2023



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2 Contribution sound level objectives and method of measurement and assessment

2.1 Modification of Development Consent

In 2020 the Development Consent for the site was modified to allow loading of isotainers on the site and set a single site-wide noise limit. The noise limit condition is shown in Table 2.1. From the Consent Modification document. Noise generated at the site must not exceed the noise limits at the times and location specified in Table 2.1 below.

Table 2.1 – Maximum Allowable Noise Contribution Limit (dB(A))

Location	Day $L_{A90\ (15\text{-minute})}$	Evening $L_{A90\ (15\text{-minute})}$	Night $L_{A90\ (15\text{-minute})}$
The noise compliance point Location 20 Store Yard Close	58	58	58

a. Day is defined as the period from 7:00am to 6:00pm Monday to Saturday and 8:00am to 6:00pm on Sundays and public holidays.

b. Evening is defined as the period from 6:00pm to 10:00pm.

c. Night is defined as the period from 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am on Sundays and public holidays

Note: The location of Noise Compliance Point (Point 20) – Store Yard is shown in Figure 2.1 below, along with the other monitoring locations.

2.2 Chloride Bypass Plant

A Chloride Bypass Plant (CBP) attached to the No.6 Kiln was approved in May 2021 and commissioning was completed on 30 November 2023. The approval conditions included requirements to prepare a Noise Verification Report prior to construction and also within three-months of commencement of operations. An assessment of the noise emissions of the operational plant was made by Recognition Research during the same period as the annual environmental noise assessment and reported in a separate document.

Recommended compliance contribution sound levels for the CBP are shown in Table 2.2. Night-time only levels are shown as these are the lowest and the plant is able to operate for 24-hours per day.

Table 2.2: Noise Compliance Objectives for Chloride Bypass Plant Operation

Location	Time of Day	Objective $L_{Aeq,15\text{-min}}$
Location 20 – noise compliance point	Day, Evening, Night	52
Taylor Ave near Adelaide St	Night	37
12 Brisbane St	Night	34
4 Melbourne St	Night	34

Assessment of compliance for the CBP was by measurement of noise source sound levels and modelling of their contribution to the receiver locations in noise propagation enhancing meteorological conditions. A separate report demonstrating achievement of compliance for the CBP has been provided.

2.3 Method of measurement and assessment

Total plant sound levels

Sound levels of the plant are measured by attended and unattended monitoring methods at Location 20.

Sound levels are also measured at the Northern Boundary to compare with previous measurements and also indicate potential for sleep disturbance during night periods. This is done on the assumption that if the Sleep Disturbance objectives are achieved at the boundary location, they will also be achieved at the residential receivers, which are 150m more distant from the plant. If the low-frequency spectra indicate relative compliance at the boundary, they will also indicate compliance at the residential locations.

2023 receiver and boundary monitoring

As well as the site noise compliance monitoring, environmental receiver sound levels are measured. The set of measurements for 2023 was done between 1 and 14 December 2023, with attended measurements on the start and finish days of the survey. The logger at 4 Melbourne St ceased operation on 10 December. As the three logger monitoring locations used recording sound level meters, additional listening "attended monitoring" was done at 4 Melbourne St location for the same 15-minute periods for (daytime, evening and night-time periods). These periods were:

- Friday 1 December 9:00 pm to 9:15 pm — Evening, all plant on, South-east wind
- Saturday 2 December 11:30pm to 11:45pm — Night, all plant on, calm wind
- Monday 4 December 8:30pm to 8:45 pm — Evening, all plant on, wind North
- Tuesday 5 December 11:00pm to 11:15 pm — Night, All plant on except CBP & CM6, wind Northerly reducing to calm
- Saturday 9 December 11:30am to 11:45 am — Daytime, all plant on, South-west wind medium velocity
- Saturday 9 December 10:45pm to 11:00 pm — Night, all on, event in period, South-East wind
- Saturday 9 December 11:30pm to 11:45 pm — Night, all on, event in period, South-East wind
- Saturday 9 December 11:45pm to 12:00 am — Night, all on, South-East wind

For the event 15-minute intervals of 9 December starting at 10:45pm and 11:30pm, when the $L_{A90,15\text{-}min}$ result exceeded the compliance limit, listening monitoring was also made for the North Fence and Location 20 sound level recordings.

Night and evening periods were selected more than daytime because these are more likely to be periods of potential annoyance and road traffic noise is significantly reduced from daytime.

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Results of long-term unattended receiver environmental noise monitoring have also been collated for monitoring undertaken at regular intervals since 2002. Comparison of these results also indicate any trends in receiver location sound levels occurring over the monitoring period since 2002.

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3 Licence monitoring location and residential receiver sound levels – activities and conditions for 2023

Environmental sound levels are measured at the Licence compliance monitoring Location 20 and at residential receiver locations in New Berrima. A combination of unattended and attended monitoring is used at three locations –

- Location 20 – the Store Yard Close – monitored since 2015
- North Fence – Monitored since 2007
- 4 Melbourne Street, New Berrima – monitored since 2002

Measurements are to assess changes at the locations, acceptability of received sound levels and compliance with the licence conditions.

Attended monitoring is also made at two other residential receiver locations to provide comparisons with previous measurements:

- 12 Brisbane St
- Adelaide St back 20m from Taylor Avenue top match the front façade of 72 Taylor Avenue, monitored previously

Attended measurements were made on 1 and 14 December 2023 in daytime. As the three logger monitoring locations used recording sound level meters, additional listening "attended monitoring" was done at 4 Melbourne Street locations for the same 15-minute periods for (daytime, evening and night-time periods). The times of these periods were noted in the previous section.

3.1 Unattended measurements

Unattended measurements were made using logging sound level meters at 3 locations, shown in Figure 1.2:

- Residential:
  - 4 Melbourne Street, New Berrima (full results provided in Appendix B).
- Boral Cement industrial site:
  - Northern Boundary at the north-western corner of the Stores Yard (full results provided in Appendix C).
  - Location 20 at the south-western corner of the Stores Yard, north of the internal cross road north of the Fettler's Shed (full results provided in Appendix D).

Monitoring instruments measured the sound levels continuously and stored the statistical results every 15-minutes. The loggers at the three locations also store all of the sound levels to allow processing of other parameters, such as $L_{A01.1\text{-minute}}$. The logger at Location 20 also stored directional information of sound level quality from which the direction of a significant source can be identified.

During the period of measurements, major plant items were idle at different times, including the Kiln. Table 1.1 shows the times of non-operation of the major plant items and Figures 1.4 to 1.8 show the operating periods graphically. Some of these periods will have affected measured sound levels at the residential receivers and some will not.

There were four periods with all plant items not operating:

4 December from 8:30am to 9:00am

8 December from 6:00am to 10:30am

8 December from 3:30pm to 4:15pm

10 December from 10:30pm to 11:00pm

On 7 December from 4:30pm to 5:45pm, CM7 only was on.

Statistical sound level parameters measured include the following:

$L_{Aeq.15\text{-}minute}$ The equivalent A-weighted continuous or time averaged sound level over each 15-minute period as units of dB. This single sound level represents the equivalent of the sound energy in all of the sound levels in the period, using a logarithmic average. This value is compared with objective sound levels for amenity and intrusiveness.

$L_{A90.15\text{-}minute}$ The 90% exceedance sound level over a 15-minute period. This is the sound level exceeded for 90% of the time or 13.5 minutes in each 15-minute period. It is often referred to as the background sound level and is used for comparison with objectives.

$L_{A01.1\text{-}minute}$ The 1% exceedance sound level over a 1-minute period. This is the sound level exceeded for 1% of the time or 0.6 seconds in each minute. It is used for assessment of typical maximum night-time sound levels and for comparison of the **$L_{A01.1\text{-}minute}$** – **$L_{A90.15\text{-}minute}$** difference with a maximum 15 dB difference objective for not causing sleep disturbance.

From these parameters, long-term averages are calculated for each period of day, evening and night in a 24-hour period, then averages or medians of these are obtained for the full length of the measurement periods of 14 days.

$L_{AEQ.period\ average}$ this is the energy average of the period (day, evening or night) L_{AEQ} for all of the periods monitored

$L_{A90.average}$ this is the arithmetic average of the average period $L_{A90.15\text{-}min}$ for the periods monitored.

10%$L_{A90.average}$ this is the median of the period 10% $L_{A90.15\text{-}min}$ for the monitoring period

3.2 Weather conditions

Weather is measured at the site meteorological station, located to the south of the Raw Materials Store.

A summary of the weather conditions for the period 1 to 14 December when the monitoring was done is shown in Figure 3.1, with those relevant to noise propagation and measurement (wind speed, wind direction and rainfall) shown in Figure 3.2.

Wind speed and rainfall are shown in Figure 3.3, wind direction is shown on Figure 3.4. Weather conditions for subsequent groups of three-day periods are shown in Figures 3.5 to Figure 3.9.

Daytime temperatures ranged from mild to hot, with daytime maxima from 21ºC to 36ºC. Night-times were cool to warm with minimums in a range of 10ºC to 18ºC.

Nights were also very humid with relative humidities rH 90% to 100% regularly and days as low as 20%. These conditions are typical of late autumn and early summer.

Rain occurred in seven 15-minute periods on four days, with a maximum of 7mm on 2 December and 4mm in one 15-minute period. 0.5mm fell in each of five other 15-minute periods. In total 10mm fell over the two-weeks.

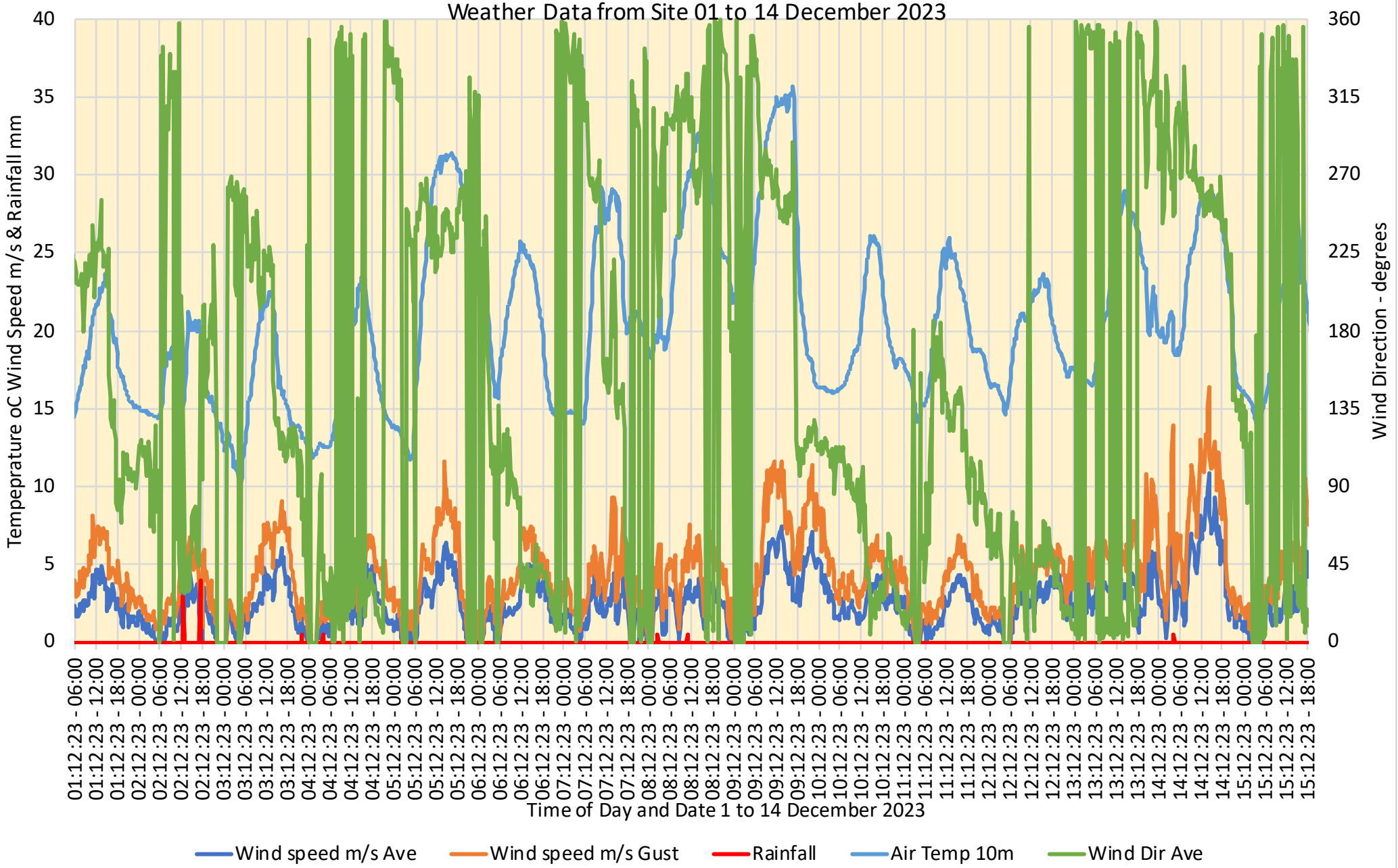
Wind speeds were from calm to a maximum of 16.4 m/s in a gust. The maximum average speed in any 15-minute period was 10.9 m/s There were 100 of the 1445 15-minute periods (or 2.9%) of calm wind and 6.9% of periods in the range from 0 to 0.1m/s. Table 3.1 and Figures 3.10 and 3.11 present the wind direction and speed range data as two different forms of graphs.

Most of the time – 47%, the wind speed range was 1 to 3m/s. For day and evening periods combined, 0.6% of periods were calm, while 6.3% of night periods were calm. For wind speeds less than 0.5m/s, this occurred for 1.7% of day and evening periods and 9.6% of night periods. This indicates there was wind for most of the time. Higher wind speeds of greater than 5m/s occurred for 6.9% of day-evenings and 1.2% of nights. These conditions were similar statistically to those of 2022.

Wind direction was mainly northerly over the whole period with some easterly, southerly and westerly wind periods of between 15 to 18% each. For the first five days, the wind was north to north-westerly for about a day then change to south-westerly for about a day. From 6 December there was a change to easterly to north-easterly, then mostly north-westerly to northerly until 9 December. On 10th December the wind direction changed to south-east to east and north-east before turning southerly on 11 December. From then it gradually changed to northerly again.

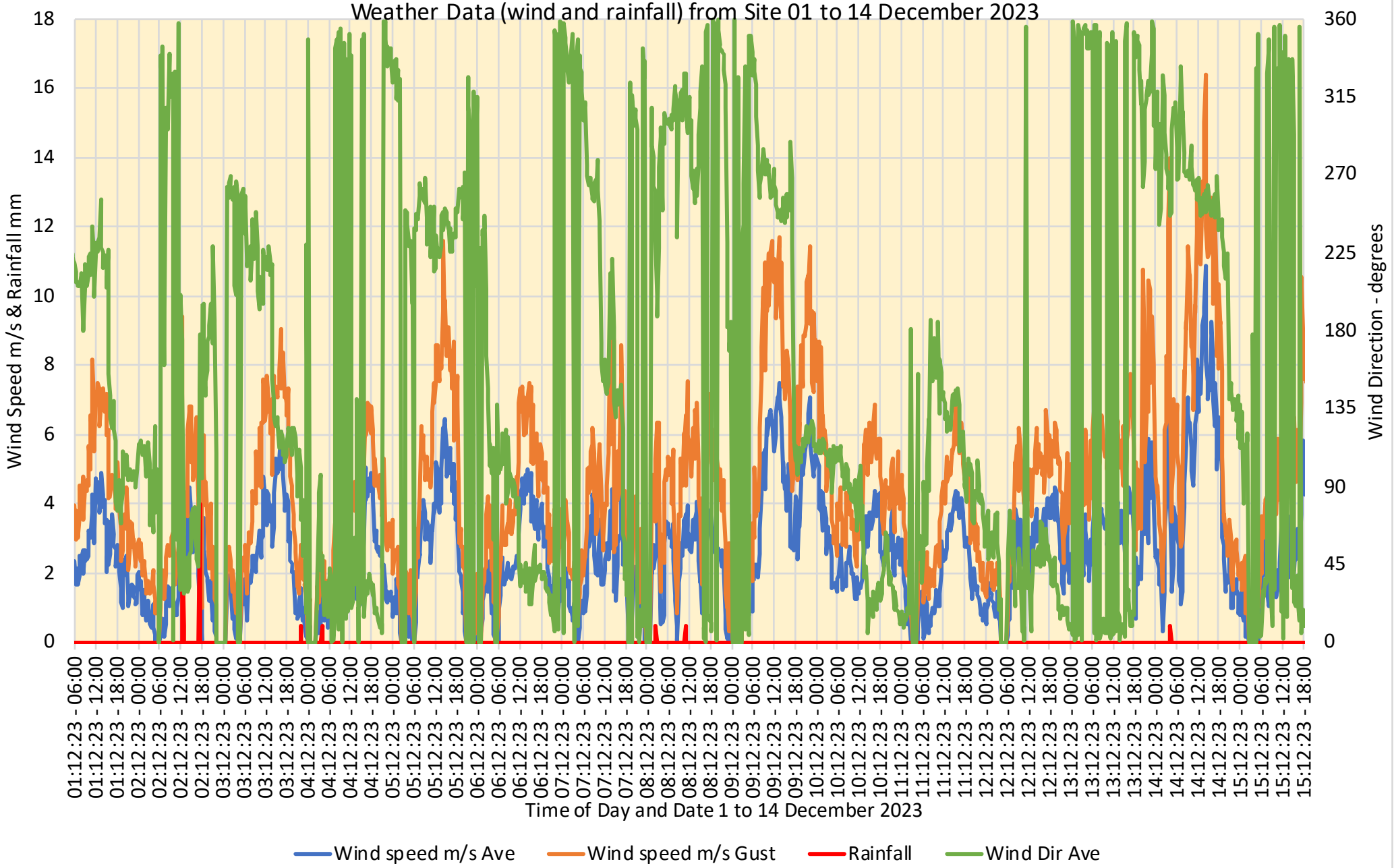
Normally data for high wind speed periods greater than 10m/s are discarded as it is likely wind speeds at or close to the microphones would be above 5m/s. However, there was only one period where the average wind speed was above 10m/s, which was at 2pm on 14 December. During very low wind speed periods the wind direction was variable. Westerly winds assist with enhancing noise propagation from the Hume freeway to New Berrima but are not significant for propagation from the Cement Plant towards New Berrima. A total of 7 periods were deleted for rain.

Figure 3.1: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 01 to 14 December 2023



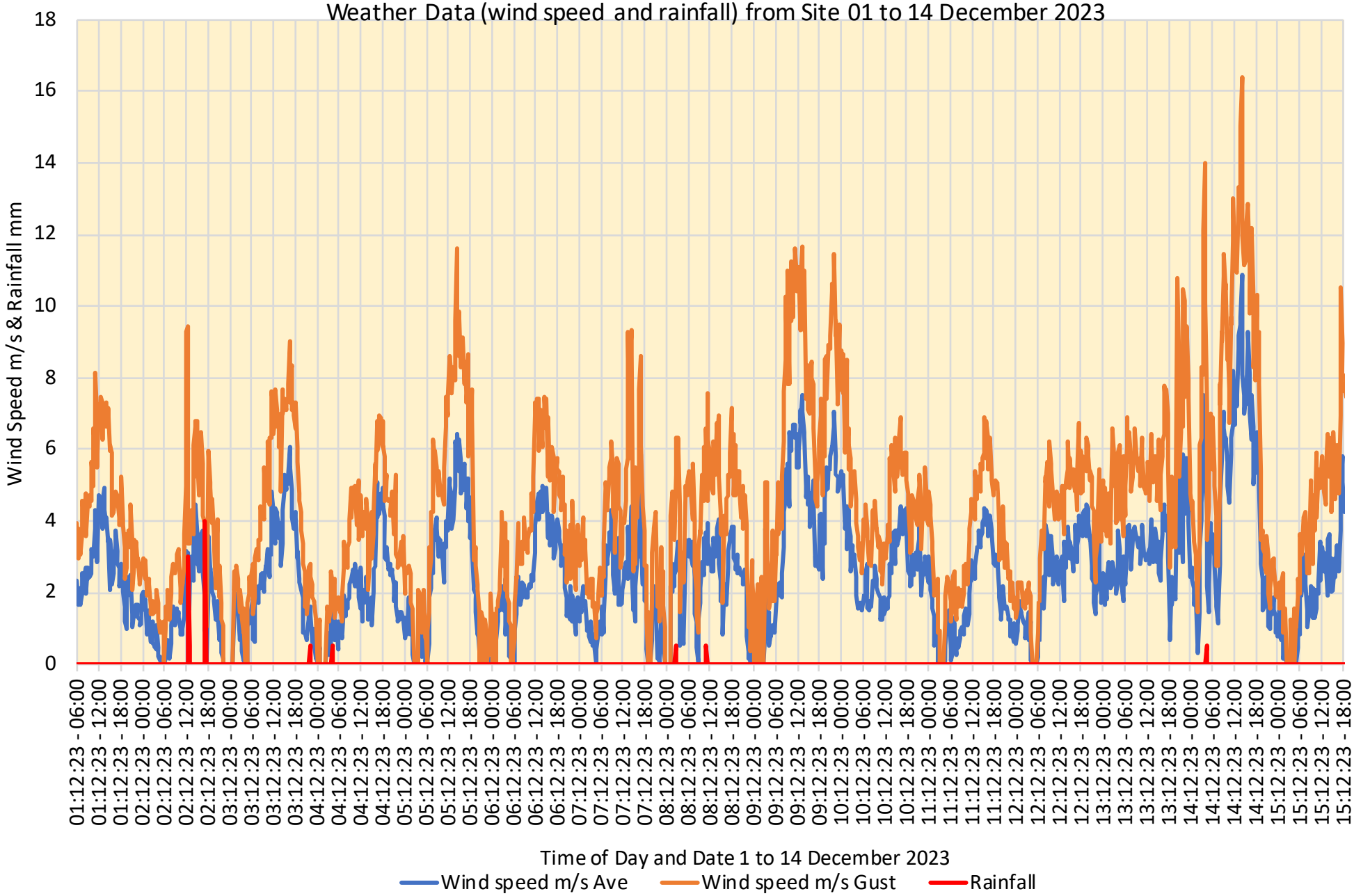
Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.2: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data (wind and rainfall) from Site 01 to 14 December 2023



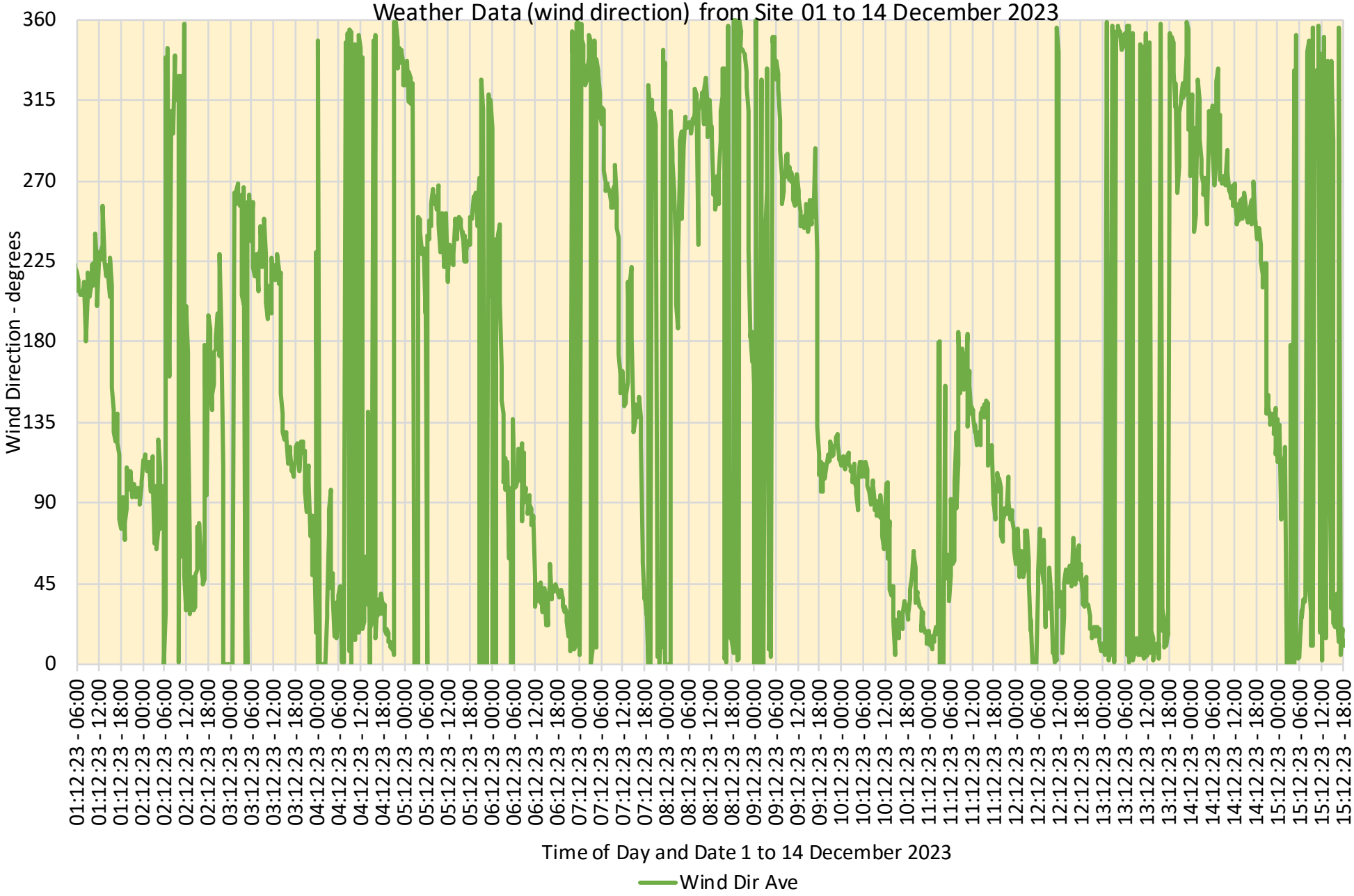
Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.3: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data (wind speed and rainfall) from Site 01 to 14 December 2023



Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.4: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data (wind direction) from Site 01 to 14 December 2023



Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.5: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 01 to 04 December 2023

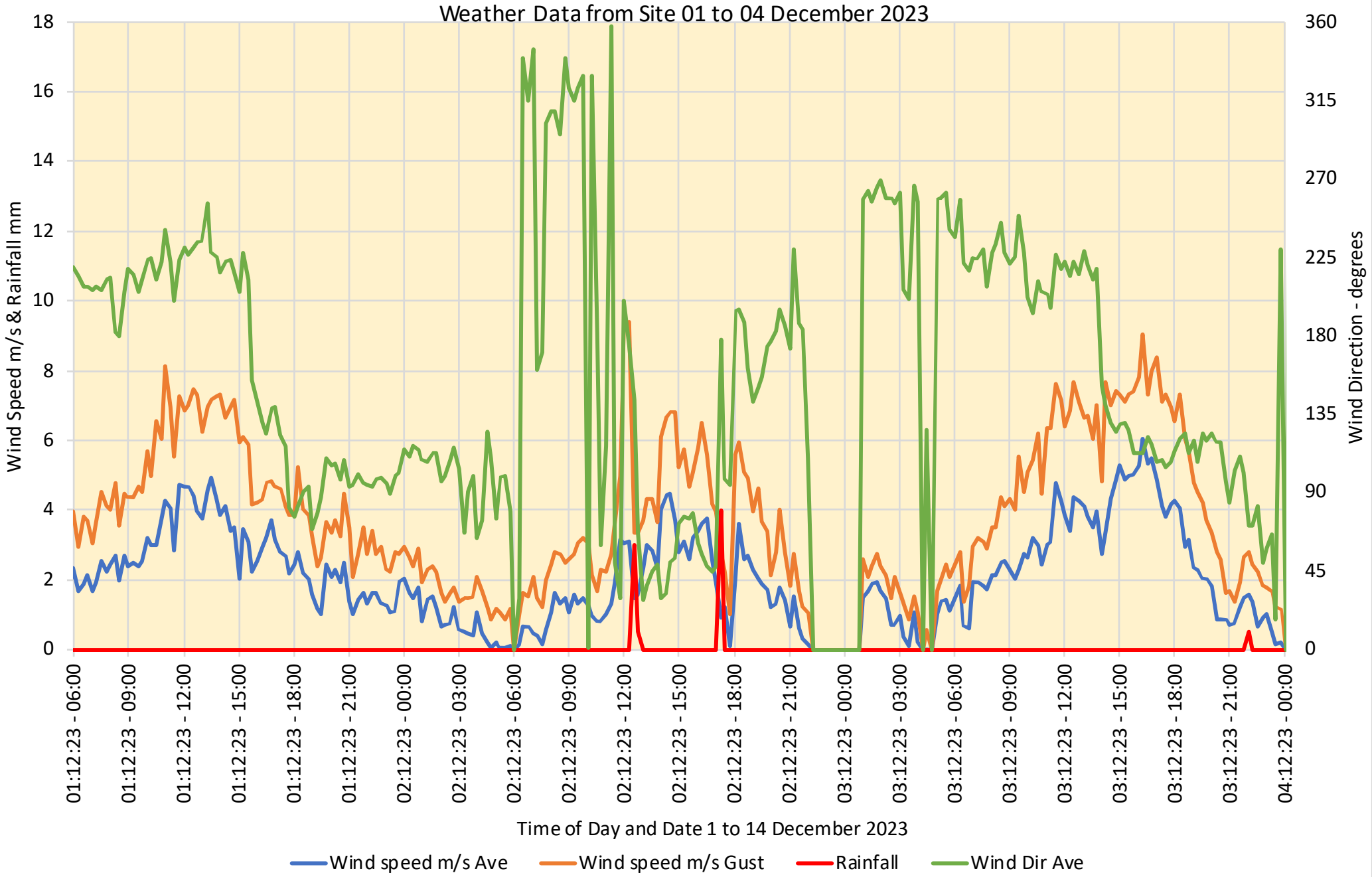
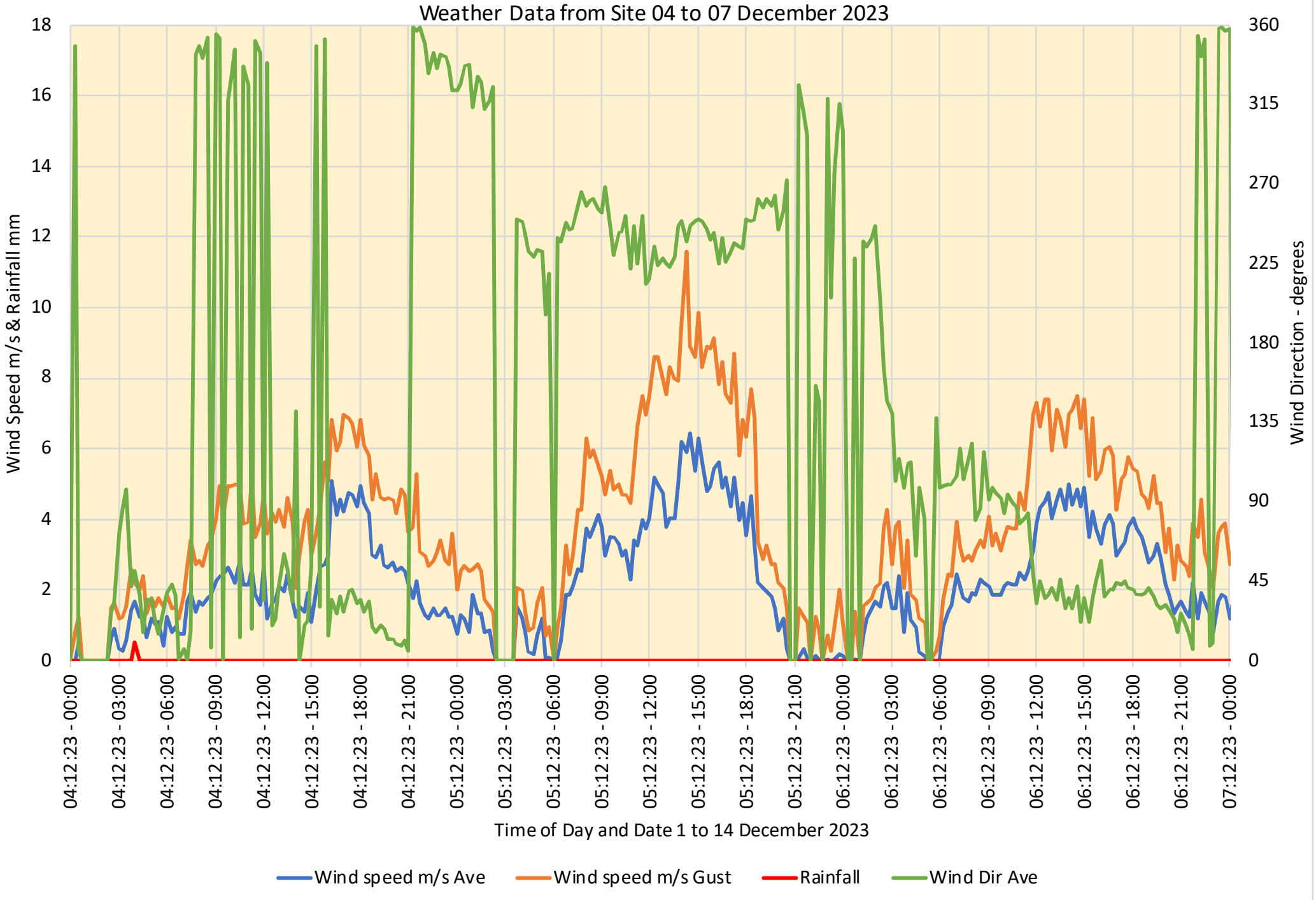


Figure 3.6: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 04 to 07 December 2023



Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.7: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 07 to 10 December 2023

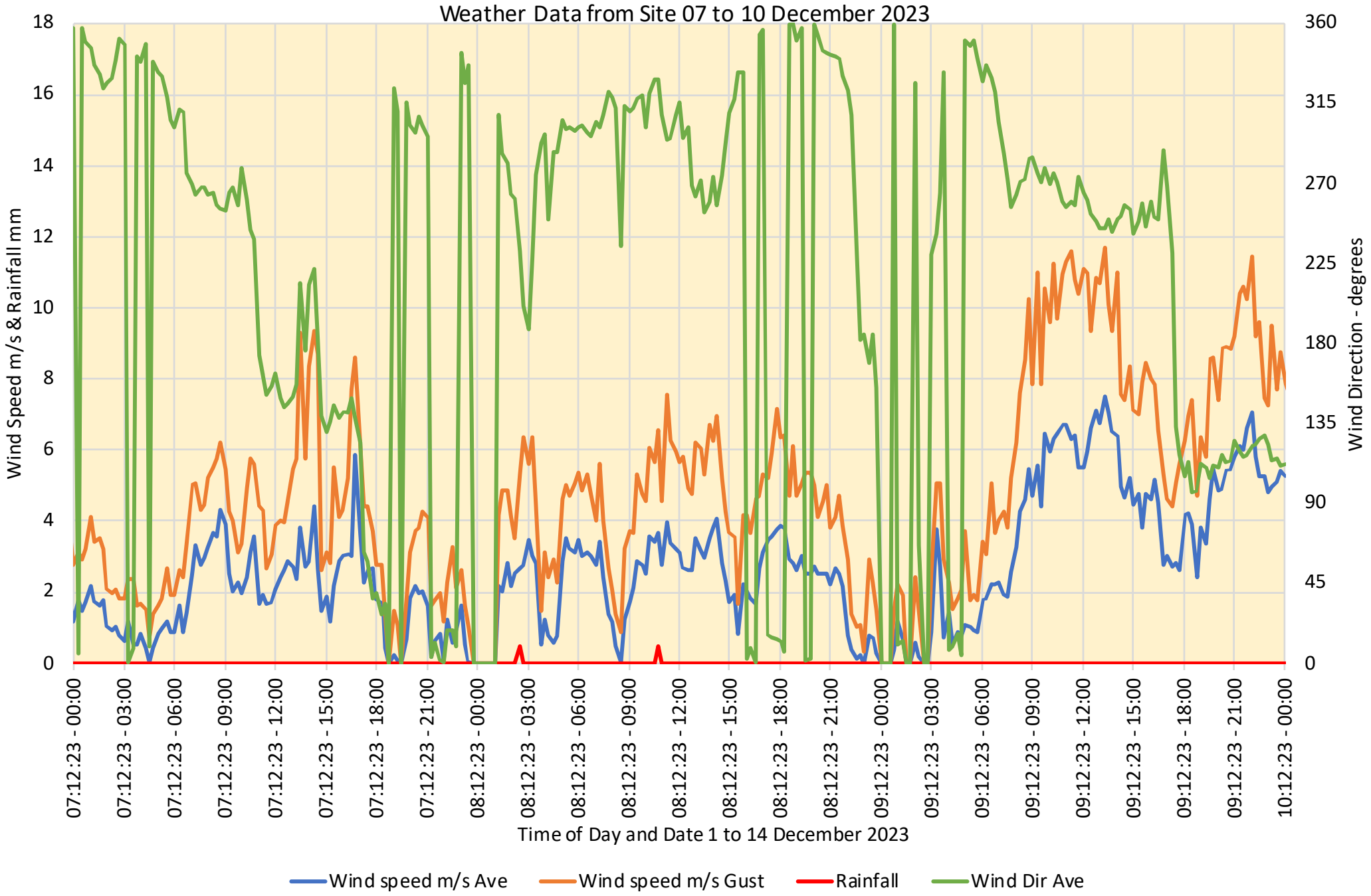
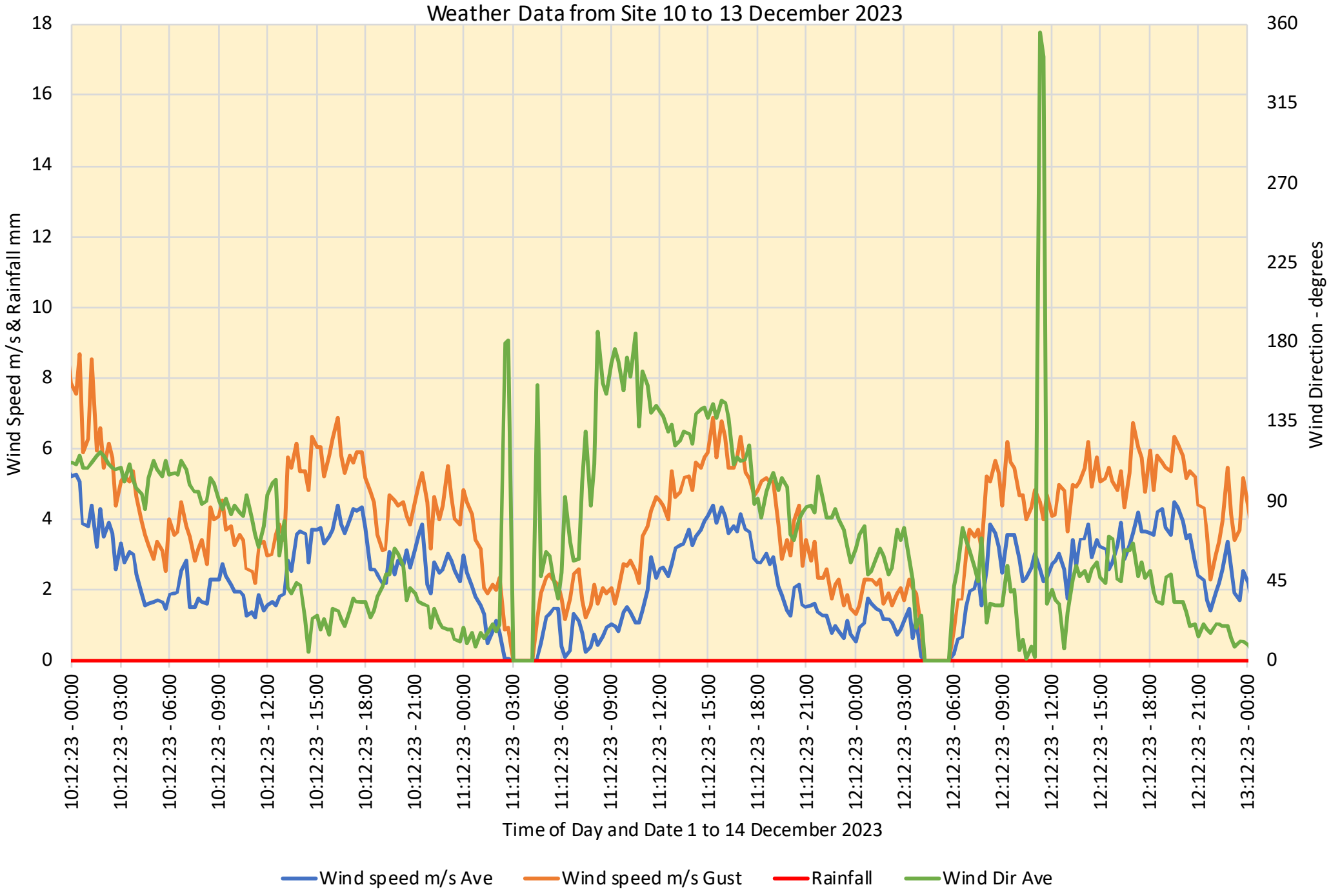
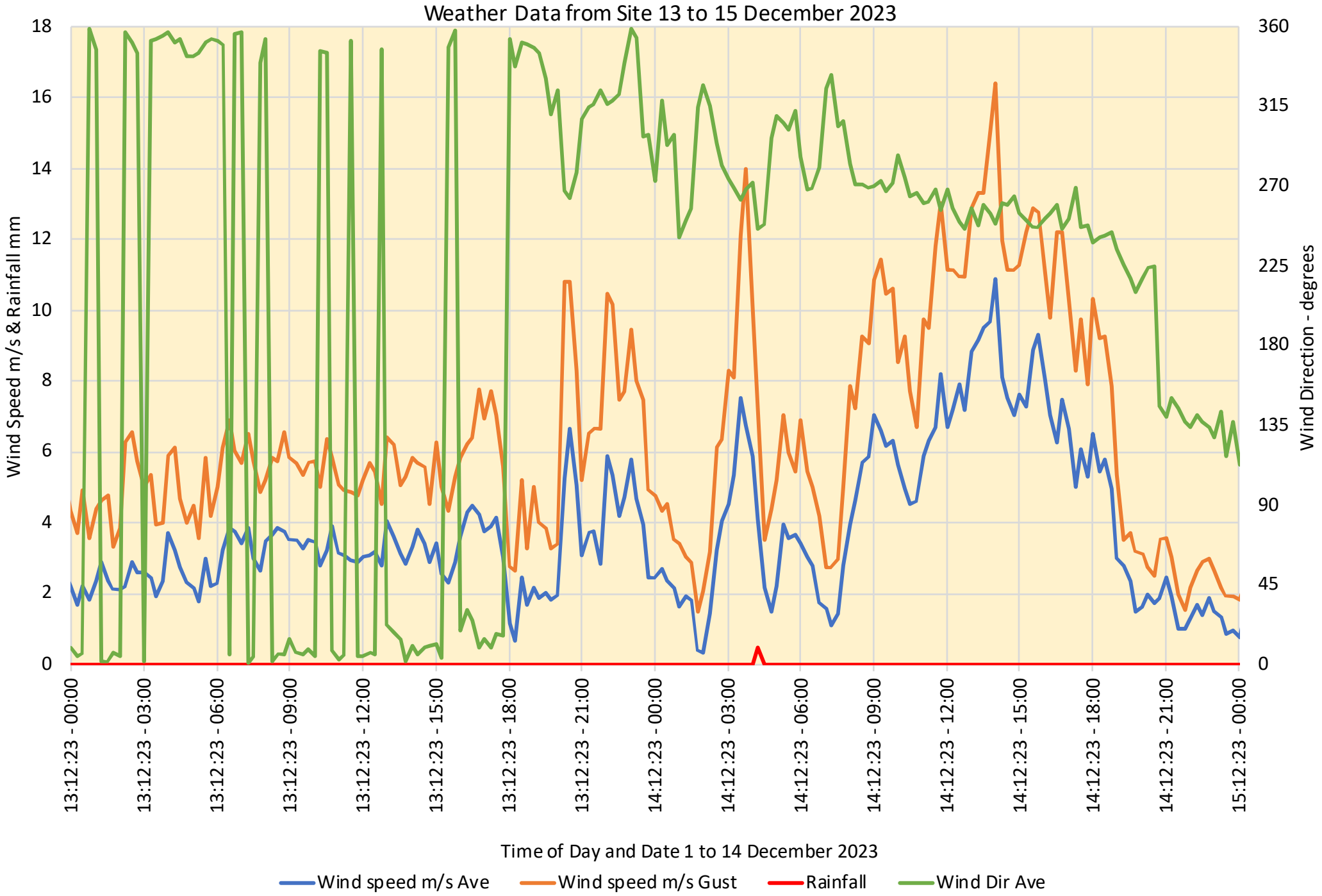


Figure 3.8: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 10 to 13 December 2023



Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Figure 3.9: Boral Cement Berrima - Annual Environmental Noise Assessment - Weather Data from Site 13 to 15 December 2023



Weather 20231201 to 14 BerrimaCement_Min15.xlsx

Table 3.1: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Wind Speed and Direction ranges

Wind Speed Range	0-0.1 m/s Calm	0.1 to 0.5 m/s	0.5-1 m/s	1-3 m/s	3-5 m/s	5-7.5 m/s	7.5-11 m/s	Total
Calm	6.94%							6.94%
N		0.28%	1.11%	6.53%	4.17%	0.14%	0.00%	12.22%
NNE		0.35%	0.35%	3.47%	5.14%	0.07%	0.00%	9.38%
NE		0.21%	0.56%	2.78%	1.81%	0.00%	0.00%	5.35%
ENE		0.56%	0.83%	3.19%	0.14%	0.00%	0.00%	4.72%
E		0.42%	0.97%	4.65%	1.32%	0.28%	0.00%	7.64%
ESE		0.28%	0.35%	2.43%	1.74%	1.32%	0.00%	6.11%
SE		0.14%	0.21%	2.36%	1.04%	0.07%	0.00%	3.82%
SSE		0.14%	0.35%	1.04%	0.07%	0.00%	0.00%	1.60%
S		0.28%	0.21%	1.11%	0.35%	0.00%	0.00%	1.94%
SSW		0.14%	0.14%	2.36%	2.01%	0.00%	0.00%	4.65%
SW		0.28%	0.42%	2.29%	2.22%	1.11%	0.21%	6.53%
WSW		0.07%	0.28%	2.85%	2.15%	2.43%	0.83%	8.61%
W		0.07%	0.21%	0.76%	0.83%	0.90%	0.00%	2.78%
WNW		0.35%	0.35%	2.57%	1.25%	0.00%	0.00%	4.51%
NW		0.35%	1.11%	3.06%	0.56%	0.14%	0.00%	5.21%
NNW		0.49%	0.63%	5.90%	0.90%	0.07%	0.00%	7.99%
Total		4.38%	8.06%	47.36%	25.69%	6.53%	1.04%	100.00%

wind rose 2023

Figure 3.10: Boral Cement Berrima Annual Noise Assessment 1 to 14 December 2023 Wind Rose for period

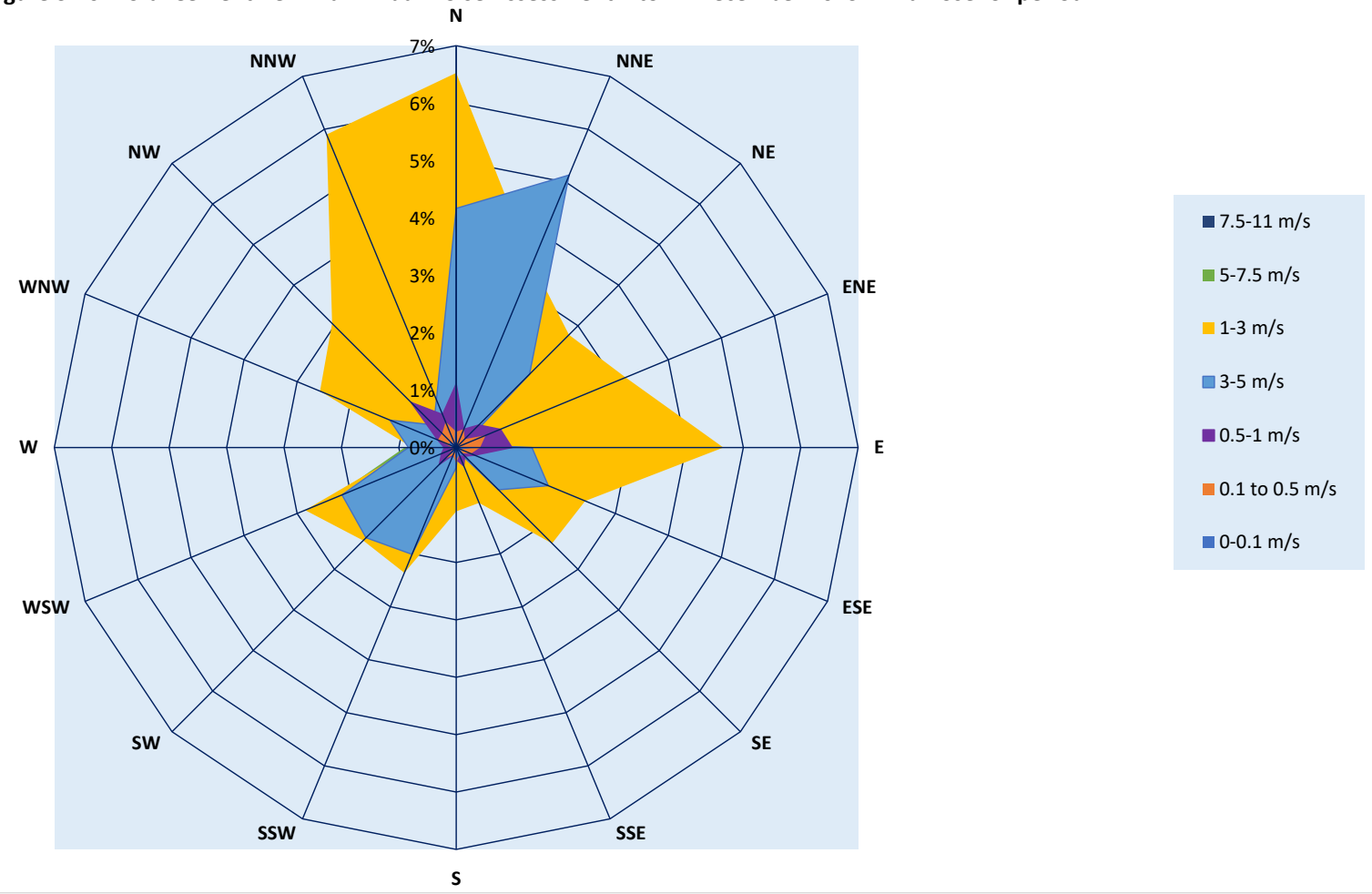
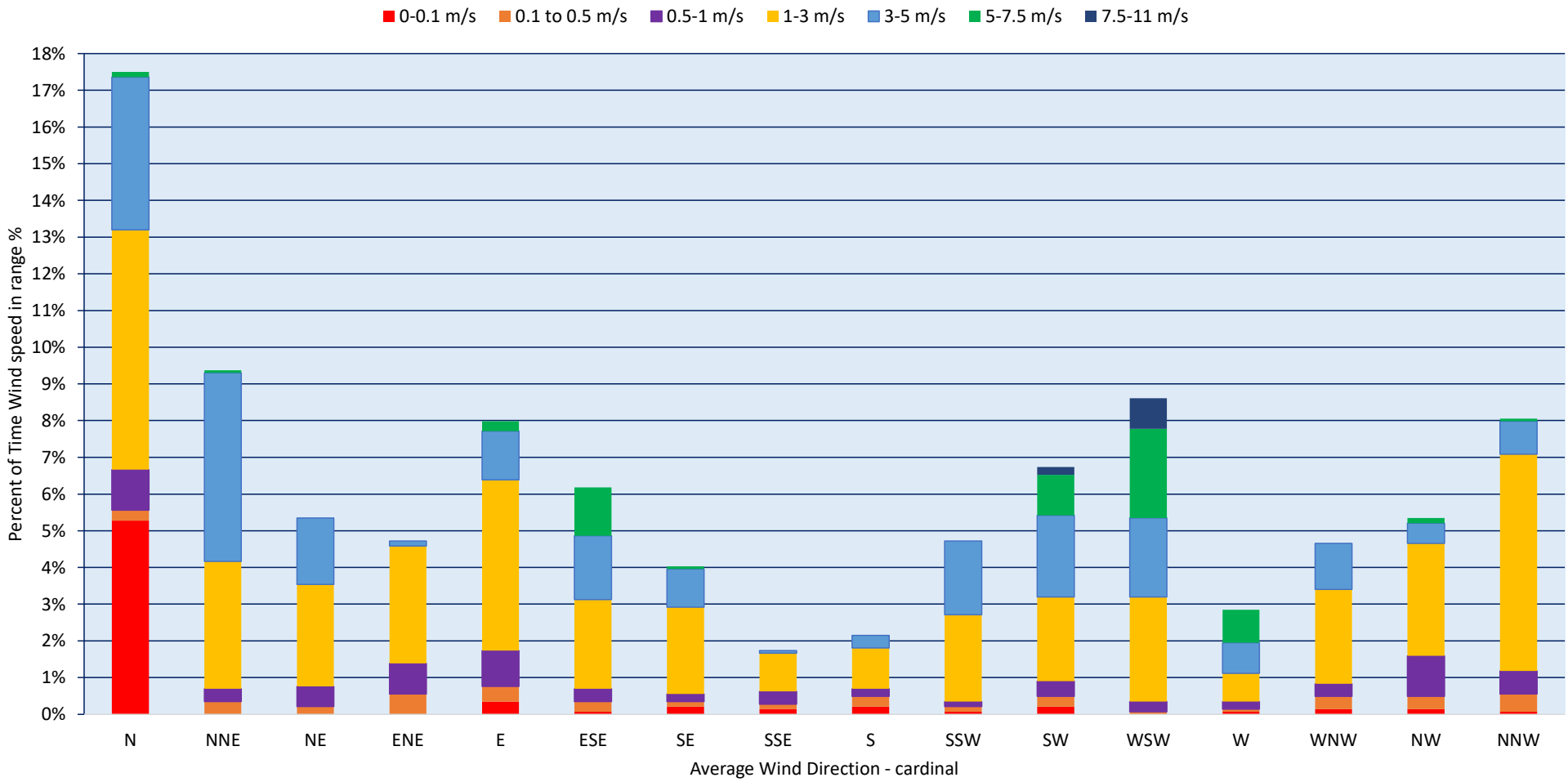


Figure 3.11: Boral Cement Berrima Annual Noise Assessment 1 to 14 December 2023
Wind Directions for period in speed ranges



wind rose 2023

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4 Results of Sound Level measurements

4.1 Long-term unattended monitoring results

Table 4.1 provides a summary of the statistical data for all monitored sites over the full period of the monitoring. Results for 4 Melbourne St, the Northern Fence and Location 20 are based on the long-term average sound levels over two weeks.

The results show that for average period (daytime, evening and night-time) $L_{Aeq,period}$ values, Location 20 averaged 55 to 57 dBA with evening being the lowest sound level period. $L_{A90,period}$ average was 53 dBA for daytime and evening and 54 dBA for night-time. This is below the long-term objective of 56 dBA. The two-day graphs of $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$ are shown in Appendix D. These results are discussed in more detail in the next section. The lowest period of sound levels at location 20 was on the evening of 8 December between 7:30 and 10:00pm when most of the major plant items were idle and the $L_{Aeq,15\text{-}min}$ was as low as 43 dBA and the $L_{A90,15\text{-}min}$ was the lowest of 42 dBA.

4 Melbourne Street unattended monitoring provides residential receiver long-term sound levels. The long-term average $L_{Aeq,period}$ sound levels were 53 dBA daytime, 51 dBA evening and 49 dBA night-time. These are 1 to 2 dB higher than in 2022 but 1 dB lower than the long-term average since 2002. Average $L_{A90,period}$ sound levels were 43 dBA daytime, evening and night-time. These are within 1 dB of 2022 results and the same as 2022 for evening and night-time, and lower than daytime when compared to the long-term average. The results of the two-day graphs of $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$ are shown in Appendix B. Night-time $L_{A90,15\text{-}min}$ sound levels ranged from 33 to 50 dBA, with some nights being in the range 35 to 40 dBA and others above 44 dBA. The difference between $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$ values was lowest in the night-time at 3 dB on some occasions, and highest in daytime with up to 15 or 16 dB difference most of the time, apart from event periods. The highest period of night-time $L_{A90.15min}$ sound levels was up to 50 dBA $L_{A90,15\text{-}min}$ at 10:00 pm to near midnight on 9 December may have been related to a period of higher wind speeds.

The major influence on night-time sound levels appeared to be wind speed, as noted in assessments for previous years. Wind direction had some influence on some occasions with northerly wind directions having lower sound levels sometimes and south-easterly winds having higher sound levels in some periods, but this was not always the case. Non-operation of major plant items did not appear to have a significant effect on sound levels.

Northern Boundary unattended measurement results are shown in Appendix C. Long-term average sound levels for $L_{Aeq,period}$ were 51 dBA daytime for all periods (day, evening and night). $L_{A90,period}$ average sound levels were 48 dBA for each of daytime and evening and 49 dBA for night-time. While the differences between the averages are low, there are times when the 15-minute $L_{Aeq,15\text{-}min}$ sound levels vary by 10 to 12 dB between measurements, either from local vehicle activities in the stores area nearby or from bird activity.

In each location, sound levels increased on most mornings from approximately 4:30am with the increase in bird activity, however this increase more often appeared to be related to wind speed.

Table 4.2 compares the long-term average results for 2020 with those measured since 2002. Overall, there have been no significant changes or increases in long-term average sound levels.

A measurement of sound levels over periods of 1 to 3 minutes has also been made on the roof of the Administration Building/Control Room during each annual survey since 2016. This is to provide a

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comparison and identify any changes in level and spectra over time. The results for the south-east corner location are also shown in Table 4.2. The results show only 2 dB variation over that time.

Figures 4.1 to 4.3 show graphs of the long-term average results as a type of time history comparison for each site. Figure 4.4 shows the results for the Administration Building roof location. These graphs also indicate there have been no significant increases in long-term sound levels from 2018 to 2022 or since measurements commenced in 2002.

The absence of significant increases in long-term average sound levels for logger monitored locations indicates that the noise emissions from the total plant are achieving compliance with the objectives.

Table 4.1: Boral Cement Berrima Annual Environmental Noise Assessment 2023
Comparison of Period LAEQ, Period Average LA10 and Period 90% LA90 Results for Location 20, North Fence and 4 Melbourne St
Summary of Statistical Data

	Day			Evening			Night			24 hour		
$L_{AEQ.15min}$	Max $L_{AEQ.Day}$	Min $L_{AEQ.Day}$	Ave $L_{AEQ.Day}$	Max $L_{AEQ.Eve.}$	Min $L_{AEQ.Eve.}$	Ave $L_{AEQ.Eve.}$	Max $L_{AEQ.Night}$	Min $L_{AEQ.Night}$	Ave $L_{AEQ.Night}$	Max $L_{AEQ.24hr}$	Min $L_{AEQ.24hr}$	Ave. $L_{AEQ.24hr}$
Location 20 - Cement Works	59	54	57	60	48	55	59	53	56	62	51	57
4 Melbourne St., New Berrima	58	48	53	60	46	51	50	46	49	55	46	50
North Fence, New Berrima	54	47	51	56	46	51	55	49	51	53	48	50

	Day				Evening				Night			
L90.15-min 10%	Max $L_{A90.Day}$	Min $L_{A90.Day}$	Ave $L_{A90.Day}$	Median $L_{A90.Day}$	Max $L_{A90.Eve.}$	Min $L_{A90.Eve.}$	Ave $L_{A90.Eve.}$	Median $L_{A90.Eve.}$	Max $L_{A90.Night}$	Min $L_{A90.Night}$	Ave $L_{A90.Night}$	Median $L_{A90.Night}$
Location 20 - Cement Works	54	49	51	51	56	42	52	53	56	48	52	52
4 Melbourne St., New Berrima	46	36	42	42	46	32	41	41	46	34	40	39
North Fence, New Berrima	50	42	46	46	53	39	47	48	52	42	47	47

	Day				Evening				Night			
L90.15-min	Max $L_{A90.Day}$	Min $L_{A90.Day}$	Ave $L_{A90.Day}$	Median $L_{A90.Day}$	Max $L_{A90.Eve.}$	Min $L_{A90.Eve.}$	Ave $L_{A90.Eve.}$	Median $L_{A90.Eve.}$	Max $L_{A90.Night}$	Min $L_{A90.Night}$	Ave $L_{A90.Night}$	Median $L_{A90.Night}$
Location 20 - Cement Works	55	49	53	53	56	44	53	54	57	51	54	54
4 Melbourne St., New Berrima	46	38	43	44	48	35	43	43	47	40	43	44
North Fence, New Berrima	51	43	48	48	53	40	48	49	53	45	49	49

Table 4.2: Boral Cement Berrima - 2022 Annual Environmental Noise Review: Comparison of statistical sound levels 2002 to 2022

Receiver Location 4 Melbourne Street

Parameter	Period	Survey Dates																																Statistics			
		Sep-02	Jan-03	Feb-03	Feb-04	Mar-04	Apr-04	May-04	Sep-04	Jan-06	Feb-06	Jun-06	Apr-07	Jun-08	Dec-08	Sep-10	Jun-11	Jul-11	Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Sep-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day	57	50	54	55	54	56	54	54	56	56	58	56	55	57	56	52	56	56	55	56	53	56	57			56	53	52	53	54	53	52	53	58	50	55	1.9
	Evening	53	48	54	54	65	53	51	50	60	57	53	52	54	59	53	52	51	51	50	52	50	53	52			53	49	49	48	49	48	49	51	65	48	52	3.8
	Night	53	44	49	47	49	50	51	49	51	51	51	52	51	56	52	50	50	51	49	51	51	52	52			52	48	48	47	47	47	48	49	56	44	50	2.3
LA90.ave	Day	46	40	43	43	44	45	45	44	44	45	47	46	47	50	47	45	46	46	43	45	43	48	48			48	44	43	43	43	43	44	43	50	40	45	2.1
	Evening	44	39	42	42	42	44	45	43	45	46	47	46	46	49	46	39	39	45	40	39	42	47	46			46	42	42	42	42	42	43	43	49	39	43	2.7
	Night	44	37	41	39	40	44	45	43	42	46	46	46	45	50	46	38	38	44	36	40	42	47	45			46	42	42	42	41	41	42	43	50	36	43	3.2
10%LA90.med	Day	44	38	41	39	41	43	43	42	43	43	45	45	45	43	45	42	44	43	40	43	41	45	46			45	42	41	40	41	40	41	42	46	38	42	2.0
	Evening	42	37	40	40	39	42	44	42	43	43	45	44	45	46	43	38	41	42	33	34	41	45	44			45	41	41	40	41	39	42	41	46	33	41	3.0
	Night	42	35	39	37	37	42	43	41	42	43	44	44	44	44	44	38	40	41	29	34	40	44	43			43	40	40	39	38	39	41	39	44	29	40	3.5
																	Most Off	Most on		Most Off	Most on																	

Receiver Location 4 Northern Boundary

Parameter	Period	Survey Dates																																Statistics			
		Sep-02	Jan-03	Feb-03	Feb-04	Mar-04	Apr-04	May-04	Sep-04	Jan-06	Feb-06	Jun-06	Apr-07	Jun-08	Aug-10	Sep-10	Jun-11	Jul-11	Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Sep-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day	52												63	53	50	52	55	52	49	50	51	51	52	51	54	53	51	53	51	51	51	54	51	63	49	52	2.8
	Evening	52												54	51	49	49	51	50	45	49	50	50	51	50	51	53	49	53	51	51	51	52	51	54	45	51	1.9
	Night	53												54	51	50	47	52	51	44	50	49	51	52	51	52	52	49	52	51	51	51	53	51	54	44	51	2.1
LA90.ave	Day	48												53	49	47	47	51	48	43	46	44	47	49	49	51	49	47	49	48	48	47	48	48	53	43	48	2.2
	Evening	50												53	48	47	45	49	48	41	47	47	48	48	48	50	49	47	51	48	48	48	48	48	53	41	48	2.3
	Night	50												53	49	47	43	49	48	39	47	46	48	48	46	50	49	47	49	49	45	47	48	49	53	39	48	2.8
10%LA90.ave	Day	46												51	48	46	44	49	46	41	45	46	46	47	47	49	47	45	47	45	45	44	46	46	51	41	46	2.1
	Evening	48												51	47	46	42	49	46	40	46	45	47	47	46	49	47	45	50	46	47	46	48	48	51	40	47	2.4
	Night	48												51	47	47	42	48	46	37	45	44	47	48	48	49	47	45	48	46	45	45	47	47	51	37	46	2.8
																	Most Off	Most on		Most Off	Most on																	

Receiver Location 20 Store Yard Close from 2015

Parameter	Period	Survey Dates																																Statistics			
																								Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Nov-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day																							58		58	58	59	56	62	56	57	57	57	62	56	58	1.7
	Evening																							56		56	53	55	55	59	55	55	56	55	59	53	55	1.5
	Night																							57		56	53	57	55	57	55	56	56	56	57	53	56	1.1
LA90.ave	Day																							54		53	53	53	52	53	52	52	53	53	54	52	53	0.7
	Evening																							54		53	50	53	53	52	52	52	54	53	54	50	53	1.1
	Night																							54		53	50	54	53	53	53	52	53	54	54	50	53	1.2
10%LA90.ave	Day																							52		52	52	52	51	53	51	44	52	51	53	44	51	2.5
	Evening																							53		52	51	53	51	51	51	46	53	53	53	46	51	2.1
	Night																							51		52	51	53	52	52	51	45	52	52	53	45	51	2.2

Table 4.2: Boral Cement Berrima - 2022 Annual Environmental Noise Review: Comparison of statistical sound levels 2002 to 2022 continued

Receiver Location 4 Melbourne Street

Parameter	Period	Survey Dates																																Statistics			
		Sep-02	Jan-03	Feb-03	Feb-04	Mar-04	Apr-04	May-04	Sep-04	Jan-06	Feb-06	Jun-06	Apr-07	Jun-08	Dec-08	Sep-10	Jun-11	Jul-11	Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Sep-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day	57	50	54	55	54	56	54	54	56	56	58	56	55	57	56	52	56	56	55	56	53	56	57			56	53	52	53	54	53	52	53	58	50	55	1.9
	Evening	53	48	54	54	65	53	51	50	60	57	53	52	54	59	53	52	51	51	50	52	50	53	52			53	49	49	48	49	48	49	51	65	48	52	3.8
	Night	53	44	49	47	49	50	51	49	51	51	51	52	51	56	52	50	50	51	49	51	51	52	52			52	48	48	47	47	47	48	49	56	44	50	2.3
LA90.ave	Day	46	40	43	43	44	45	45	44	44	45	47	46	47	50	47	45	46	46	43	45	43	48	48			48	44	43	43	43	43	44	43	50	40	45	2.1
	Evening	44	39	42	42	42	44	45	43	45	46	47	46	46	49	46	39	39	45	40	39	42	47	46			46	42	42	42	42	42	43	43	49	39	43	2.7
	Night	44	37	41	39	40	44	45	43	42	46	46	46	45	50	46	38	38	44	36	40	42	47	45			46	42	42	42	41	41	42	43	50	36	43	3.2
10%LA90.med	Day	44	38	41	39	41	43	43	42	43	43	45	45	45	43	45	42	44	43	40	43	41	45	46			45	42	41	40	41	40	41	42	46	38	42	2.0
	Evening	42	37	40	40	39	42	44	42	43	43	45	44	45	46	43	38	41	42	33	34	41	45	44			45	41	41	40	41	39	42	41	46	33	41	3.0
	Night	42	35	39	37	37	42	43	41	42	43	44	44	44	44	44	38	40	41	29	34	40	44	43			43	40	40	39	38	39	41	39	44	29	40	3.5
																	Most Off	Most on		Most Off	Most on																	

Receiver Location 4 Northern Boundary

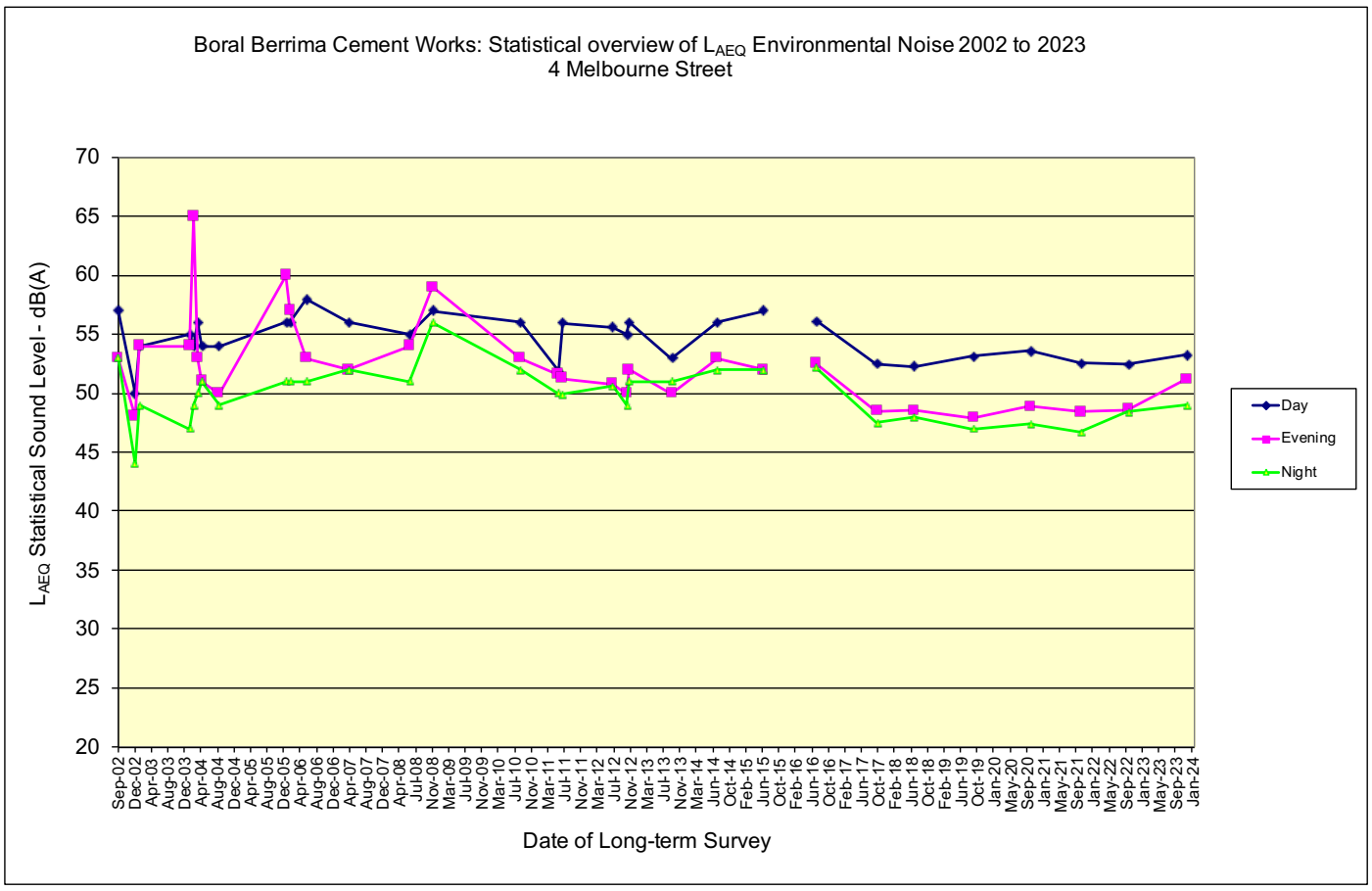
Parameter	Period	Survey Dates																																Statistics			
		Sep-02	Jan-03	Feb-03	Feb-04	Mar-04	Apr-04	May-04	Sep-04	Jan-06	Feb-06	Jun-06	Apr-07	Jun-08	Aug-10	Sep-10	Jun-11	Jul-11	Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Sep-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day	52												63	53	50	52	55	52	49	50	51	51	52	51	54	53	51	53	51	51	51	54	51	63	49	52	2.8
	Evening	52												54	51	49	49	51	50	45	49	50	50	51	50	51	53	49	53	51	51	51	52	51	54	45	51	1.9
	Night	53												54	51	50	47	52	51	44	50	49	51	52	51	52	52	49	52	51	51	51	53	51	54	44	51	2.1
LA90.ave	Day	48												53	49	47	47	51	48	43	46	44	47	49	49	51	49	47	49	48	48	47	48	48	53	43	48	2.2
	Evening	50												53	48	47	45	49	48	41	47	47	48	48	48	50	49	47	51	48	48	48	48	48	53	41	48	2.3
	Night	50												53	49	47	43	49	48	39	47	46	48	48	46	50	49	47	49	49	45	47	48	49	53	39	48	2.8
10%LA90.ave	Day	46												51	48	46	44	49	46	41	45	46	46	47	47	49	47	45	47	45	45	44	46	46	51	41	46	2.1
	Evening	48												51	47	46	42	49	46	40	46	45	47	47	46	49	47	45	50	46	47	46	48	48	51	40	47	2.4
	Night	48												51	47	47	42	48	46	37	45	44	47	48	48	49	47	45	48	46	45	45	47	47	51	37	46	2.8
																	Most Off	Most on		Most Off	Most on																	

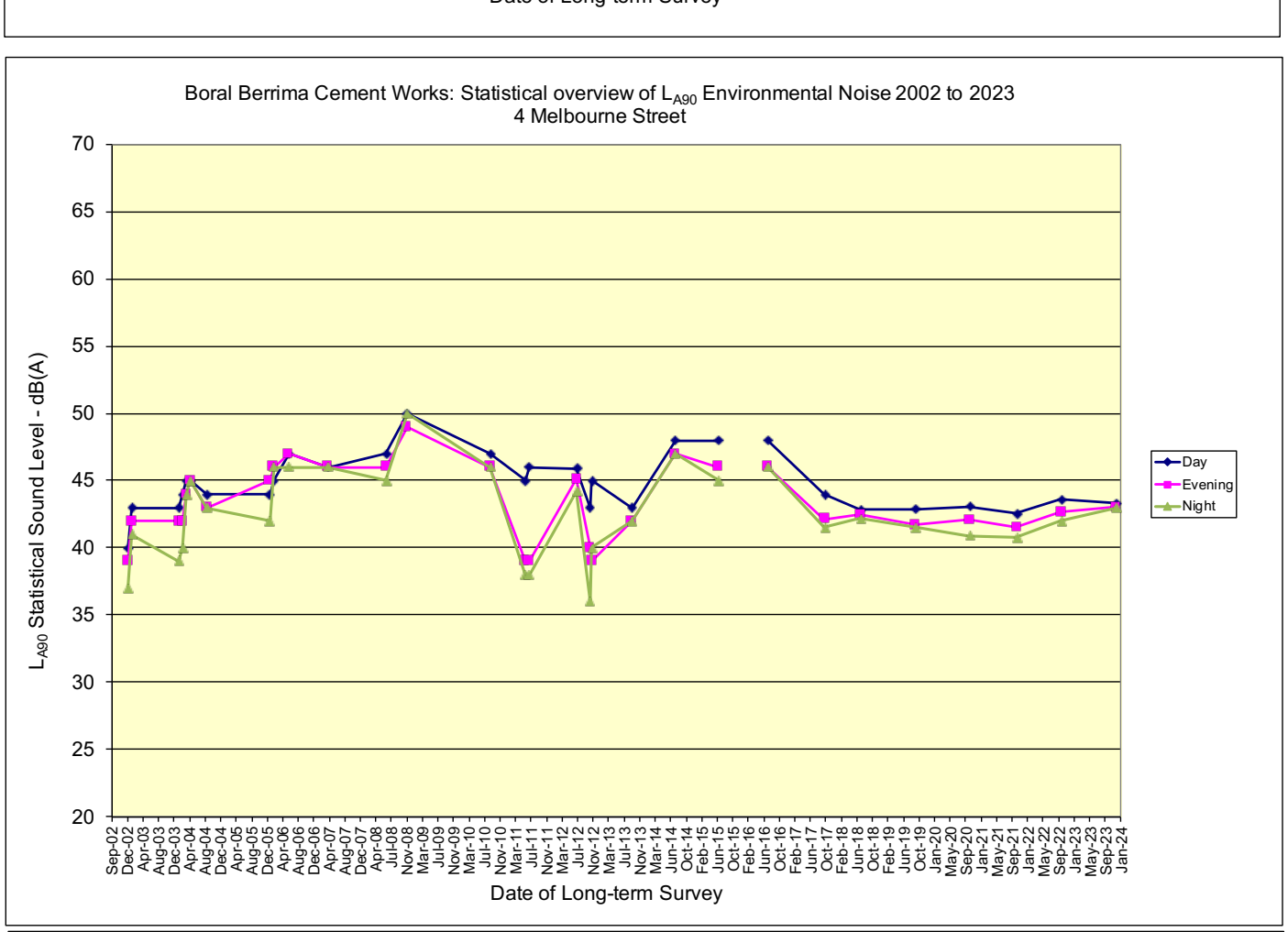
Receiver Location 20 Store Yard Close from 2015

Parameter	Period	Survey Dates																																Statistics			
																								Jul-15	Apr-16	May-16	Jul-16	Sep-17	Jul-18	Nov-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day																							58		58	58	59	56	62	56	57	57	57	62	56	58	1.7
	Evening																							56		56	53	55	55	59	55	55	56	55	59	53	55	1.5
	Night																							57		56	53	57	55	57	55	56	56	56	57	53	56	1.1
LA90.ave	Day																							54		53	53	53	52	53	52	52	53	53	54	52	53	0.7
	Evening																							54		53	50	53	53	52	52	52	54	53	54	50	53	1.1
	Night																							54		53	50	54	53	53	53	52	53	54	54	50	53	1.2
10%LA90.ave	Day																							52		52	52	52	51	53	51	44	52	51	53	44	51	2.5
	Evening																							53		52	51	53	51	51	51	46	53	53	53	46	51	2.1
	Night																							51		52	51	53	52	52	51	45	52	52	53	45	51	2.2

Receiver Location Admin Building Roof South East Corner

Parameter	Period	Survey Dates								Statistics			
		Jul-16	Sep-17	Jul-18	Sep-19	Oct-20	Oct-21	Oct-22	Dec-23	Max	Min	Ave	SD
LAEQ.ave	Day Leq	71	72	72	72	71	72	70	72	72	70	71	0.8
LA90.ave	Day L90	70	71	72	72	71	72	70	70	72	70	71	0.8





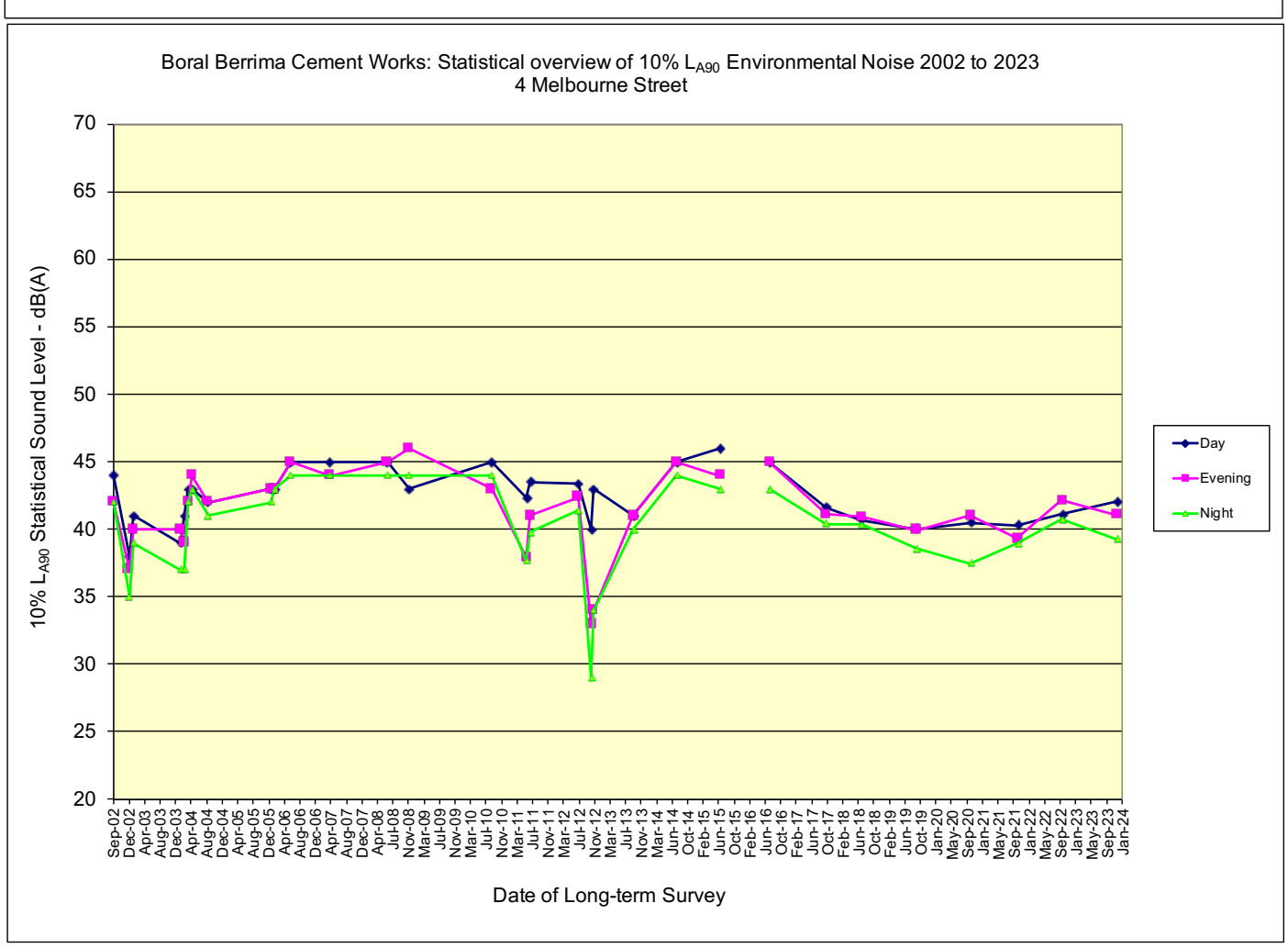


Figure 4.1: Comparison of statistical sound levels for 4 Melbourne Street location

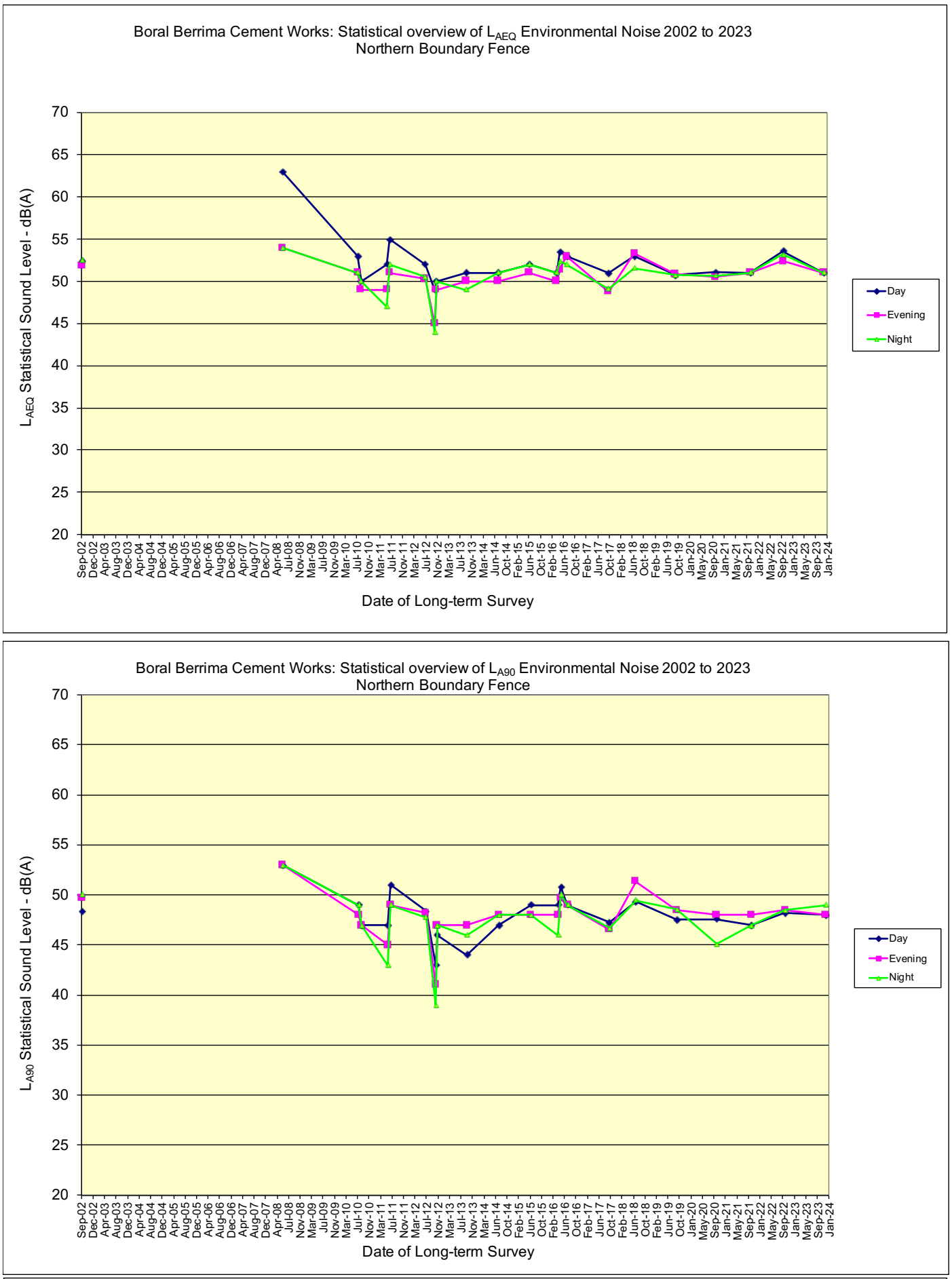
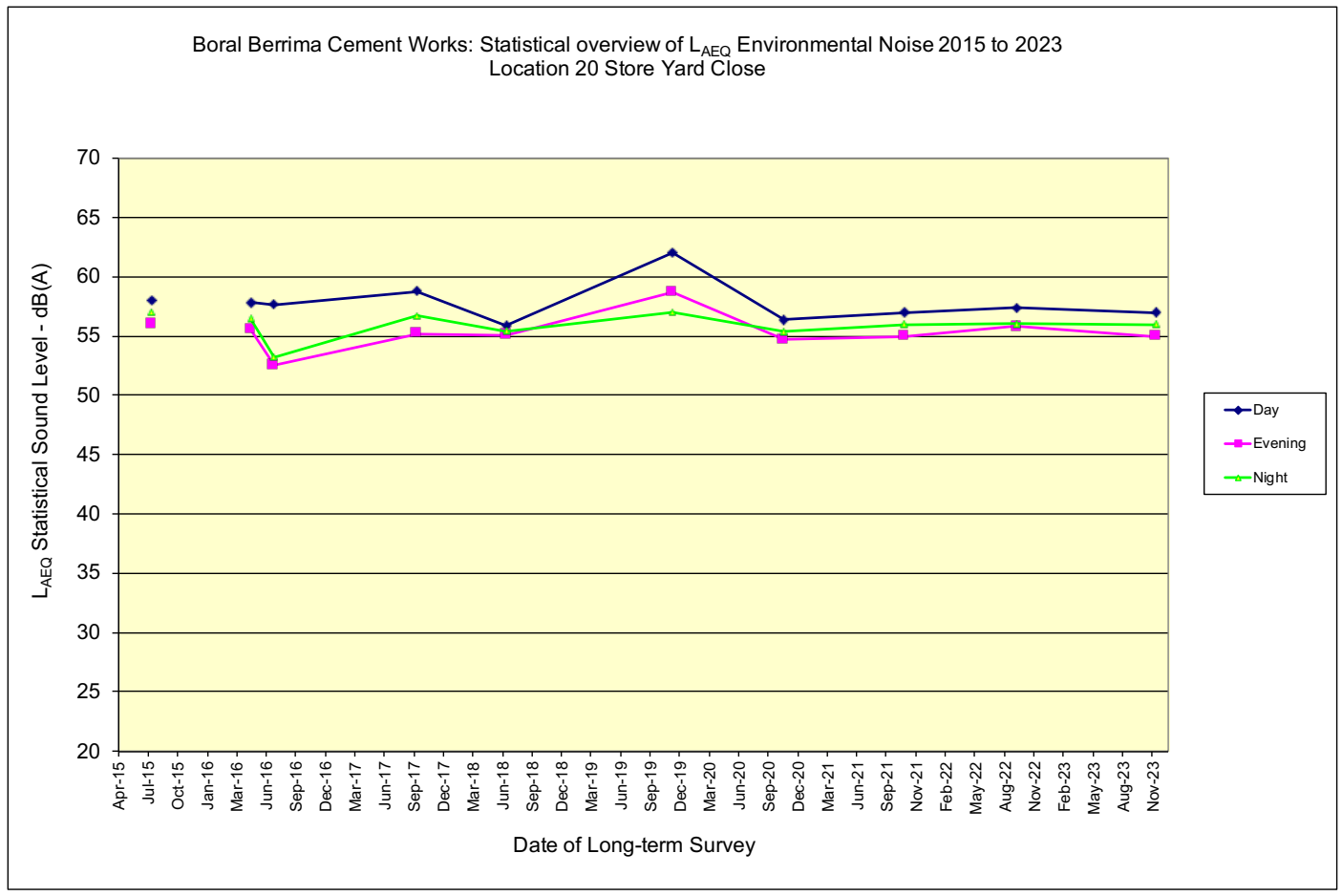
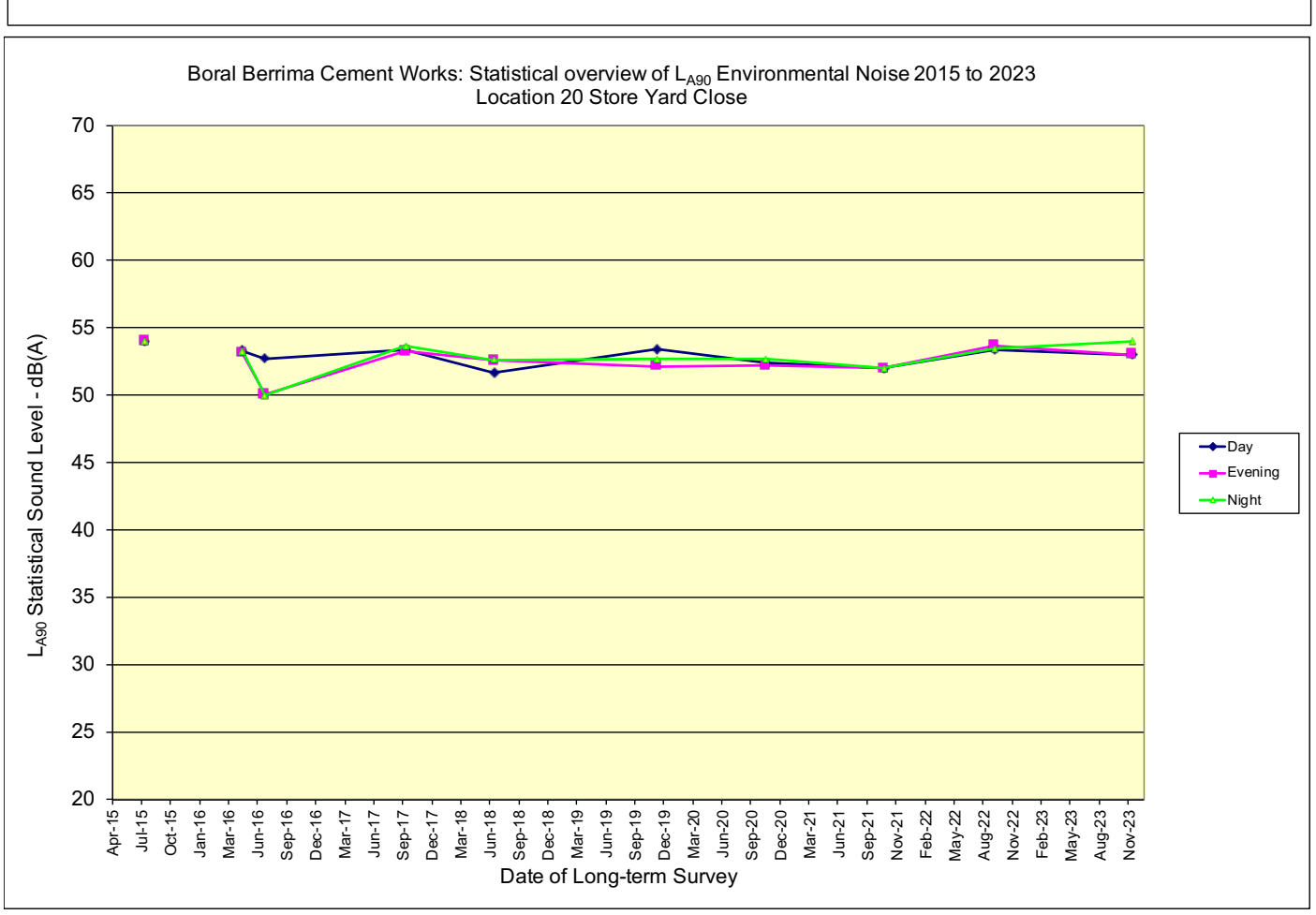


Figure 4.2: Comparison of statistical sound levels for Northern Boundary Fence location





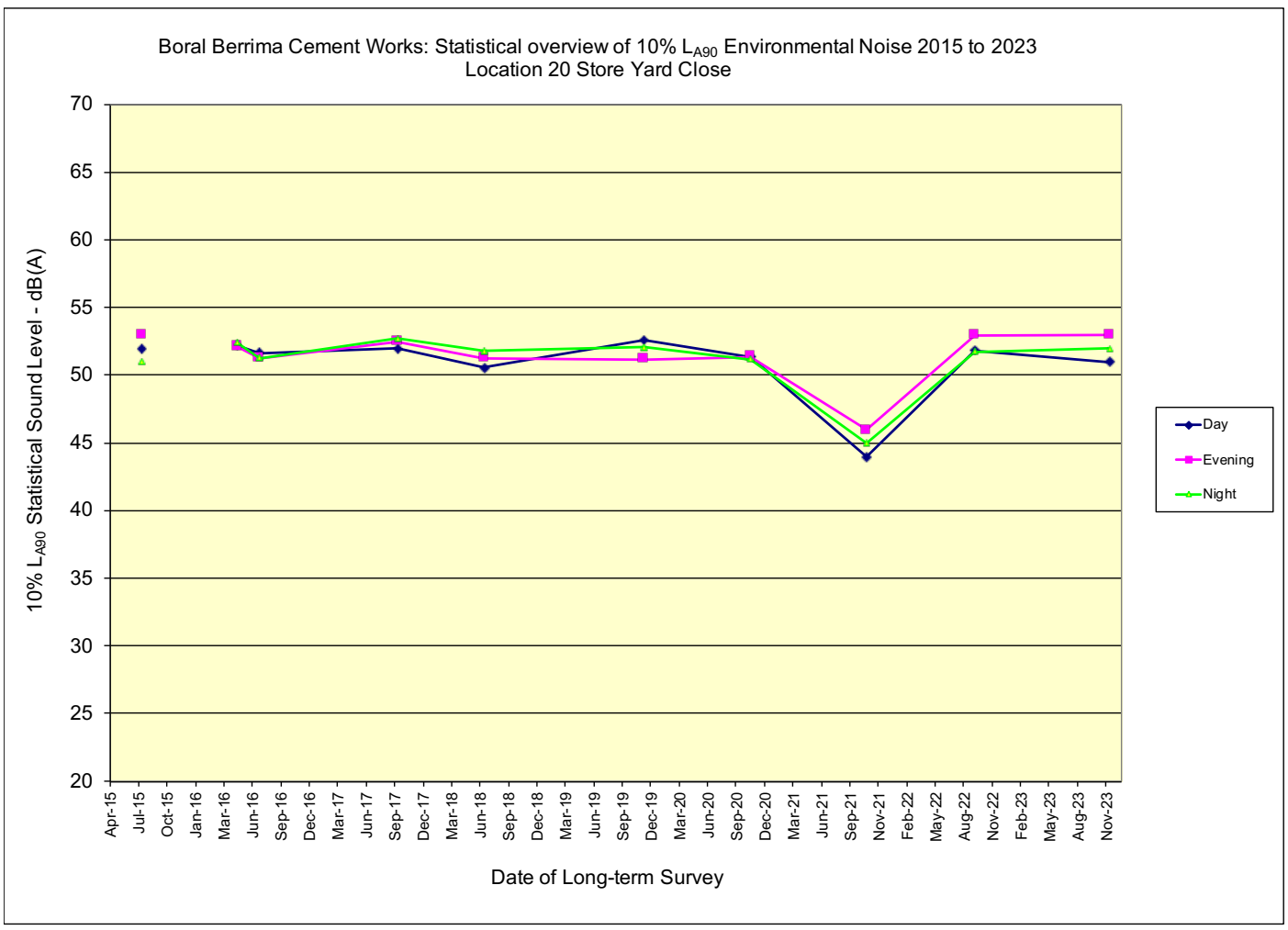


Figure 4.3: Comparison of statistical sound levels for Store Yard Close location

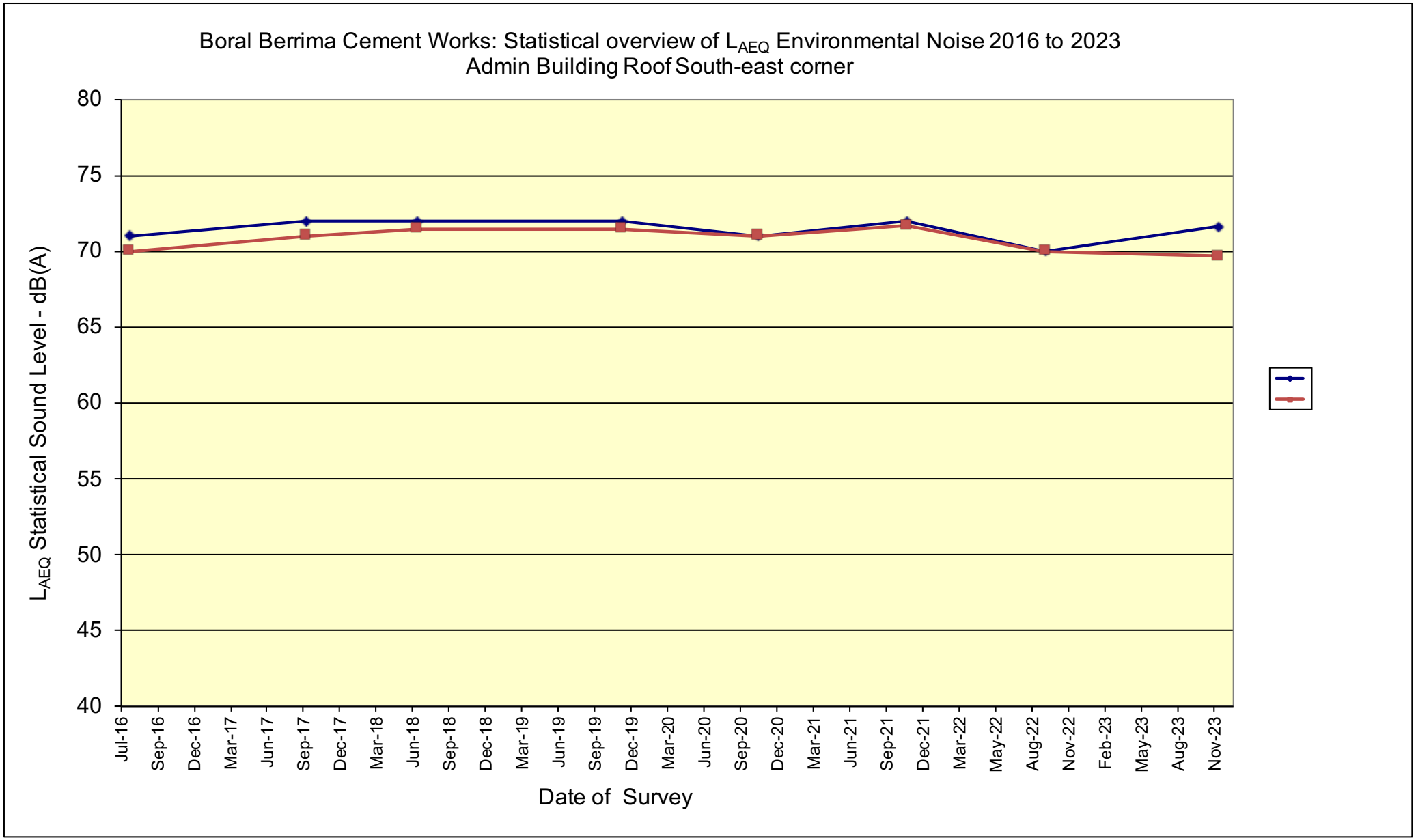


Figure 4.4: Comparison of short-term statistical sound levels for SE corner of Admin Building

4.2 Location 20 Store Yard (Close) location results compared to licence conditions and recommendations

4.2.1 $L_{A90,period}$ sound levels

The licence condition for noise emissions from the site is consolidated into measurements at Location 20, with $L_{A90,15\text{-minutes}}$ not to exceed 58 dBA. The PRP recommended objectives for the Store Yard Close location were a long-term average $L_{A90.period}$ not greater than 56 dBA or 58 dBA for any 15-minute period. Measurement methods have to be generally as required in the NSW Noise Policy for Industry – this means omission of results during high wind speed or rainfall or from extraneous sources. Results of the measurements are provided in Appendix D.

For the 14 days of measurements, the highest 15-minute period value for $L_{A90,15\text{-min}}$ was 59 dBA, which is similar to or lower than the highest 15-minute sound levels in previous years. This occurred in the 15-minute interval starting at 22:45 on the night of 9 December. Similar high sound levels occurred during the period 10:00pm to 2:00am, ranging from 57 to 59 dBA $L_{A90\text{-}15\text{-}min}$. A total of seven 15-minute intervals in this period had sound levels greater than 58.0 dBA and 11 had $L_{A90\text{-}15\text{-}min}$ sound levels greater than 57.5 dBA. During this period there were relatively high wind speeds occurring from 6 to 9 m/s from East-South-East to East. The period from 9:15pm to 10 pm had wind speeds above 10m/s.

There were 9 of 1222 15-minute intervals which had $L_{A90,15\text{-minutes}}$ exceed 58 dBA. This is 0.74% of the monitored periods. Table 4.3 shows the number of $L_{A90,15\text{-minute}}$ sound levels at specific values between 42 and 59 dBA and these are also shown graphically in Figures 4.5 to 4.8. The specific 15-minute noise objective was not exceeded for 99.3% of the measurements. The times when the $L_{A90,15\text{-minute}}$ sound level values were above 58 dBA were caused by high windspeeds causing vegetation noise close to the monitor and other activities east to north-east of the monitor, not from normal plant activities.

The highest 15-minute period value for $L_{A90,15\text{-min}}$ was 58.9 dBA. This occurred in the 15-minute period from 22:45 pm to 23:00 pm on 9 December 2023, and is considered to have been caused by activities in or around the stores area. Evidence of this is from the detection of the starting up of a diesel-electric generator in a direction east – northeast (75 degrees) from the Location 20 logger. The difference in sound level of the $L_{AFMax50Hz}$ observed between the North Fence and Location 20 was determined to be 4 to 6 dB. This difference indicates that the generator was no more than 100 m from the Location 20 logger.

The other exceedance recorded for the survey was in the same activity event recorded from 23:30 pm to 23:45 pm on the 9 December 2023 with the $L_{A90,15\text{-min}}$ being 58.6 dBA. The sound levels measured in the periods between these two exceedance events and the one after (i.e. 23:45 to 24:00) were also relatively high, being greater than 58 dBA but less than 58.5 dBA. Figure 4.9 and 4.10 show the L_{AFSPL}, $L_{AFMax50Hz}$ and $L_{AFMax63Hz}$ parameters clearly starting at the time when a noise at the 75 degrees is identified. The 50 Hz band sound level indicates an electrical energy source and the 63 Hz band indicates the presence of a diesel motor. It should be noted that there is noise detected in the activity event in the direction greater than 80 degrees, indicating activities generating extraneous noise in that north-easterly direction for that period. Figures 4.11 and 4.12 show the L_{AFSPL} in the exceedance event periods after listening to the audio files to observe the noise from the North Fence logger location. These figures highlight bangs and thumps both of the exceedance events as well as vehicle movements in the stock yard.

ABN: 25 153 946 064
ACN: 153 946 064

The sources identified in Figures 4.9 to Figures 4.12 are considered extraneous to normal plant operations and the sound levels from these periods are not included in the assessment level. This analysis of acceptable sound level periods monitored at Location 20 for the full 14-day period are considered to be less than or not greater than the licence condition and compliance is achieved.

Table 4.3 : BoralCement Berrima Annual Environemtnal Noise December 2023 - Location 20
LA90,15-min Sound Level occurrences and percentages

LA90,15-min dBA	No. at level	% at level	Cumulative %	- Cumulative %	Cumulative No.	Percentile	LA90,15-min
42	3	0.2%	0.16%	99.84%	2	0%	41.9
42.5	2	0.2%	0.41%	99.59%	5	1%	44.9
43	3	0.2%	0.57%	99.43%	7	2%	47.6
43.5	2	0.2%	0.82%	99.18%	10	3%	48.7
44	0	0.0%	0.98%	99.02%	12	4%	48.9
44.5	1	0.1%	0.98%	99.02%	12	5%	49.2
45	1	0.1%	1.06%	98.94%	13	10%	50.3
45.5	0	0.0%	1.15%	98.85%	14	15%	51.0
46	3	0.2%	1.15%	98.85%	14	20%	51.6
46.5	1	0.1%	1.39%	98.61%	17	25%	52.0
47	7	0.6%	1.47%	98.53%	18	30%	52.4
47.5	5	0.4%	2.05%	97.95%	25	40%	53.0
48	2	0.2%	2.45%	97.55%	30	50%	53.4
48.5	22	1.8%	2.62%	97.38%	32	60%	53.9
49	21	1.7%	4.42%	95.58%	54	70%	54.6
49.5	23	1.9%	6.14%	93.86%	75	75%	55.0
50	40	3.3%	8.02%	91.98%	98	80%	55.5
50.5	47	3.8%	11.29%	88.71%	138	85%	55.9
51	50	4.1%	15.14%	84.86%	185	90%	56.2
51.5	75	6.1%	19.23%	80.77%	235	95%	56.7
52	81	6.6%	25.37%	74.63%	310	96%	56.9
52.5	104	8.5%	32.00%	68.00%	391	97%	57.0
53	150	12.3%	40.51%	59.49%	495	97.5%	57.1
53.5	119	9.7%	52.78%	47.22%	645	98.0%	57.3
54	80	6.5%	62.52%	37.48%	764	98.5%	57.4
54.5	67	5.5%	69.07%	30.93%	844	99.0%	57.7
55	68	5.6%	74.55%	25.45%	911	99.1%	57.8
55.5	71	5.8%	80.11%	19.89%	979	99.2%	57.9
56	87	7.1%	85.92%	14.08%	1050	99.3%	58.0
56.5	47	3.8%	93.04%	6.96%	1137	99.4%	58.2
57	23	1.9%	96.89%	3.11%	1184	99.5%	58.2
57.5	6	0.5%	98.77%	1.23%	1207	99.6%	58.2
58	7	0.6%	99.26%	0.74%	1213	99.7%	58.3
58.5	2	0.2%	99.84%	0.16%	1220	99.75%	58.3
59	0	0.0%	100.00%	0.00%	1222	99.80%	58.3
						99.85%	58.4
						99.90%	58.5
						99.95%	58.7
						100%	58.9

Figure 4.5. : Boral Cement Berrima Annual Environmental Noise 2023 - Location 20 LA90,15-min sound levels occurrence

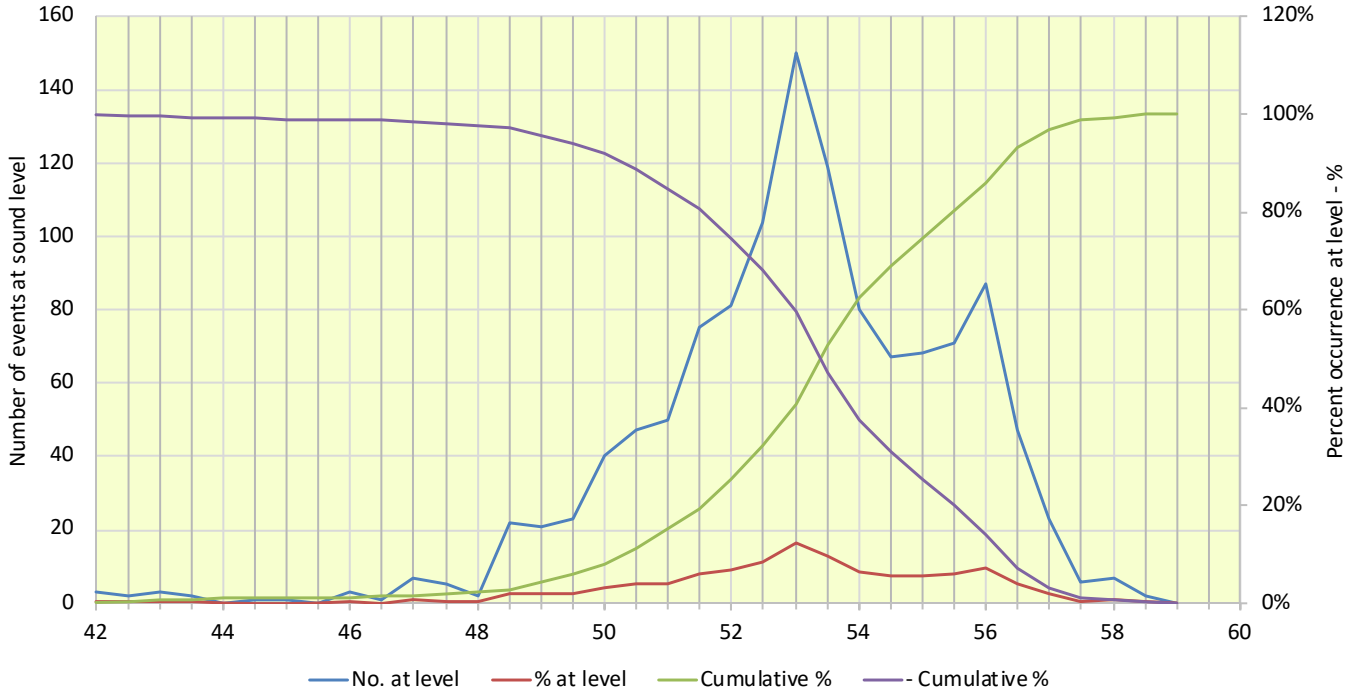


Figure 4.6 : Boral Cement Berrima Annual Environmental Noise 2023 - Location 20 LA90,15-min sound levels occurrence

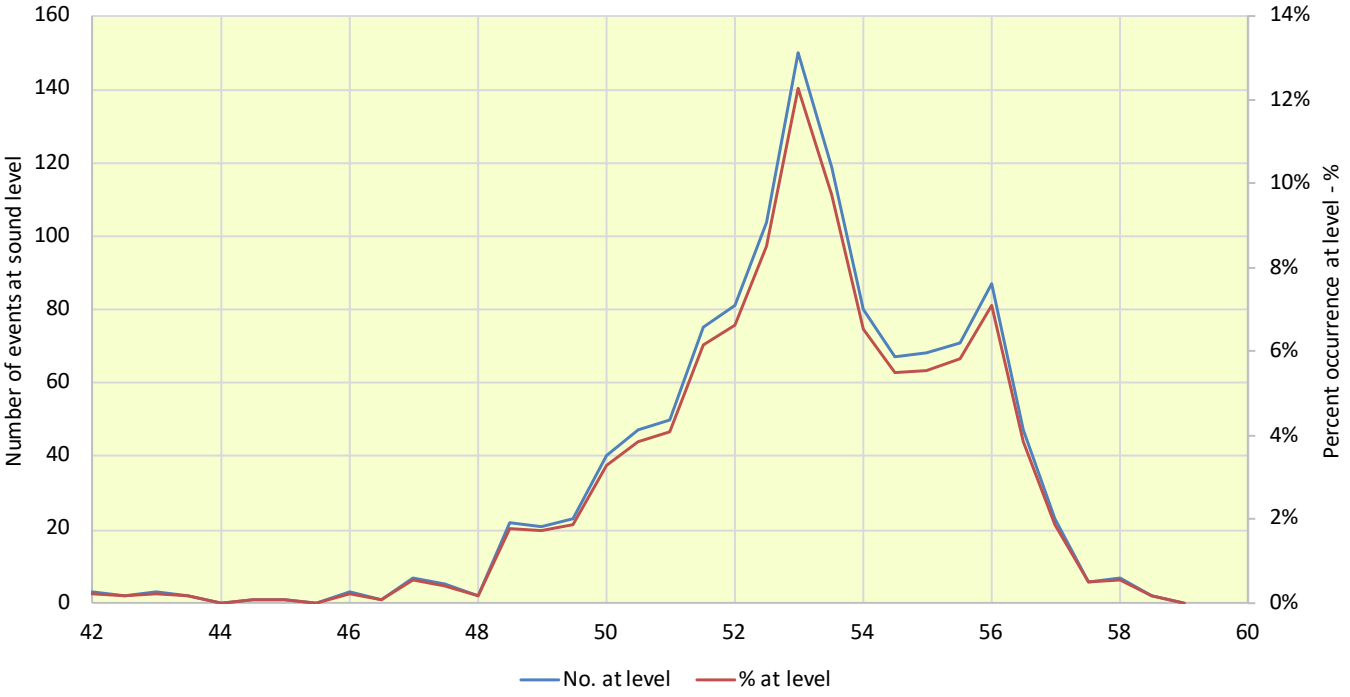


Figure 4.7 : Boral Cement Berrima Annual Environmental Noise October 2023 -
Location 20 Percentile occurrence of LA90,15-min sound levels

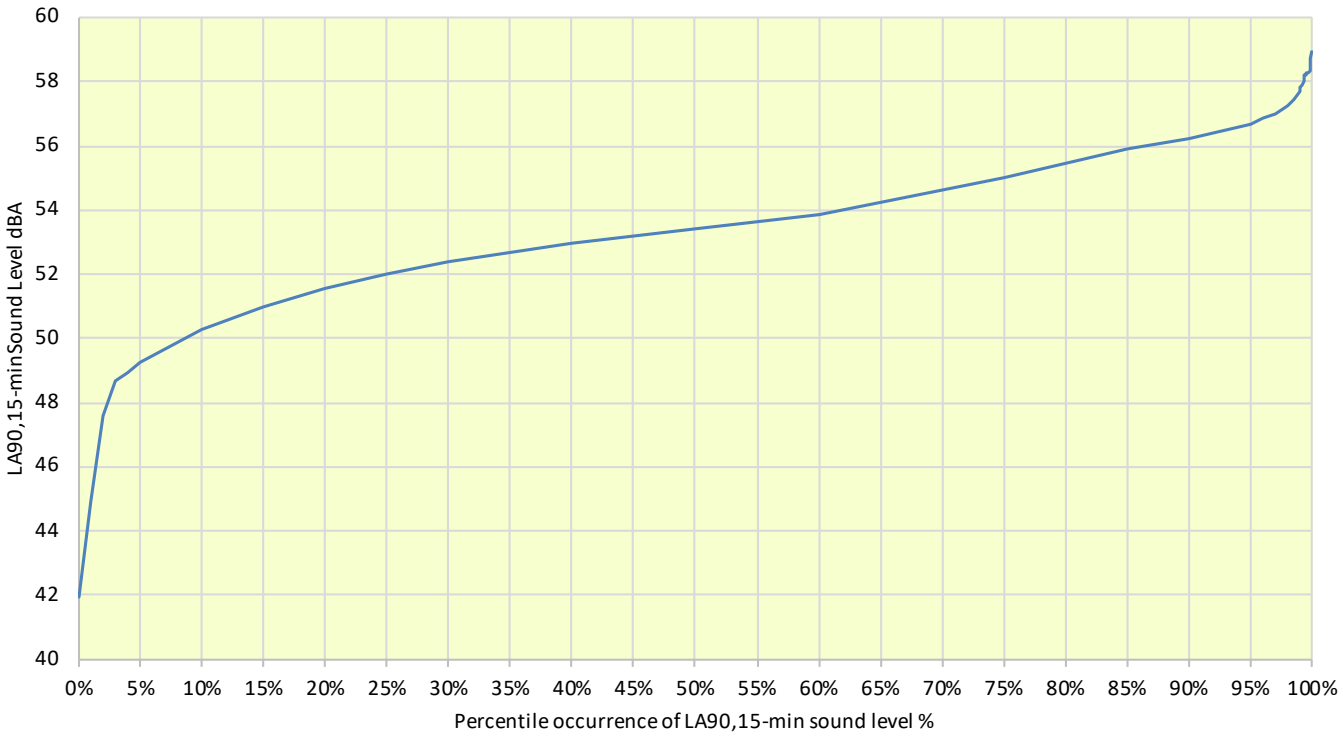


Figure 4.8 : Boral Cement Berrima Annual Environmental Noise October 2023 -
Location 20 Percentile occurrence of LA90,15-min sound levels

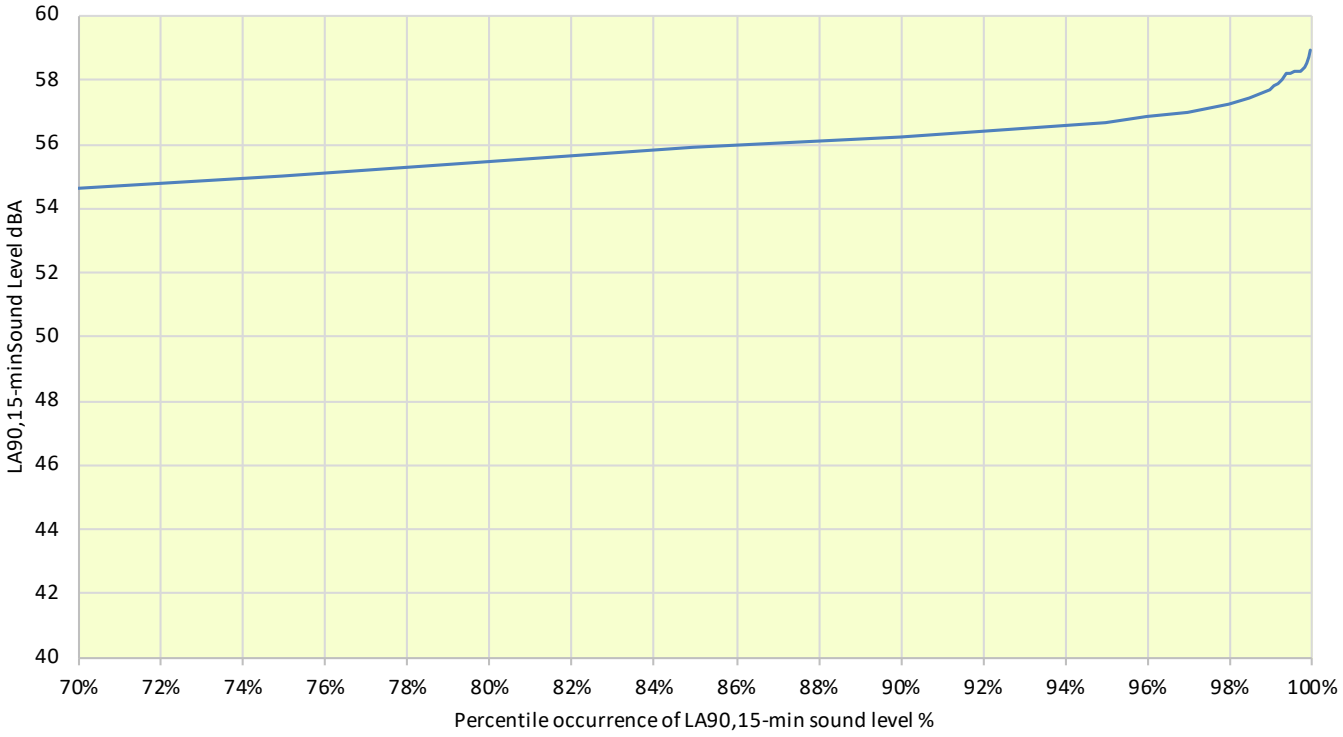


Figure 4.8

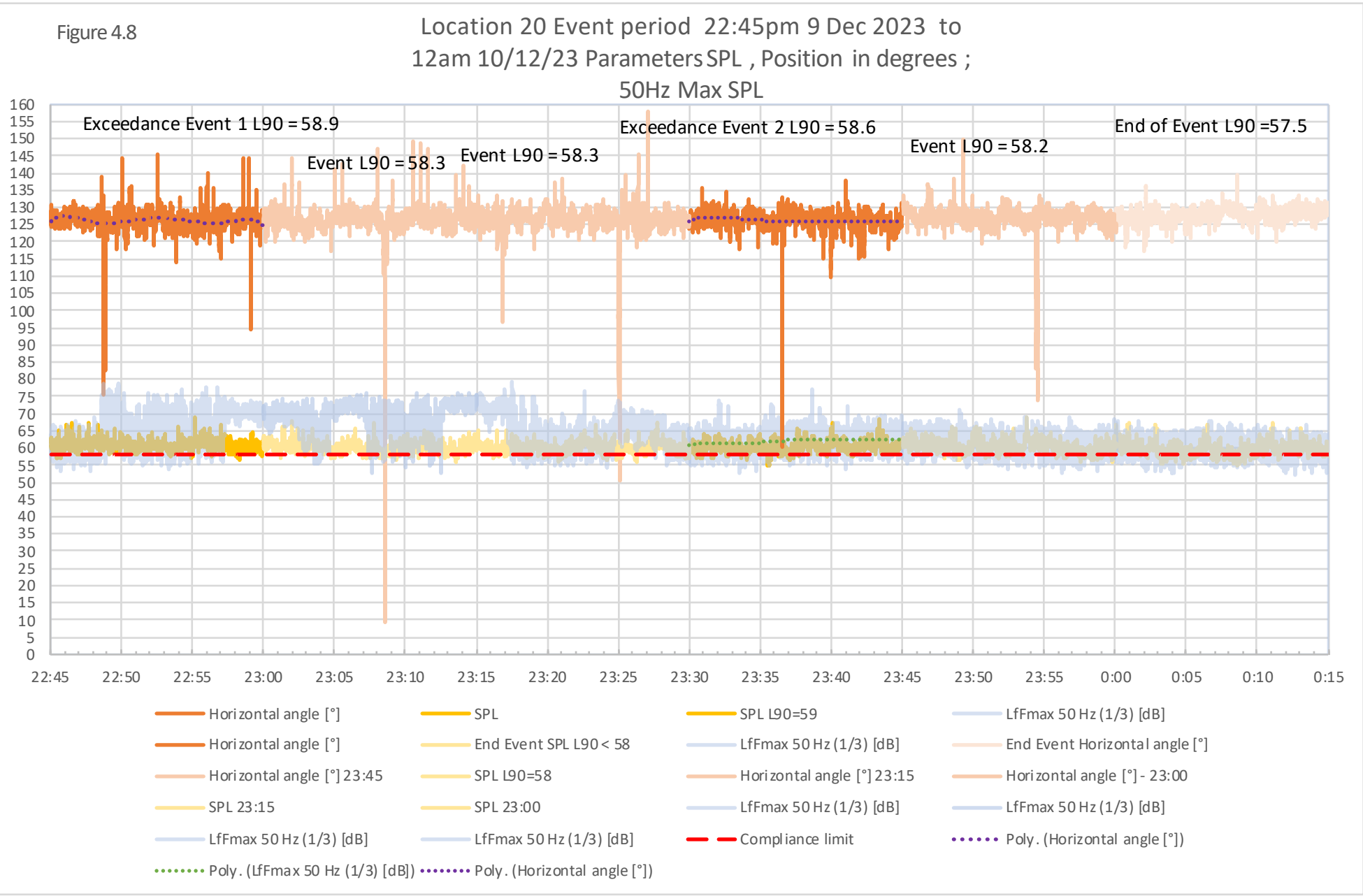

Location 20 Event period 22:45pm 9 Dec 2023 to 12am 10/12/23 Parameters SPL , Position in degrees ; 50Hz Max SPL
Exceedance Event 1 L90 = 58.9
Event L90 = 58.3
Event L90 = 58.3
Exceedance Event 2 L90 = 58.6
Event L90 = 58.2
End of Event L90 =57.5
160
155
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
22:45
22:50
22:55
23:00
23:05
23:10
23:15
23:20
23:25
23:30
23:35
23:40
23:45
23:50
23:55
0:00
0:05
0:10
0:15
Horizontal angle [°]
SPL
SPL L90=59
LfFmax 50 Hz (1/3) [dB]
Horizontal angle [°]
End Event SPL L90 < 58
LfFmax 50 Hz (1/3) [dB]
End Event Horizontal angle [°]
Horizontal angle [°] 23:45
SPL L90=58
Horizontal angle [°] 23:15
Horizontal angle [°] - 23:00
SPL 23:15
SPL 23:00
LfFmax 50 Hz (1/3) [dB]
LfFmax 50 Hz (1/3) [dB]
LfFmax 50 Hz (1/3) [dB]
LfFmax 50 Hz (1/3) [dB]
Compliance limit
Poly. (Horizontal angle [°])
Poly. (LfFmax 50 Hz (1/3) [dB])
Poly. (Horizontal angle [°])

Figure 4.9

Location 20 Event from 22:45pm 9 Dec 2023 to 0:00 10 Dec 23 showing 63Hz max & 50Hz max End of event No spikes in direction past 115 deg

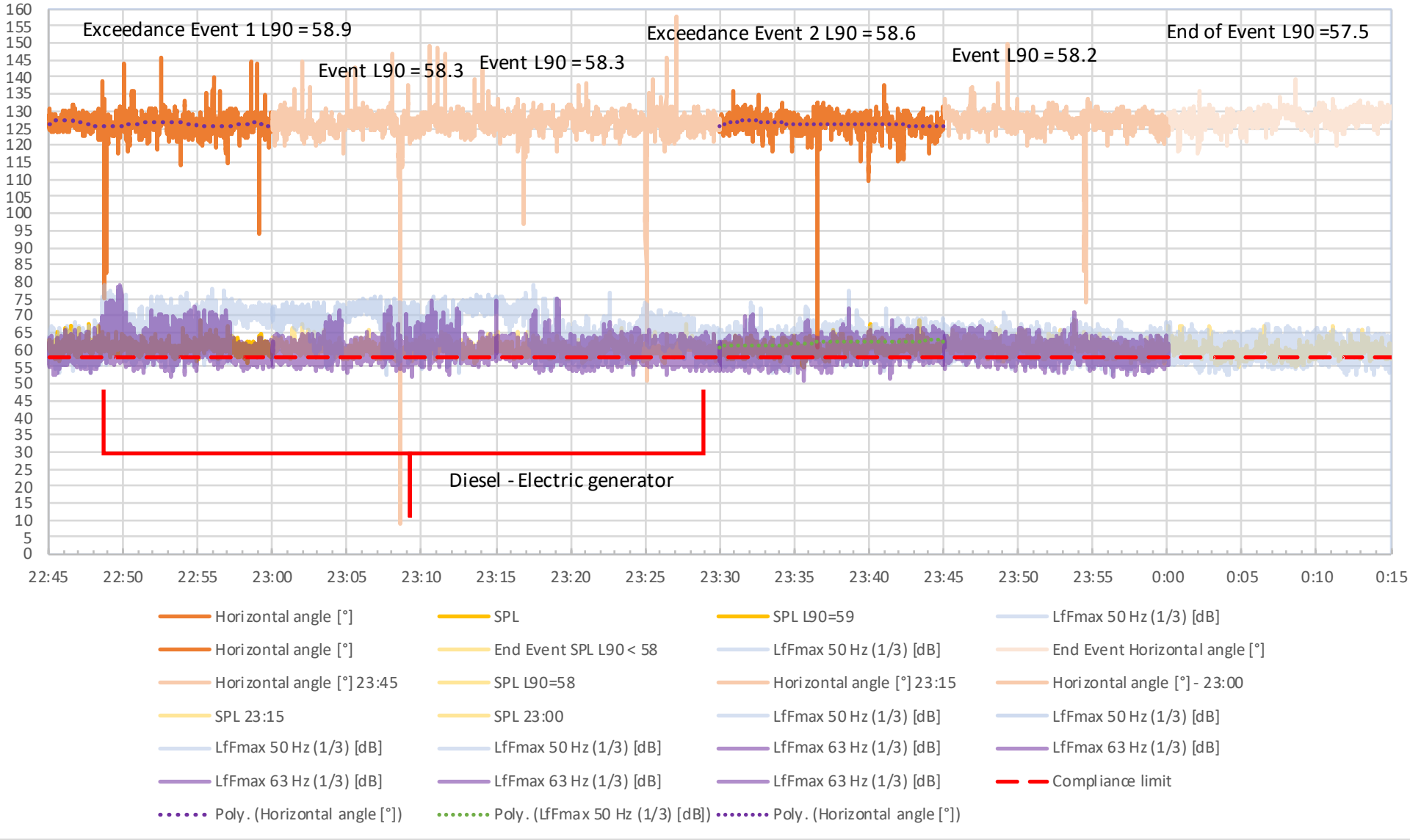


Figure 4.10

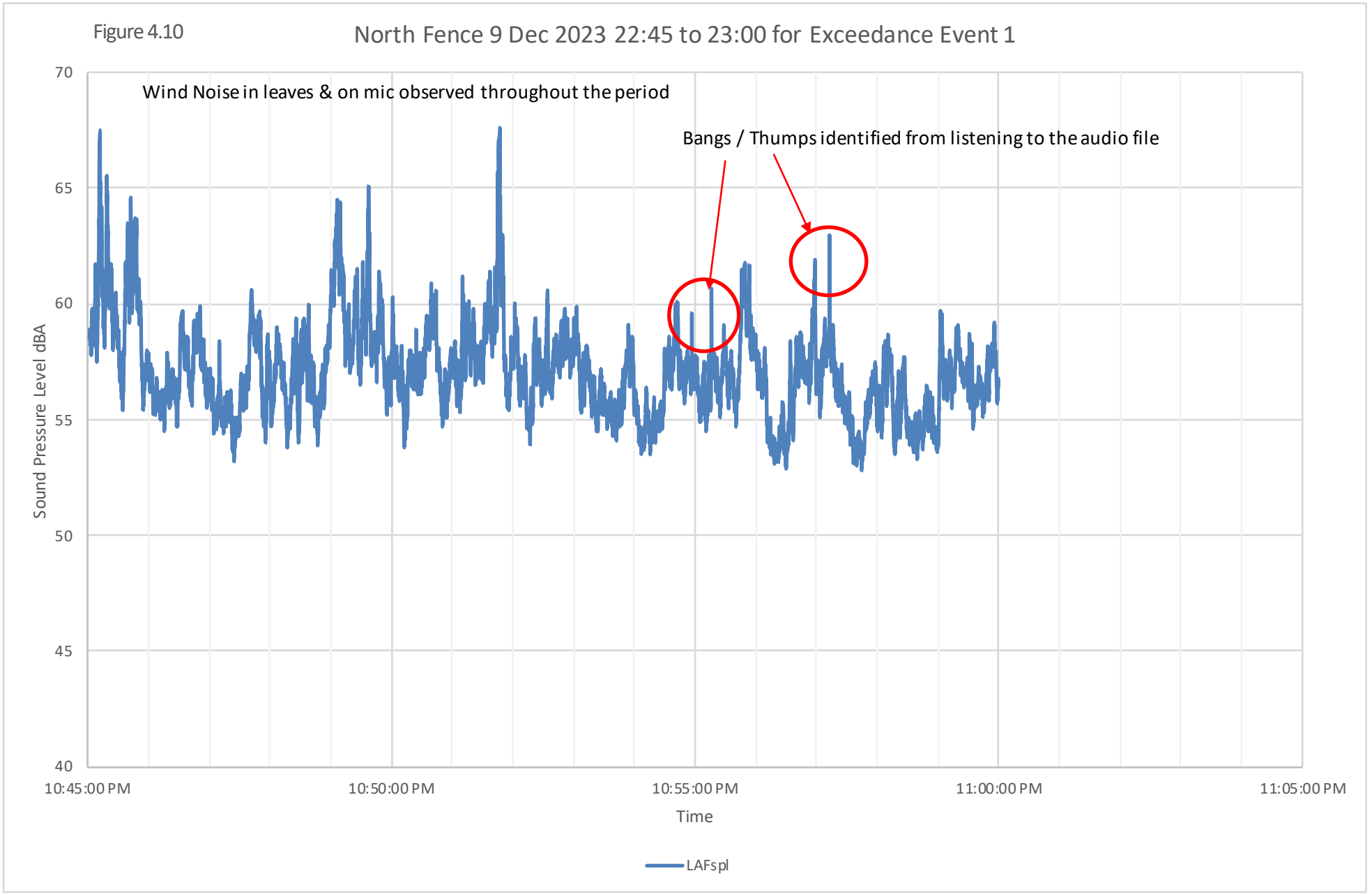
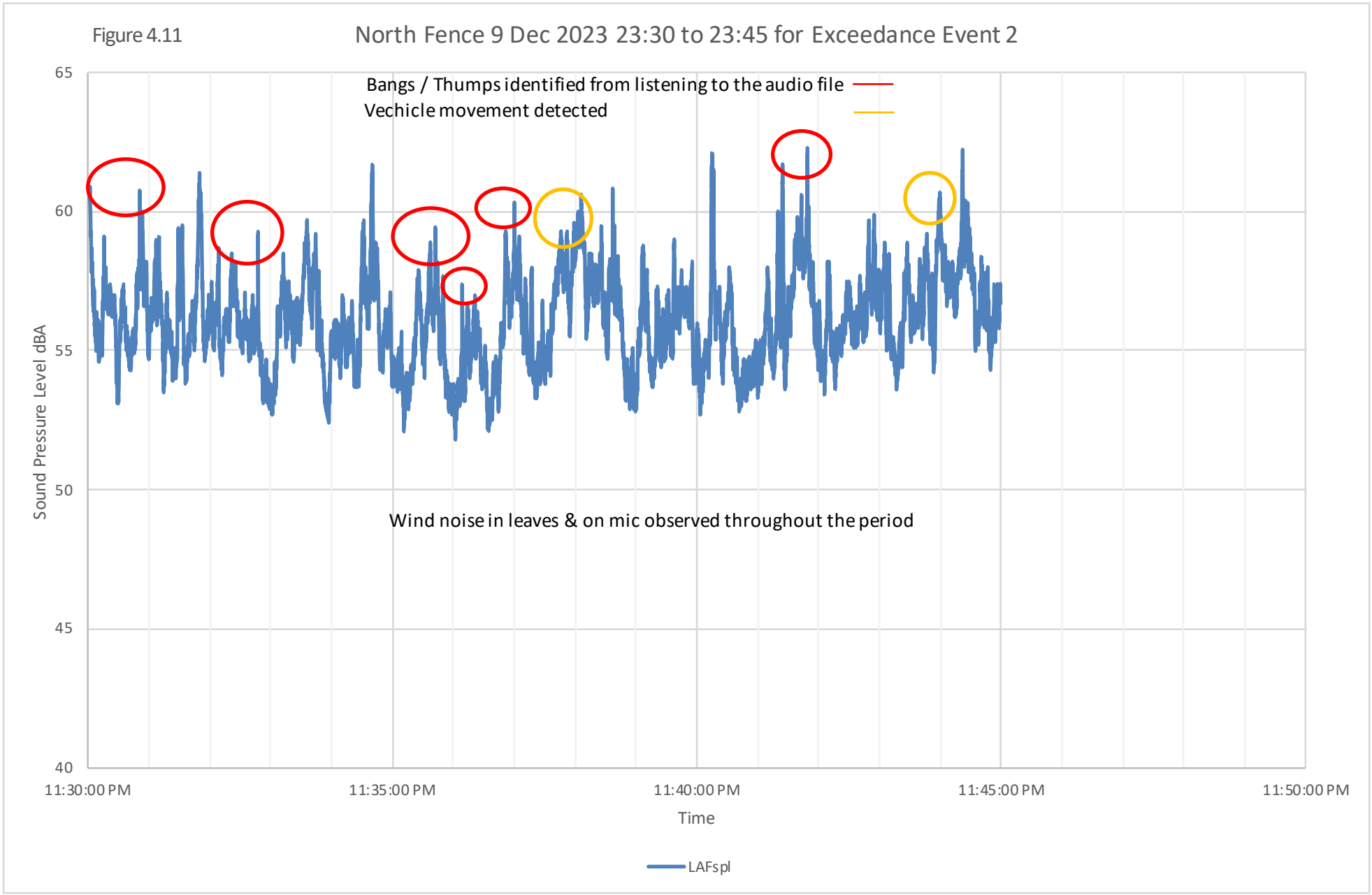

North Fence 9 Dec 2023 22:45 to 23:00 for Exceedance Event 1
Wind Noise in leaves & on mic observed throughout the period
Bangs / Thumps identified from listening to the audio file
Sound Pressure Level dBA
70
65
60
55
50
45
40
10:45:00 PM
10:50:00 PM
10:55:00 PM
11:00:00 PM
11:05:00 PM
Time
LAFspl

Figure 4.11


North Fence 9 Dec 2023 23:30 to 23:45 for Exceedance Event 2
Bangs / Thumps identified from listening to the audio file
Vechicle movement detected
Wind noise in leaves & on mic observed throughout the period
Sound Pressure Level dBA
65
60
55
50
45
40
11:30:00 PM
11:35:00 PM
11:40:00 PM
11:45:00 PM
11:50:00 PM
Time
LAFspl

ABN: 25 153 946 064
ACN: 153 946 064

4.2.2 $L_{A01.1\text{-minute}}$ and $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ results for the Northern Boundary

Sound levels measured at the Northern Boundary location included $L_{A01.1\text{-minute}}$ to allow calculations of $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ at night-time to be made, to provide comparisons with recommended maximum values for these parameters for night-time. The recommended maximum objective of 60 dBA for $L_{A01.1\text{-minute}}$ night-time for the Northern Boundary location and not greater than 15 dB difference for $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ are to indicate sleep disturbance potential and were provided as recommendations in the PRP report. The analysis is made at the Northern Boundary rather than 4 Melbourne St because sound levels at 4 Melbourne St are regularly affected by noise of passing vehicles in Taylor Avenue and would require significant analysis. If the North Fence results indicate acceptable conditions from Cement plant emissions, then it follows that the 4 Melbourne St location would also be acceptable for Cement Plant sound levels.

The analyses made for the Northern Boundary location showed that for this location, there were 55 night-time events which exceeded the objective of $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ to be not greater than 15 dB. This number of events is significantly less than the 871 observed in 2022 assessment and 105 observed in the 2021 assessment. There were 2 (4%) of the 55 events observed before 4am and they were rail movement related events. From the rest of the 53 events, 35% (19) were measured from 4am to 5am, 47% (26) were measured from 5am to 6am and 15% (8) were measured from 6am to 7am. On multiple occasions of listening to these events, in one-minute detection of exceedance, there were more than one noise source identified, for example birds and truck. In reviewing these events, and due to the total number in the sample set, 34 of the 55 were listened to and each of the 15-minute periods in which they occurred were represented. Table 4.4 shows the results of the analysis performed.

Table 4.4 Berrima Cement Annual Noise Assessment 2023

Survey of audible sources of the Sleep Disturbance parameter $L_{A01.1min}$ - $L_{A90.15-min}$ > 15 dBA

for Night-time exceedances at the Berrima Cement Works North Fence monitoring location 1 to 14 December 2023

Date Time	Event Time	Time period	$L_{A01.1min}$ - $L_{A90.15-min}$ dB	$L_{A1.1min}$ dB	L90	Observations in period	Prominent Noise
3/12/23 3:45	3/12/23 3:54	3	15.2	65	49.7	train horn air hose release	train horn
3/12/23 3:45	3/12/23 3:57	3	16.2	66	49.7	rail squeal	rail squeal
2/12/23 4:15	2/12/23 4:22	4	19.2	72	52.7	birds vehicle	birds
2/12/23 4:15	2/12/23 4:23	4	21.2	74	52.7	birds truck	birds
2/12/23 4:15	2/12/23 4:24	4	20.0	73	52.7	birds	birds
2/12/23 4:15	2/12/23 4:25	4	23.0	76	52.7	birds truck	birds
2/12/23 4:15	2/12/23 4:26	4	20.8	74	52.7	birds truck	birds
2/12/23 4:45	2/12/23 5:00	4	15.3	67	52.1	birds	birds
3/12/23 4:00	3/12/23 4:15	4	15.2	64	48.7	birds thump	birds
3/12/23 4:15	3/12/23 4:16	4	15.8	65	49.2	birds thump thump	birds
3/12/23 4:15	3/12/23 4:25	4	15.4	65	49.2	birds thump thump	birds
7/12/23 4:15	7/12/23 4:20	4	15.2	65	50	birds	birds
7/12/23 4:15	7/12/23 4:21	4	20.4	70	50	birds truck x2	birds
8/12/23 4:15	8/12/23 4:26	4	26.6	75	48.5	rain	rain
8/12/23 4:15	8/12/23 4:27	4	24.6	73	48.5	rain	rain
8/12/23 4:15	8/12/23 4:28	4	24.2	73	48.5	rain	rain
14/12/23 4:45	14/12/23 4:57	4	15.2	64	48.5	truck /train rain	truck /train
2/12/23 5:00	2/12/23 5:01	5	17.9	69	51.4	birds vechicle	birds
2/12/23 5:00	2/12/23 5:02	5	19.6	71	51.4	thump truck birds	thump
2/12/23 5:00	2/12/23 5:04	5	19.1	71	51.4	truck motor bike birds	truck
2/12/23 5:00	2/12/23 5:05	5	18.8	70	51.4	thump birds	thump
2/12/23 5:00	2/12/23 5:06	5	20.3	72	51.4	truck over bump birds	truck over bump
2/12/23 5:00	2/12/23 5:07	5	18.2	70	51.4	birds	birds
2/12/23 5:00	2/12/23 5:08	5	15.9	67	51.4	birds	birds
2/12/23 5:00	2/12/23 5:09	5	16.8	68	51.4	birds motor bike	birds
2/12/23 5:00	2/12/23 5:10	5	20.4	72	51.4	birds	birds
2/12/23 5:00	2/12/23 5:11	5	21.3	73	51.4	birds traffic taylor	birds
2/12/23 5:00	2/12/23 5:12	5	20.0	71	51.4	birds loud	birds loud
2/12/23 5:00	2/12/23 5:13	5	18.0	69	51.4	birds	birds
2/12/23 5:00	2/12/23 5:14	5	16.3	68	51.4	birds loud	birds loud
5/12/23 5:45	5/12/23 5:56	5	17.0	66	49.1	truck over bump thump birds	truck over bump
12/12/23 5:15	12/12/23 5:24	5	17.2	70	52.5	birds (crow)	birds (crow)
2/12/23 6:30	2/12/23 6:31	6	17.2	66	49.1	Truck over bump (long)	Truck over bump (long)
2/12/23 6:30	2/12/23 6:44	6	17.1	66	49.1	birds	birds
4/12/23 6:00	4/12/23 6:08	6	15.5	64	48.4	birds	birds
4/12/23 6:15	4/12/23 6:23	6	20.9	69	47.7	birds	birds
4/12/23 6:15	4/12/23 6:29	6	18.0	66	47.7	truck	truck

It should be noted that within an event, there may have been more than one noise source and the prominent noise source that caused the exceedance was noted. A summary of the distribution of these events with respect to hour of the day of the $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ parameter is shown below in Table 4.5.

Table 4.5 Distribution and Summary of maximum $L_{A01.1min} - L_{A90.15\text{-min}}$ greater than 15 dB with Time of Day

Time Period (Hour of the Day)	Maximum $L_{A01.1\text{-min}} - L_{A90.15\text{-min}}$ > 15 dB	Occurrences
03:00 to 04:00	16	2
04:00 to 05:00	27	19
05:00 to 06:00	21	26
06:00 to 07:00	21	8

The maximum difference was 27 dB in the period between 4:00am and 5:00am and this was caused by rain. The next highest (without rain) in the same period was 23 dB, during which birds and truck movements (probably from Taylor Avenue) were observed. The two occurrences before 4:00am were caused by rail movement activities (a train horn and rail wheel-squeal). Most of the samples that were listened to in the 4:00am to 7:00am period included noise from birds in some form. It is estimated that in 62% of the high event sample intervals, birds were the prominent source; 18% of the sample intervals had trucks and especially trucks running over road bumps or potholes in Taylor Avenue. 6% of the samples included thump type noises from the Cement works.

A review of the event sound levels received at the Northern Boundary indicated that the high levels of $L_{A01,1\text{-minute}}$ measured were caused by birds, insects or animals, the highest being 76 dBA, however truck noise was also observed in this minute. Trucks on Taylor Ave were also identified at the Northern Boundary. Rail squeal was noted to have $L_{A01,1\text{-minute}}$ sound levels of greater than 60 dBA at the Northern boundary, however the number of occurrences was lower when compared to the corresponding survey reported in the 2022 Annual Noise Assessment report (5 events) and the same as in the 2021 Annual Noise Assessment report (2 events).

The number of exceedances was significantly lower than the 2022 survey (due to the amount of bird, insects and animal noise events and the season in which it was performed), and lower than 2021 survey; however, the results of the analyses identified that the number of Cement works emissions for 2023 are very similar to those of the corresponding analysis from the 2022 and 2021 Annual Noise Assessment reports. These analyses indicate that the number or times that the objectives of $L_{A01,1\text{-minute}}$ greater than 60 dBA and $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ difference results are greater than 15 dB and are caused by Cement plant events, are relatively low.

On the basis of this analysis, it is considered that the noise emissions from the Cement Plant have a low potential for sleep disturbance. Site measurements and analyses indicate that the most likely site noise sources to exceed criteria are rail-movement associated noise, but not all rail events cause exceedances.

4.2.3 Low frequency noise

The NSW Noise Policy for Industry has a section for assessment of low frequency noise from industry as received at residential locations. This is based on an initial screening test of the C-weighted minus A-weighted $L_{eq,15\text{-}min}$ (L_{Ceq}-L_{Aeq}) period sound level exceeding more than 15 dB. If the screening value is exceeded a one-third octave band frequency analyses is then made of un-weighted (or Z-weighted L_Z) sound levels in the low-frequency bands from 10 Hz to 160 Hz, and compared to a specific criterion or threshold value. The values for the community attended monitoring locations are shown in Table 4.6

If the threshold levels are exceeded by up to and including 5 dB in evening or night-time, a positive adjustment of 2 dB is added to the measured sound level. If the exceedance in any band is more than 5 dB, a positive adjustment of 2 dB is added to the measured sound level for daytime and 5 dB added for evening and night-time.

The initial screening test on attended measurements indicated that exceedances were reported on seven occasions measured at 4 Melbourne Street, and one occasion for 12 Brisbane Street (from the daytime monitoring).

Figures of the one-third octave band spectra compared to the objectives for both L_{Aeq} and L_{A90} spectra are shown in Appendix F figures F62 to F67.

From the measurements in the residential receiver locations, the low frequency assessment was made on the $L_{Aeq,15\text{-}min}$ as per policy. Exceedance of the screening test were identified on six occasions out of 10 measurements for $L_{eq,15\text{-}min}$ at 4 Melbourne St, none of the two measurements from Adelaide St and one from two from 12 Brisbane St. For the North Fence location exceedance of the screening test occurred on five of the seven of the measurements analysed. The North Fence was used primarily to further the Low Frequency Noise propagation (LFN) investigation for the residential receiver locations, as discussed below.

Referring to Table 4.6, six of the eight evening and night-time measurements at 4 Melbourne St. had exceedances in the 40 to 160Hz bands by 4 to 10 dB, especially in the 50 Hz band where the highest measurement had a 10 dB exceedance. This could be explained to an electrical item that was running locally. It is interesting to note that the night of 9 December 10:45pm and 11:30 pm the screening test passed at the North Fence, and the 50 Hz band for the 10:45pm measurement was higher at Melbourne St than North Fence. The North Fence data shown in Table 4.6 highlights for the same time periods, there was a higher level of low frequency content at 4 Melbourne St. than measured at North Fence by up to 4 dB for the 160Hz band case and 3 dB in the 50Hz case; consequently, it can be considered that there is potentially another local LFN source other than Berrima Cement Works present in the community which causes this effect. This is similar to the findings of the 2022 assessment. It should be noted that a new petrol station has been built on the corner of Taylor Ave and Argyle St since 2020, which is about 230m from 4 Melbourne St – this establishment may have equipment working at various times throughout the night that may explain the higher LFN observed at 4 Melbourne St than the North Fence.

12 Brisbane St location, which was measured at 4:47 pm on the 14 December, was the other residential receiver location which had an exceedance. Higher values than the criteria occurred in the 63 Hz and 80 Hz bands, which would reflect the traffic passing by; an exceedance in the 50 Hz band indicates a potential electrical energy source. An exceedance in the 160hz band was also observed,

ABN: 25 153 946 064
ACN: 153 946 064

however this value is lower than the other residential locations, indicating that road traffic was likely to be the main contributor to cause this location failing the initial screening test.

From the assessment of this survey of Low Frequency Noise, it is considered that the main source of low-frequency noise events exceeding the policy objectives for the L_{Aeq} measurements is from either the new petrol station on the corner of Taylor Ave and Argyle St, road traffic noise associated with passing trucks, either from within New Berrima or on distant roads and the freeway or a combination of both. The plant can be a source at times but this is not considered to be significant.

Table 4.6 Low Frequency Noise Analysis for Attended Monitoring : Community Locations

							Frequency (Hz) Criteria													*Frequency* (values)											
							10	*13*	*16*	*20*	*25*	*32*	*40*	*50*	*63*	*80*	*100*	*125*	*160*	*10*	*13*	*16*	*20*	*25*	*32*	*40*	*50*	*63*	*80*	*100*	*125*	*160*
						dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44													
							One third Octave Band Spectra													**One third Octave Band Spectra Criteria values**											
Description	Condition	MeasureDateTime	L_{Aeq}	Lceq	initial screening (diff >15?)	Fail screening test for LNF 1= To Proceed next stage	10 Hz	12_ 5 Hz	16 Hz	20 Hz	25 Hz	31_ 5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	10 Hz	12_ 5 Hz	16 Hz	20 Hz	25 Hz	31_ 5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
4 Melbourne St	Day	14/12/23 9:16 am	57	69	12.3	0	70	66	64	64	62	61	60	61	60	63	56	55	56	0	0	0	0	0	0	0	0	0	0	0	0	0
Adelaide St 20m to Taylor level with front of house	Day	14/12/23 5:10 pm	60	71	11.2	0	70	64	62	64	66	60	60	59	66	66	54	59	59	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Brisbane St.	Day	14/12/23 4:47 pm	51	67	15.8	1	70	67	65	65	64	61	59	56	55	52	50	49	51	-22	-22	-21	-12	-5	0	5	6	5	3.7	2.3	2.9	7
4 Melbourne St	Day	1/12/23 9:16 am	59	73	14.6	0	59	60	61	61	58	62	59	62	68	66	60	68	61	0	0	0	0	0	0	0	0	0	0	0	0	0
Adelaide St 20m to Taylor level with front of house	Day	1/12/23 9:36 am	62	75	12.3	0	60	61	63	62	61	63	63	62	67	70	60	64	66	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Brisbane St.	Day	1/12/23 10:30 am	53	66	12.4	0	61	58	60	60	58	58	57	55	56	55	51	58	54	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Melbourne St	Evening	1/12/23 9:00 pm	50	66	16.6	1	53	55	57	58	66	53	59	57	58	53	50	47	50	-39	-34	-29	-19	-3	-8	5	7	8	5	2	1.3	6
4 Melbourne St	Night	2/12/23 11:30 pm	48	66	17.2	1	56	56	59	59	66	56	58	57	52	50	48	40	48	-36	-33	-27	-18	-3	-5	3.9	7	2.1	1.7	0	-6	3.6
4 Melbourne St	Evening	4/12/23 8:30 pm	48	64	16.5	1	55	56	58	58	64	54	57	55	52	49	45	40	45	-37	-33	-28	-19	-5	-7	3.2	5	1.7	0.6	-3	-6	0.7
4 Melbourne St	Night	5/12/23 11:00 pm	45	62	16.9	1	54	55	58	58	61	53	55	54	48	48	45	41	48	-38	-34	-29	-19	-8	-8	0.6	4.2	-2	0	-4	-5	4.4
4 Melbourne St	Day	9/12/23 11:30 am	46	62	16.0	1	63	62	61	60	58	55	55	55	51	47	44	41	45	-29	-27	-25	-17	-11	-6	1.3	5	0.8	-1	-4	-5	0.8
4 Melbourne St	Night	9/12/23 10:45 pm	52	67	15.2	1	69	68	66	65	64	59	59	60	55	52	47	41	46	-23	-22	-20	-12	-5	-2	5	10	5	3.7	-1	-6	2.1
4 Melbourne St	Night	9/12/23 11:30 pm	52	65	13.4	0	63	63	62	60	62	57	58	56	53	52	48	39	47	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Melbourne St	Night	9/12/23 11:45 pm	52	65	13.4	0		61	61	60	62	56	58	56	53	52	48	40	48	0	0	0	0	0	0	0	0	0	0	0	0	0
North Fence	Evening	1/12/23 9:00 pm	54	71	17.4	1	60	59	64	67	74	60	62	57	54	52	50	44	48	-32	-30	-22	-10	5	-1	8	7	4	4	2	-2	4
North Fence	Night	2/12/23 11:30 pm	52	70	18.3	1	61	60	64	66	72	60	64	57	52	52	49	44	47	-31	-29	-22	-11	3	-1	10	7	2	4	1	-2	3
North Fence	Evening	4/12/23 8:30 pm	49	69	19.8	1	60	59	63	66	72	59	60	55	53	53	49	44	45	-33	-30	-23	-11	3	-2	6	5	3	5	1	-2	1
North Fence	Night	5/12/23 11:00 pm	45	68	22.5	1	60	59	62	65	70	61	59	55	51	50	47	40	44	-32	-30	-24	-13	1	0	5	5	1	2	-2	-6	0
North Fence	Day	9/12/23 11:30 am	48	64	16.7	1	60	60	61	62	59	59	58	56	55	52	49	47	45	-32	-30	-25	-15	-10	-2	4	6	5	4	1	1	1
North Fence	Night	9/12/23 10:45 pm	58	72	13.9	0	66	65	67	68	72	63	60	57	55	55	53	49	57	0	0	0	0	0	0	0	0	0	0	0	0	0
North Fence	Night	9/12/23 11:30 pm	56	71	14.4	0	65	63	66	66	72	63	62	56	53	53	52	48	53	0	0	0	0	0	0	0	0	0	0	0	0	0

Community Locations that have Issues with Low freq Noise : +ve

Community locations which exceeds 5 dB

Melbourne St higher than North Fence NOT expected for Cement Works emmissions

4.3 Attended measurement results and specific receiver locations

Attended measurements were taken at the same three residential receiver locations as the in previous surveys, as well as at unattended monitoring locations to provide measurements to identify the sources of noise occurring that were audible at the time, as well as other conditions. Attended monitoring was made during daytime on 1 December and daytime on 14 December.

Listening attended monitoring was also done for the Melbourne St logger locations for one day, two evening and four night-time periods two night time North Fence and Location 20 (in the investigation of the Limit exceedance cause), using the recordings from the logger recording sound level meters. This listening "attended monitoring" was done at both locations for the same 15-minute periods. These periods were:

- Friday 1 December 9:00 pm to 9:15 pm — Evening, all plant on, South-east wind
- Saturday 2 December 11:30pm to 11:45pm — Night, all plant on, calm wind
- Monday 4 December 8:30pm to 8:45 pm — Evening, all plant on, wind North
- Tuesday 5 December 11:00pm to 11:15 pm — Night, All plant on except CBP & CM6, wind Northerly reducing to calm
- Saturday 9 December 11:30am to 11:45 am — Daytime, all plant on, South-west wind medium velocity
- Saturday 9 December 10:45pm to 11:00pm — Night, all on, event in period, South-East wind
- Saturday 9 December 11:30pm to 11:45pm — Night, all on, event in period, South-East wind
- Saturday 9 December 11:45pm to 12:00 am — Night, all on, South-East wind

Night and evening periods were selected more than daytime because these are more likely to be periods of potential annoyance and road traffic noise is significantly reduced from daytime.

Table 4.7 provides a summary of all of the monitoring results and conditions and observations during each 15-minute period of attended or listening attended monitoring. Table 4.8 summarises these results without the comments. Figures 4.12 to 4.19 compare the statistical sound level results of $L_{Aeq,15\text{-}min}$, $L_{Ceq,15\text{-}min}$, $L_{A90,15\text{-}min}$ and $L_{A01,15\text{-}min}$ for each location for day, evening and night periods, as well as the differences $L_{Aeq,15\text{-}min} - L_{A90,15\text{-}min}$, $L_{A01,15\text{-}min} - L_{A90,15\text{-}min}$ and $L_{Ceq,15\text{-}min} - L_{Aeq,15\text{-}min}$.

Figure 4.13 shows that Adelaide St near Taylor Avenue has the highest levels of $L_{Aeq,15\text{-}min}$ for daytime with 60 and 62 dBA, on both occasions. 4 Melbourne St had the lowest daytime $L_{Aeq,15\text{-}min}$ on one occasion but the next highest to Adelaide St on another occasion. Night-time $L_{Aeq,15\text{-}min}$ levels at 4 Melbourne St were 45 to 52 dBA.

$L_{A90,15\text{-}min}$ values shown in Figure 4.14 had a similar same variation with the lowest at 4 Melbourne St of 39 dBA in daytime, compare to 46 dBA at 12 Brisbane St and 47 dBA at Adelaide St near Taylor Ave. Highest daytime $L_{A90,15\text{-}min}$ values were 51 and 54 dBA at Location 20.

$L_{A01,15\text{-}min}$ daytime sound levels were highest at the residential receiver locations because of their proximity to Taylor Avenue and the passing vehicles which create that noise. The lowest $L_{A01,15\text{-}min}$ night-time sound level at 4 Melbourne St was 55 dBA and the highest was 57 dBA.

Figures of one-third octave band spectra and tonality spectra for all of the attended measurements are given in Appendix A. The tonality figures show no measurement location had tonal criteria exceeded at frequencies below 1000 Hz. One measurement at 4 Melbourne St had criteria exceeded at 8000 Hz and 12,500 Hz at 11:30 pm on 2 December, and for 4000 Hz on the evening of 4 December; in both cases these exceedances are considered to be caused by insects and not from the Cement Plant.

The collated results and comments for the attended measurements are also given in Appendix F. Table 4.9 shows the one-third octave band spectra from the attended monitoring. Table 4.10 has the tonality calculations for these measurements.

Narrow band spectra for the attended monitoring have been prepared and are shown in Appendix E, with some major peaks in the frequency spectrum highlighted. Spectra shown are taken from sound recordings of the monitoring for a period with the least influence from extraneous noise sources. These may be from 10 seconds to a couple of minutes in length. Usually, two different periods within a measurement interval have been analysed. The spectrum shown may include the C or Z-weighted spectrum in the 0 to 4000 Hz range to indicate the low-frequency components. The A-weighted spectra have been shown in all of the figures and only in the 0 to 2000 Hz and 0 to 1000 Hz range spectra. In some cases, the 0 to 500 Hz spectra have also been shown.

Spectra have been prepared for 4 Melbourne St, Adelaide St, 12 Brisbane St, North Fence and Location 20.

4.3.1 Comments on sound levels and results at residential 4 Melbourne St

Results for 4 Melbourne St attended measurements are shown in Tables 4.7 to 4.10 and Appendix F: Environmental Noise Level Assessment Reports, with unattended measurements shown in Appendix B and Table 4.1, long-term unattended results in Table 4.2. Results have been collected for this location since 2002. Figure 4.1 shows the historical data since 2002 for the long-term unattended measurements. Attended measurements were obtained for daytime on 1 and 14 December, and listening attended results for daytime on 9th, evening on 4th and night on 2, 5, and 9 December. One-third octave band spectra are shown in Appendix A figures A1 to A9. Narrow-band spectra are shown in Figures E1 to E7.

As in previous surveys, sound levels in residential receiver areas continue to be mainly caused by road traffic noise, both on Taylor Avenue or Melbourne Street, and from the Hume Freeway at night-time. The noise emissions from the Cement Plant form the background sound levels on most occasions. Cement Plant sources audible included broad band sources such as fans and some rail operations. Tonal noise was not evident on most occasions or for 15-minute sample periods. Night time sound levels were ranging typically from 44 to 50 dBA.

One-third octave band sound levels are shown in Appendix F, Table 4.9 and spectra and tonality graphs are combined in Figures A1 for $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$. The spectra are relatively broad-band with very little tonality evident in either L_{Aeq} or L_{A90} results. L_{Aeq} spectra often show higher levels at higher frequencies compared to L_{A90} results – this is caused by insect noise. The only tonal exceedances occurred in higher frequencies, also from insect noise.

Unattended sound levels shown on the two-day graphs of Appendix B show sound levels vary mainly diurnally with some influence from wind speed occasionally correlating with wind direction, but not all occasions, and there is little correlation of the effect from wind direction.

Average night-time $L_{A90.15\text{-minute}}$ sound levels were in the range 42 to 50 dBA and averaged 46 dBA.

Figures 4.20 to 4.24 show time histories of the listening attended monitoring periods, with annotations showing the causes of the higher sound level events. Most of the higher events were caused by passing vehicles in Taylor Avenue. Some of the higher levels were also caused by wind generated noise. For the event occurring on the night of 9 December from 11:30 to 11:45pm, the impact on the microphone at 11:36pm is shown, and this was noted to be probably a stick or other object impacting the microphone during high wind.

For personal attended monitoring on the morning of 1 December, road traffic was the main source. The $L_{Aeq,15\text{-min}}$ was 59 dBA and the $L_{A90,15\text{-min}}$ 48 dBA. One bulk cement tanker which emerged from the Cement plant, DaHon-Cooma, had a very high low-frequency noise noted. Figure A1 shows the one-third octave band spectra, with significantly higher levels for the L_{Aeq}. This has a peak in the 125 Hz band which may be related to the loud cement tanker truck, while the L_{A90} curve peaks in the 200 Hz band, related to the Cement plant stack fan noise. The measurements for both parameters show the spectra were non-tonal. Narrow-band spectra in Figures E1 show the peak at 180Hz is the highest, with others at 171 and 201 Hz, also related to stack fan emissions.

Later period narrow-band analyses show slight variations on the major peak in the spectrum but 180 Hz features most often as the highest. If the major source is a vehicle, then this has different peaks to those from the plant. The results are similar to those of 2022.

4.3.2 Taylor Avenue – Corner Adelaide St

The location used for the attended measurements is in Adelaide Street, 20m north of Taylor Avenue which is in-line with the front façade of the residence at 72 Taylor Ave. Attended measurements were obtained for daytime on 1 December from 10:36 am and daytime on 14 December from 17:10. Results are provided in Table 4.7. One-third octave band spectra are shown in Figures A10 and A11. Both sets of spectra are broadband, with the 125 Hz band being highest in the morning measurement of 1st December. On 14th December in the late afternoon, the spectra have higher levels at higher frequencies – this shows a combination of vehicle and barking dog noise, added to that of the Cement plant. Figures E8 and E9 show narrow band frequency analysis from both measurement periods. The highest A-weighted peak in the morning measurement of 1st December is at 180 Hz, related to stack fan emissions. in the measurement of 14 December afternoon there were few intervals with little road traffic noise and the spectrum is much less distinct and has many other peaks in it.

For the attended measurement on the morning of 1 December, the L_{Aeq} was 62 dBA and the L_{A90} 50 dBA, with ambient levels between road traffic at 49 to 52 dBA.

For the afternoon measurement on 14 December, the L_{Aeq} was 60 dBA and the L_{A90} 47 dBA, with ambient levels between road traffic at 45 dBA. These results are similar to those of 2022.

Results for attended measurements are shown in Appendix F: Environmental Noise Level Assessment Report, with the summary of unattended measurements shown in Table 4.1, long-term averages of unattended results in Table 4.2 and Figure 4.12. In comparison with results from previous years, L_{Aeq} measurements were higher for day and evening with 62 and 58 dBA respectively, while L_{A90} results were higher for evening at 47 dBA but lower for daytime at 45 dBA.

L_{Aeq} results for this location are controlled by motor vehicle noise passing on Taylor Avenue and whether trucks pass over bumps in the road surface.

Cement Plant site sources identified included the gate alarm from the eastern (Truck) access gate opening and closing and occasional screw-conveyor squeal noise.

4.3.3 12 Brisbane Street

Monitoring locations used for 12 Brisbane Street were the same as in the measurements of previous years. L_{Aeq} results are affected by road traffic noise from Taylor Avenue and Brisbane Street, but usually less than at 4 Melbourne St or Adelaide St. Cement Plant noise emissions also contribute at this location.

Results for attended measurements are shown in Table 4.7 and Appendix F: Environmental Noise Level Assessment Report. Table 4.8 has the one-third octave band spectra and tonality assessment with Figures A12 to A13 showing graphs of the one-third octave band spectra and tonality.

Attended measurements were made on the morning of 1 December and afternoon of 14 December. For 1 December the L_{Aeq} result was 53 dBA, with cars being the highest sound level source at up to 72 dBA and birds also contributing at up to 60 dBA. Trucks bumping over potholes in Taylor Avenue were also up to 64 dBA. Ambient sound levels were 45 dBA when quiet. The L_{A90} result was 46 dBA. The one-third octave band spectra in Figure A12 show highest L_{Aeq} and L_{A90} levels is in the 200 Hz band. L_{Aeq} levels at higher frequencies have relatively higher levels from insect noise, bird and car noise compared to the L_{A90} curve.

For the afternoon of 14 December, road traffic on Taylor Avenue was the major source, with trucks to 64 dBA. The statistical sound levels L_{Aeq} at 51 and L_{A90} at 47 were similar to previous measurements. The one-third octave band spectra shown in Figure A13 are very broadband. Both sets of measurements were non-tonal. The narrow band spectra are shown in Figures E10. Stack fan noise would be the likely source of the 180 Hz peak.

4.3.4 Northern Boundary

Attended sound levels at the Northern Boundary have been measured at the northern end of the stockyard, this survey the attended measurements were made at the inside location next to the unattended meter.

Results for attended measurements are shown in Appendix F: Environmental Noise Level Assessment Report, and summarised in Table 4.7, with unattended measurements shown in Appendix C. Table 4.1 has the summarised unattended measurements with the long-term unattended results and the historical data in Table 4.2 and Figures 4.2 from 2008. Personal attended sound levels were measured on 1 December and 14 December 2023. Listening attended monitoring was also done for the same periods which included the high $L_{A90,15\text{-}min}$ periods of night-time on 9 December. Table 4.9 has the one-third octave band spectra and Table 4.10 the tonality assessment. Appendix A Figures A14 to A16 show the spectra and tonality assessments. Both L_{Aeq} and L_{A90} spectra are non-tonal.

The results in Figure 4.2 show long-term average sound level parameters are similar to those of previous years. Statistical averages are similar to the previous years and long-term averages. Long-term L_{Aeq} averages were 51 dBA for each period and the same as the overall long-term average from 2008 to 2023. L_{A90} period averages were 48 or 49 dBA with the night-time being the highest – considered caused by road traffic noise along Taylor Avenue or the high wind noise periods. These were also the same as or within 1 dB below the overall long-term average.

Taylor Avenue vehicle movement sound levels are lower at this location than for the residential locations but are still the main influence on L_{Aeq}. Site sources identified in the attended monitoring included vehicle movements, train activities and general industrial noise.

For daytime on1 December, measured attended L_{Aeq} sound levels were 54 dBA, mainly from road traffic and the Cement Plant, and L_{A90} 51 dBA. One-third octave band spectra are shown in Figure A14, with a peak in the 200 Hz band likely caused by stack fan emissions. The spectrum is non-tonal.

For daytime on 14 December the measured attended L_{Aeq} sound levels were 53 dBA and L_{A90} also 53 dBA. Road traffic and the Cement Plant were the main sources. One-third octave band frequency and tonality spectra are shown in Figure A15, and these are similar to those of 1 December.

For the listening attended monitoring on the night of 9 December from 10:45pm and 11:30pm, with all of the plant shut down, wind in vegetation noise was the main source, along with Cement Plant noise. L_{A90} sound levels were 55 and 54 dBA respectively, and L_{Aeq} 56 and 58 dBA. Figure A16 shows the one-third octave band $L_{Aeq,15\text{-}min}$ spectra were broad band with the 200 Hz peak 5 dB higher in the 10:45 pm measurement.

4.3.5 Location 20 Store Yard Close location

This location is the Environment Protection Licence noise compliance monitoring location to indicate achievement of compliance with licence conditions, because it has lower significant intrusion from other external noise sources (traffic) outside the plant boundary. The licence condition is for the $L_{A90,15\text{-}minutes}$ not to exceed 58 dBA (measured according to the methods of the Noise Policy for Industry, without transient or extraneous noise sources). Objectives are also for a long-term $L_{A90.period}$ over 7 days of 56 dBA. Earlier discussion of the results of this monitoring was provided in Section 4.2.

Results discussed in this section are for attended monitoring and associated one-third octave band analyses. Results of the attended monitoring are given in Table 4.7, Appendix F: Environmental Noise Level Assessment Report, and summarised in Table 4.8. Tables 4.9 and 4.10 show one-third octave band and tonality assessments and these are graphed in Appendix A figures A17 and A18. Appendix D provides the unattended sound level results.

Main sources were industrial noise of fans from the main parts of the plant, internal traffic movements and some truck movements on Taylor Avenue.

Figures A17 and A18 show the combined L_{Aeq} and L_{A90} spectra and tonality assessment. None of the spectra were found to be tonal. The higher frequency bands were between 400 Hz and 2000 Hz.

For the attended measurements on 1 December, general Cement plant noise was the main source, with some impact noise audible from the south-western side of the plant, perhaps the shale crusher or trucks feeding it. Some vehicle movement noise was also noted. The L_{Aeq} and L_{A90} were 56 and 54 dBA respectively. One-third octave band spectra shown in Figure A17 shows a peak at 25 Hz, which is seen as 23 Hz in narrow-band spectra from other locations. This may be related to a mill drive, however it is 17 dB below the L_{A90} and 16 dB below the L_{Aeq} highest spectrum levels in the mid frequencies and is unlikely to be audible on most occasions. The 200 Hz band is the highest band in the spectrum but is well below the tonality criteria.

For the listening attended monitoring on the afternoon of 14 December, similar industrial plant sources were heard to those of 1 December, but also included trucks on Taylor Avenue at 55 dBA. The impact noise from the south-western side of the plant was also heard again. With the whole plant

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idle, birds, cars and road trucks were the main sources of noise. The L_{Aeq} and L_{A90} were slightly lower at 54 and 51 dBA respectively. Figure A19 shows the one-third octave spectrum is broad band with the 500 to 1600 Hz bands being highest. The peak at 200 Hz is not apparent in this spectrum but that at 25 Hz is again seen.

Table 4.7:Boral Cement Berrima Annual Noise Assessment 2023

Attended noise measurements 1 to 14 December 2023

Location	Condition	Date	Time Start	Period mm:ss	File	Wtg	Statistical Sound Level - dBA								Comments
							LAeq,t	LCeq,t	Ceq-Aeq	LAMax	LA01,t	LA10,t	LA90,t	LA99,t	
4 Melbourne St		1/12/23	10:16 am	15:00	N140_01	A	59	73	15		69		48		Overcast, 7/8 cc low level cumulo stratus. 19oC, wind 0 to 1m/s SSW to S from plant to here. Resident in No.4 advised truck noise is an issue - especially empty trucks bumping on the road surface. Traffic noise is main variable source above ambient plant noise. Quiet is 48 to 50, cars 55 to 65, trucks 69 to 71 on road and in plant.One cement bulk truck DaHon Cooma very high Low frequency level.
		1/12/23	9:00 pm	15:00	NGARA	A	50	66	16	64	58	52	47	46	16oC, wind 1 to 3.5m/s E, 90%rh. 6 cars and 5 trucks pass, some close to the meter in Melbourne St, Cement plant noise is background but relatively constant. Occasional increases over a 20 second period on the wind. No birds or dogs. Plant noise had no significant events.
		2/12/23	11:30 pm	15:00	NGARA	A	48	65	17	60	55	49	47	46	13oC, 97%rh, calm wind. Fairly constant sound level. 5 car passes, 1 truck pass and 1 jet aircraft.
		4/12/23	8:30 pm	15:00	NGARA	A	47	64	17	66	57	49	42	41	5oC, 75%rh, 9 Km/hr N Ambient 42; Car horn / Dog - 67 , 55; Birds 45 ,55; Car 54, 54, 54, 53, 61, 53, 59, 51, 51, 53 ;Truck 61; distant Traffic ; cicadas
		5/12/23	11:00 pm	15:00	NGARA	A	45	62	17	66	57	43	39	38	19oC, 74%rh, wind 21 Km/hr E-SE; Ambient Noise 39-43; Truck 66 over bump 64; Truck 61 over bump 63 (3 bumps & rattling suspension; Car 58 ; Car over bump 58
		9/12/23	11:30 am	15:00	NGARA	A	46	62	16	63	55	49	40	38	34.5oC, 27%rh, wind 5.5m/s W. Mainly cars and birds with wind in tree noise, background bottom is possibly Cement plant noise or vegetation in wind noise. 35 cars, one truck pass, 1 plane.
		9/12/23	10:45 pm	15:00	NGARA	A	52	67	15	60	57	54	50		Ambient 49 - 52 dBA Car 55, 59 Thump 53, 53 Wind noise in leaves & on mic occasionally
		9/12/23	11:30 pm	15:00	NGARA	A	51	65	13	60	56	53	49	48	16.4oC, 42% rh, wind ave. 5.4m/s ESE to 8.8m/s at 23:30. Mostly wind noise from vegetation with background plant constant noise. High event 'click' at 23:36:20 probably a stick hitting the microphone and a bump noise a few seconds later. Some variation of plant noise on wind over 20 to 30 seconds of 5 to 7 dB 5 cars and 1 truck pass.
		9/12/23	11:45 pm	15:00	NGARA	A	52	65	13	61	57	54	49	48	16.3oC, 42%rh, wind ave 5.2m/s ESE to 7.9m/s at 23:47. Three vehicle passes. Plant noise varies on wind by 5 to 7 dB over 20 seconds on occasions.
	CBP On	14/12/23	9:16 am	15:00	2	A	57	69	12	74	69	60	46	44	26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Trucks on bumps in Taylor 68-73, cars 60-63, quiet ambient 45 to 47. Plant varies 45 to 49 on wind. Corellas 60
	CBP On	14/12/23	9:32 am	3:52	3	C	72	72		87	82	76	61	60	
Adelaide St		1/12/23	10:36 am	15:00	N140_02	A	62	75	12		75		50		Dog barking 59 to 65; Quiet 49 to 52, cars 56 to 71. Truck out of plant 77, trucks 67 to 77. Plant is background but fan noise not as strong here as Melbourne.
		14/12/23	5:10 pm	15:00	109	A	60	71	11	79	73	62	47	45	TAS 919 C80. Mainly WITN here. Plant barely audible unlike Brisbane. Trucks 68. Cars 58-68. Quiet 45. Wind at mic 0.5-1.5 avg. 0.8 SW
12 Brisbane St.		1/12/23	10:30 am	15:00	N150_01	A	53	66	12		65		46		26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Industry Heard 46-48. Car 53,49,55. Car Local 72,65. Truck 55 64 over bump 61, 63, 67, 62. Birds 48, 60, 53.
		14/12/23	4:47 pm	15:00	108	A	51	67	16	69	60	53	47	46	31oC, wind 1-2m/s to 4 on gusts S-SW. WITN 50-54, Cars to 58 mostly < WITN. Plant is bottom 49-53 on wind LF is audible. Distant trucks to W audible. Cars on street 63-68. Trucks 60-64 TAS 918 C80
		1/12/23	2:15 pm	15:00	N2540	A	54	70	16		60		51		26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Industry Heard 50-51. Truck 53, 55 , 55. High frequency noise observed

Table 4.7:Boral Cement Berrima Annual Noise Assessment 2023
Attended noise measurements 1 to 14 December 2023

Location	Condition	Date	Time Start	Period mm:ss	File	Wtg	Statistical Sound Level - dBA								Comments
							LAeq,t	LCeq,t	Ceq-Aeq	LAMax	LA01,t	LA10,t	LA90,t	LA99,t	
North Fence		14/12/23	3:31 pm	15:00	N140-63	A	53	72	19		60		53		Industry Heard 49-51 surging 54. Truck Taylor 54. High frequency noise observed. Airplane 55, 60-62
		9/12/23	10:45 pm	15:00	N140	A	58	72	14	68	63	60	55		16.4oC, 42% rh, wind ave. 4.8m/s ESE to 5m/s at 23:30. Mostly wind noise from vegetation and on mic occasionally; Noise varying on Wind ; a Moaning noise 3:36min in 60 dBA; rattle 6min in ; Bangs and Thumps 10to 12min in 58 to 63 dBA
		9/12/23	11:30 pm	15:00	N140	A	56	71	14	62	60	58	54		16.4oC, 42% rh, wind ave. 4.8m/s ESE to 5m/s at 23:30. Mostly wind noise from vegetation and on mic occasionally; Noise varying on Wind ; Bangs and Thumps thru out 58 to 63 dBA Car movement detected 8min in 60 dBA again 14 min in 63 dBA
Loc 20		9/12/23	10:45 pm	15:00	Nor150-799	A	61	74	13	70	65	63	59		Wind over mic masked the defining of noise. possible voices heard (2min) possible vehicle movement (2min 30) bang 66,65,63 possible Vehicle movement 62 (7min 36) Wind over mic 66 Clang 69 , 66, 67, 62, 63
		9/12/23	11:30 pm	15:00	Nor150-802	A	61	73	12	69	65	62	59		Wind over mic masked the defining of noise. possible vehicle movements (4 min, 6min 30, 13min 30)) bang 63-65 Wind over mic 63 Air release
		1/12/23	2:43 pm	15:00	N2541	A	56	72	16		60		54		Wind S-SW. Industry Heard 55 surge to 58, 61. Thump SW side of site 58 repeating; to 61. Car 61. Alarm 56
		14/12/23	4:11 pm	15:00	N140_64	A	54	75	21		60		51		Industry Heard 55-56 surge to 57 to 60 Thump SW side of site 58 repeating to 61. Truck Taylor 55. Birds 54
Admin Building Roof															
SW corner	CBP On	1/12/23	10:36 am		N140_31		72								Wind 2-3m/s NW to SW
SE corner	CBP On	1/12/23	10:36 am		N140_32		73								Wind 1-2m/s SW. Compressed air noise from kiln and low-frequency noise from CM7 & PHT
SE corner	CBP Off	14/12/23	3:51 pm	1:00	100	A	72	87		76	75	73	71	71	
SE corner	CBP Off	14/12/23	4:18 pm	1:01	104	A	73	85		76	75	74	71	71	
SE corner	CBP Off	14/12/23	4:24 pm	1:38	105	A	71	83		75	74	73	68	65	TAS 915
SE corner		14/12/23	4:27 pm	0:47	106	C	84	84		90	88	85	83	81	TAS 916 A90. TAS 917 C90
NE corner	CBP On	1/12/23			N140_33		72								

Table 4.8:Boral Cement Berrima Annual Noise Assessment 2023

Summary of Attended noise measurements Statistical sound levels 1 to 14 December 2023

Location	Condition	Date	Time Start	Period mm:ss	File	Time D,E,N	Statistical Sound Pressure Level - dBA							
							LAeq,t	LCeq,t	Ceq-Aeq	LAMax	LA01,t	LA10,t	LA90,t	LA99,t
4 Melbourne St		1/12/23	10:16 am	15:00	N140_01	D	59	73	15		69		48	
		1/12/23	9:00 pm	15:00	NGARA	E	50	66	16	64	58	52	47	46
		2/12/23	11:30 pm	15:00	NGARA	N	48	65	17	60	55	49	47	46
		4/12/23	8:30 pm	15:00	NGARA	A	47			66	57	49	42	41
		5/12/23	11:00 pm	15:00	NGARA	A	45			66	57	43	39	38
		9/12/23	11:30 am	15:00	NGARA	D	46	62	16	63	55	49	40	38
		9/12/23	11:30 pm	15:00	NGARA	N	51	65	13	60	56	53	49	48
		9/12/23	11:45 pm	15:00	NGARA	N	52	65	13	61	57	54	49	48
	CBP On	14/12/23	9:16 am	15:00	2	D	57	69	12	74	69	60	46	44
Adelaide St/Taylor		1/12/23	10:36 am	15:00	N140_02	D	62	75	12		75		50	
		14/12/23	5:10 pm	15:00	109	D	60	71	11	79	73	62	47	45
12 Brisbane St		1/12/23	10:30 am	15:00	N150_01	D	53	66	12		65		46	
		14/12/23	4:47 pm	15:00	108	D	51	67	16	69	60	53	47	46
North Fence		1/12/23	2:15 pm	15:00	N2540	D	54	70	16		60	51	49	
		9/12/23	10:45 pm	15:00	N140	N	58	72	14	68	63	60	55	
		9/12/23	11:30 pm	15:00	N140	N	56	71	14	62	60	58	54	
		14/12/23	3:31 pm	15:00	N140-63	D	53	72	19		60	53	49	
Loc 20		1/12/23	2:43 pm	15:00	N2541	D	56	72	16		60		54	
		9/12/23	10:45 pm	15:00	Nor150-799	N	61	74	13	70	65	63	59	
		9/12/23	11:30 pm	15:00	Nor150-802	N	61	73	12	69	65	62	59	
		14/12/23	4:11 pm	15:00	N140_64	D	54	75	21		60		51	
Admin Building Roof														
SW corner	CBP On	1/12/23	10:36 am	1:00	N140_31	D	72							
SE corner	CBP On	1/12/23	10:36 am	1:00	N140_32	D	73							
SE corner	CBP Off	14/12/23	3:51 pm	1:00	100	D	72	87	14	76	75	73	71	71
SE corner	CBP Off	14/12/23	4:18 pm	1:01	104	D	73	85	13	76	75	74	71	71
SE corner	CBP Off	14/12/23	4:24 pm	1:38	105	D	71	83	12	75	74	73	68	65
NE corner	CBP On	1/12/23		0:47	N140_33	D	72							

Table 4.9:Boral Cement Berrima Annual Noise Assessment 2023

Attended noise measurements 1 to 14 December 2023 - One Third Octave Band Spectra

Location	Date	Time Start	Wtg	Total - dBA LAeq,t	One-third Octave Band LAeq,t dB at Centre Frequency - Hz																															
					12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz	20 kHz
4 Melbourne St	1/12/23	10:16 am	A	59	-3	5	10	13	23	24	32	42	43	41	52	47	48	43	46	46	46	47	47	47	46	44	44	42	41	40	38	33	30	26	22	13	6
	1/12/23	9:00 pm	A	50	-9	0	7	22	13	24	27	32	30	31	31	36	37	37	36	40	41	41	40	40	39	37	36	34	29	24	20	16	13	10	7	3	-3
	2/12/23	11:30 pm	A	48	-7	2	8	21	17	23	26	26	27	29	24	34	37	37	35	37	38	39	39	39	37	36	33	30	23	18	12	11	10	21	25	11	-1
	4/12/23	8:30 pm	A	47	-8	1	7	19	14	23	25	26	26	26	24	31	35	34	32	34	35	36	37	41	41	36	32	29	28	33	19	15	12	12	11	3	-3
	5/12/23	11:00 pm	A	45	-9	1	8	16	14	20	24	22	25	25	25	35	37	32	31	31	33	35	35	35	36	33	31	27	23	20	16	16	11	8	7	3	-3
	9/12/23	11:30 am	A	46	-1	4	9	14	16	21	24	25	25	25	25	31	33	33	31	34	36	36	38	39	38	35	32	30	28	26	22	19	17	15	10	4	7
	9/12/23	10:45 pm	A	52	4	9	14	20	19	24	30	29	29	28	24	33	38	41	41	43	44	42	42	42	41	40	39	38	35	33	30	28	24	20	14	7	-1
	9/12/23	11:30 pm	A	51	-1	5	10	17	17	24	26	26	29	29	23	34	39	41	41	43	44	42	41	41	40	38	36	34	31	28	26	24	20	15	13	9	-1
	9/12/23	11:45 pm	A	52	-2	4	9	17	17	24	26	27	30	29	24	35	40	42	41	44	44	42	41	41	40	38	36	34	30	27	24	22	18	14	14	10	-1
	14/12/23	9:16 am	A	57	3	8	13	17	21	26	31	34	41	37	39	43	43	42	43	45	45	47	47	47	47	46	44	44	42	43	39	35	33	31	22	11	2
	14/12/23	9:32 am	C	72	60	61	62	62	61	61	61	65	57	60	58	54	53	49	50	49	47	50	48	47	45	45	42	41	40	39	36	32	30	27	20	10	1
Adelaide St	1/12/23	10:36 am	A	62	-3	6	12	16	23	28	32	41	48	41	48	53	49	47	50	51	51	52	53	52	51	49	48	46	45	43	40	37	37	33	27	21	15
	14/12/23	5:10 pm	A	60	0	6	14	21	21	25	29	39	43	35	42	46	44	46	46	47	48	49	50	50	50	49	46	46	46	50	47	40	38	36	32	20	9
12 Brisbane St.	1/12/23	10:30 am	A	53	-5	4	9	13	19	22	24	30	32	32	42	41	43	37	38	40	41	41	43	44	43	43	39	37	36	38	35	28	25	23	20	16	16
	14/12/23	4:47 pm	A	51	3	9	14	19	22	24	26	28	29	31	33	38	40	35	35	38	39	40	41	41	41	40	38	38	39	38	36	31	28	24	18	11	3
North Fence	1/12/23	2:15 pm	A	54	-3	7	17	25	24	29	28	31	36	35	35	40	45	39	40	43	45	43	42	43	41	40	39	37	35	31	26	23	27	30	26	16	14
	14/12/23	3:31 pm	A	53	5	11	18	27	26	29	31	35	36	37	38	40	43	38	39	41	42	42	43	43	42	42	41	40	38	36	34	33	31	28	24	20	14
	9/12/23	10:45 pm	A	58	1	11	17	28	23	25	27	29	32	34	33	44	50	46	48	48	48	46	46	47	45	43	41	39	36	34	32	31	29	24	19	14	8
	9/12/23	11:30 pm	A	56	0	9	16	28	23	28	25	27	31	33	31	40	46	44	47	47	47	46	46	46	45	43	41	39	37	34	32	31	29	25	21	15	7
Loc 20	9/12/23	10:45 pm	A	61			18	28	24	28	38	35	36	38	41	45	47	46	51	53	53	51	50	50	49	47	45	43	39	35	31	27	25	20	15	9	3
	9/12/23	11:30 pm	A	61			18	28	25	29	32	34	36	37	41	45	48	46	50	53	54	51	50	50	49	47	45	42	39	35	30	27	24	20	21	16	6
	1/12/23	2:43 pm	A	56	-1	8	19	27	22	29	29	31	35	38	44	46	48	41	42	45	47	46	44	45	44	43	42	39	38	35	31	32	26	25	23	17	15
	14/12/23	4:11 pm	A	54	11	16	21	31	28	31	33	34	37	37	38	39	38	37	40	43	45	44	43	44	44	43	42	39	37	35	30	26	25	21	17	11	6
Admin Building Roof																																				
SW corner	1/12/23	10:36 am		72																																
SE corner	1/12/23	10:36 am		73																																
SE corner	14/12/23	3:51 pm	A	72	22	27	32	37	45	45	47	49	49	51	53	57	59	57	58	61	61	60	62	62	62	61	61	61	60	58	55	52	47	37	24	15	5
SE corner	14/12/23	4:18 pm	A	73	19	25	30	34	44	42	44	47	50	50	53	59	60	57	58	62	63	60	61	62	62	62	61	60	59	57	55	52	46	36	22	10	2
SE corner	14/12/23	4:24 pm	A	71	15	22	27	32	41	41	43	46	48	50	52	56	58	56	56	58	60	59	59	61	61	61	60	59	58	56	54	50	45	38	30	24	18
SE corner	14/12/23	4:27 pm	C	84	65	69	71	71	79	74	70	71	70	69	68	72	72	67	64	66	66	63	62	64	62	62	62	60	60	58	56	52	47	38	23	9	2
NE corner	1/12/23			72																																

LA90,15-min

Location	Date	Time Start	Wtg	LA90,t dB	One-third Octave Band LA90,t																															
					12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz	20 kHz
Tonality Criteria																																				
4 Melbourne St	1/12/23	10:16 am	A	47	-12	-2	4	7	14	18	21	26	28	32	33	39	41	30	31	34	34	33	32	33	33	31	30	27	26	23	18	15	15	12	7	3	1
	1/12/23	9:00 pm	A	46	-15	-6	2	20	9	17	22	22	25	27	21	32	33	33	33	36	37	37	35	36	35	34	32	30	25	20	13	10	9	8	6	3	-3
	2/12/23	11:30 pm	A	46	-13	-4	3	19	13	19	22	22	24	26	20	32	35	34	33	35	36	37	37	37	34	33	30	27	20	14	10	9	8	7	6	3	-3
	4/12/23	8:30 pm	A	42	-14	-5	2	18	10	17	19	20	21	22	16	26	28	27	26	28	29	29	29	29	28	26	24	23	19	18	11	10	9	8	6	3	-3
	5/12/23	11:00 pm	A	39	-15	-5	2	13	9	15	18	16	19	19	14	32	33	25	24	25	26	27	27	26	22	19	16	15	10	9	9	9	9	8	6	3	-3
	9/12/23	11:30 am	A	39	-13	-5	1	6	9	15	20	16	20	20	16	25	27	26	25	27	28	29	30	30	29	26	24	21	20	18	15	13	13	12	8	4	3
	9/12/23	11:30 pm	A	48	-10	-3	3	12	11	18	21	22	25	25	20	28	32	37	37	40	40	39	38	38	37	36	34	31	27	23	20	17	14	10	7	3	-3
	9/12/23	11:45 pm	A	48	-11	-3	3	12	11	18	21	23	26	25	20	28	32	36	37	40	40	39	38	38	37	36	33	31	26	21	17	14	12	9	6	3	-3
	14/12/23	9:16 am	A	45		-2	4	9	14	17	22	22	24	26	28	32	33	29	32	34	34	35	36	35	34	33	32	31	30	29	27	24	28	27	16	5	0
	14/12/23	9:32 am	C	59	43	47	48	47	50	49	51	47	45	46	44	46	44	38	39	40	38	38	37	36	35	33	32	31	30	29	26	23	25	25	14	4	-2
Adelaide St	1/12/23	10:36 am	A	48	-11	-1	5	8	17	18	22	25	28	32	35	41	41	33	36	37	35	35	36	37	37	34	33	31	30	26	22	19	19	12	7	3	1
	14/12/23	5:10 pm	A	46		-6	9	18	13	20	18	21	23	24	29	28	28	29	32	33	34	35	37	37	37	36	33	32	29	27	24	22	25	25	17	6	0
12 Brisbane St.	1/12/23	10:30 am	A	44	-12	-3	2	6	13	15	17	21	23	25	29	36	37	29	30	33	34	32	34	34	33	30	28	25	24	22	19	15	13	11	9	7	5
	14/12/23	4:47 pm	A	46		-2	7	14	15	18	16	20	22	25	27	32	33	29	32	34	35	35	36	36	36	34	32	31	31	30	28	24	22	17	12	5	0
North Fence	1/12/23	2:15 pm	A	49	-10	1	14	23	20	26	25	26	28	29	30	35	39	33	35	39	41	39	39	40	38	37	36	34	32	27	21	16	19	20	14	10	8
	14/12/23	3:31 pm	A	49	-9	1	11	24	17	22	23	24	26	28	27	32	36	32	35	38	39	39	40	40	39	38	37	34	31	27	24	21	20	18	12	4	1
	9/12/23	10:45 pm	A	59			13	25	19	24	28	30	32	34	38	41	42	42	47	50	50	49	48	49	47	46	43	41	37	33	28	23	17	10	6	3	1
	9/12/23	11:30 pm	A	59			13	25	19	24	28	30	33	34	38	41	42	42	47	49	50	48	48	48	47	45	43	40	37	33	27	21	14	7	6	3	1
Loc 20	1/12/23	2:43 pm	A	53	-7	3	16	25	18	26	26	28	32	35	40	43	44	37	39	41	43	42	42	43	42	40	39	37	34	30	24	17	14	13	12	11	8
	14/12/23	4:11 pm	A	50	-8	-1	14	28	16	26	24	26	31	32	33	35	35	34	36	39	41	41	40	41	41	40	38	36	32	27	21	14	10	8	6	3	1
Admin Building Roof																																				
SW corner	1/12/23	10:36 am																																		
SE corner	1/12/23	10:36 am																																		
SE corner	14/12/23	3:51 pm	A	70	4	15	22	25	41	37	36	42	43	46	51	55	57	55	56	59	60	58	60	60	61	60	59	59	57	55	52	49	43	33	20	7	0
SE corner	14/12/23	4:18 pm	A	71	7	18	23	26	41	38	38	43	45	47	51	56	58	56	57	60	61	59	60	61	61	60	59	58	56	54	51	47	42	33	19	6	0
SE corner	14/12/23	4:24 pm	A	67	7	16	22	27	36	37	38	42	44	46	49	53	54	53	53	55	57	55	55	57	57	57	56	55	54	52	49	46	40	32	24	18	13
SE corner	14/12/23	4:27 pm	C	81	55	62	65	65	77	71	65	67	66	66	66	70	70	65	63	64	65	61	60	61	61	60	59	58	57	55	53	49	44	35	20	6	-2
NE corner	1/12/23			72																																

Table 4.10:Boral Cement Berrima Annual Noise Assessment 2023

Attended noise measurements 1 to 14 December 2023 - One Third Octave Band Tonality Spectra

Location	Condition	Date	Time Start	Period mm:ss	File	Wtg	One-third Octave Band LAeq,t Tonality dB at Centre Frequency - Hz																										
							31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz
Tonality Criteria							15.0	15.0	15.0	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4 Melbourne St		1/12/23	10:16 am	15:00	N140_01	A	4	3	1	4	2	7	8	3	3	4	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	0	3	1
		1/12/23	9:00 pm	15:00	NGARA	A	10	4	1	3	1	0	2	2	1	0	2	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	1
		2/12/23	11:30 pm	15:00	NGARA	A	6	2	2	1	0	4	8	4	2	0	2	1	0	1	0	1	1	1	0	2	0	0	2	0	6	3	9	1
		4/12/23	8:30 pm	15:00	NGARA	A	7	3	1	0	0	1	5	2	2	0	1	0	0	0	2	2	3	1	0	1	3	9	5	0	2	1	3	1
		5/12/23	11:00 pm	15:00	NGARA	A	4	1	3	3	2	0	5	4	3	2	0	1	0	1	0	0	2	0	1	0	0	0	2	3	1	1	2	1
		9/12/23	11:30 am	15:00	NGARA	A	1	1	2	0	0	0	4	3	1	1	2	0	1	1	0	1	1	0	0	0	0	1	0	0	0	2	0	4
		9/12/23	10:45 pm	15:00	NGARA	A																											
		9/12/23	11:30 pm	15:00	NGARA	A	3	2	1	1	2	3	8	3	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	0	1	1	3
		9/12/23	11:45 pm	15:00	NGARA	A	4	2	1	1	2	3	8	3	2	1	2	1	2	1	1	1	0	0	0	1	0	0	0	1	1	2	2	3
	CBP On	14/12/23	9:16 am	15:00	2	A	0	0	1	2	5	3	1	2	1	1	0	1	1	1	0	0	0	1	1	1	1	2	1	1	0	3	1	1
	CBP On	14/12/23	9:32 am	3:52	3	C	0	0	2	6	5	2	1	1	2	3	1	1	2	2	0	1	1	1	1	0	0	1	0	1	0	2	2	1
Adelaide St		1/12/23	10:36 am	15:00	N140_02	A	1	1	3	1	7	7	1	4	1	3	2	0	1	0	1	0	0	1	1	0	0	1	0	1	1	2	0	0
		14/12/23	5:10 pm	15:00	109	A	2	1	4	3	6	8	2	3	2	1	1	1	0	0	0	0	0	1	1	0	2	4	2	2	0	0	5	1
12 Brisbane St.		1/12/23	10:30 am	15:00	N150_01	A	1	0	2	2	1	5	6	2	5	4	1	1	1	1	1	1	1	3	2	0	1	2	2	2	1	1	1	3
		14/12/23	4:47 pm	15:00	108	A	0	1	1	1	1	0	2	2	3	3	1	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0
North Fence		1/12/23	2:15 pm	15:00	N2540	A	4	4	2	1	3	1	3	1	5	3	1	0	3	1	0	1	0	0	0	0	1	0	1	3	0	3	3	4
		14/12/23	3:31 pm	15:00	N140-63	A	3	1	1	1	0	0	1	0	4	3	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
		9/12/23	10:45 pm	15:00	N140	A																											
		9/12/23	11:30 pm	15:00	N140	A																											
Loc 20		9/12/23	10:45 pm	15:00	Nor150-799	A	4	3	6	1	1	1	0	1	2	3	2	1	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0
		9/12/23	11:30 pm	15:00	Nor150-802	A	3	0	0	0	0	1	0	1	3	3	1	1	2	1	0	1	0	0	0	0	0	0	0	1	1	3	3	2
		1/12/23	2:43 pm	15:00	N2541	A	6	4	1	1	1	2	3	0	5	5	0	0	1	0	1	1	0	0	0	0	1	0	3	4	2	1	1	2
		14/12/23	4:11 pm	15:00	N140_64	A	4	1	0	1	2	1	0	1	0	2	1	1	2	0	1	0	0	1	0	0	0	1	1	2	2	0	0	0
Admin Building Roof																																	
SW corner	CBP On	1/12/23	10:36 am		N140_31																												
SE corner	CBP On	1/12/23	10:36 am		N140_32																												
SE corner	CBP Off	14/12/23	3:51 pm	1:00	100	A	4	1	0	1	0	1	1	1	3	2	1	1	1	1	0	0	0	0	0	0	1	0	1	1	2	2	2	0
SE corner	CBP Off	14/12/23	4:18 pm	1:01	104	A	6	2	0	0	1	2	1	2	3	2	1	1	2	2	0	1	0	0	0	0	1	0	1	1	2	2	1	2
SE corner	CBP Off	14/12/23	4:24 pm	1:38	105	A	5	1	0	1	0	0	1	1	2	1	2	0	2	1	1	1	0	1	0	0	0	0	1	1	1	0	1	0
SE corner		14/12/23	4:27 pm	0:47	106	C	7	0	3	1	0	0	2	1	3	2	2	0	2	1	2	2	1	0	0	1	1	0	1	1	2	3	0	3
NE corner	CBP On	1/12/23			N140_33																												

LA90,15-min

Location	Condition	Date	Time Start	Period mm:ss	File	Wtg	One-third Octave Band LA90,t Tonality dB at Centre Frequency - Hz																										
							31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz
Tonality Criteria							15.0	15.0	15.0	15.0	15.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
4 Melbourne St		1/12/23	10:16 am	15:00	N140_01	A	1	1	1	1	1	1	3	2	7	6	1	1	1	0	1	0	1	1	1	0	1	1	1	2	1	1	1	0
		1/12/23	9:00 pm	15:00	NGARA	A	10	2	2	1	0	4	9	5	0	0	2	1	0	1	1	1	0	0	0	2	0	1	2	1	0	0	1	1
		2/12/23	11:30 pm	15:00	NGARA	A	7	2	2	1	0	4	9	4	2	0	1	1	0	1	0	1	0	1	0	2	1	0	2	0	0	0	1	1
		4/12/23	8:30 pm	15:00	NGARA	A	8	3	1	0	1	3	8	4	1	0	2	1	0	0	0	1	0	1	1	1	2	3	3	0	0	0	1	1
		5/12/23	11:00 pm	15:00	NGARA	A	5	1	2	2	1	3	12	8	5	3	2	0	0	0	1	1	0	0	1	2	3	0	0	1	0	0	1	1
		9/12/23	11:30 am	15:00	NGARA	A	1	0	5	4	2	2	6	4	1	0	2	1	0	0	0	1	1	0	0	0	0	1	0	1	0	2	0	2
		9/12/23	11:30 pm	15:00	NGARA	A	4	2	1	1	2	2	6	2	0	2	1	1	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1
		9/12/23	11:45 pm	15:00	NGARA	A	3	2	1	1	2	2	7	2	0	2	1	1	1	0	1	1	0	0	0	1	0	1	1	0	0	0	0	1
	CBP On	14/12/23	9:16 am	15:00	2	A	1	1	3	2	0	0	2	2	2	3	0	1	0	0	1	0	0	0	0	0	0	1	0	3	2	5.3	0	2
Adelaide St		1/12/23	10:36 am	15:00	N140_02	A	4	1	0	0	1	0	1	3	4	5	1	1	1	1	0	1	1	1	1	0	1	1	1	1	3	1	1	0
		14/12/23	5:10 pm	15:00	109	A	6	5	3	1	1	2	3	0	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0	3	1	4	1	2
12 Brisbane St.		1/12/23	10:30 am	15:00	N150_01	A	3	1	1	1	1	1	1	3	5	5	1	1	1	1	1	0	1	0	0	0	0	1	0	1	0	0	0	0
		14/12/23	4:47 pm	15:00	108	A	1	2	3	1	0	0	1	2	2	3	0	0	0	0	0	1	0	1	1	0	0	1	0	0	1	1	0	0
North Fence		1/12/23	2:15 pm	15:00	N2540	A	5	4	1	0	0	1	3	1	5	4	1	1	2	1	0	1	0	0	0	0	1	1	0	4	1	3	1	1
		14/12/23	3:31 pm	15:00	N140-63	A	6	2	0	0	0	1	3	1	4	4	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1	2	1	2
Loc 20		9/12/23	10:45 pm	15:00	Nor150-799	A	6	1	1	0	0	1	0	1	0	2	1	1	1	1	0	1	0	0	0	0	0	1	0	0	0	1	1	0
		9/12/23	11:30 pm	15:00	Nor150-802	A	5	1	0	0	0	1	0	1	1	3	1	1	2	1	0	1	0	0	0	0	0	1	0	0	0	2	0	0
		1/12/23	2:43 pm	15:00	N2541	A	7	4	1	1	0	1	1	1	4	4	1	1	1	0	1	1	0	0	0	0	1	1	0	2	1	0	0	0
		14/12/23	4:11 pm	15:00	N140_64	A	11	6	2	2	2	0	1	1	1	2	0	1	1	0	1	0	0	1	0	1	0	1	0	1	1	1	0	0
Admin Building Roof																																	
SW corner	CBP On	1/12/23	10:36 am		N140_31																												
SE corner	CBP On	1/12/23	10:36 am		N140_32																												
SE corner	CBP Off	14/12/23	3:51 pm	1:00	100	A	10	1	3	2	1	1	0	1	2	2	1	1	1	2	1	0	1	0	0	0	1	0	0	1	2	2	0	3
SE corner	CBP Off	14/12/23	4:18 pm	1:01	104	A	9	2	2	1	0	1	1	2	2	2	1	1	2	2	0	0	0	0	0	0	1	0	0	1	2	2	1	3
SE corner	CBP Off	14/12/23	4:24 pm	1:38	105	A	4	0	2	1	0	0	1	1	1	0	1	0	2	1	1	1	0	0	0	0	1	0	1	1	1	0	2	0
SE corner		14/12/23	4:27 pm	0:47	106	C	9	0	3	1	0	0	2	2	3	1	2	0	2	1	1	1	0	0	0	0	1	0	1	1	2	3	0	4
NE corner	CBP On	1/12/23			N140_33																												

Figure 4.12: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison

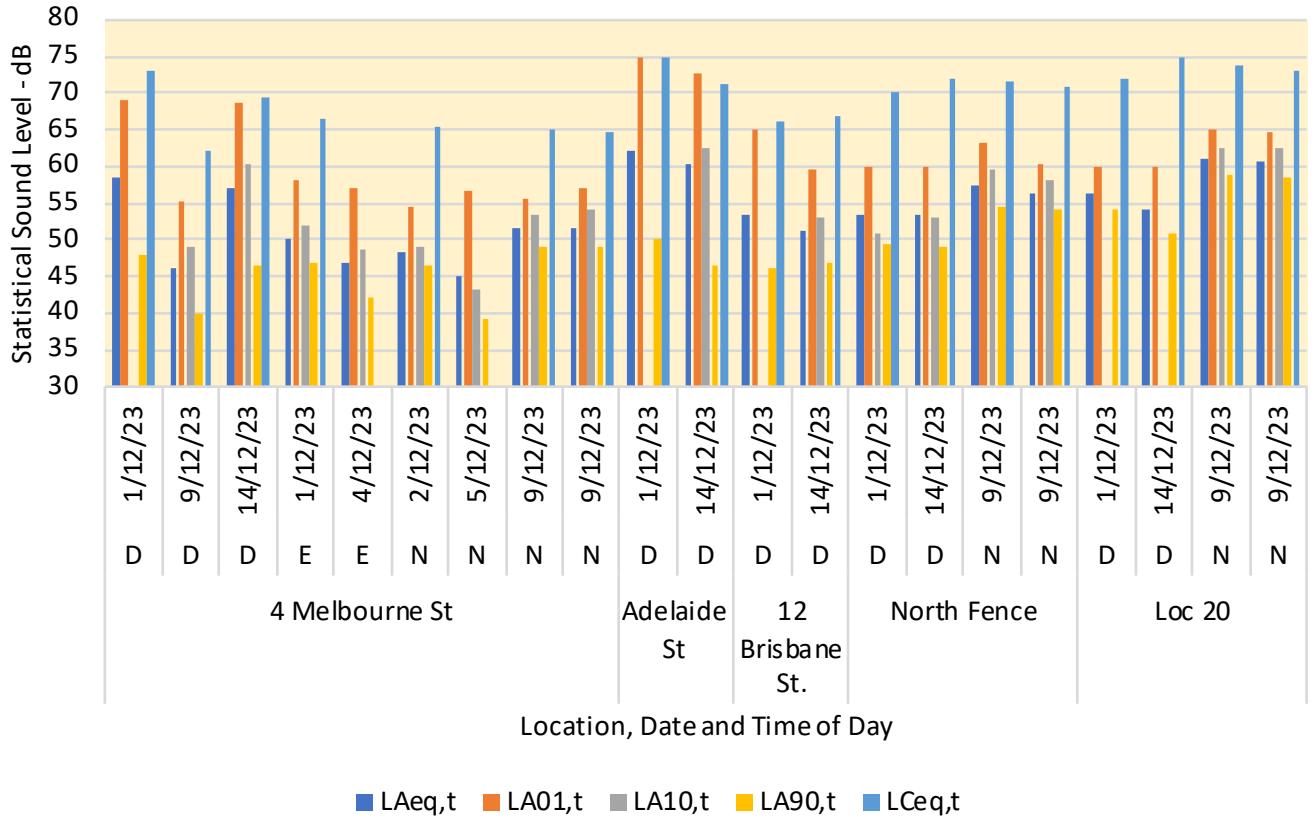


Figure 4.13: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison
LAeq,t

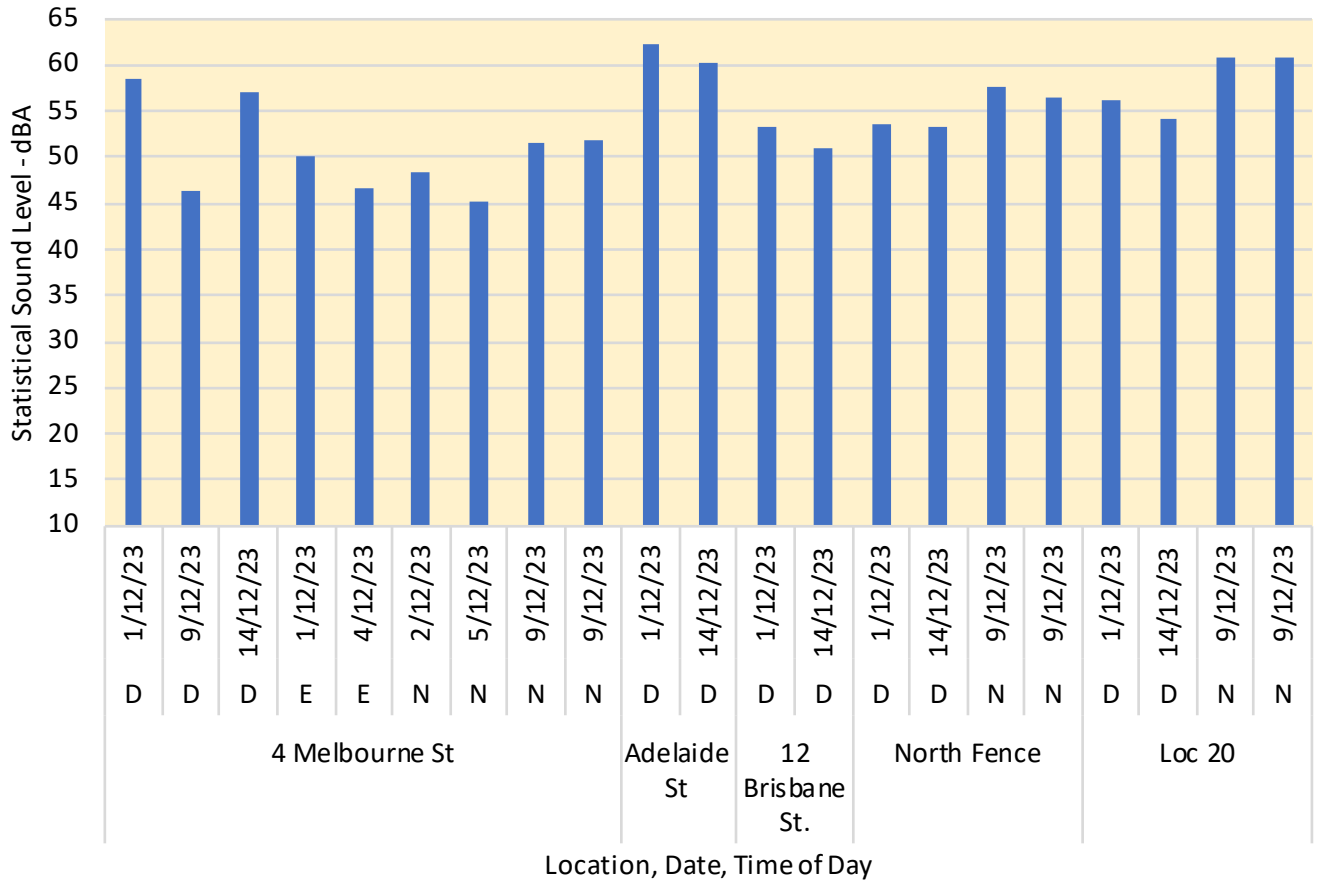


Figure 4.14: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison
LA90,t

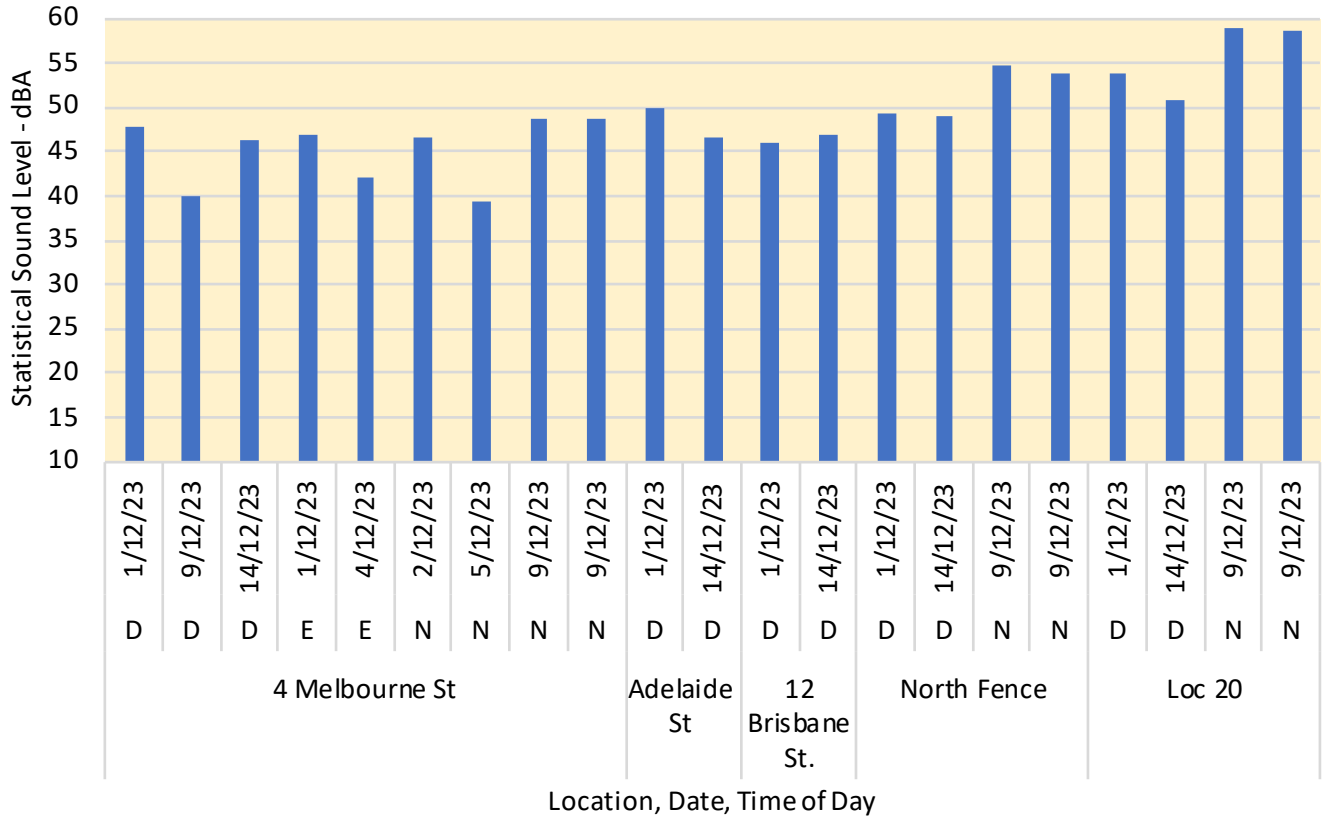


Figure 4.15: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison
LA01,t

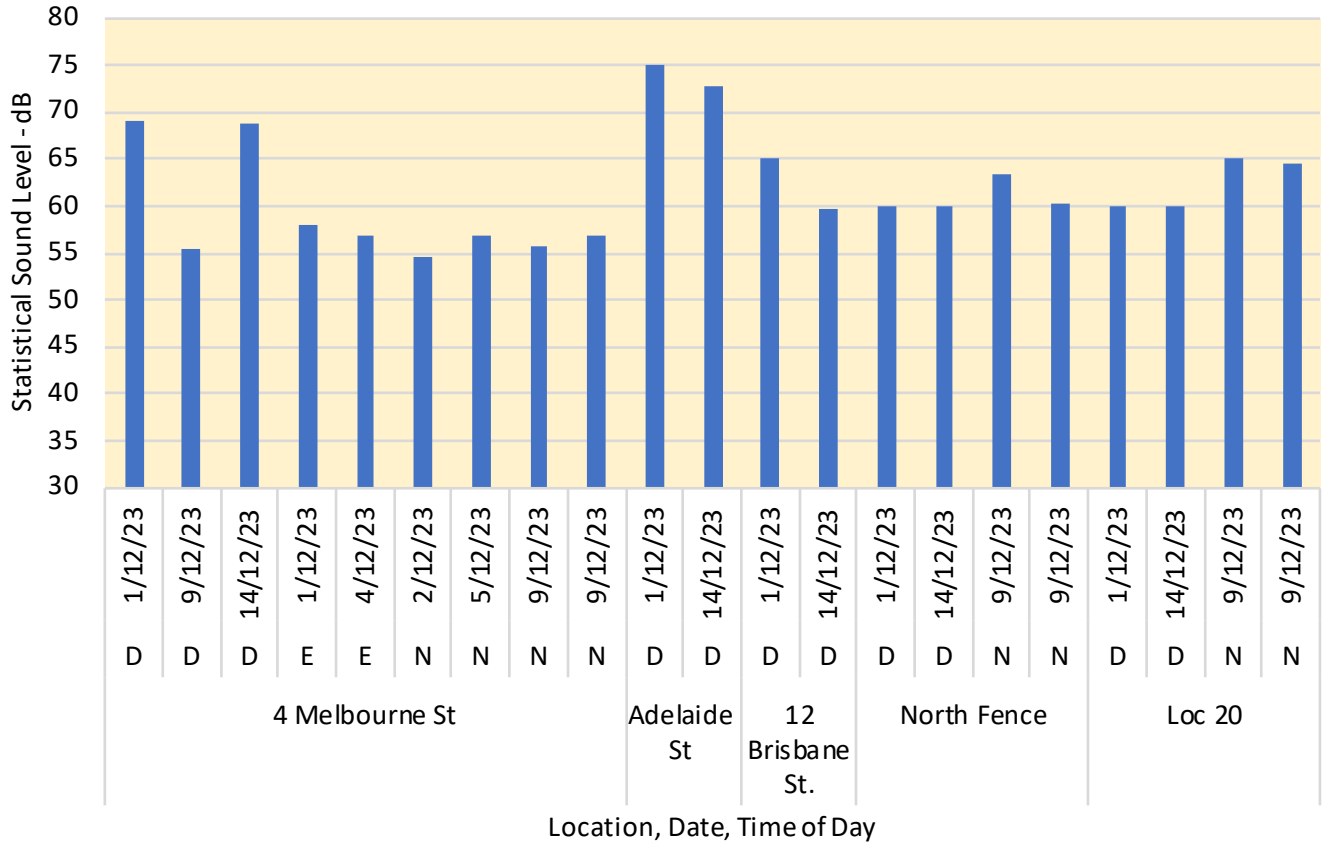


Figure 4.16: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison
LCeq,t

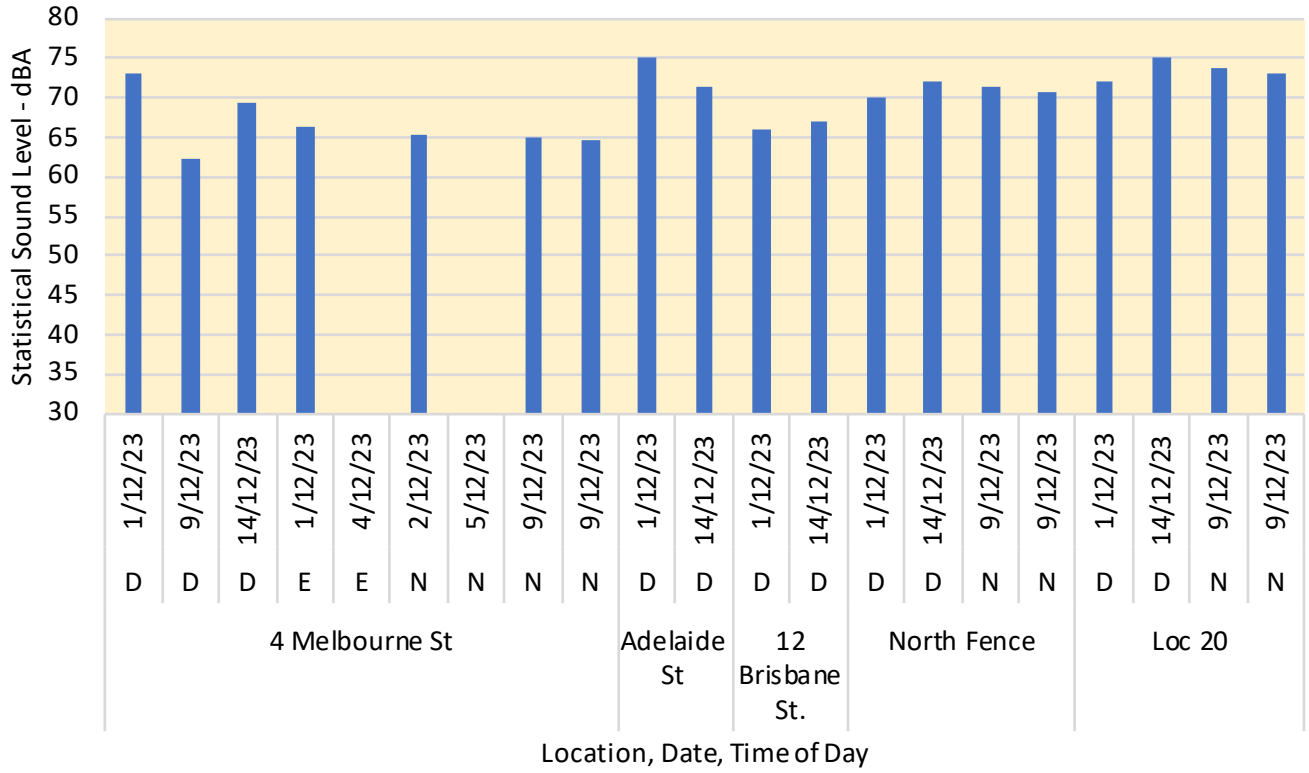


Figure 4.17: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison
LCeq-LAeq

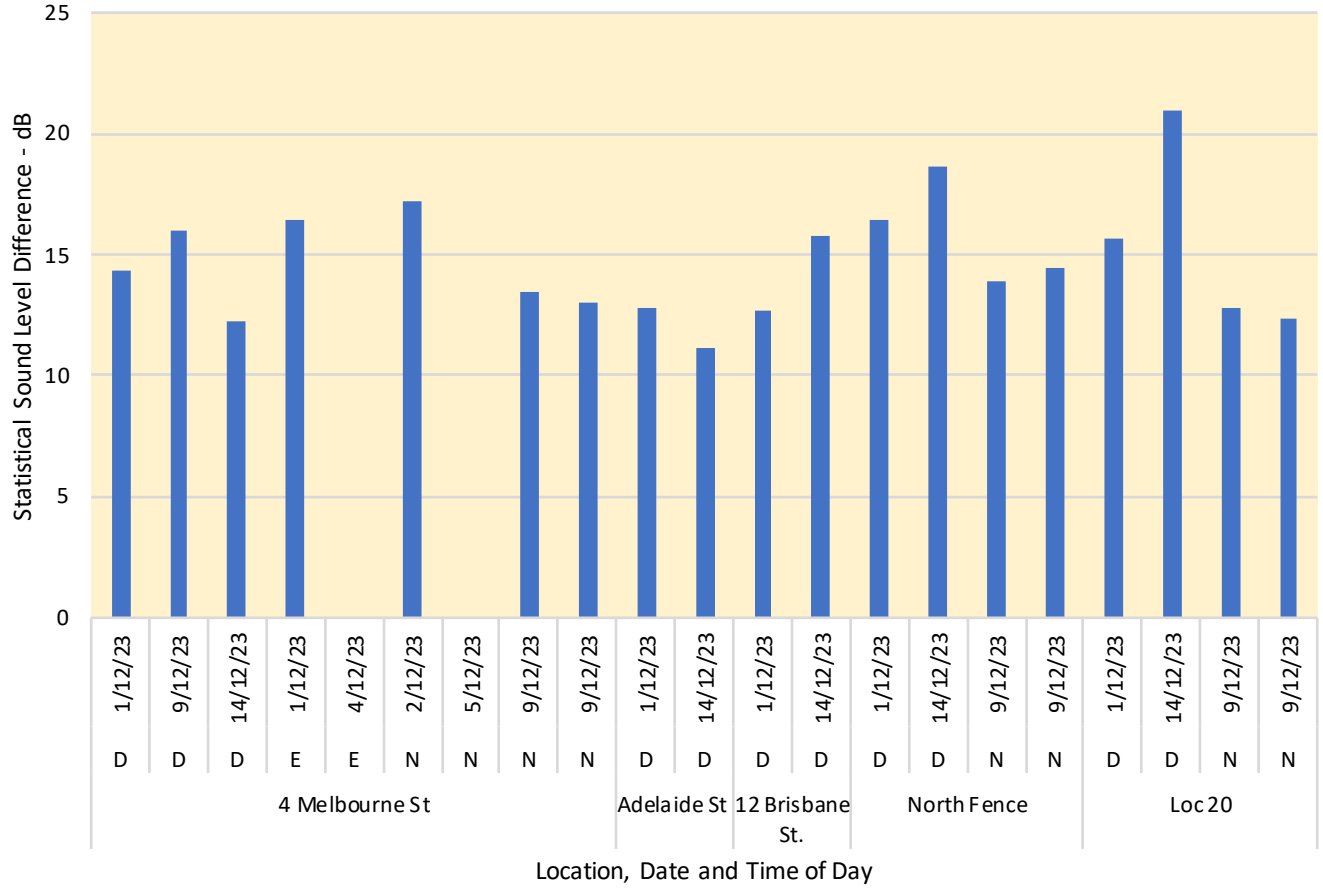


Figure 4.18: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison LAeq-LA90

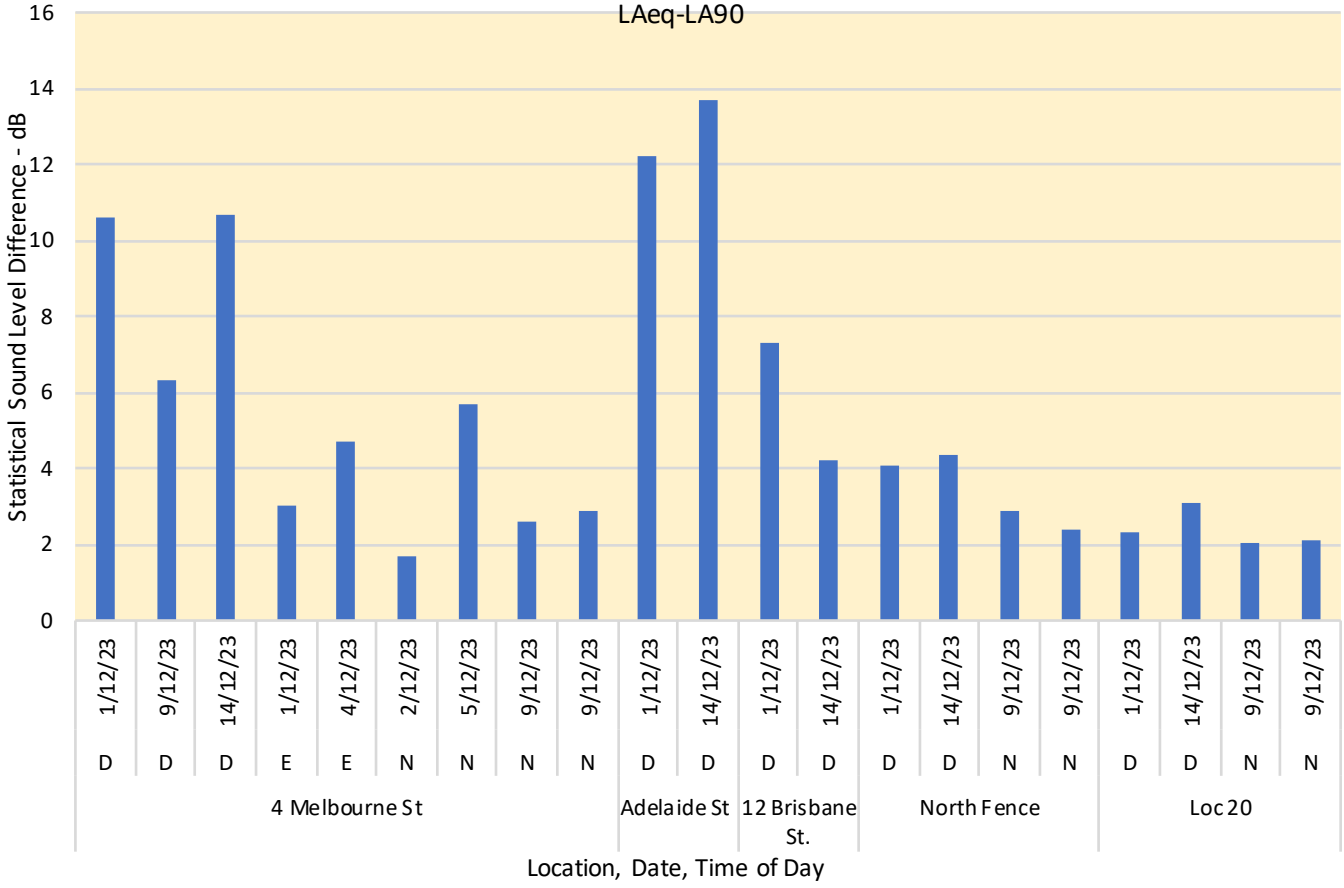


Figure 4.19: Boral Cement Berrima Annual Environmental Noise Assessment 2023 - Attended Monitoring Statistical Sound Levels Comparison LA01-LA90

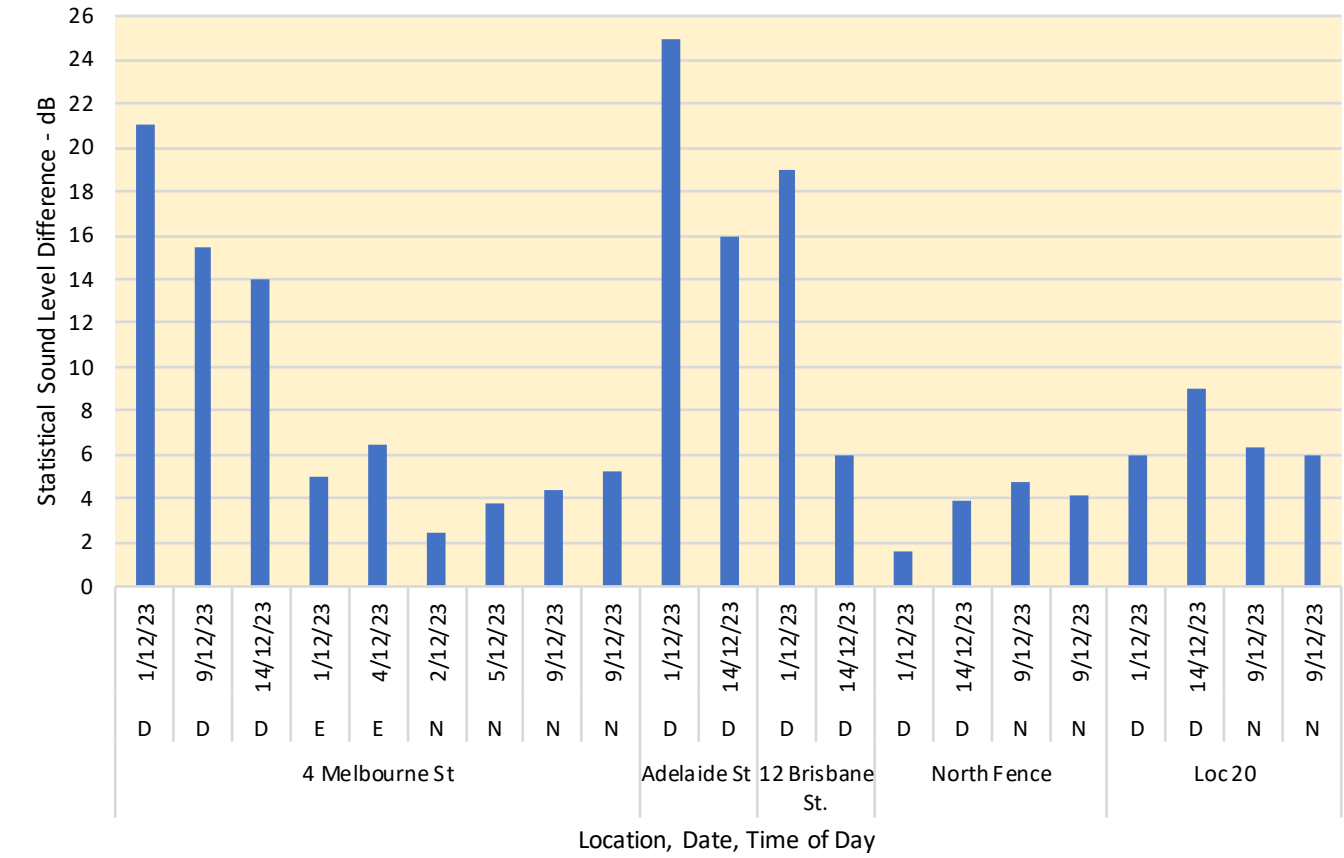
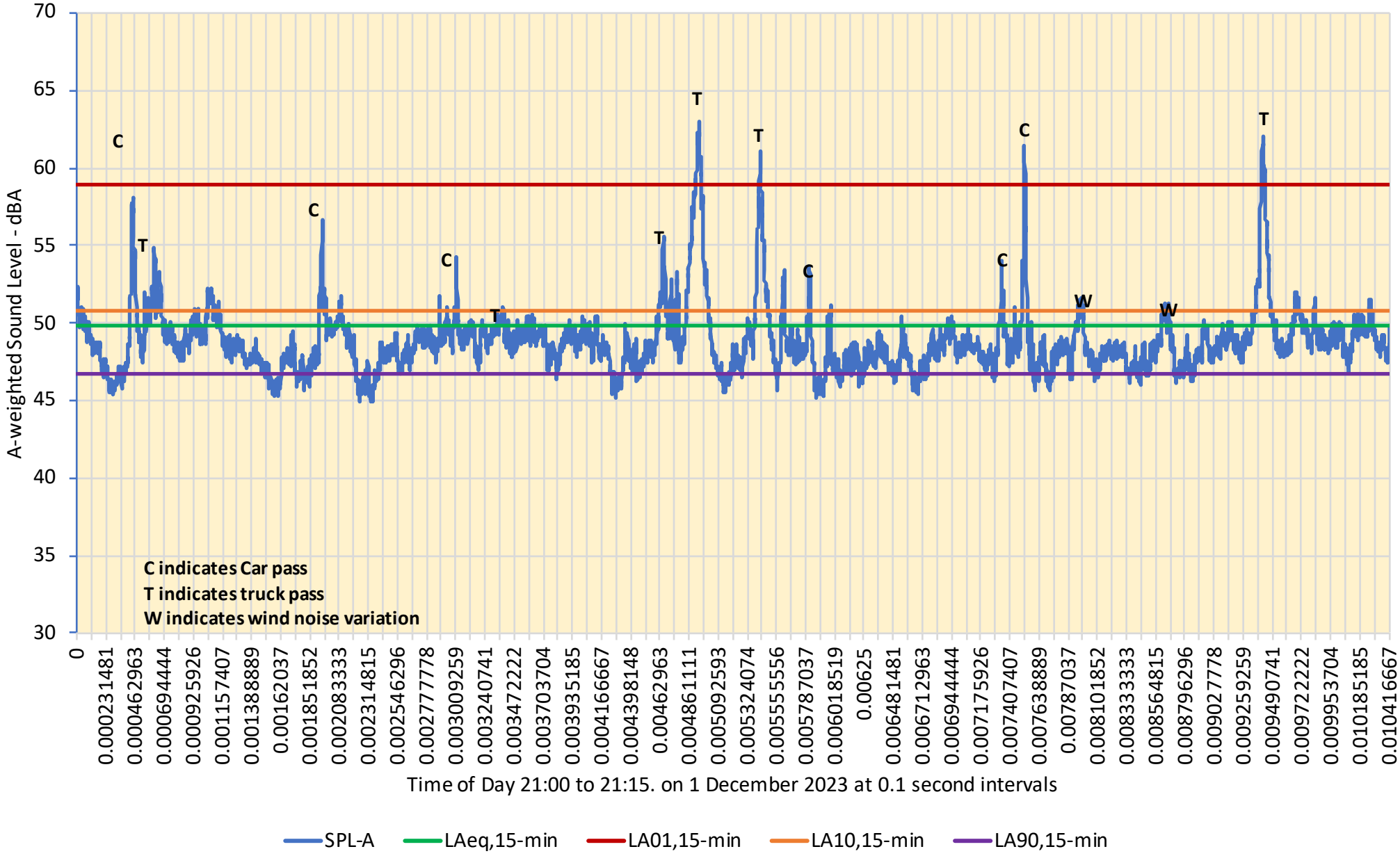
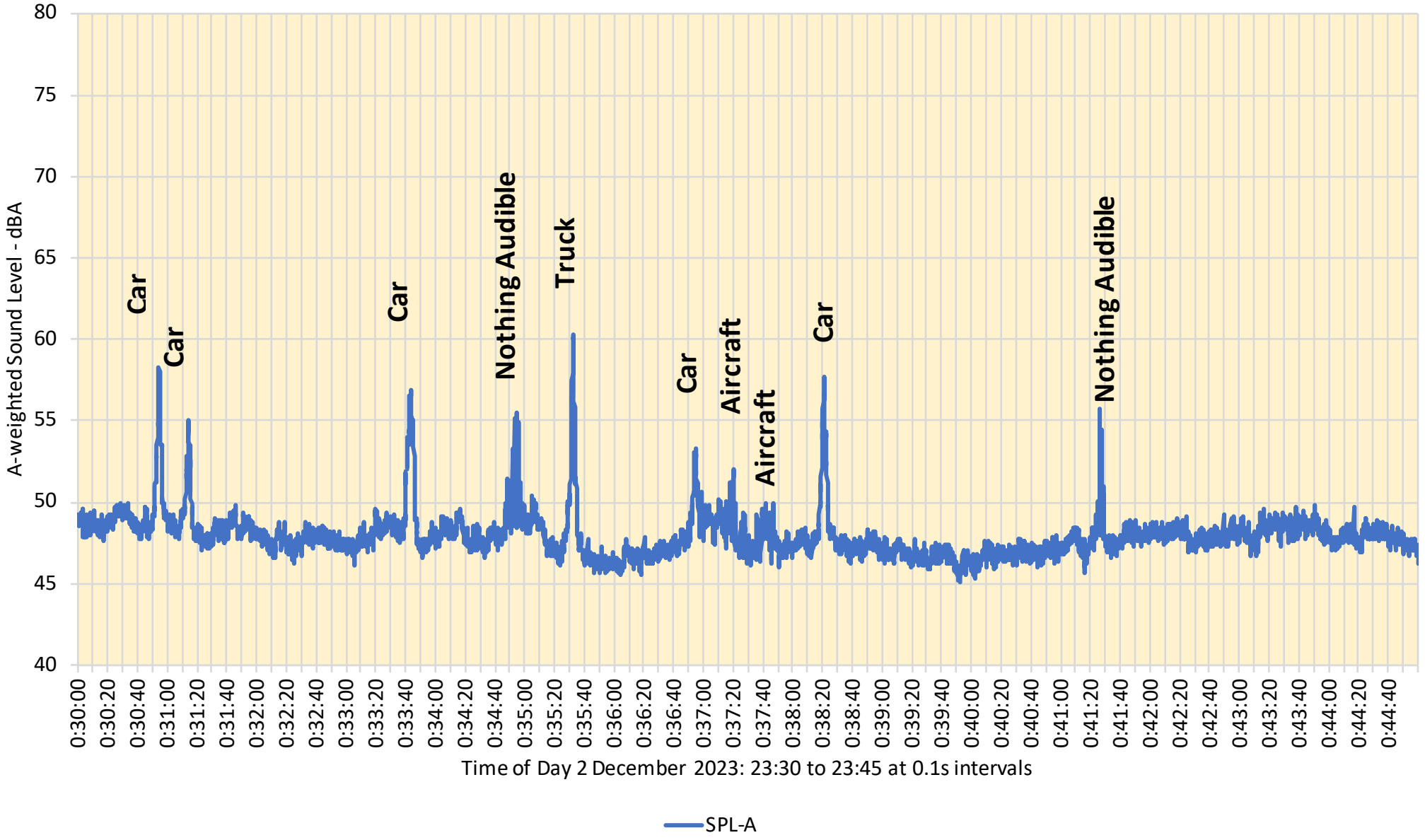


Figure 4.20: Boral Cement Berrima Annual Environmental Noise Assessment -
Sound levels at 4 Melbourne St 21:00 to 21:15 on 1 December 2023 at 0.1s intervals



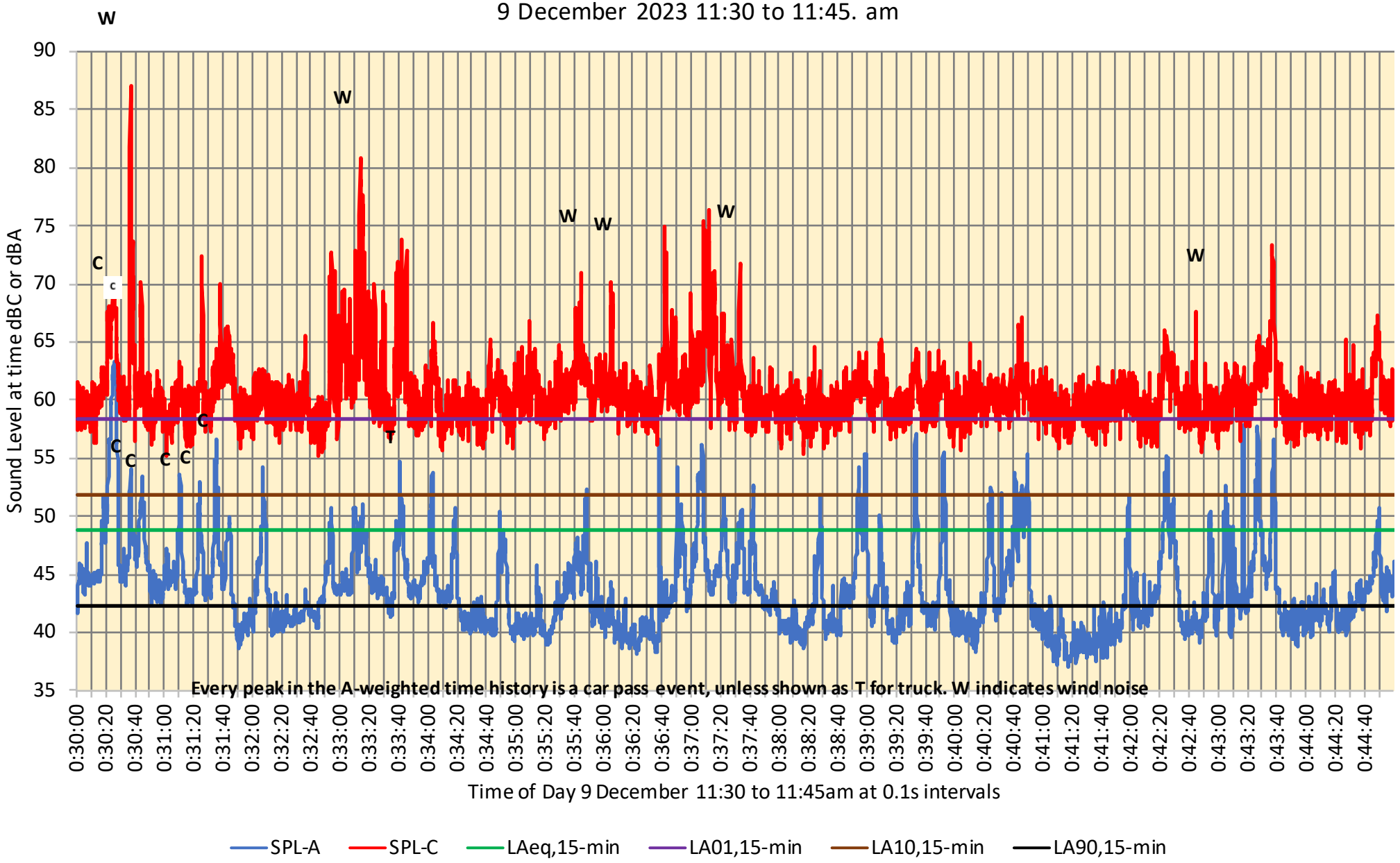
time histories 4ms.xlsx

Figure 4.21: Boral Cement Berrima Annual Environmental Noise Assessment - 4 Melbourne St 23:30 to 23:45 on 2 December 2023



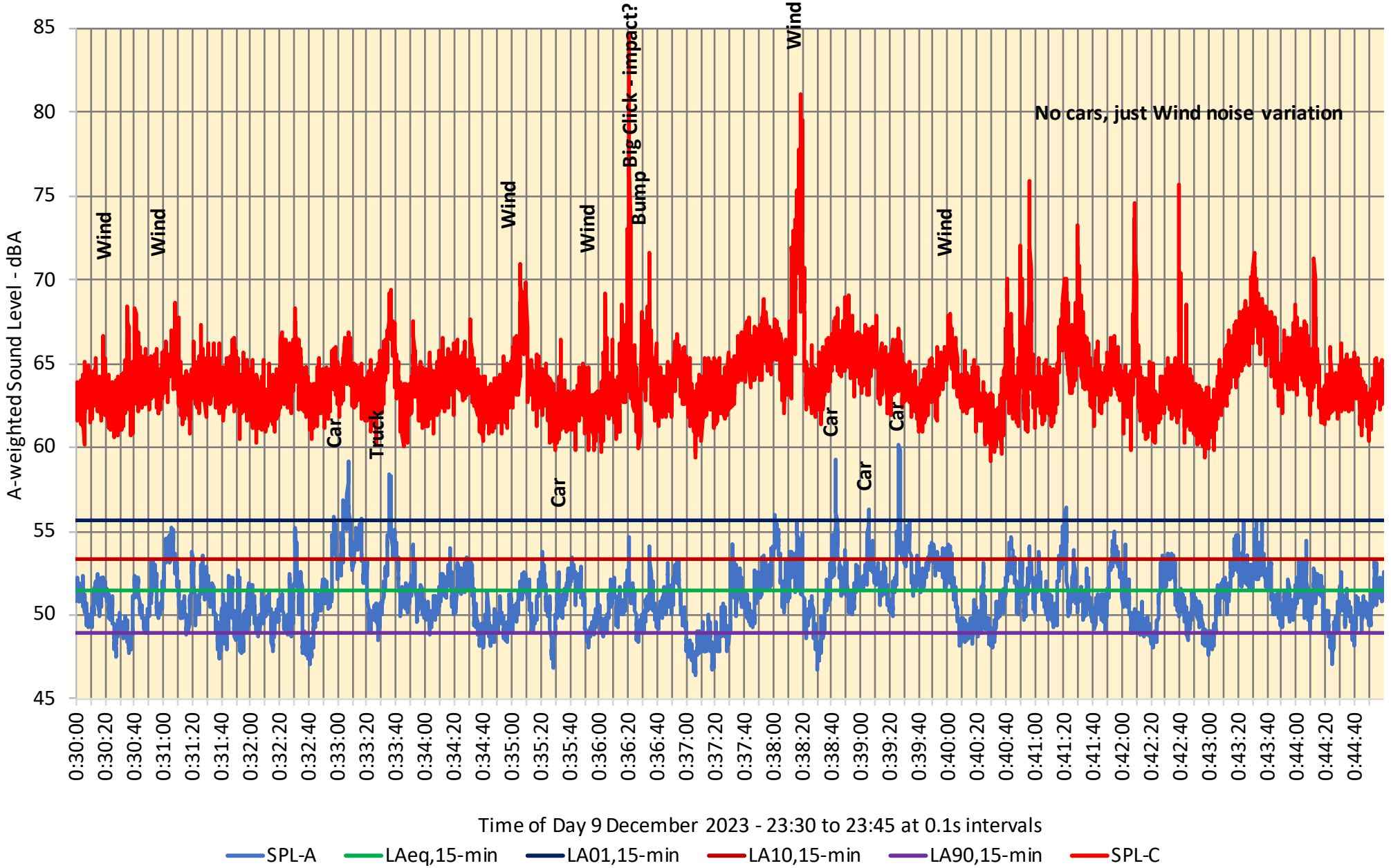
time histories 4ms.xlsx

Figure 4.22: Boral Cement Berrima Annual Environmental Noise Assessment - 4 Melbourne St
9 December 2023 11:30 to 11:45. am



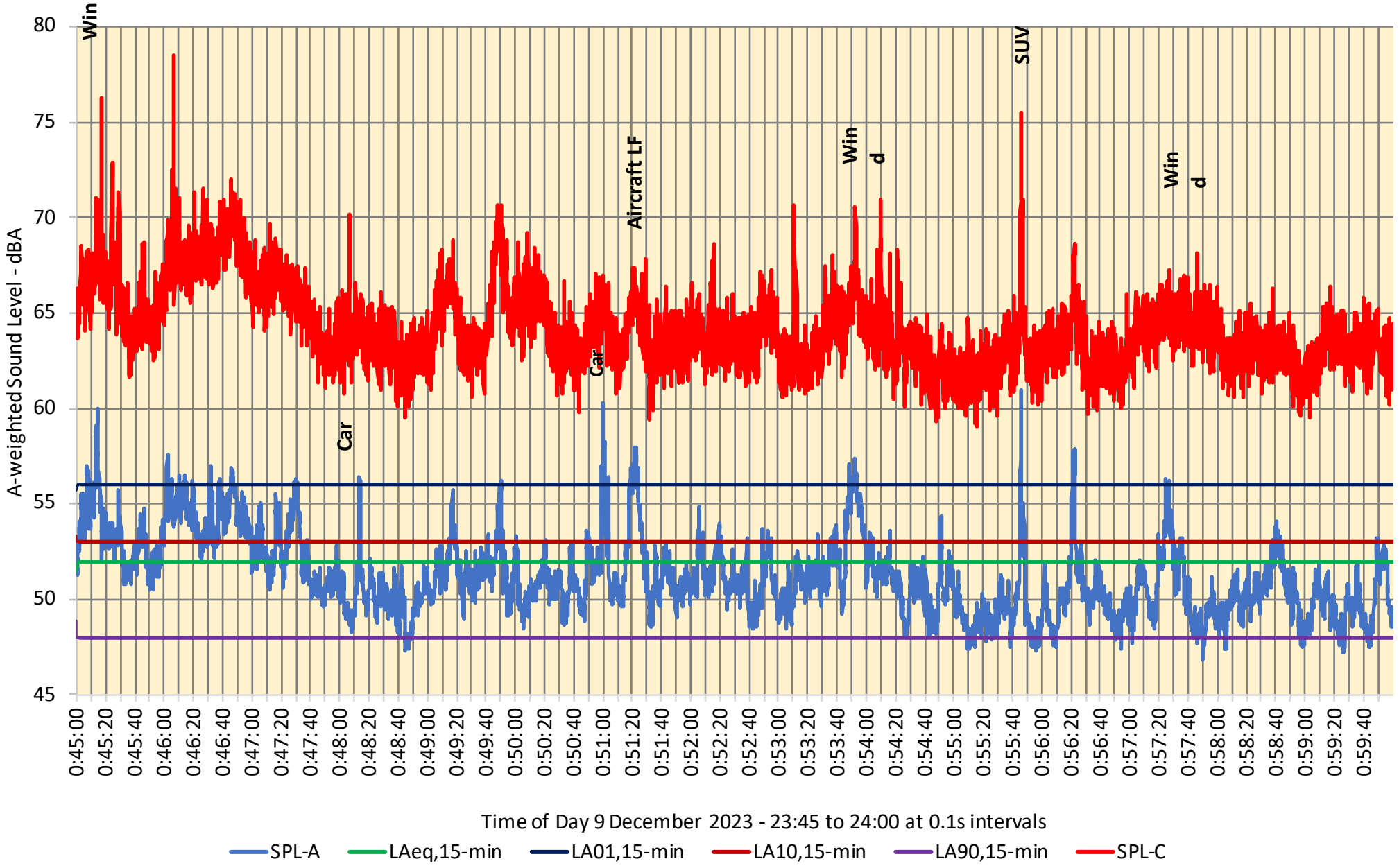
time histories 4ms.xlsx

Figure 4.23: Boral Cement Berrima Annual Environmental Noise Assessment - 4 Melbourne St
9 December 2023 23:30 to 23:45.



time histories 4ms.xlsx

Figure 4.24: Boral Cement Berrima Annual Environmental Noise Assessment - 4 Melbourne St
9 December 2023 23:45 to 24:00.



time histories 4ms.xlsx

Recognition Research
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ACN: 153 946 064

5 Summary and Conclusions

The Boral Cement Berrima works has a single noise limit condition for the total site, of $L_{A90,15\text{-minute}}$ to not exceed 58 dBA at Location 20 in the Store Yard. Monitoring for total site emissions at Location 20 over a 14-day period in December 2023 has again confirmed that total site emissions are in compliance with that licence condition, as has occurred in 2019 to 2022. Times when that sound level limit was exceeded at the site were assessed to be caused by weather conditions of high wind and extraneous short-term noise sources, potentially in the vicinity of the car park near the main truck gate, not relevant to the compliance assessment.

Sound levels at the plant and in the residential community affected by the noise emissions from the total site have been measured regularly since 2002 and since the completion of each of the Kiln 6 Upgrade and Cement Mill No.7 projects. Monitoring of both site source sound levels and residential receiver sound levels on an annual basis from 2008 to 2021 confirmed that both of the projects were in compliance with their noise limit conditions at the time. Sound levels measured close to the plant at Location 20 and on the Control Building roof in 2022 and 2023 indicate that these projects continue to achieve their objectives. A separate assessment of the Chloride Bypass Plant indicated that it was in compliance with its sound level contribution objectives.

The annual environmental noise assessment has evaluated noise emission from the Cement Plant by the following methods:

- Monitoring of sound levels at Location 20 for compliance assessment;
- Monitoring of sound levels in one residential receiver location with unattended monitoring over long-term periods of two weeks and attended monitoring in daytime at three residential receiver locations to compare with long-term averages from previous years and assess the audible acceptability of the received sound levels.
- Monitoring of sound levels at the North Fence location over the same two-week period to assess the potential for sleep intrusion and low-frequency noise emissions

The finding of this 2023 annual environmental noise assessment is that total site noise emissions are considered to be in compliance with the licence condition.

Sound levels from the two major completed projects (Kiln 6 Upgrade and Cement Mill No.7) are also considered to be in compliance with their noise objectives at the nearest residential receiver locations.

It is also the finding of this assessment that the long-term average statistical sound levels have not increased and indicates that the Cement Plant is not increasing its emissions.

Measurements at the North Fence boundary location also assessed potential sleep disturbance and low-frequency impacts according to the NSW Noise Policy for Industry.

Calculations of sleep disturbance potential use $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ at night-time to provide comparisons with recommended maximum values for night-time of 60 dBA for $\mathbf{L_{A01.1\text{-minute}}}$ night-time for the Northern Boundary location and not greater than 15 dB difference for $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$. From the analyses it is considered that the number or times that the objectives of $\mathbf{L_{A01,1\text{-minute}}}$ greater than 60 dBA and $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ difference results greater than 15 dB are relatively low and the noise emissions from the Cement Plant have a low potential for sleep disturbance. Site measurements and analyses indicate that the most likely site noise sources to exceed criteria are rail-

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movement associated noise, but not all rail events cause exceedances. Noise from birds and other sources cause a greater number of events exceeding the criteria.

For low frequency assessment, an initial screening test is made of the C-weighted minus A-weighted (L_C-L_A) period sound level exceeding more than 15 dB. This is done for both the North Fence and 4 Melbourne St logger results, as well as attended monitoring results at all locations. If the screening value is exceeded a one-third octave band frequency analyses is then made of un-weighted (or Z-weighted L_Z) sound levels in the low-frequency bands from 10 Hz to 160 Hz, compared to a specific value.

From the measurements in the residential receiver locations, the low frequency assessment was made on both $L_{Aeq,15\text{-}min}$ and $L_{A90,15\text{-}min}$ values. Exceedances were identified for L_{eq} on seven occasions at 4 Melbourne St and one occasions for 12 Brisbane St. At the Northern Fence, analysis of low-frequency sound levels for the times they occurred at 4 Melbourne St indicated they were lower than those measured at 4 Melbourne St, indicating it is more likely that low-frequency sources which cause the objectives to be exceeded are external to the Cement Plant.

From the assessment of this survey it is considered that the main source of low-frequency noise events exceeding the policy objectives is from road traffic noise associated with trucks, either from within New Berrima or on distant roads and the freeway. The plant can be a source at times but this is not considered to be significant. Exceedances of the objectives by the L_{90} spectrum levels are considered to be minor.

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ACN: 153 946 064

Appendices

Appendix A: One-third octave band frequency spectra of measurements and tonality graphs

Appendix B: Unattended environmental sound level results for 4 Melbourne Street

Appendix C: Unattended environmental sound level results for Northern Boundary

Appendix D: Unattended environmental sound level results for Compliance Monitoring Location 20 - Store Yard Close

Appendix E: Narrow-band spectra from attended measurement recordings

Appendix F: Attended monitoring results

Recognition Research
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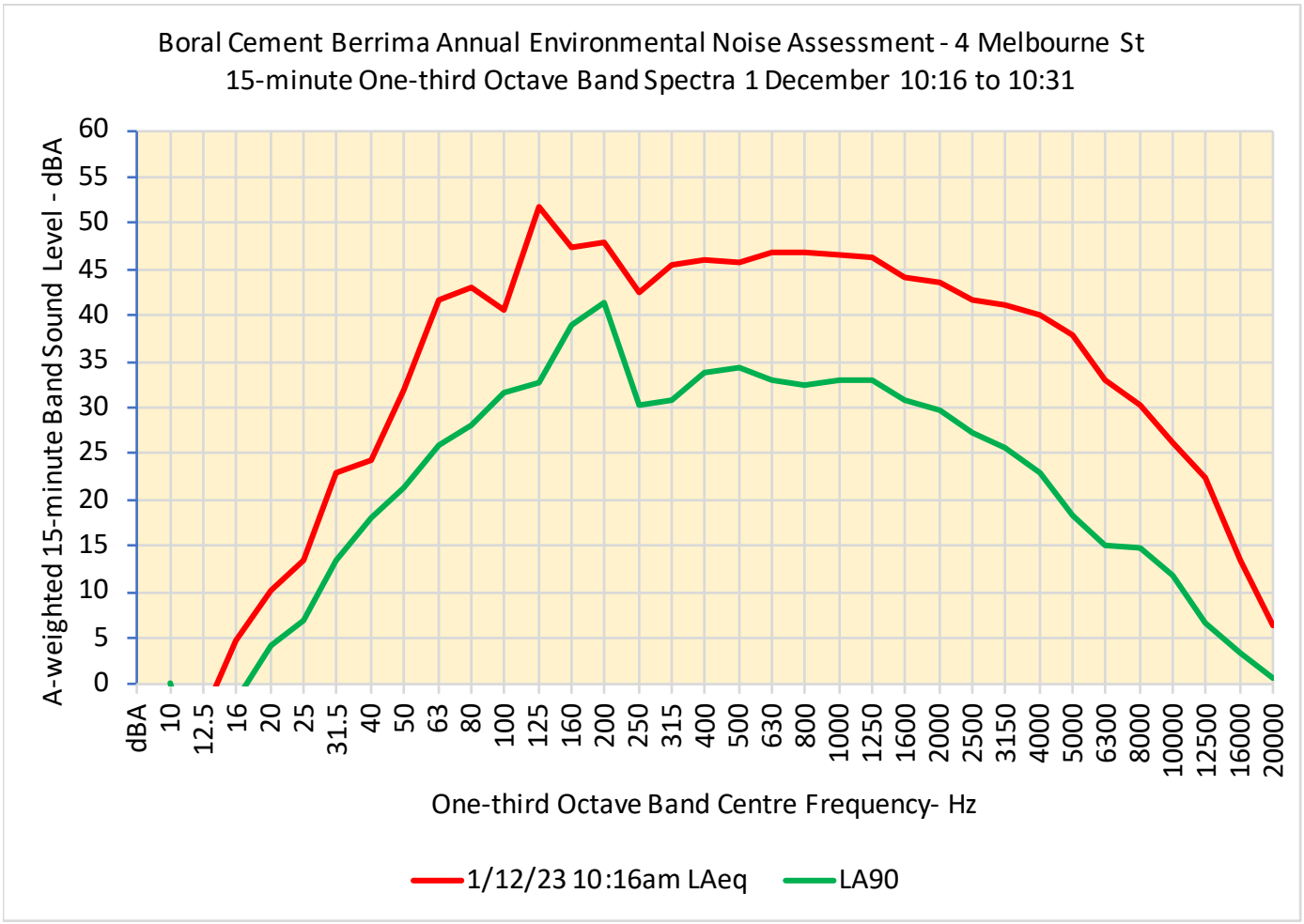
Appendix A: One-third octave band frequency spectra of measurements and tonality graphs



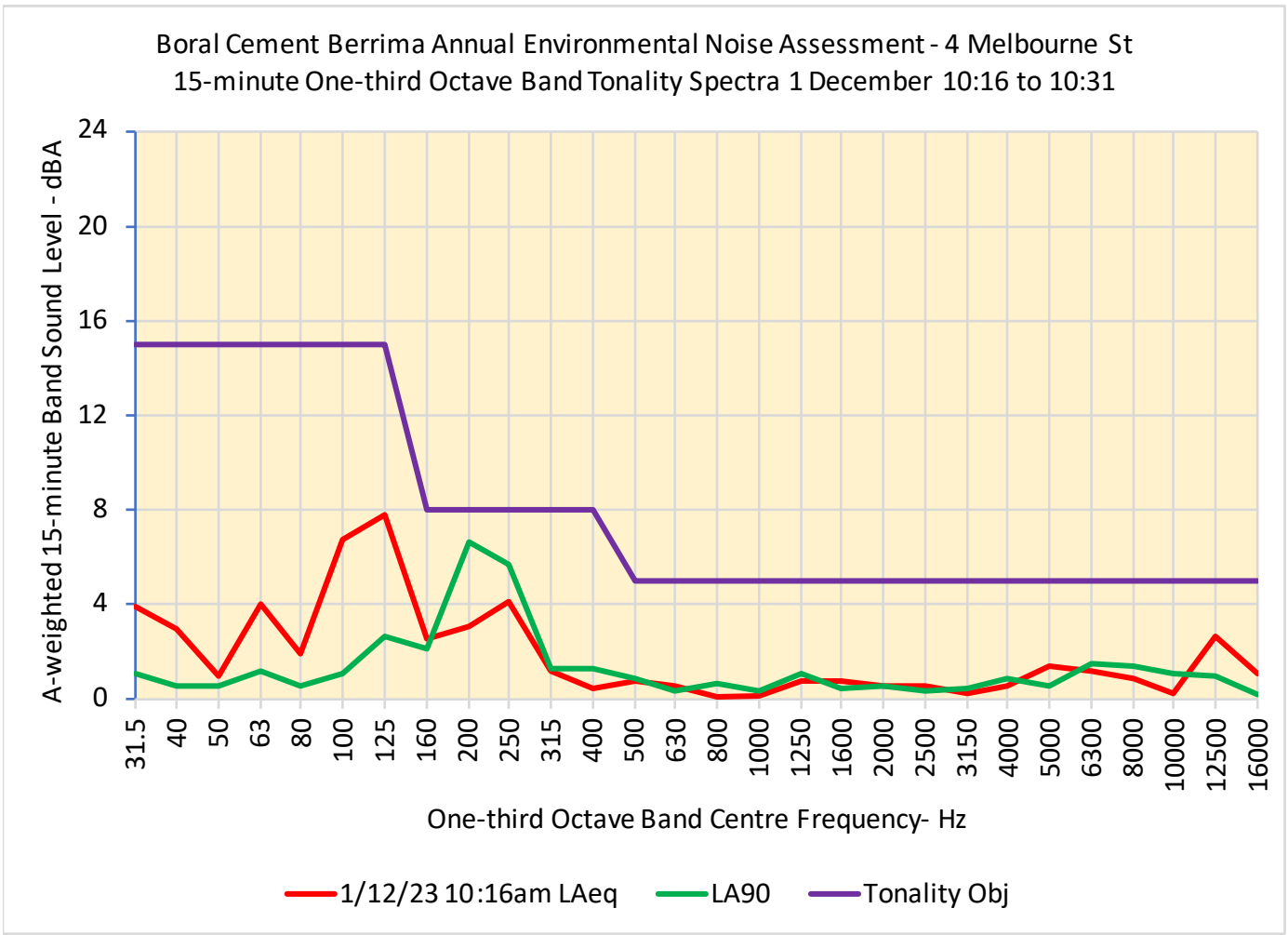
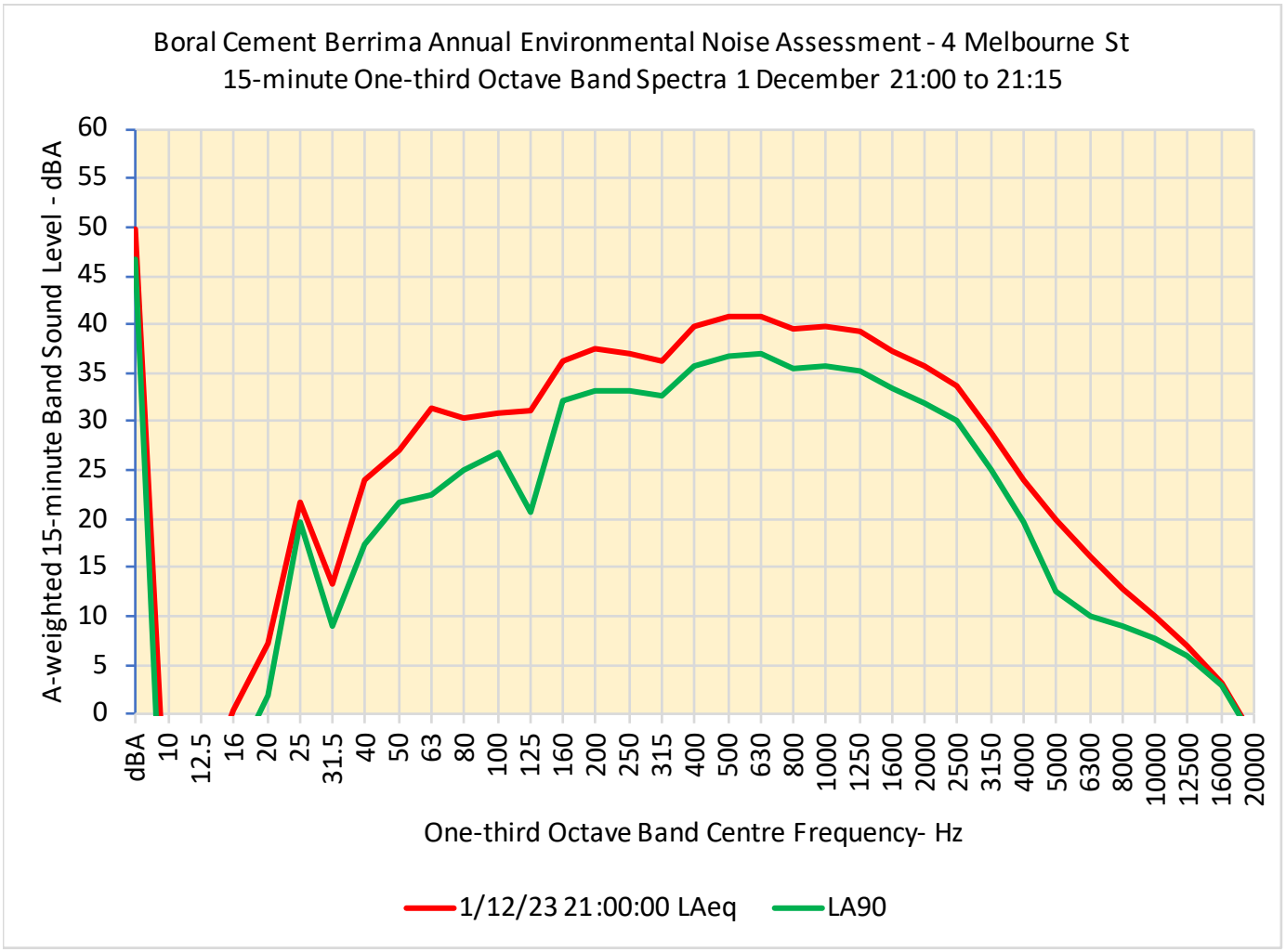


Figure A1: One-third Octave Band Spectra and Tonality for 4 Melbourne St 1 December 2023 start 10:16

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



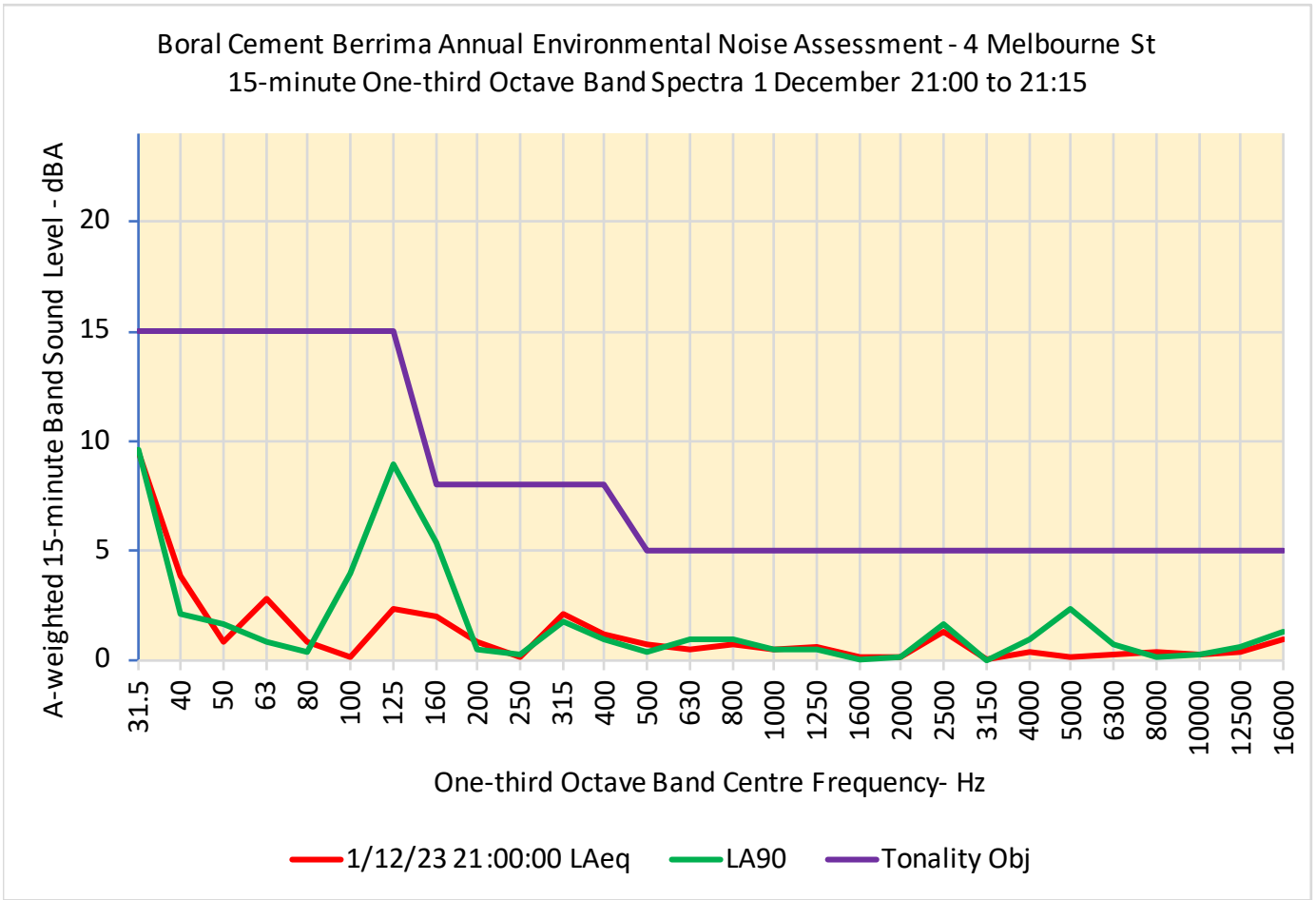
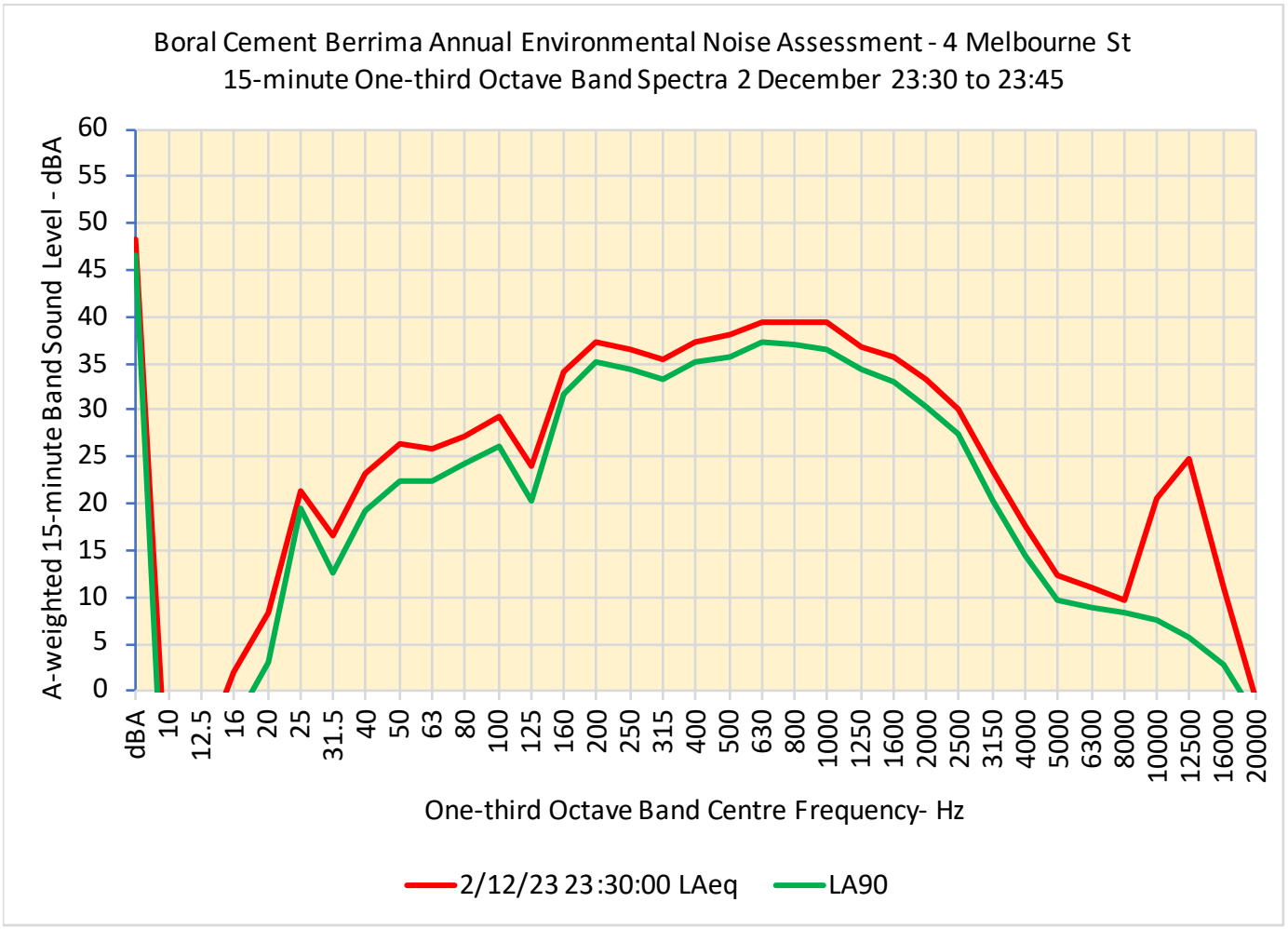


Figure A2: One-third Octave Band Spectra and Tonality for 4 Melbourne St 1 December 2023 start 21:00

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



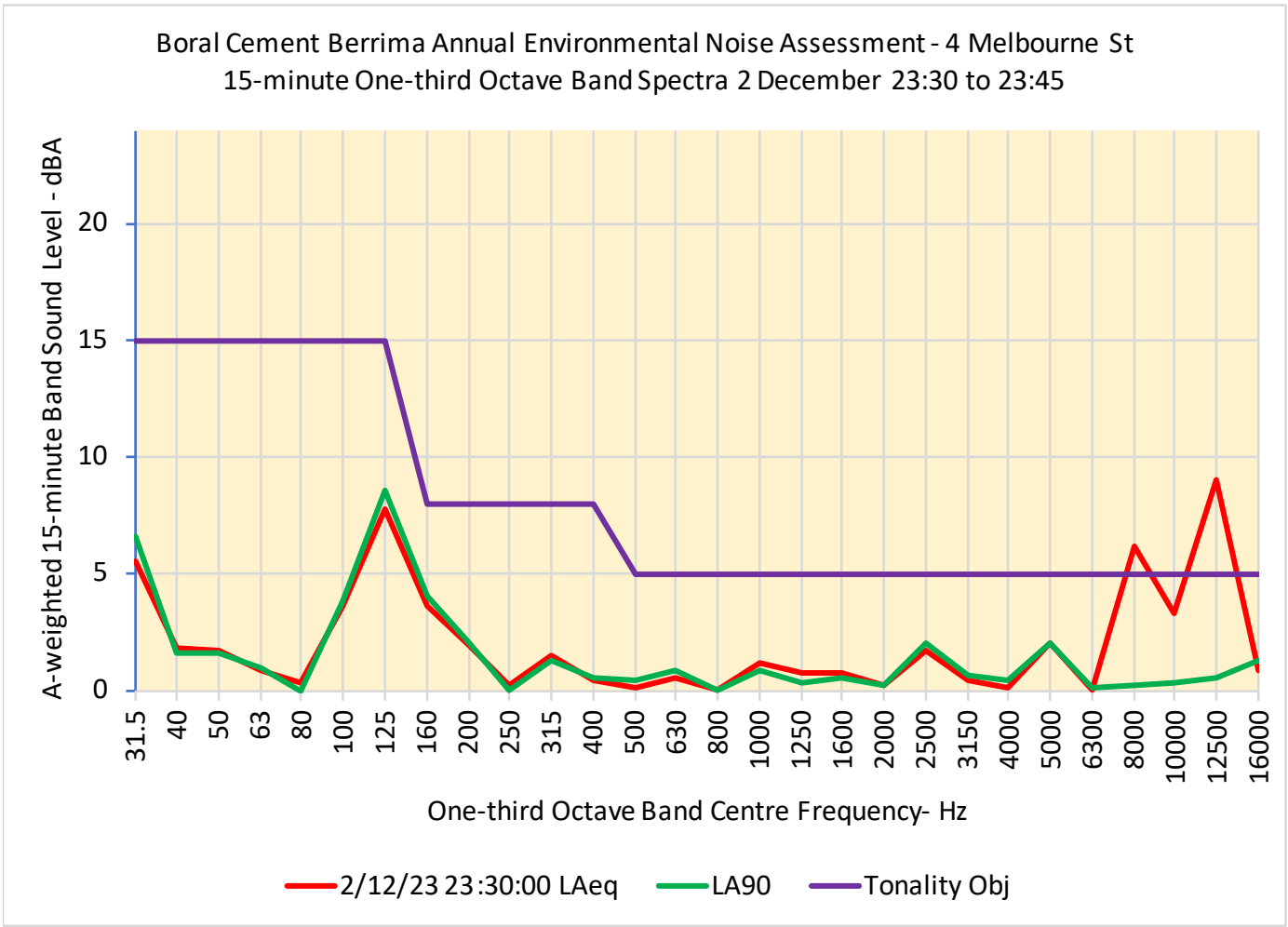
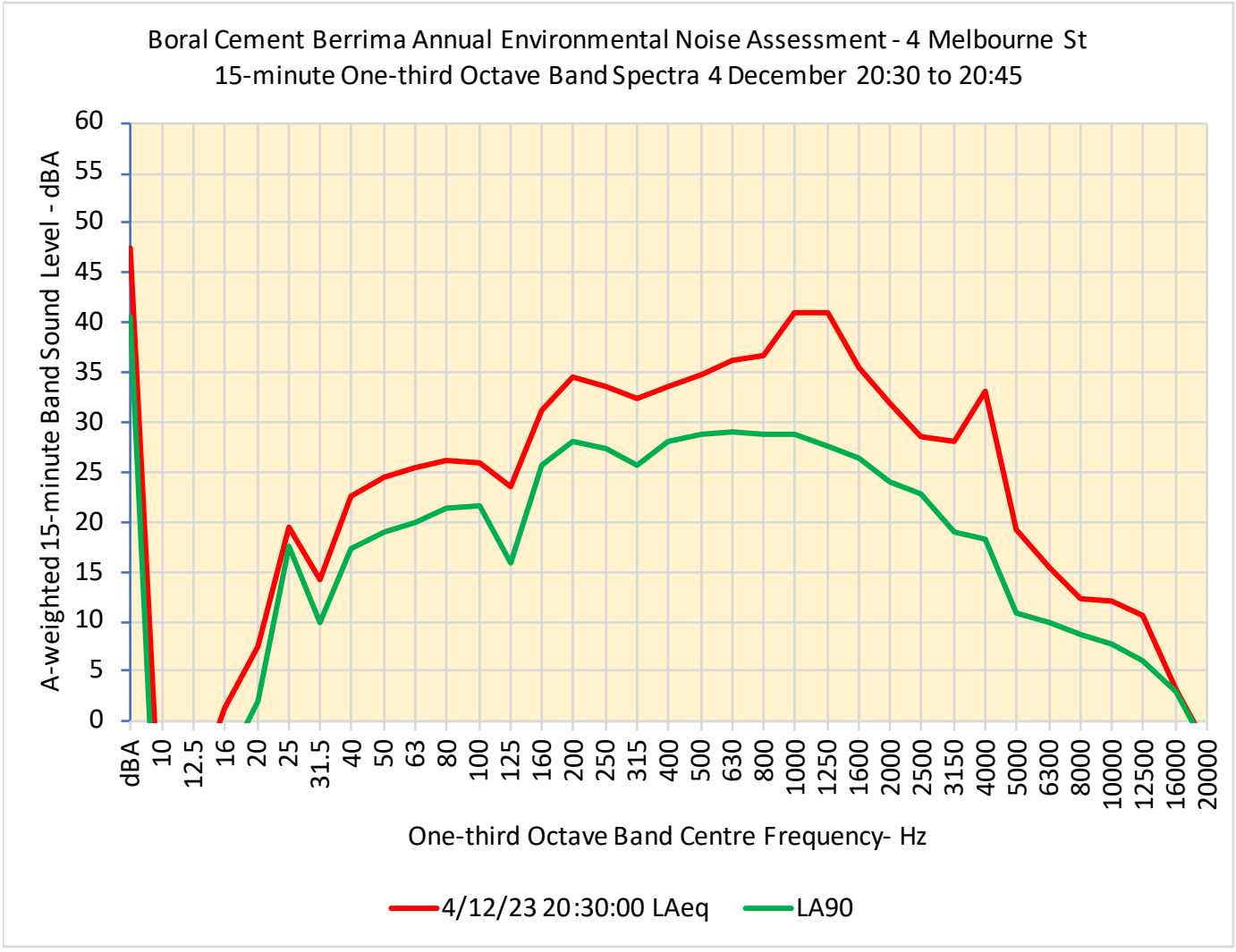


Figure A3: One-third Octave Band Spectra and Tonality for 4 Melbourne St 2 December 2023 start 23:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



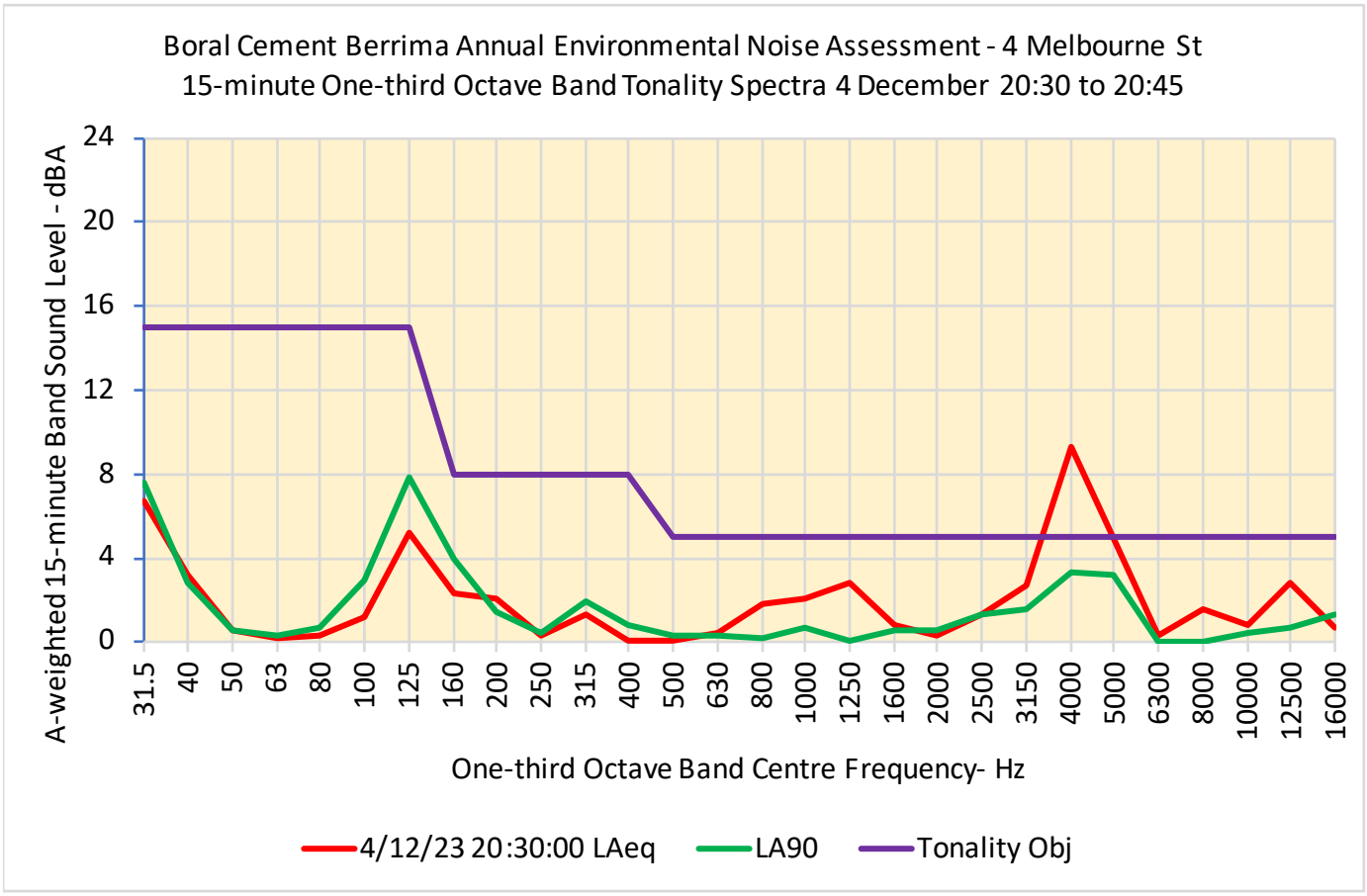
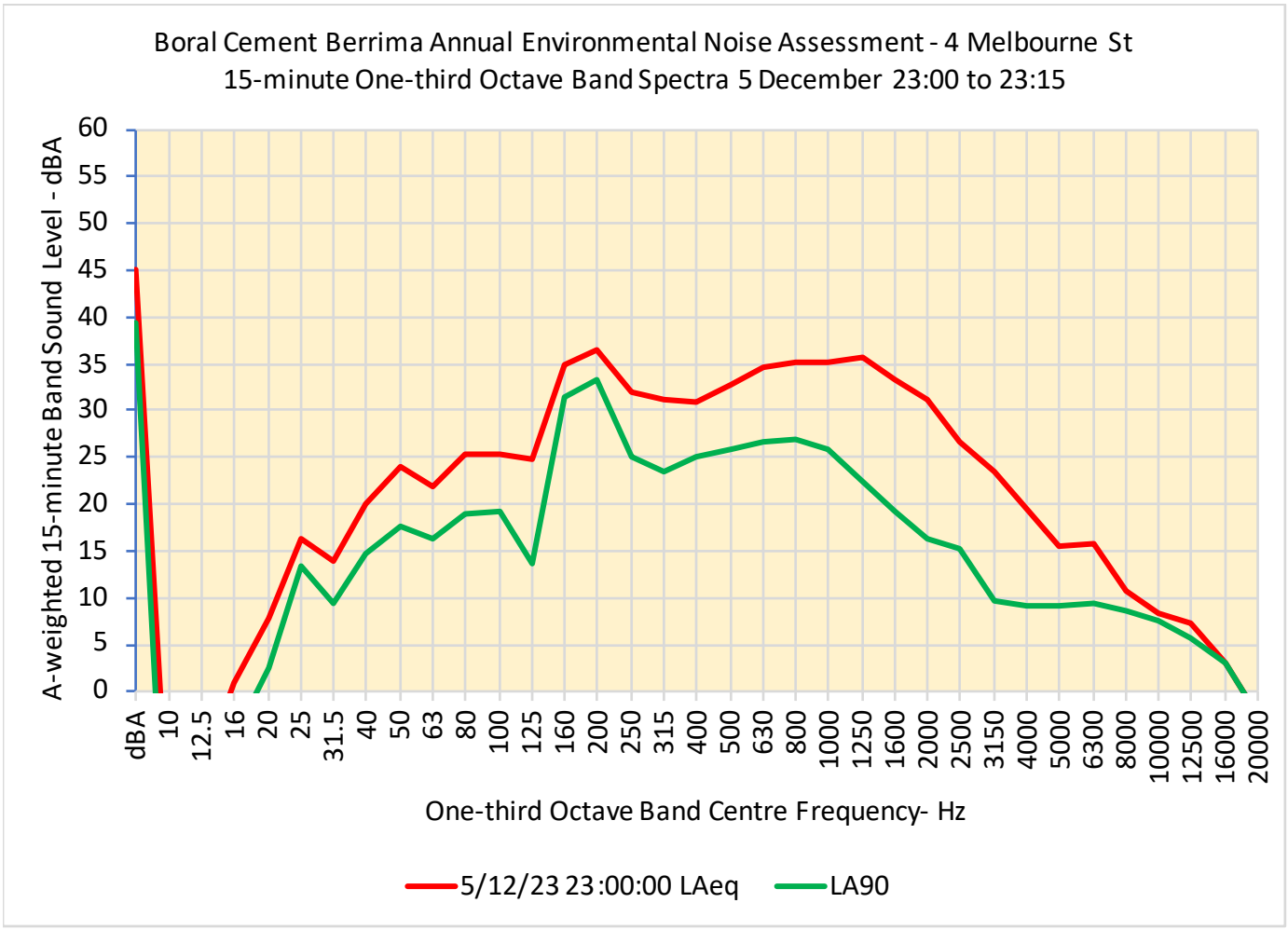


Figure A4: One-third Octave Band Spectra and Tonality for 4 Melbourne St 4 December 2023 start 20:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



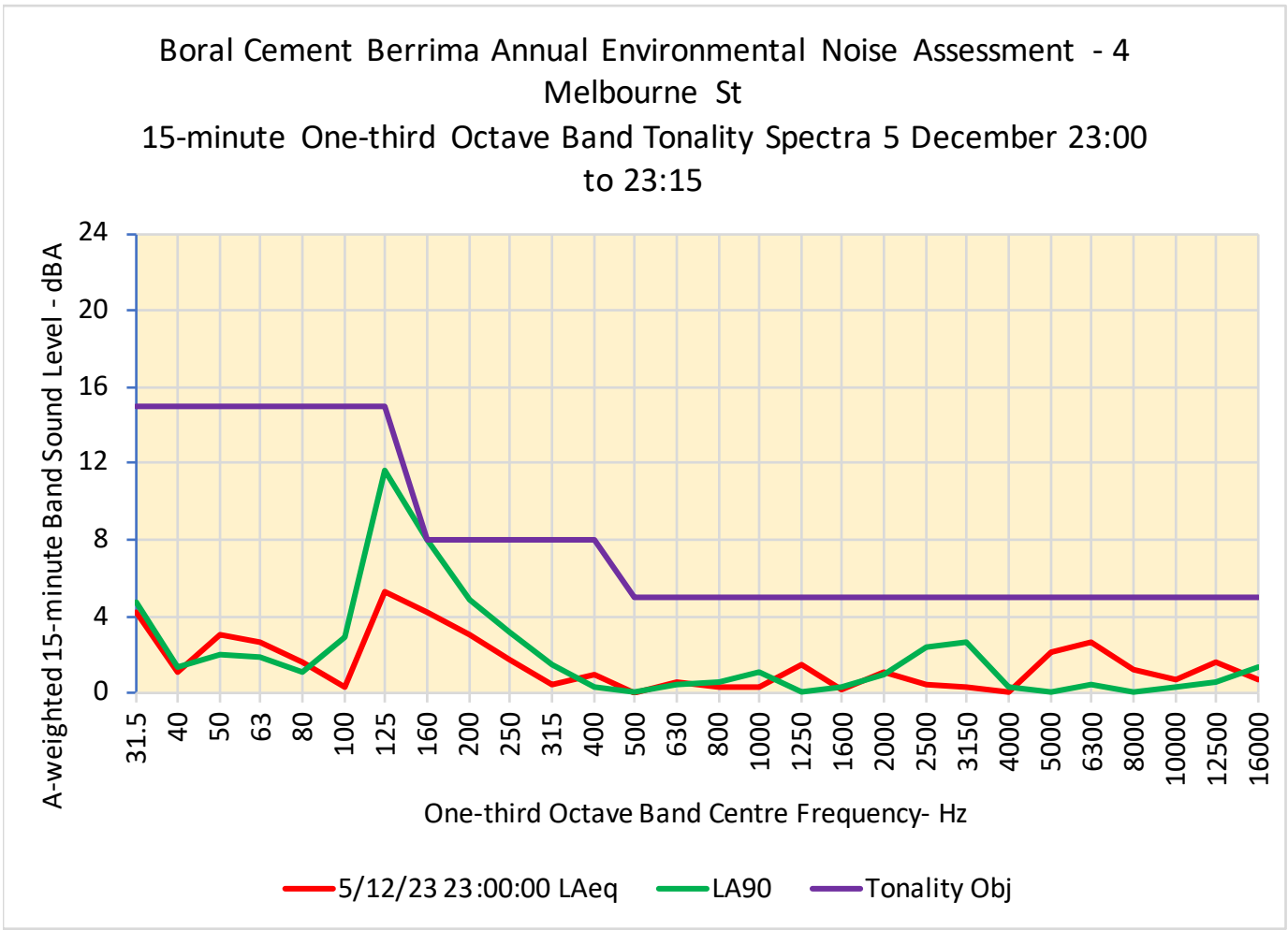
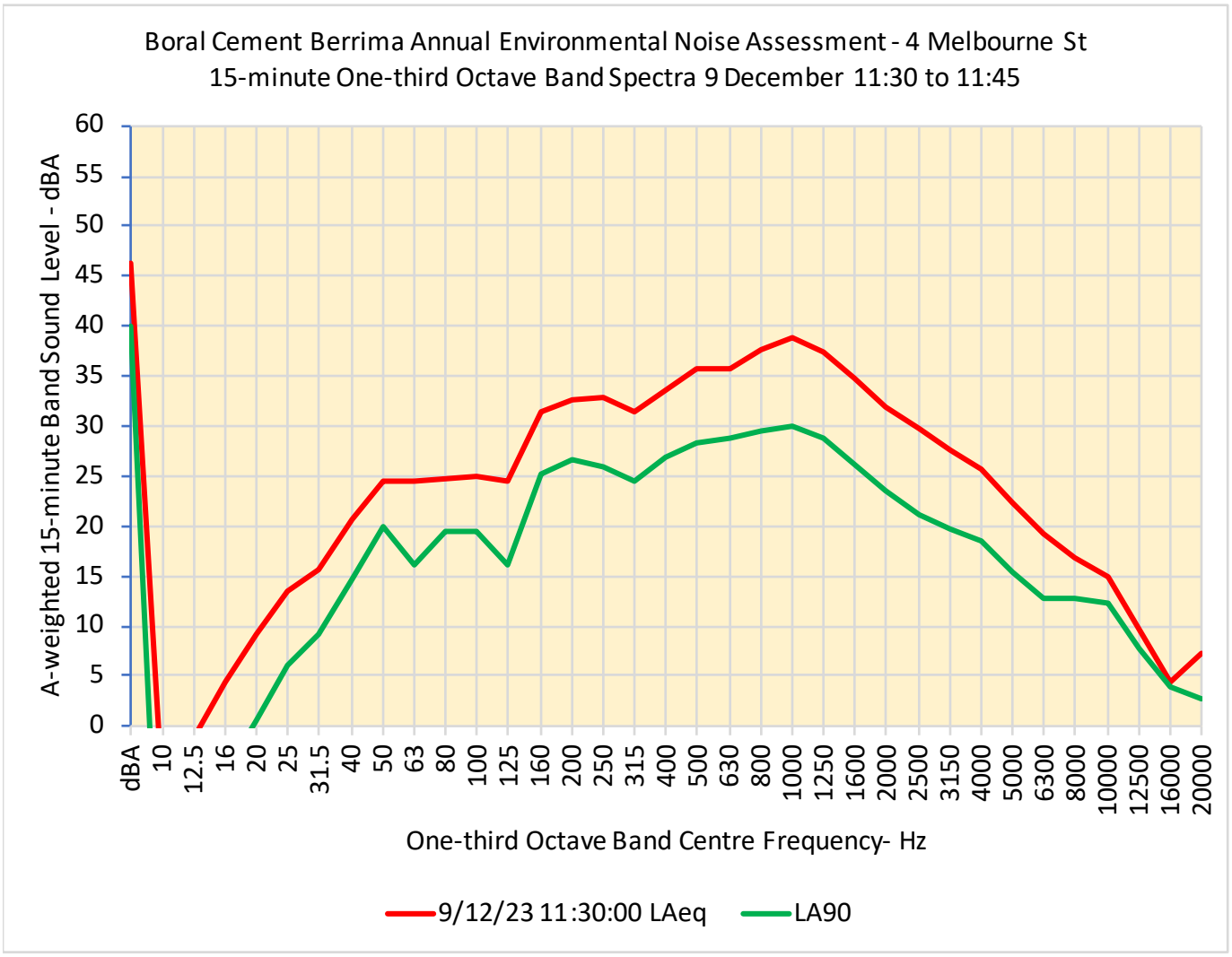


Figure A5: One-third Octave Band Spectra and Tonality for 4 Melbourne St 5 December 2023 start 23:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



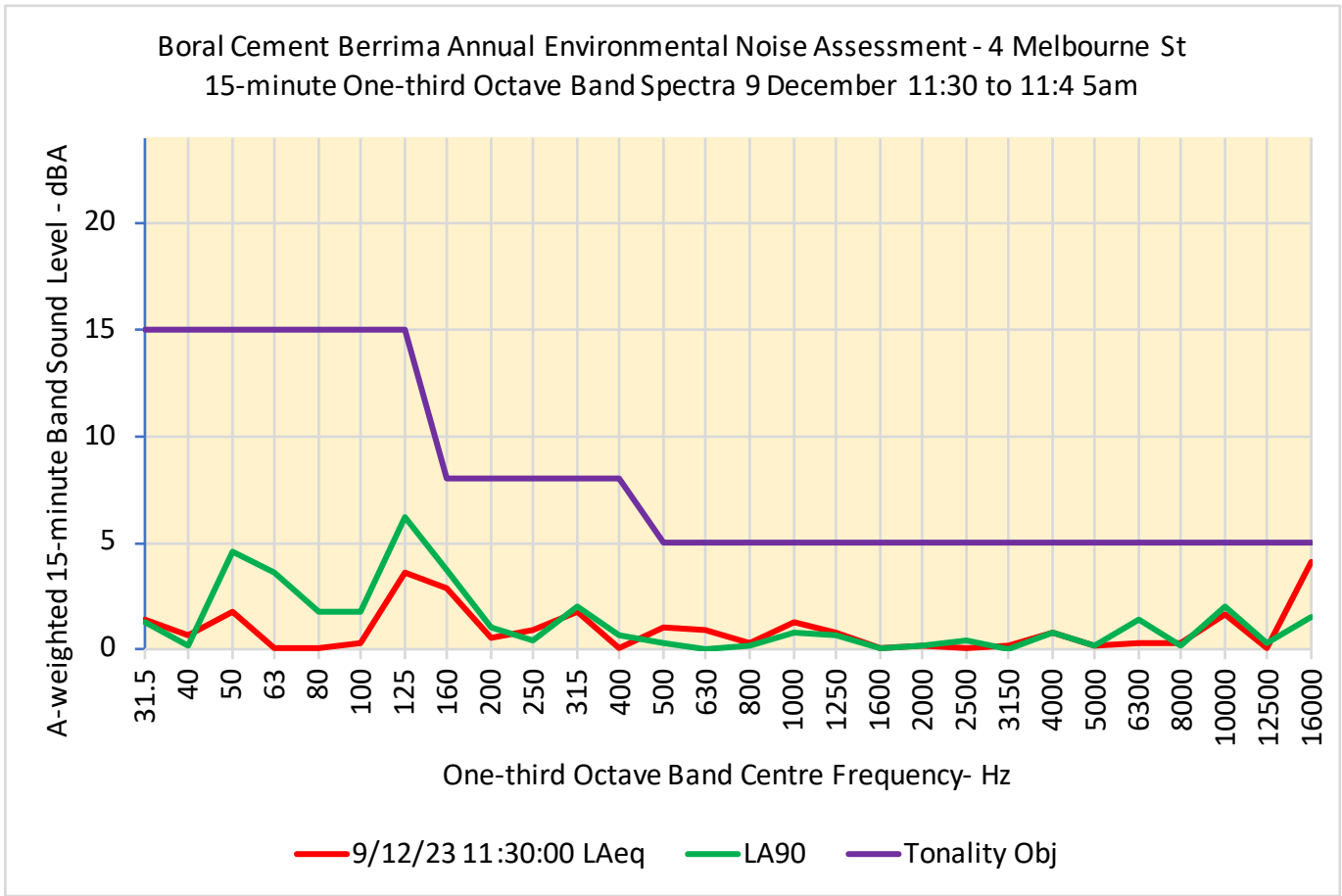
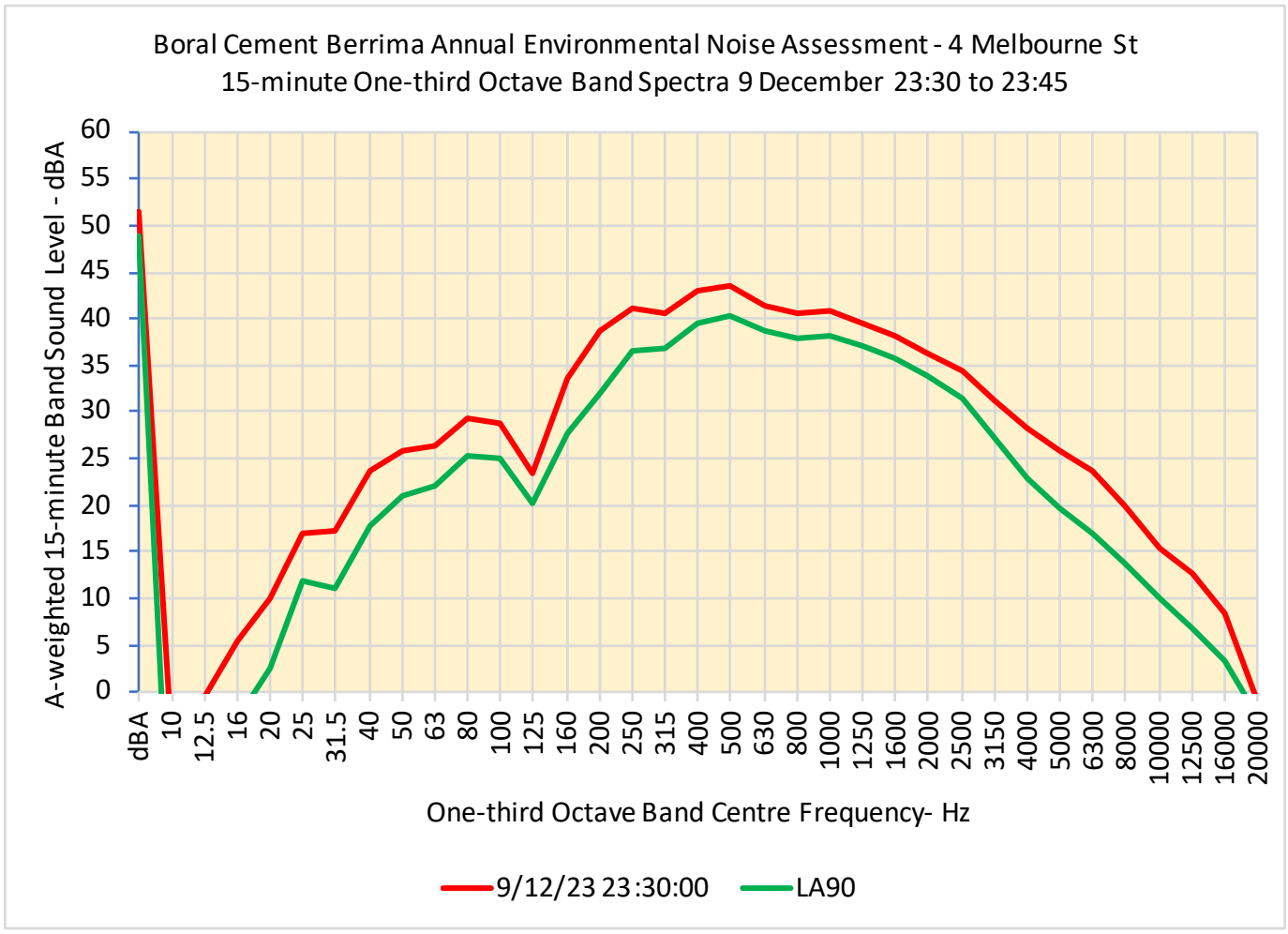


Figure A6: One-third Octave Band Spectra and Tonality for 4 Melbourne St 9 December 2023 start 11:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



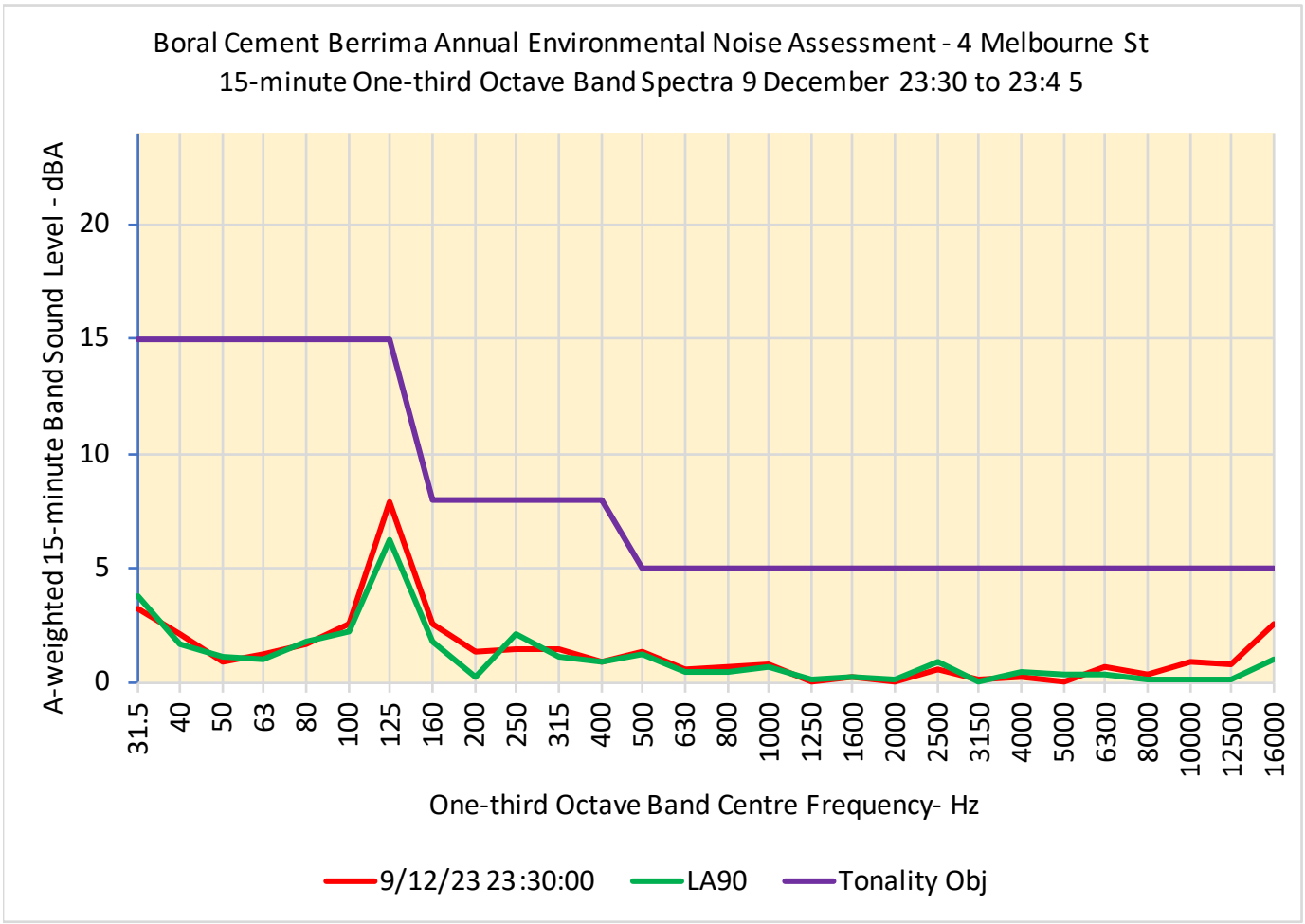
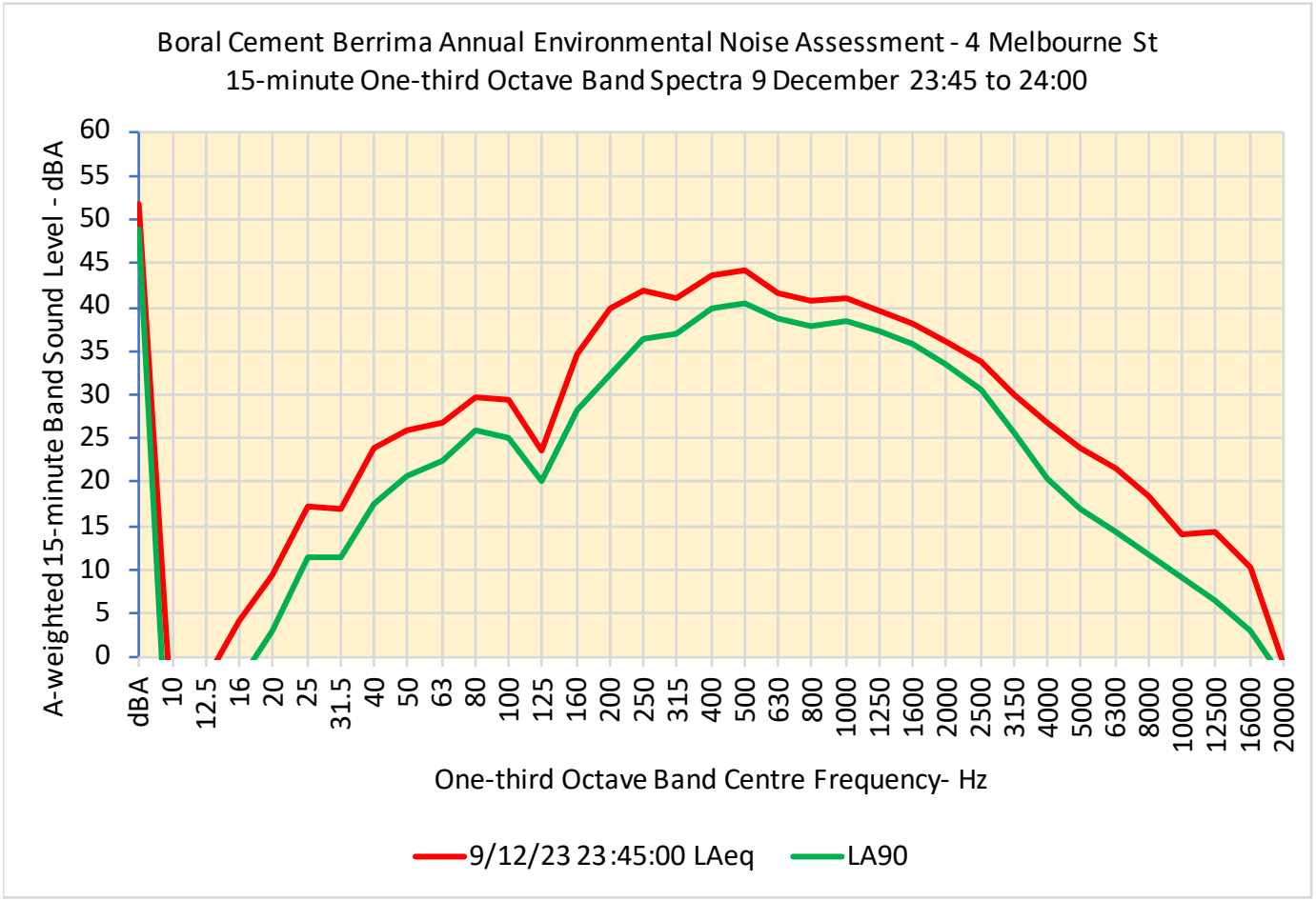


Figure A7: One-third Octave Band Spectra and Tonality for 4 Melbourne St 9 December 2023 start 23:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



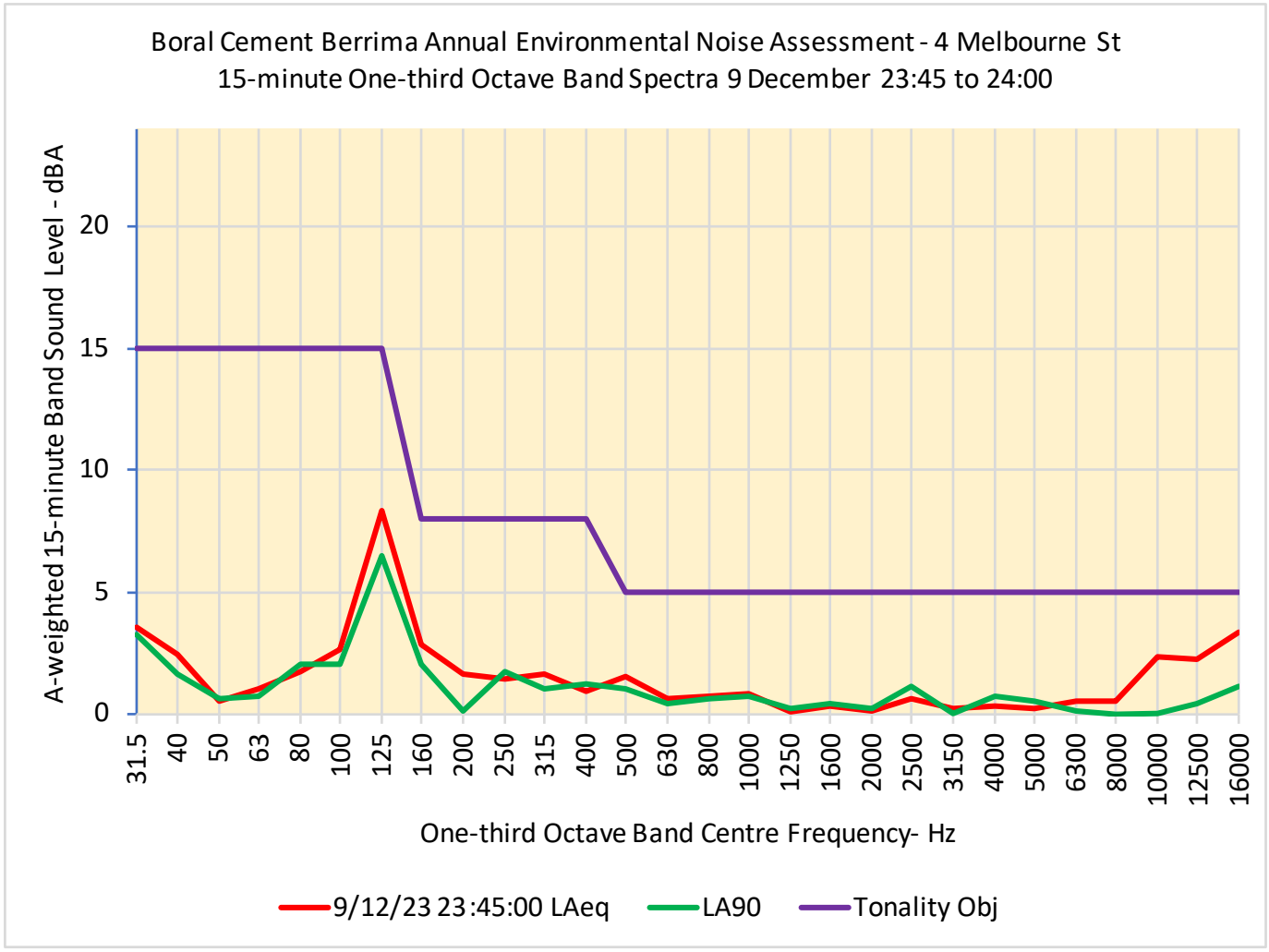
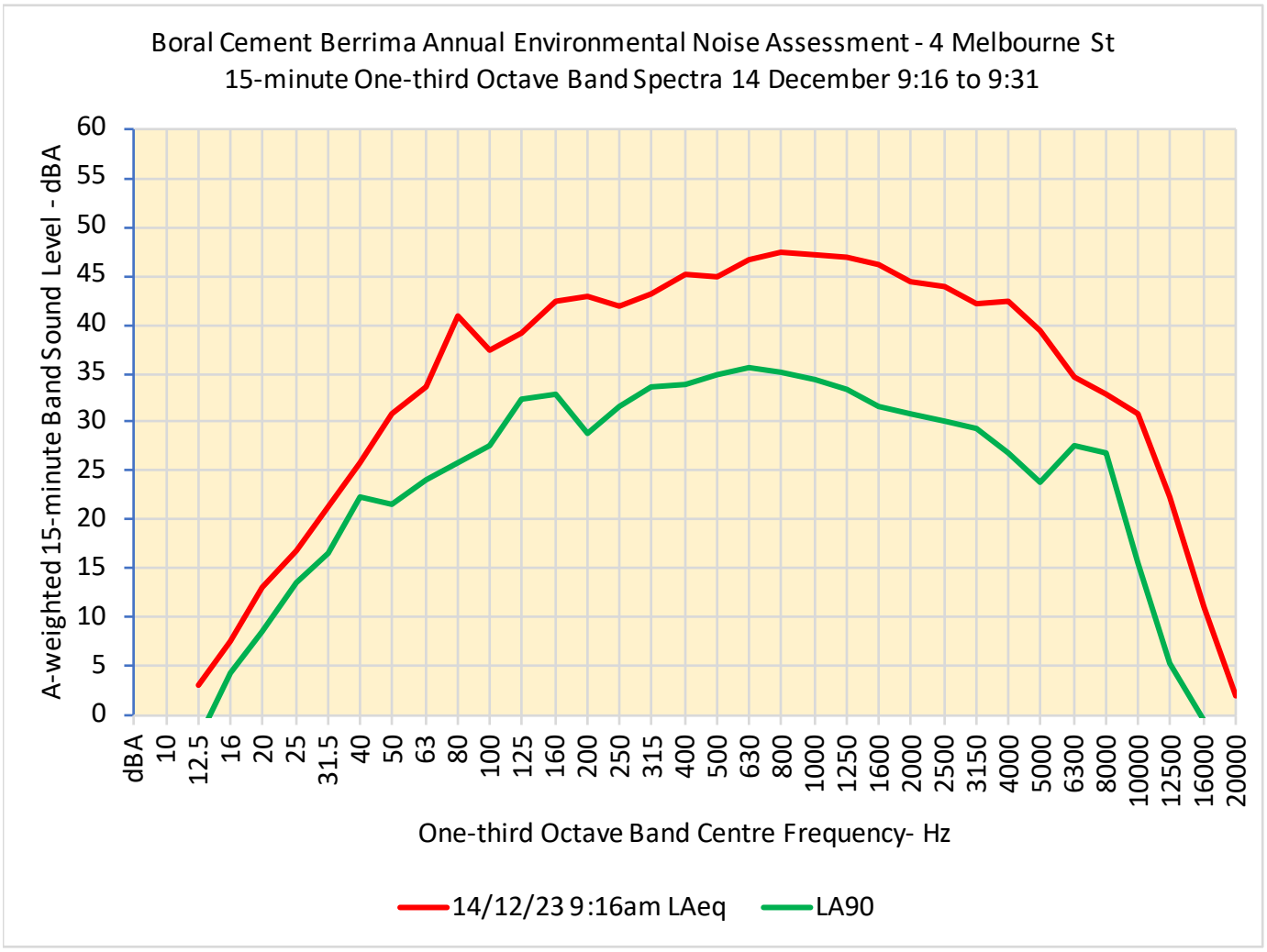


Figure A8: One-third Octave Band Spectra and Tonality for 4 Melbourne St 9 December 2023 start 23:45

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



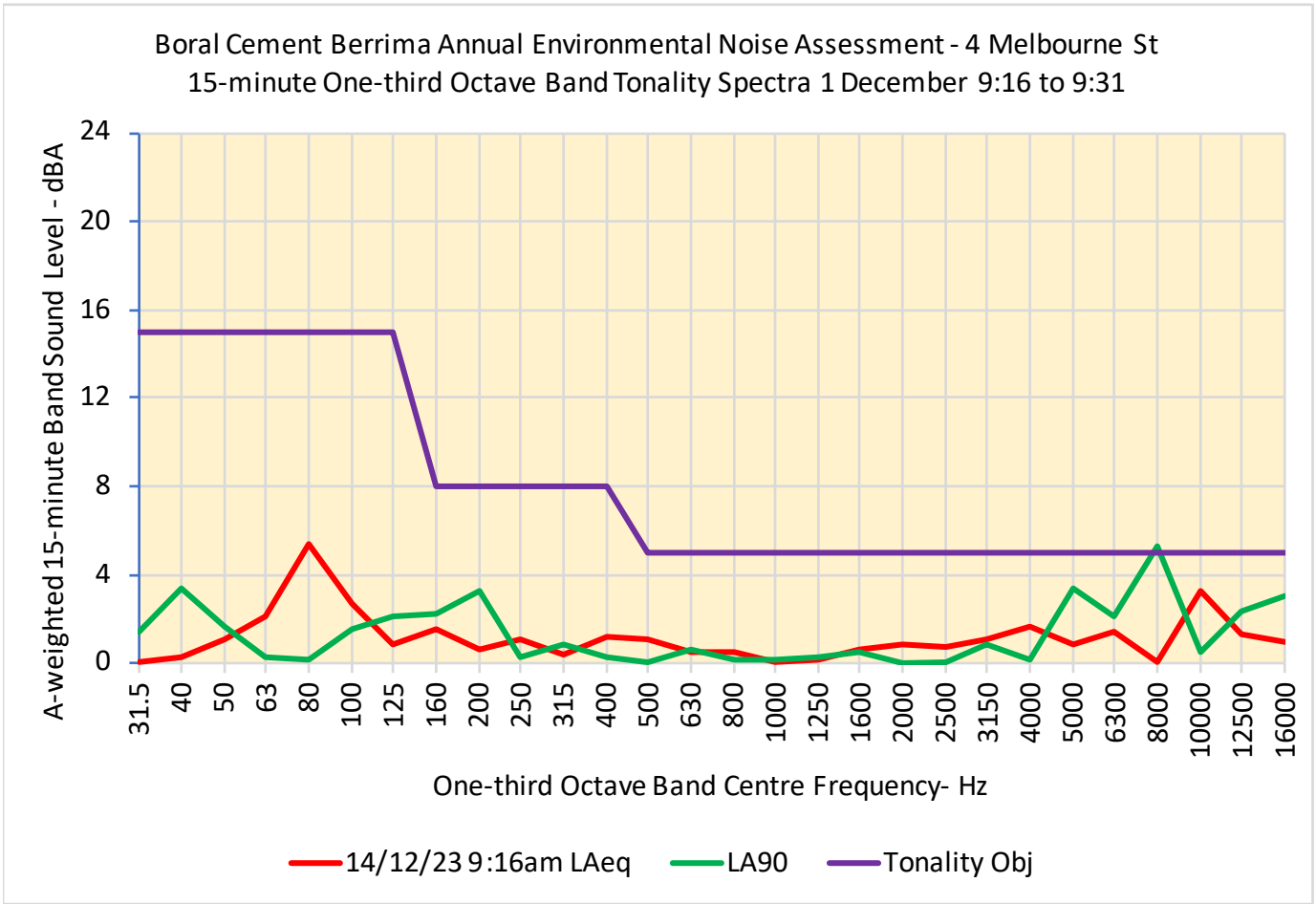
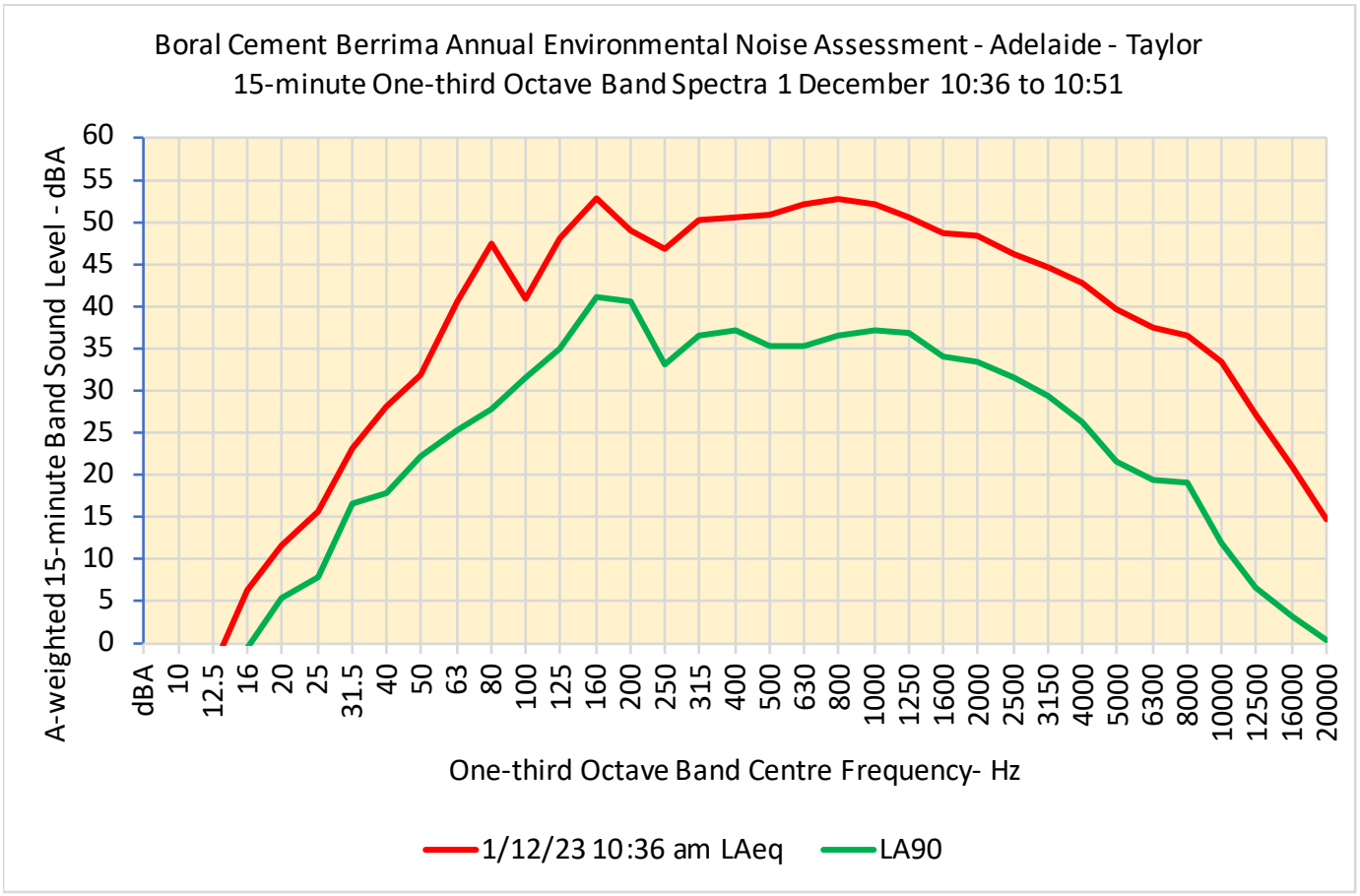


Figure A9: One-third Octave Band Spectra and Tonality for 4 Melbourne St 14 December 2023 start 9:16

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



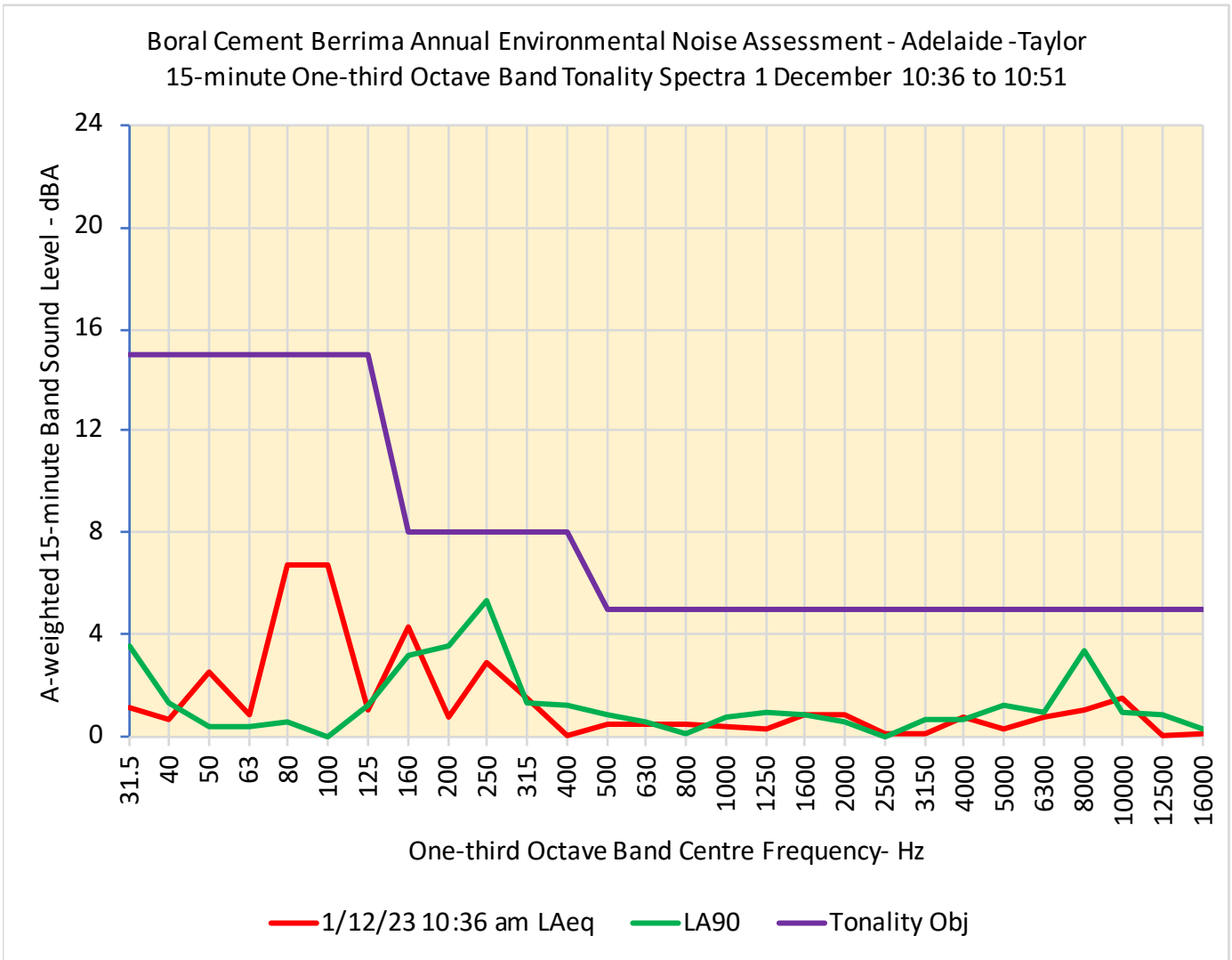
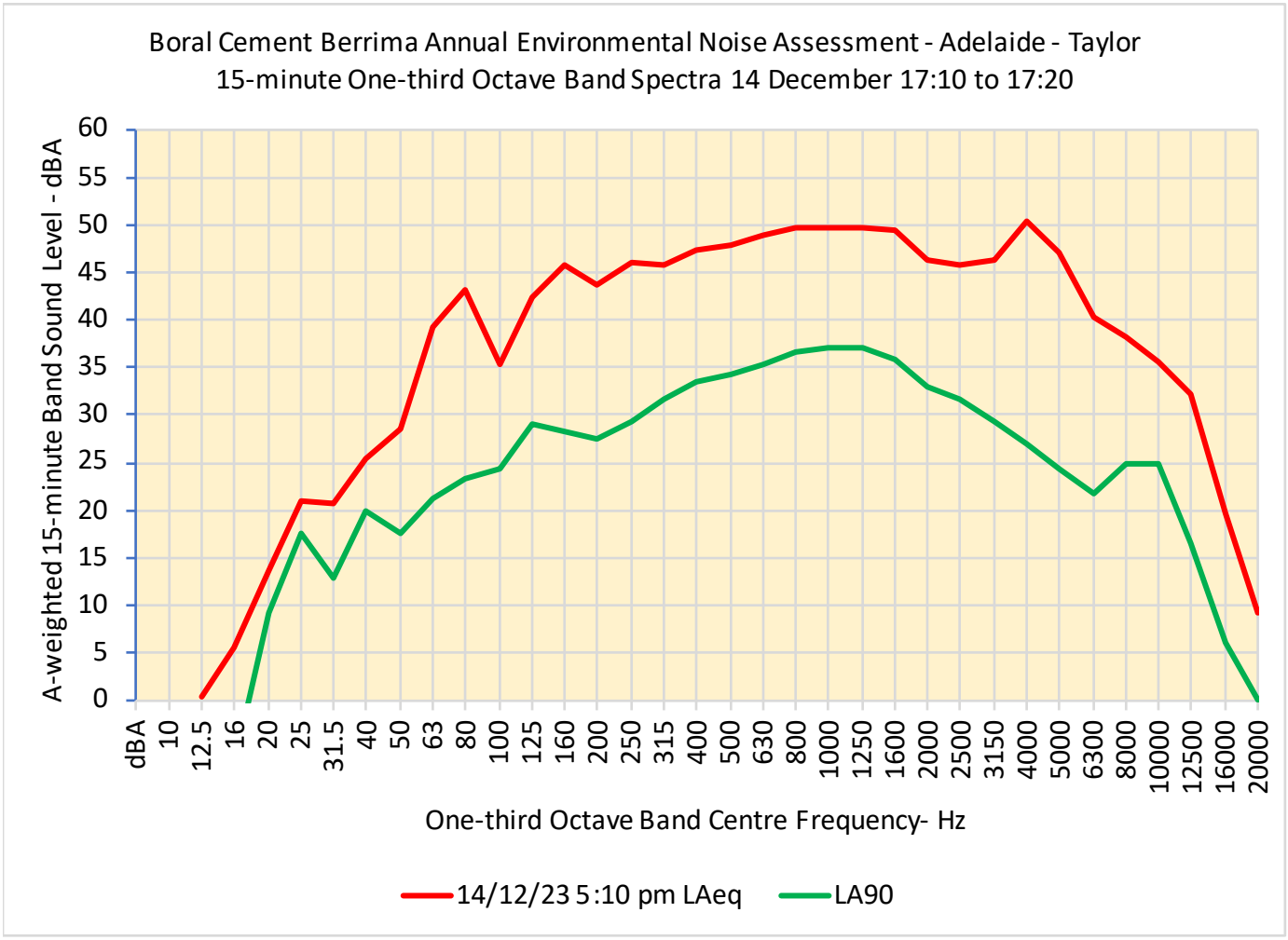


Figure A10: One-third Octave Band Spectra and Tonality for Adelaide-Taylor 1 December 2023 start 10:36

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



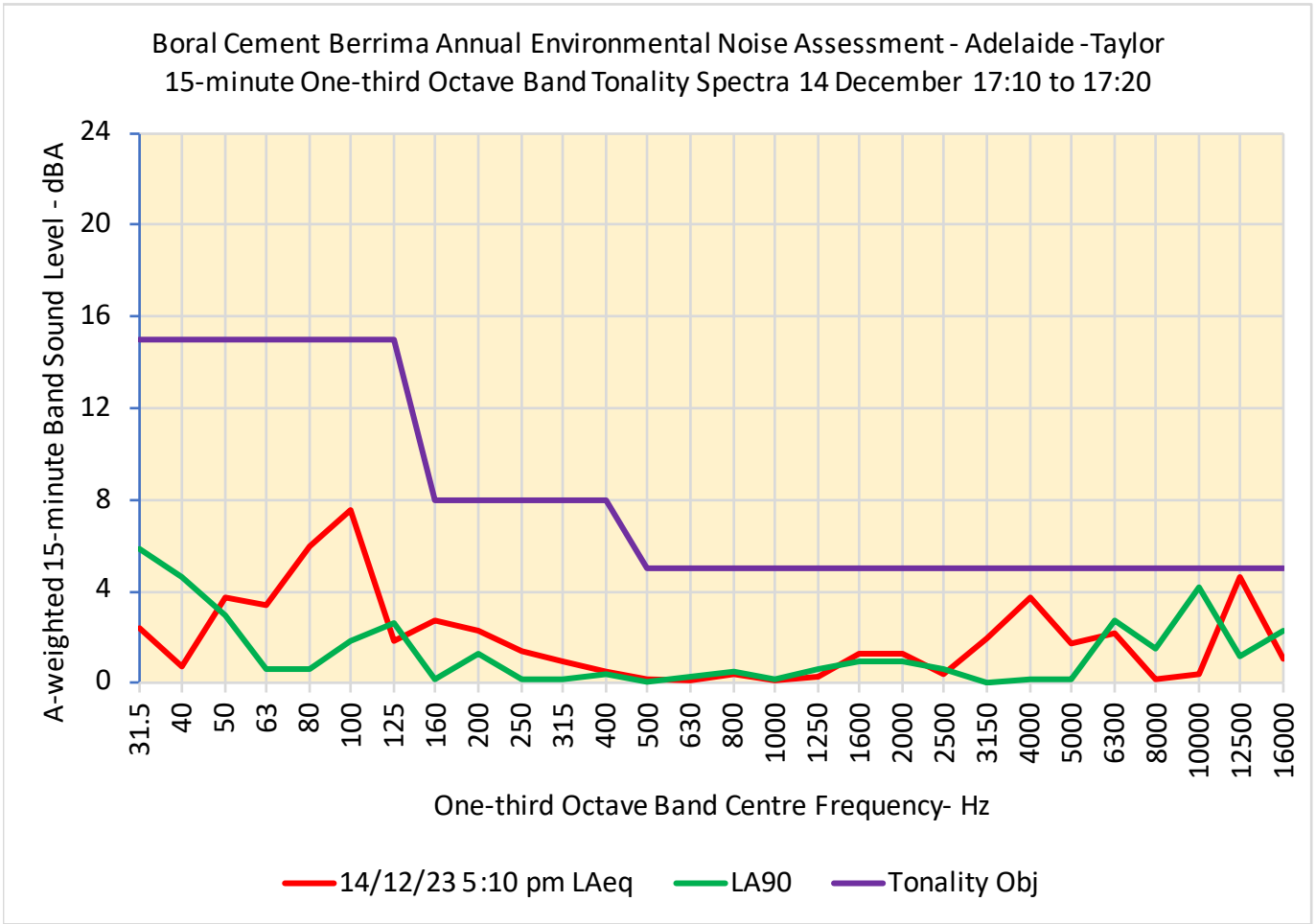
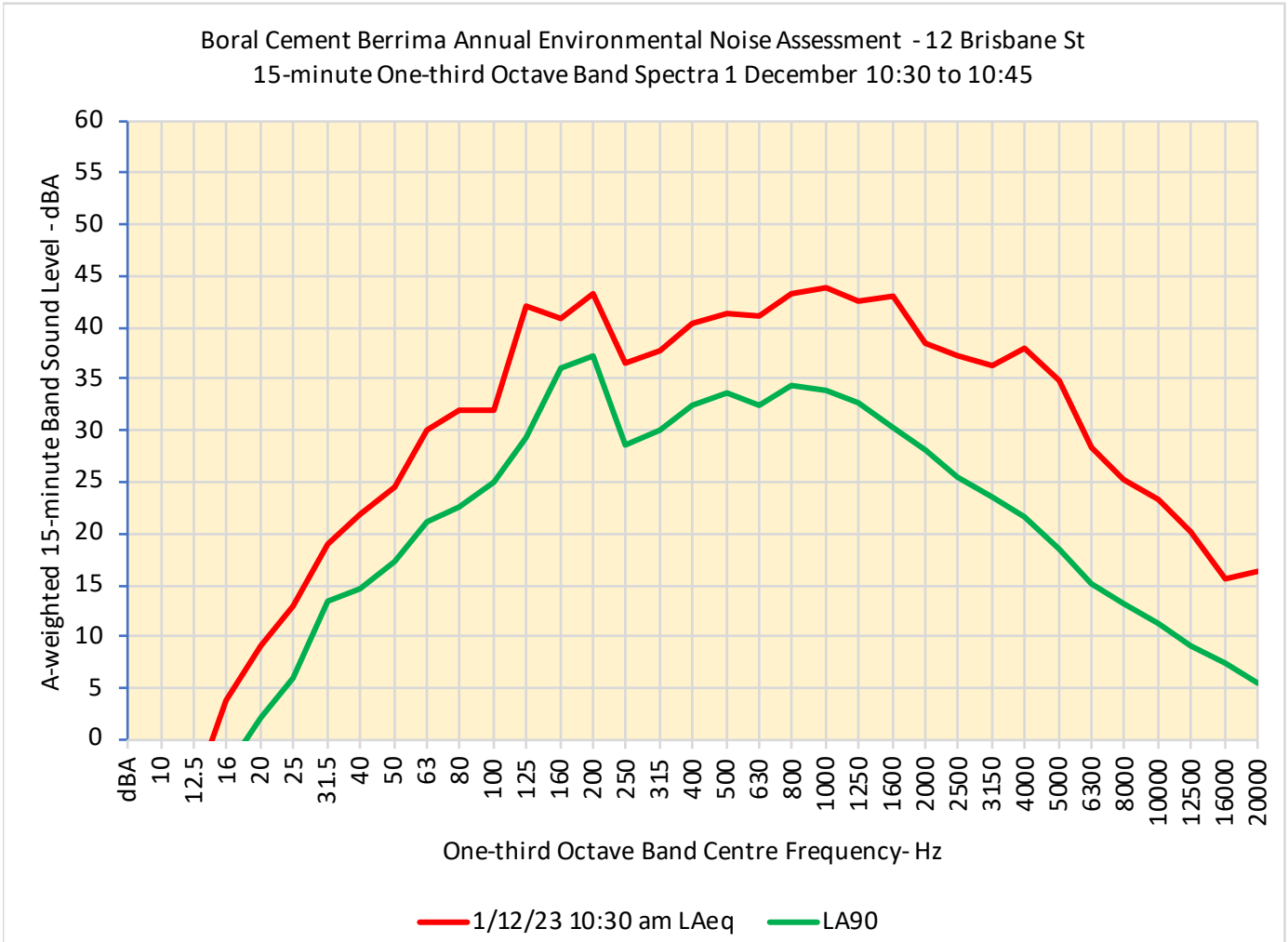


Figure A11: One-third Octave Band Spectra and Tonality for Adelaide-Taylor 14 December 2023 start 17:1(

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



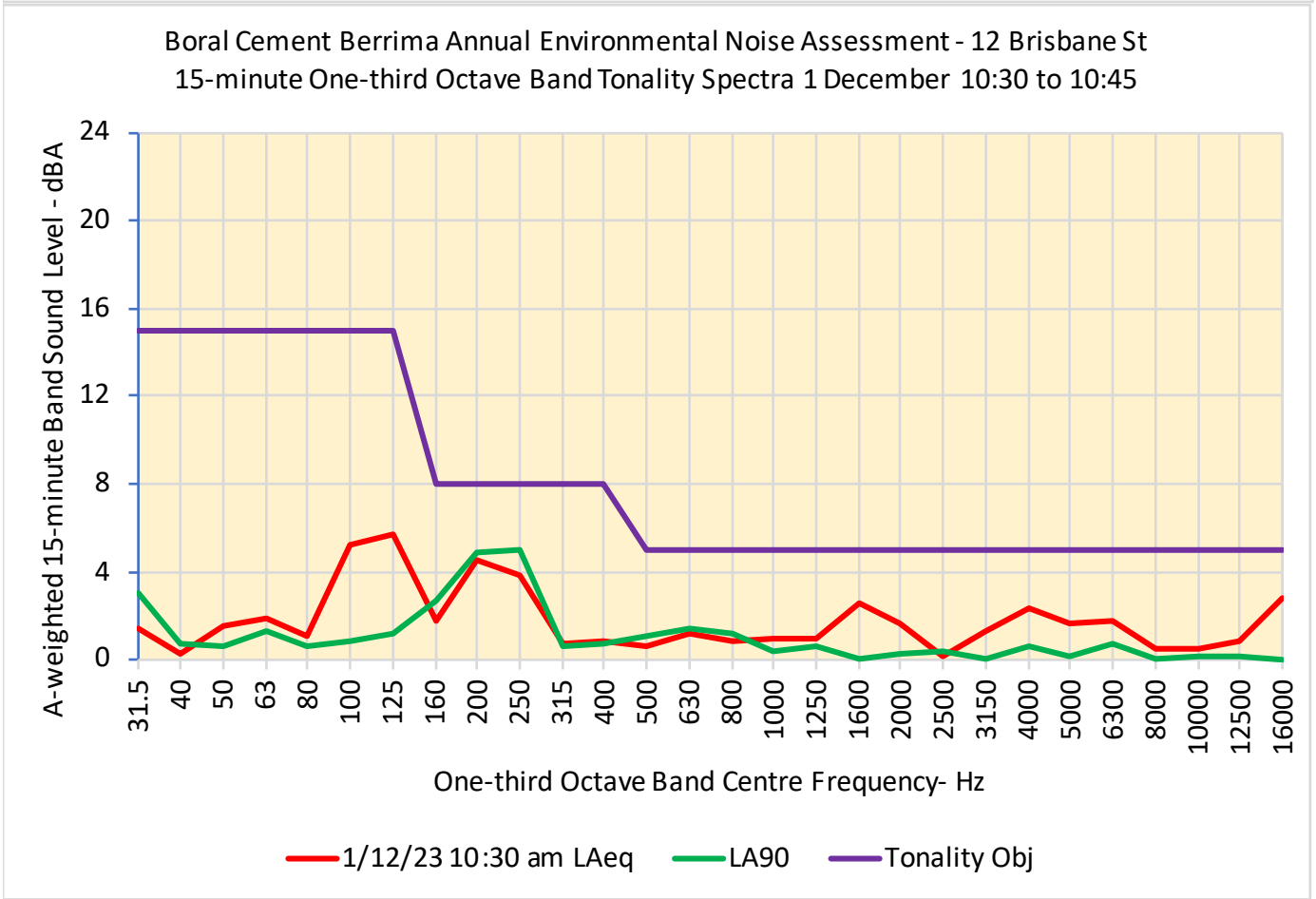
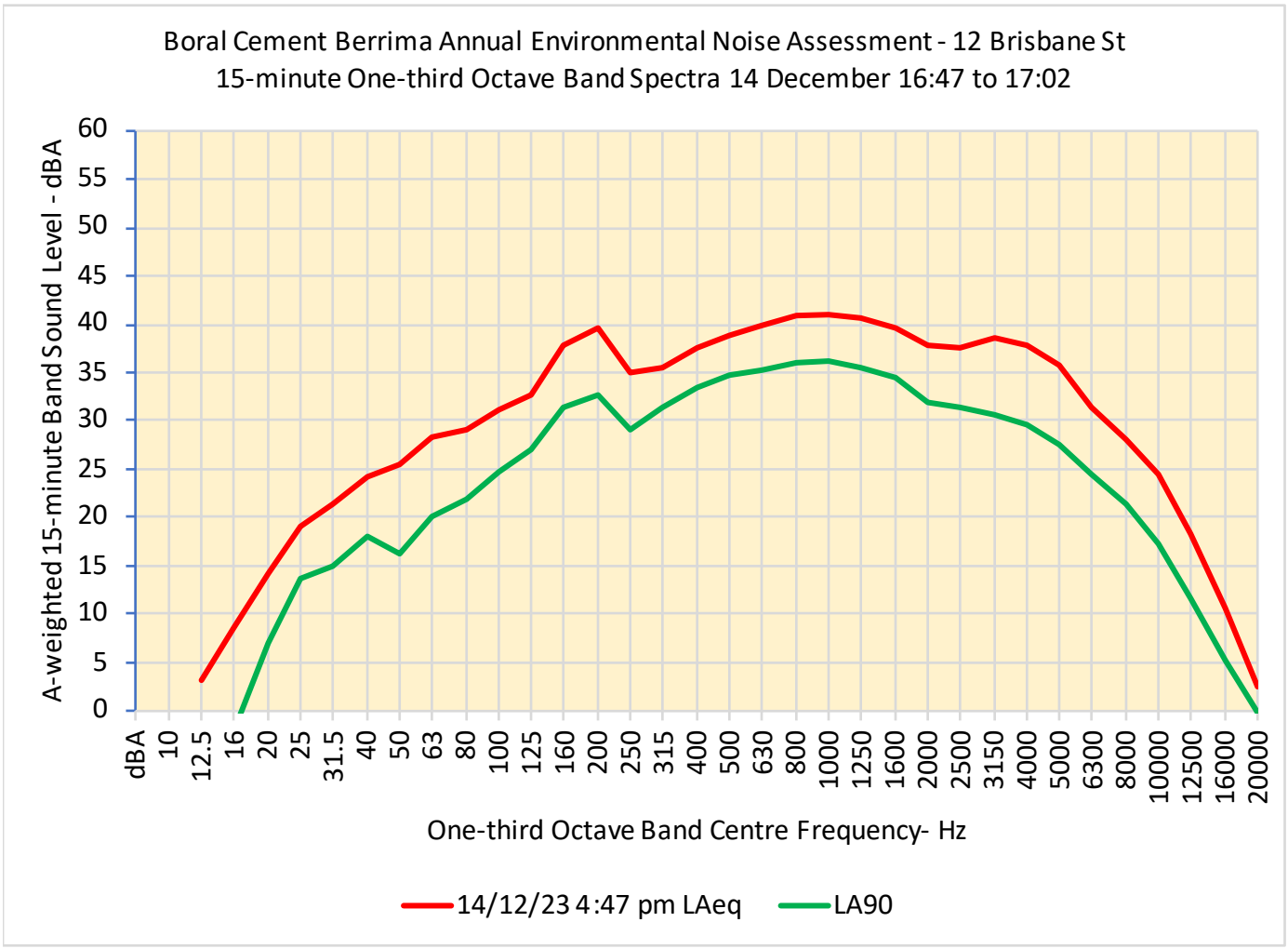


Figure A12: One-third Octave Band Spectra and Tonality for 12 Brisbane St 1 December 2023 start 10:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



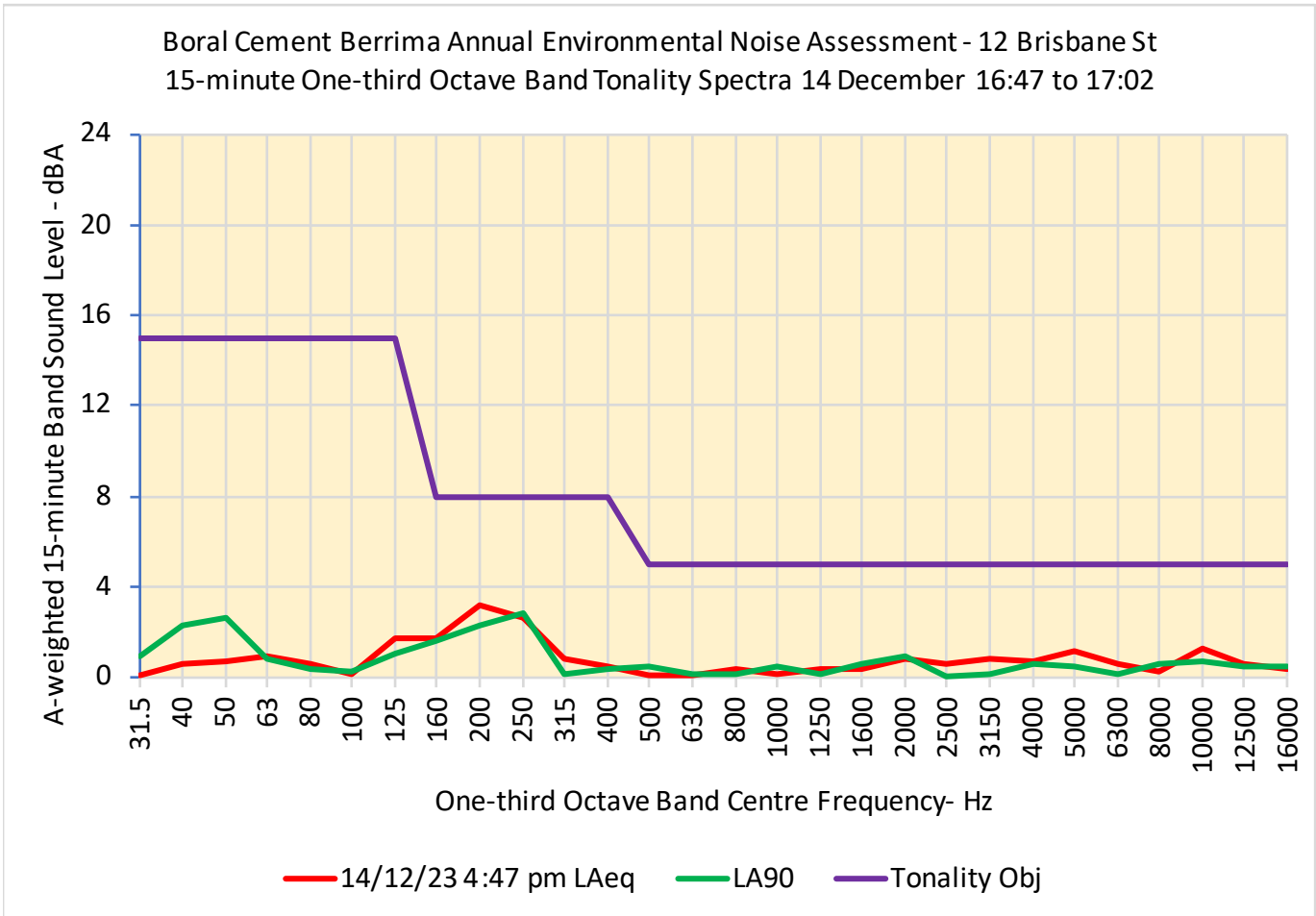
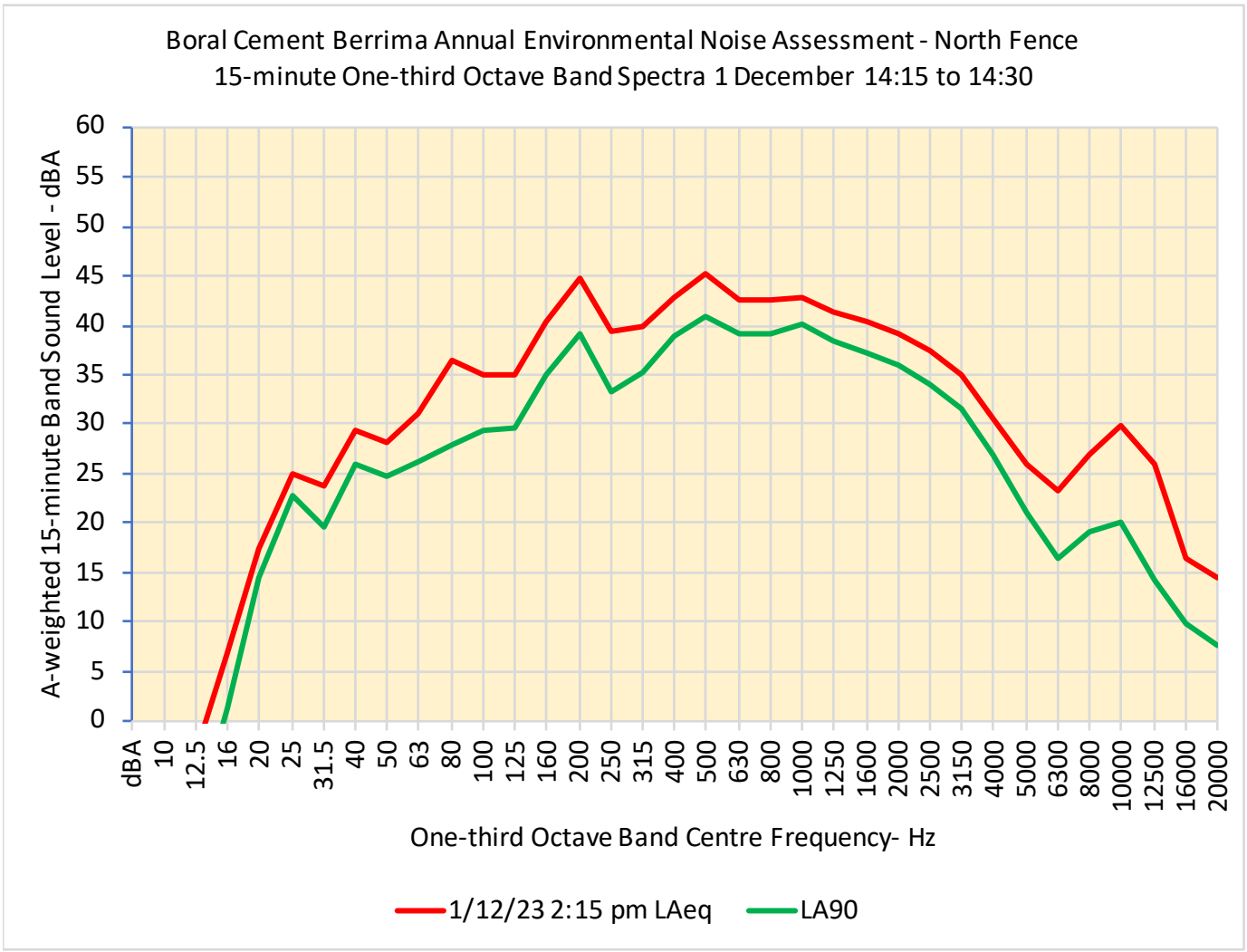


Figure A13: One-third Octave Band Spectra and Tonality for 12 Brisbane St 14 December 2023 start 16:47

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



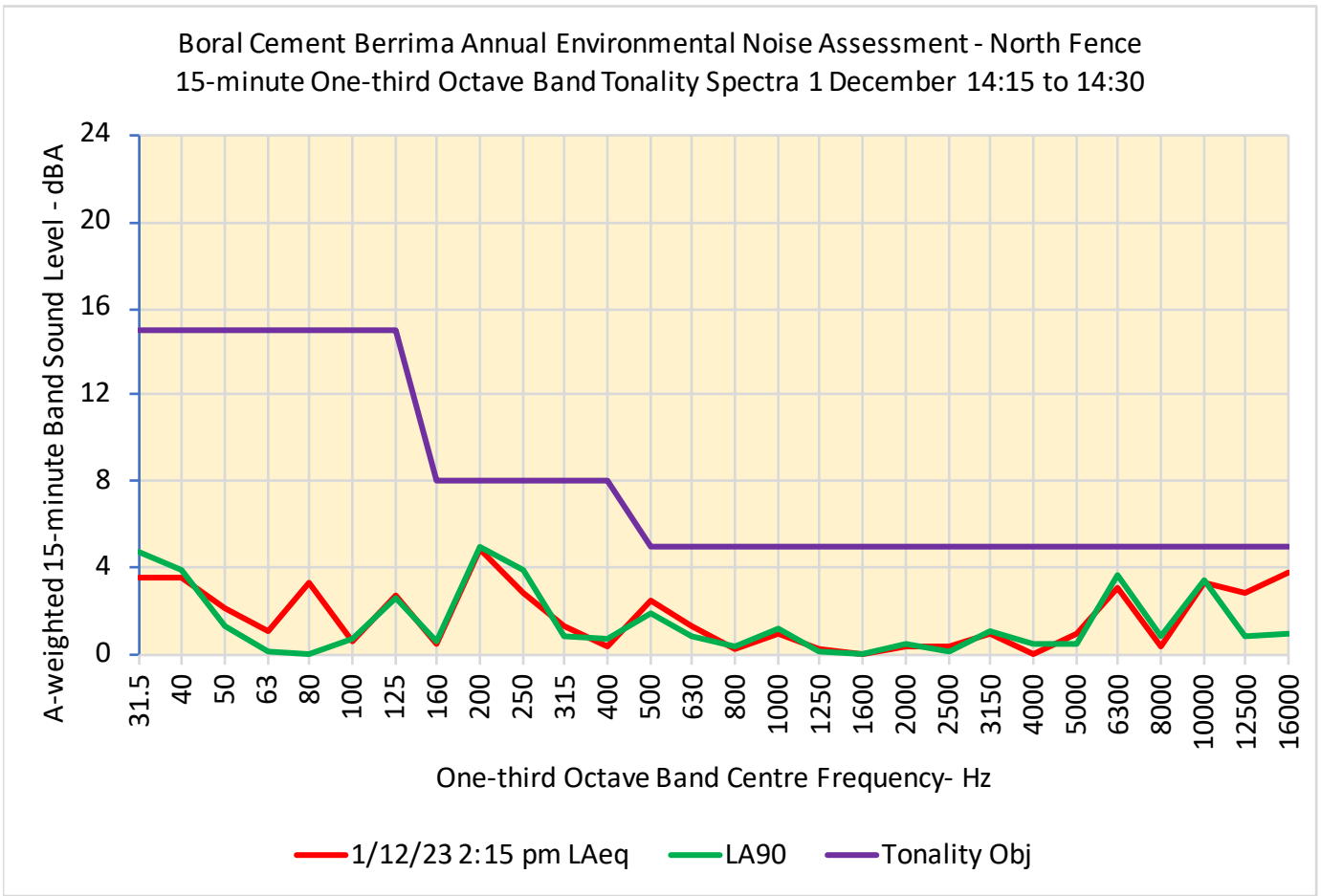
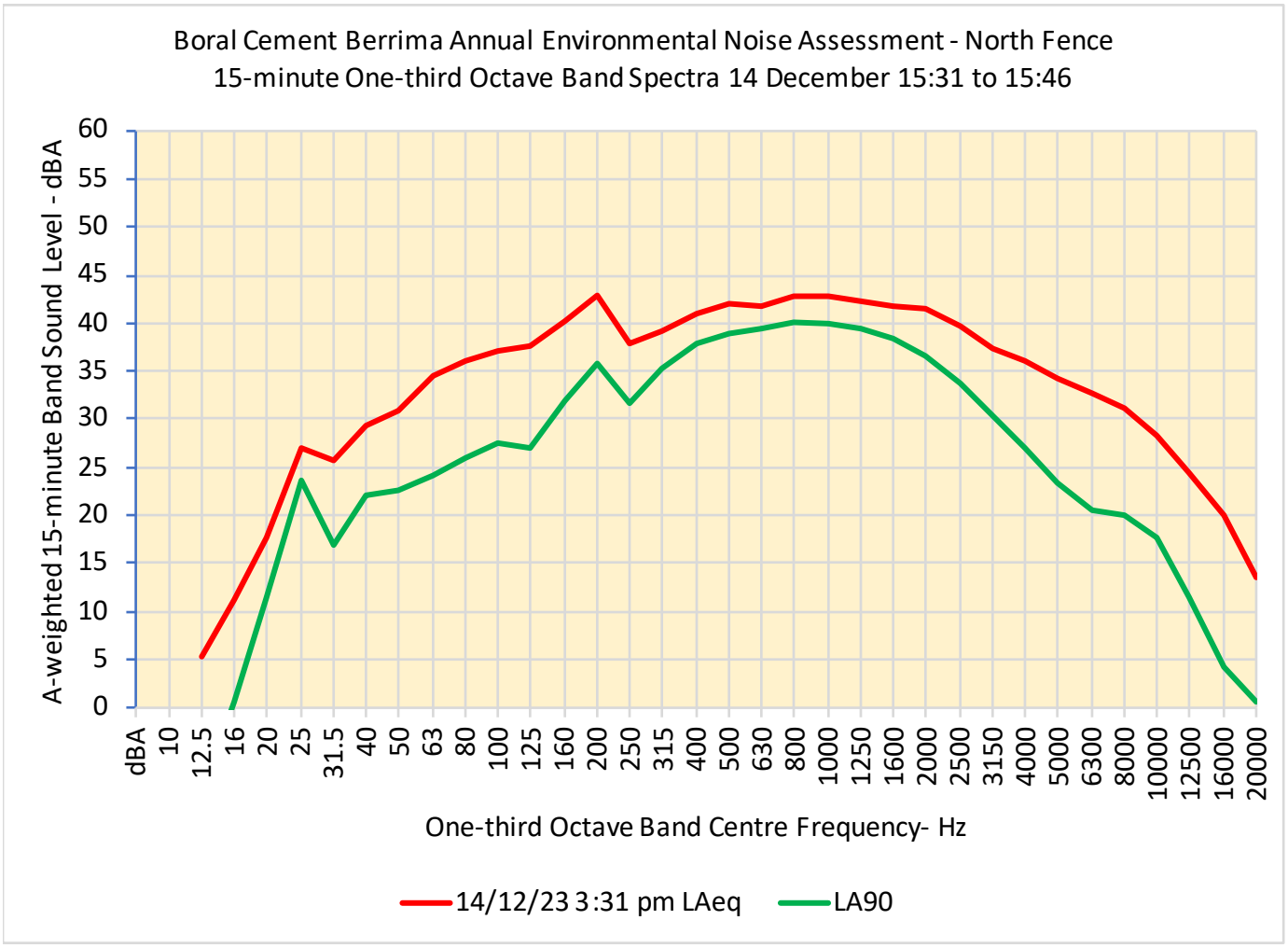


Figure A14: One-third Octave Band Spectra and Tonality for North Fence 1 December 2023 start 14:15

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



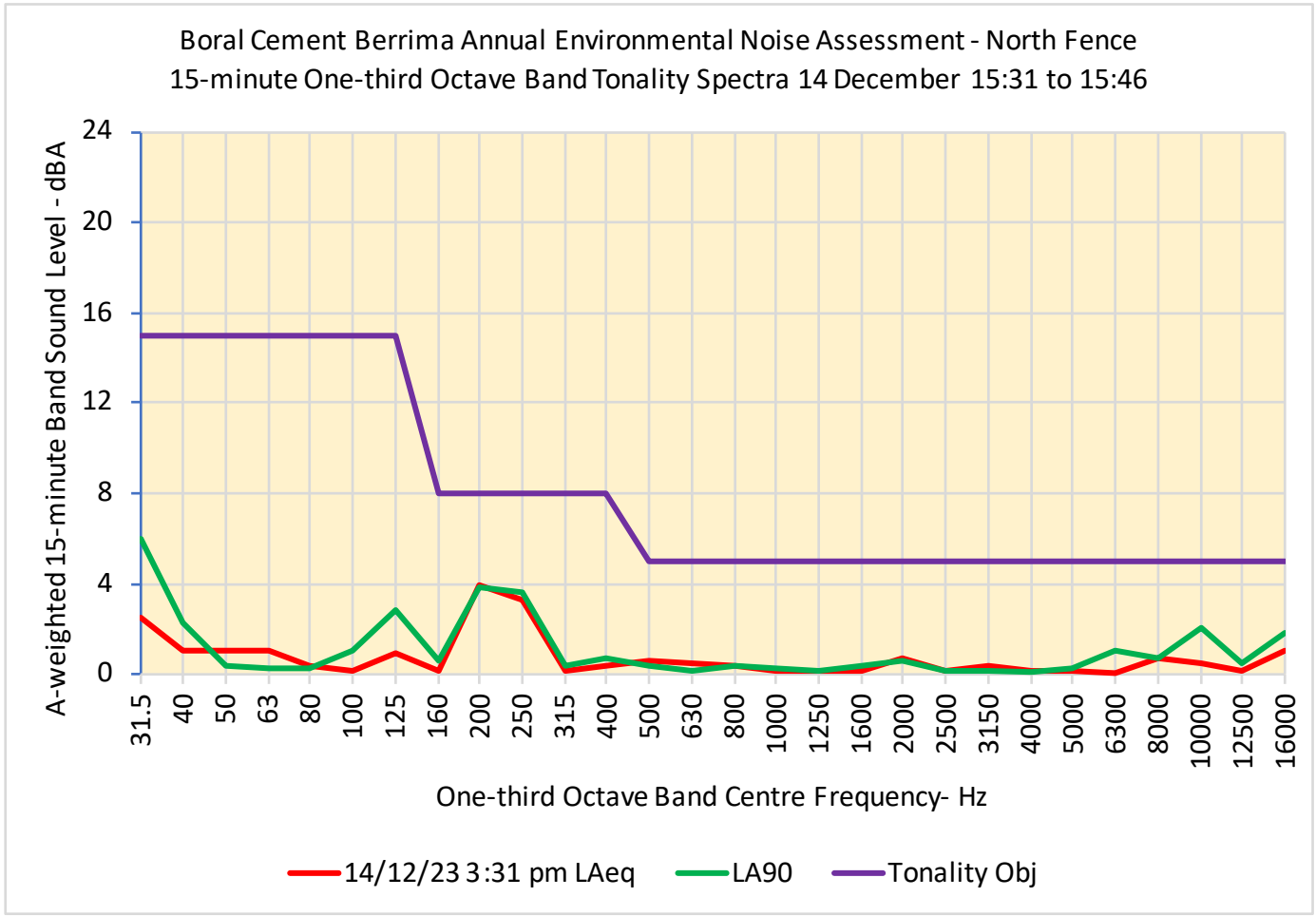
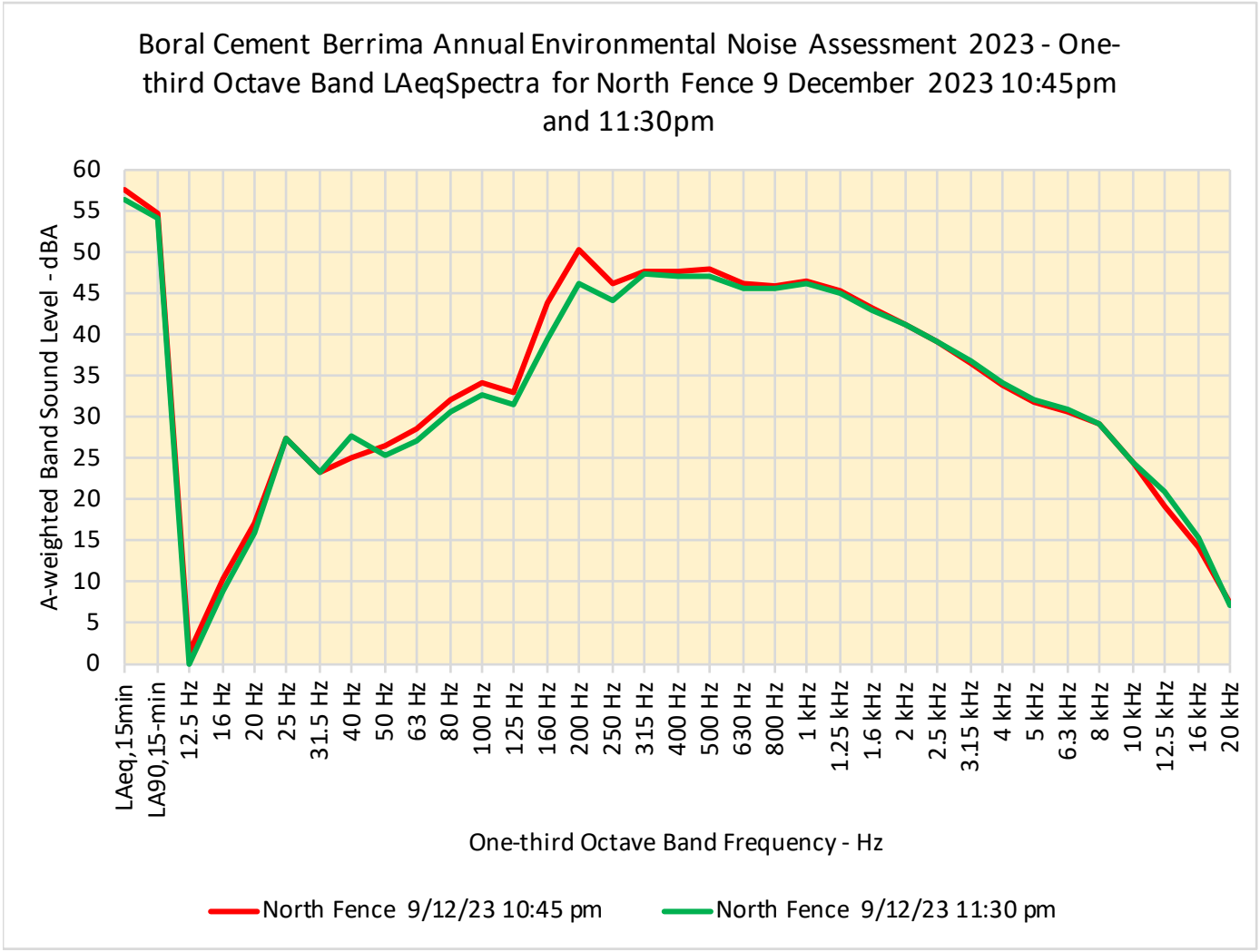


Figure A15: One-third Octave Band Spectra and Tonality for North Fence 14 December 2023 start 15:31

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



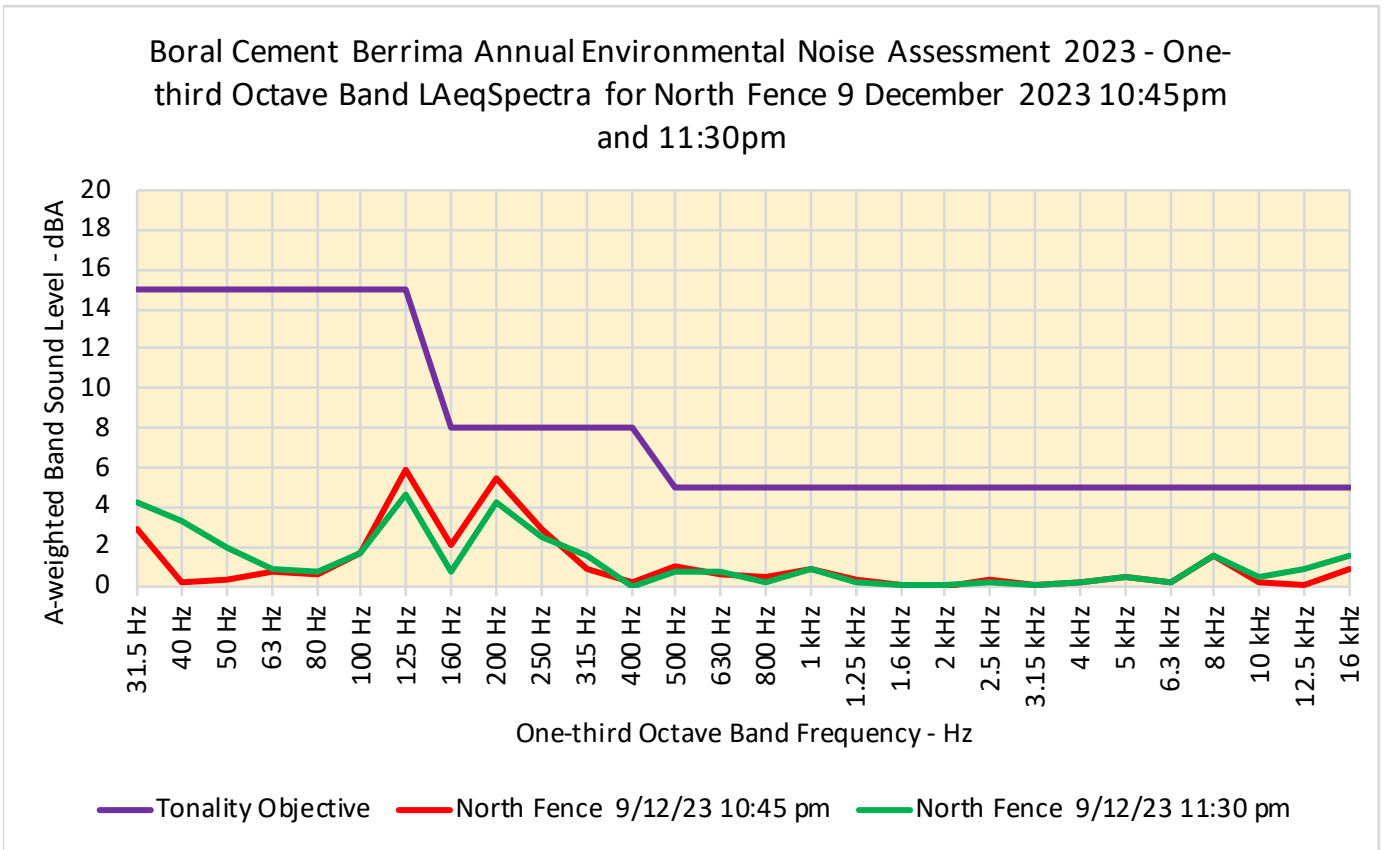
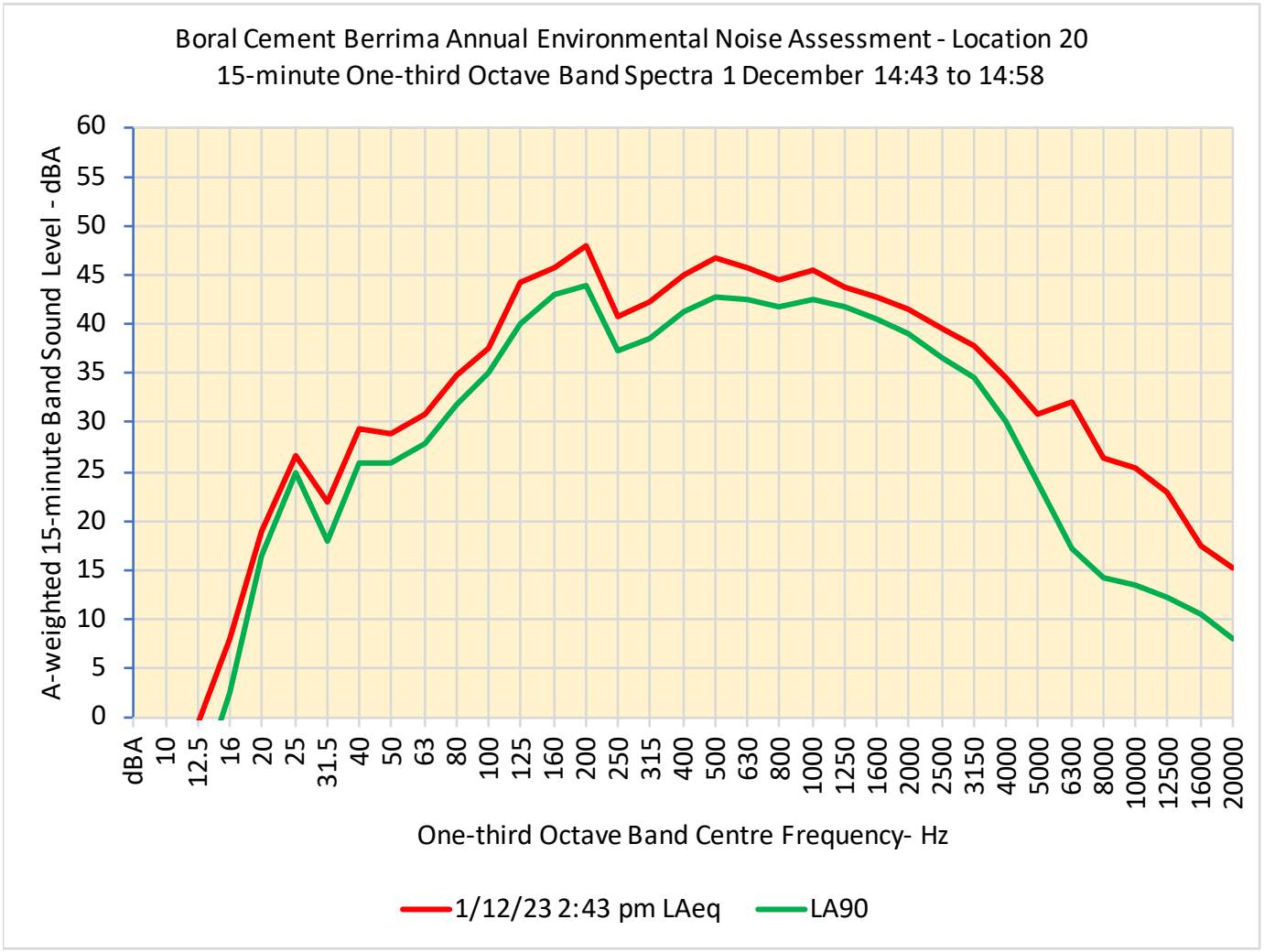


Figure A16: One-third Octave Band Spectra and Tonality for North Fence 9 December 2023 event periods start 22:45 and 23:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



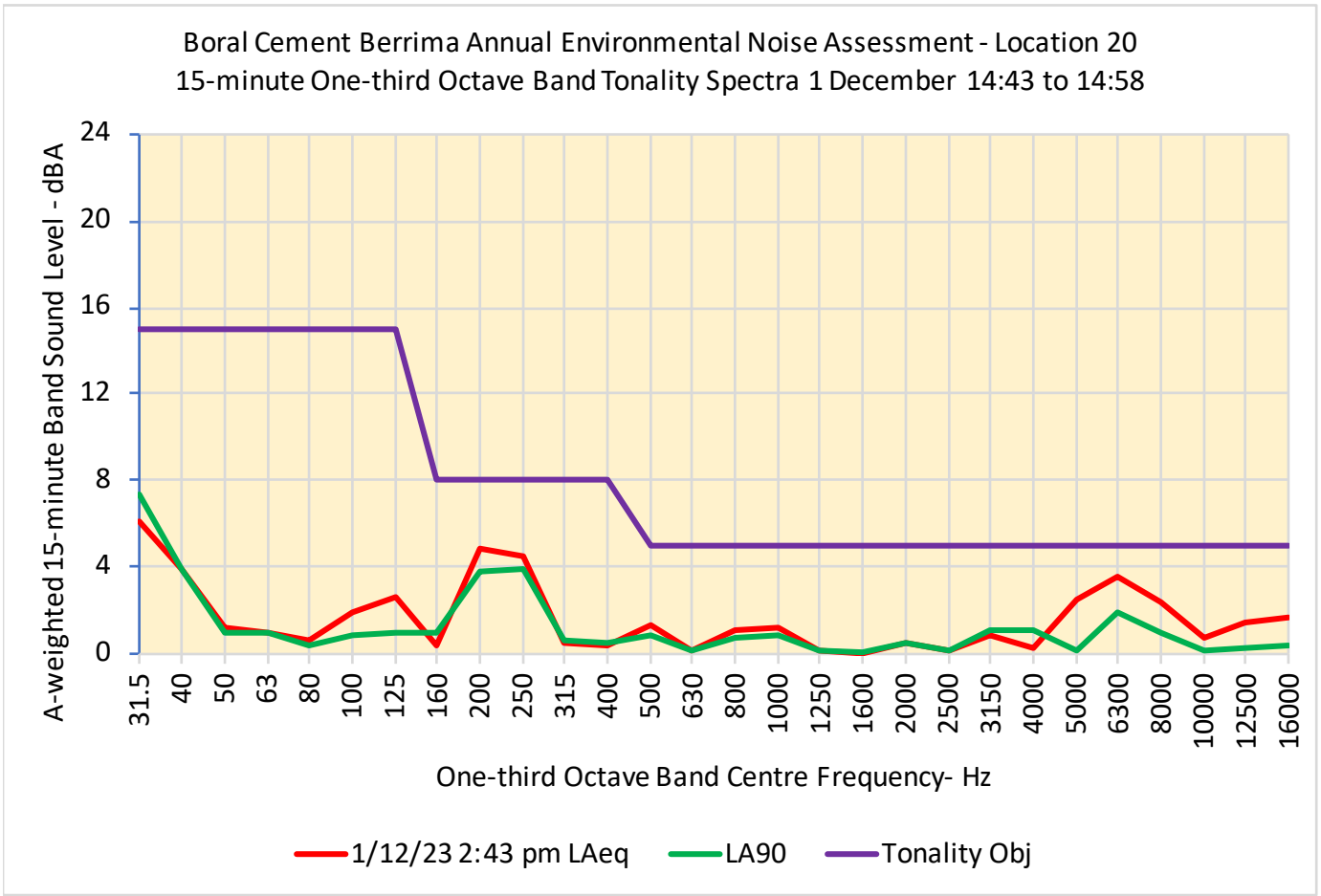
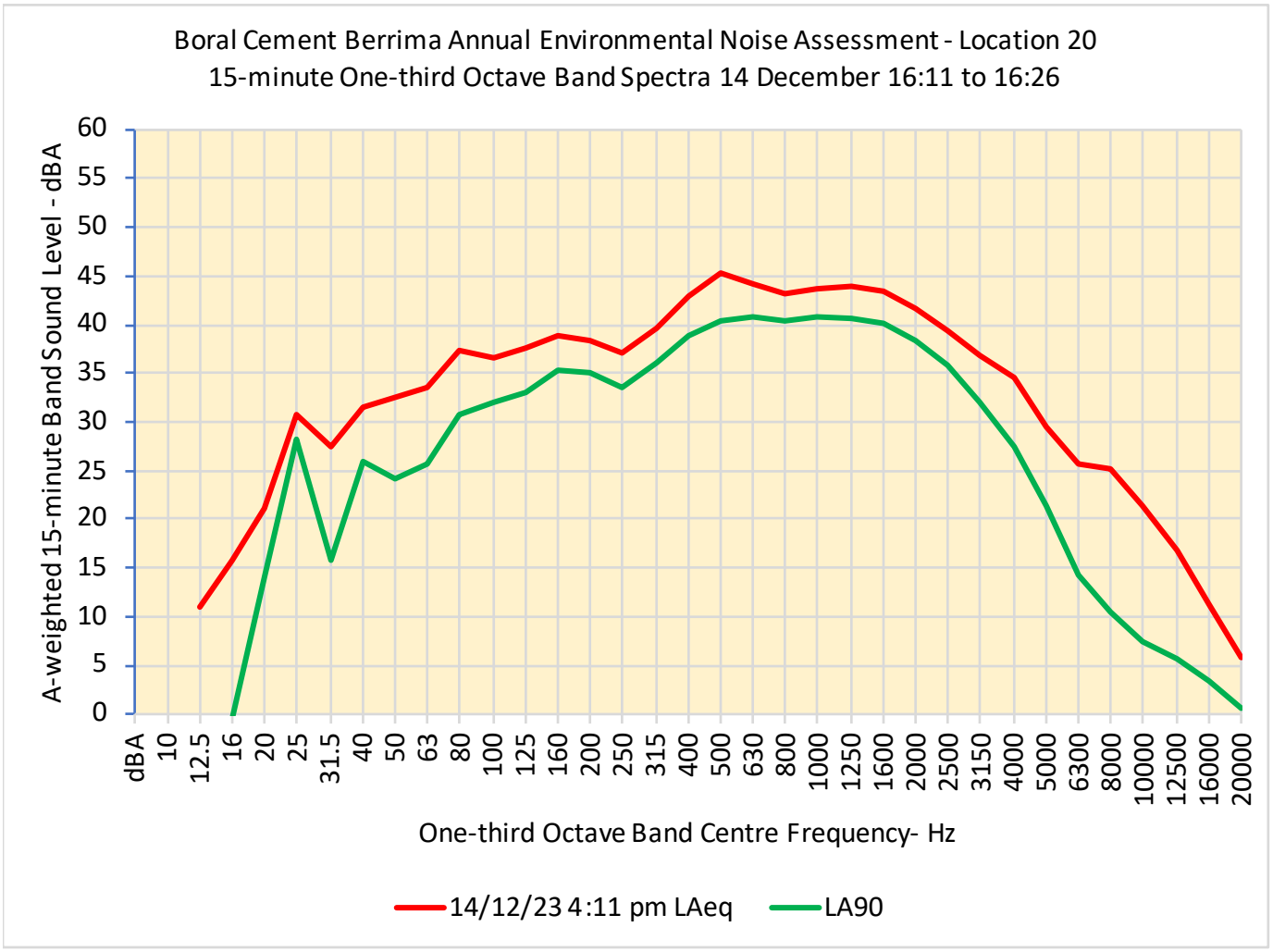


Figure A17: One-third Octave Band Spectra and Tonality for Location 20 1 December 2023 start 14:43

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



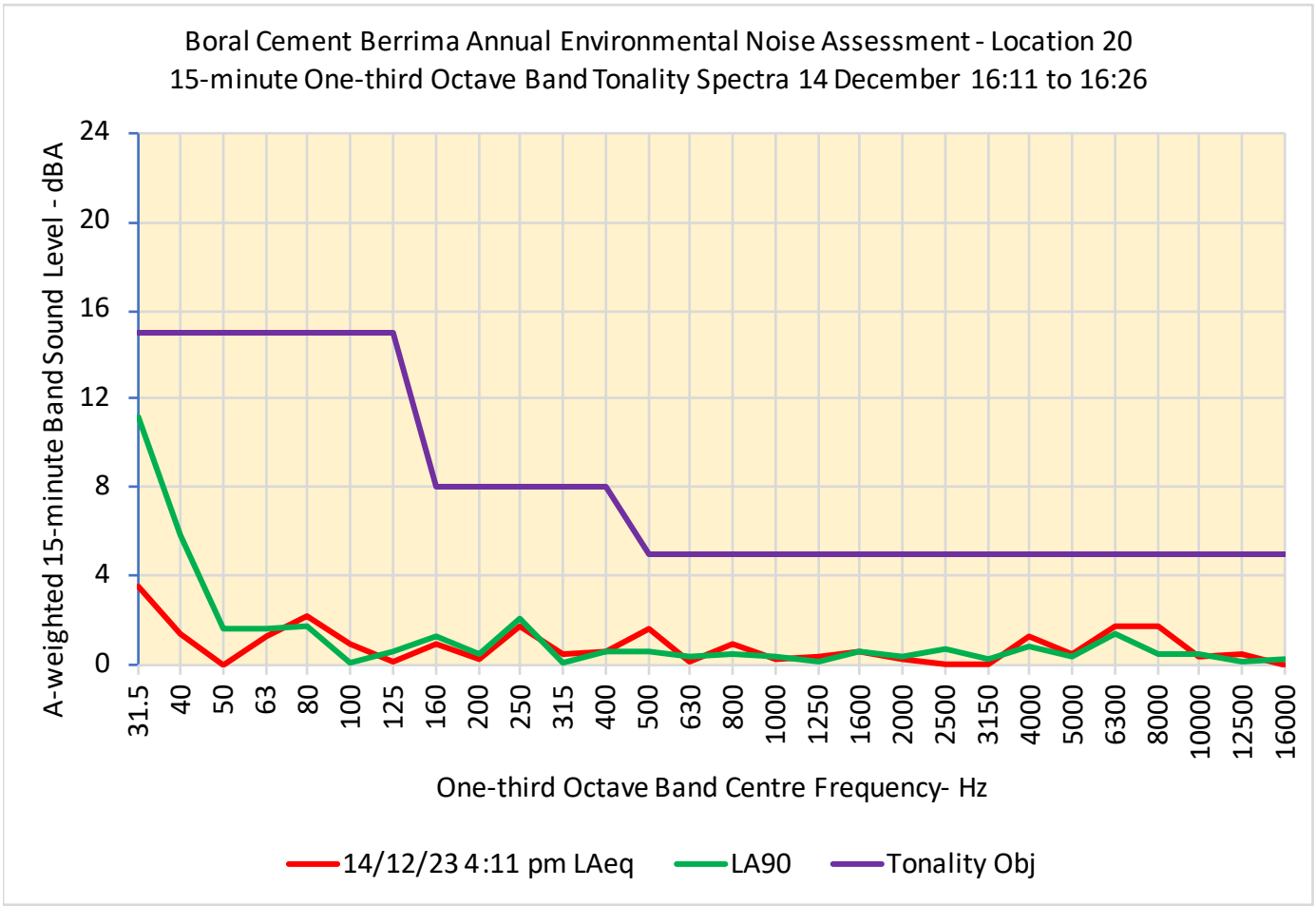
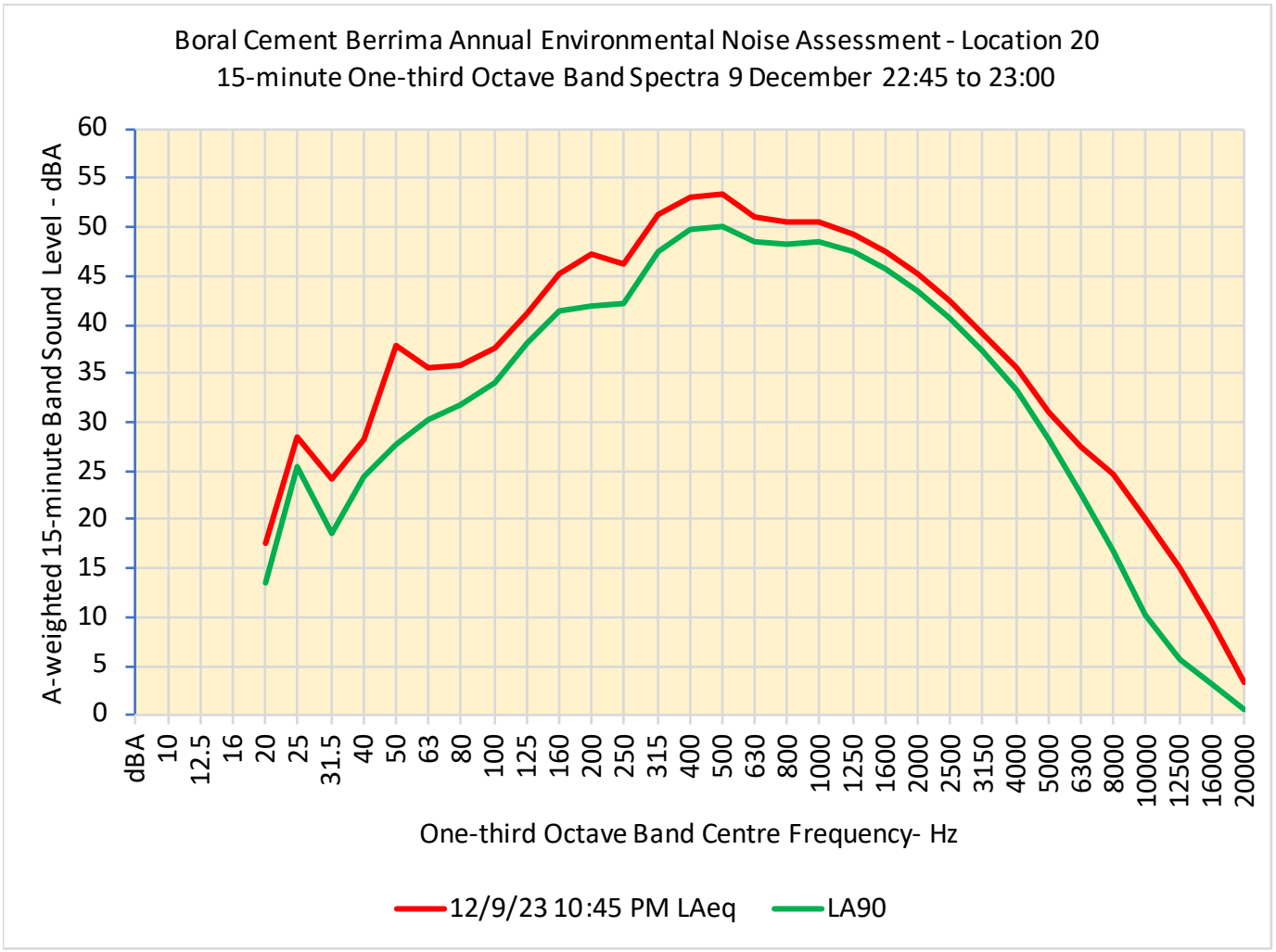


Figure A18: One-third Octave Band Spectra and Tonality for Location 20 14 December 2023 start 14:11

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023.xlsx



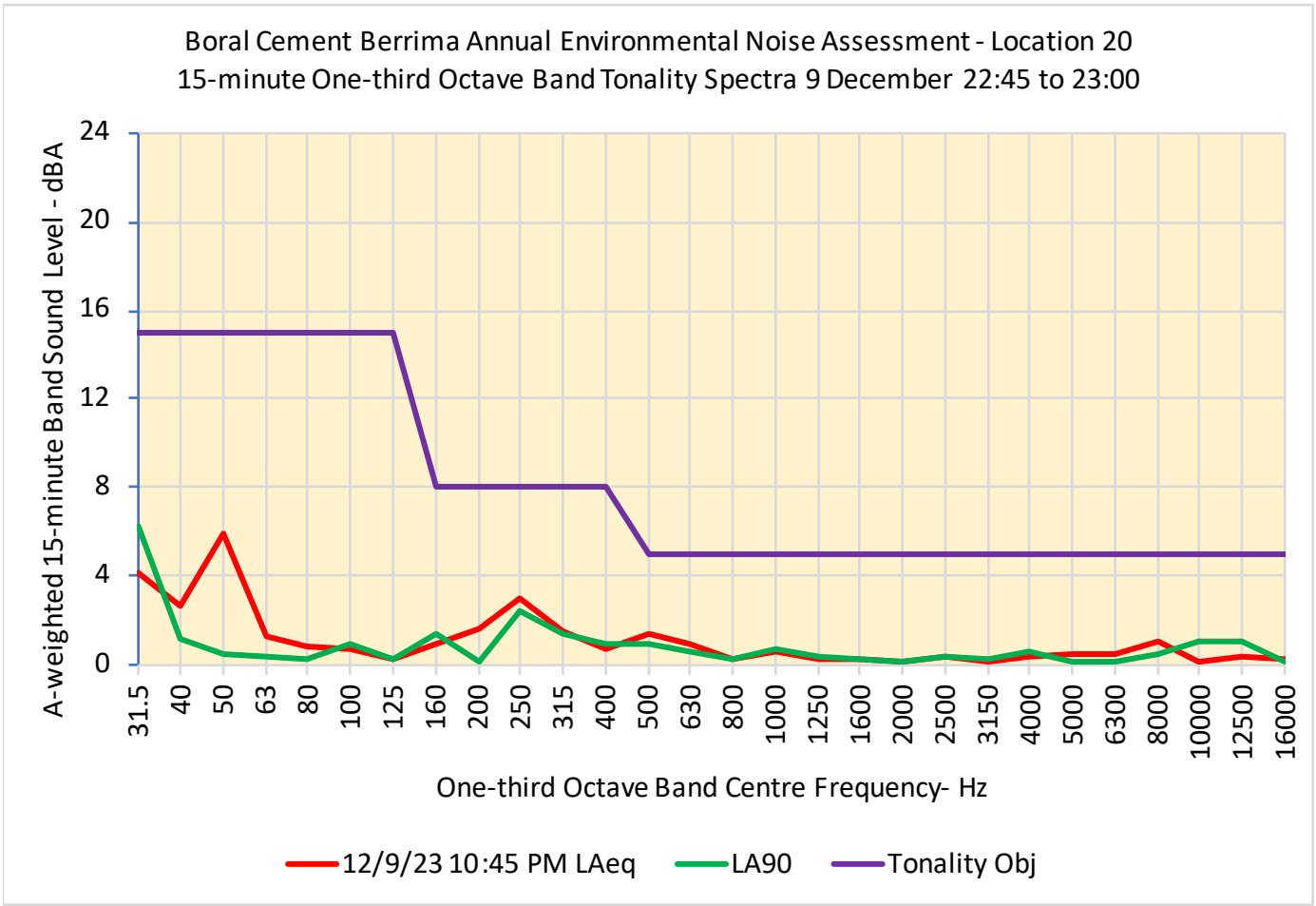
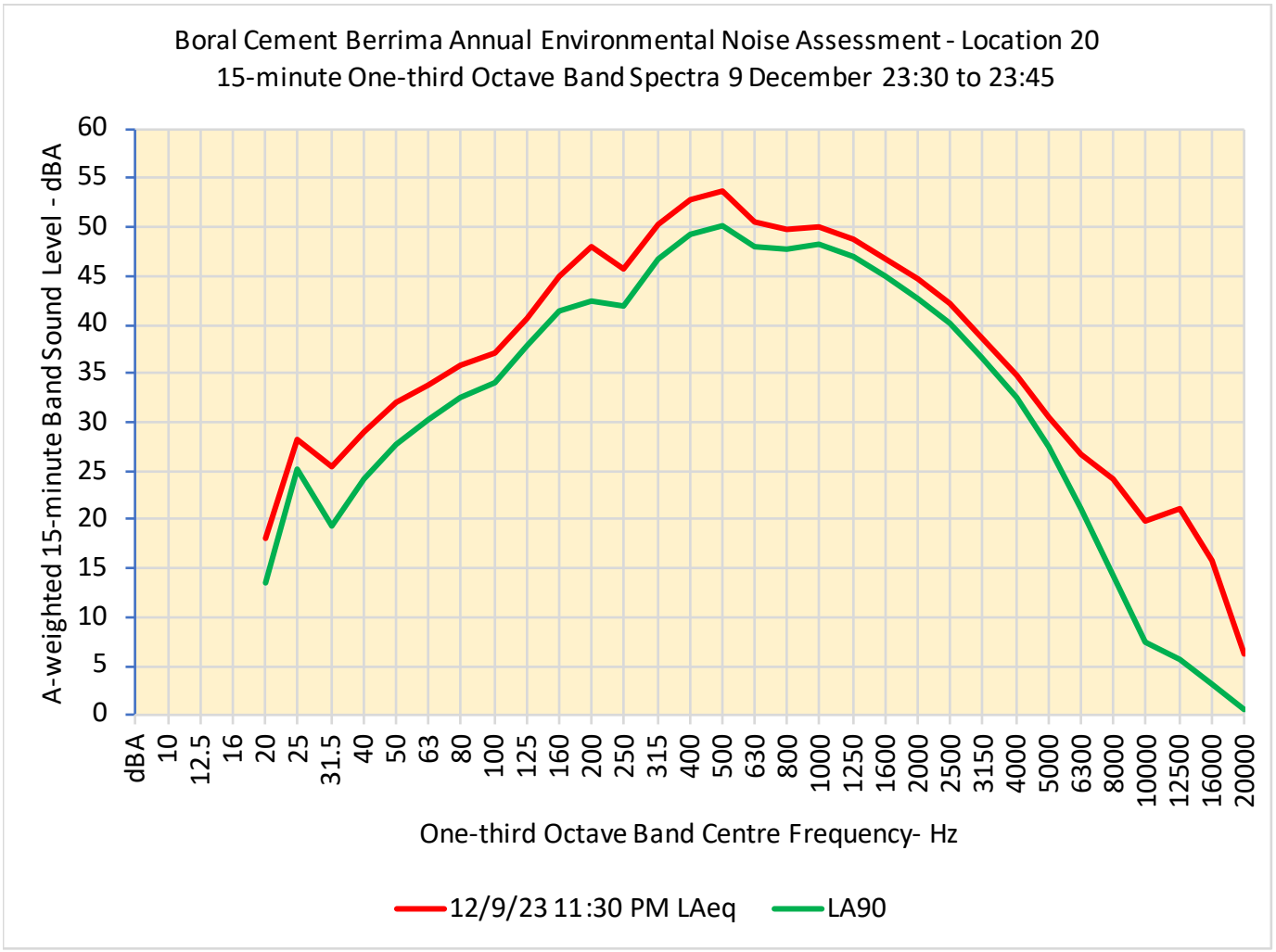


Figure A19: One-third Octave Band Spectra and Tonality for Location 20 9 December 2023 start 22:45

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023 (version 1).xlsb



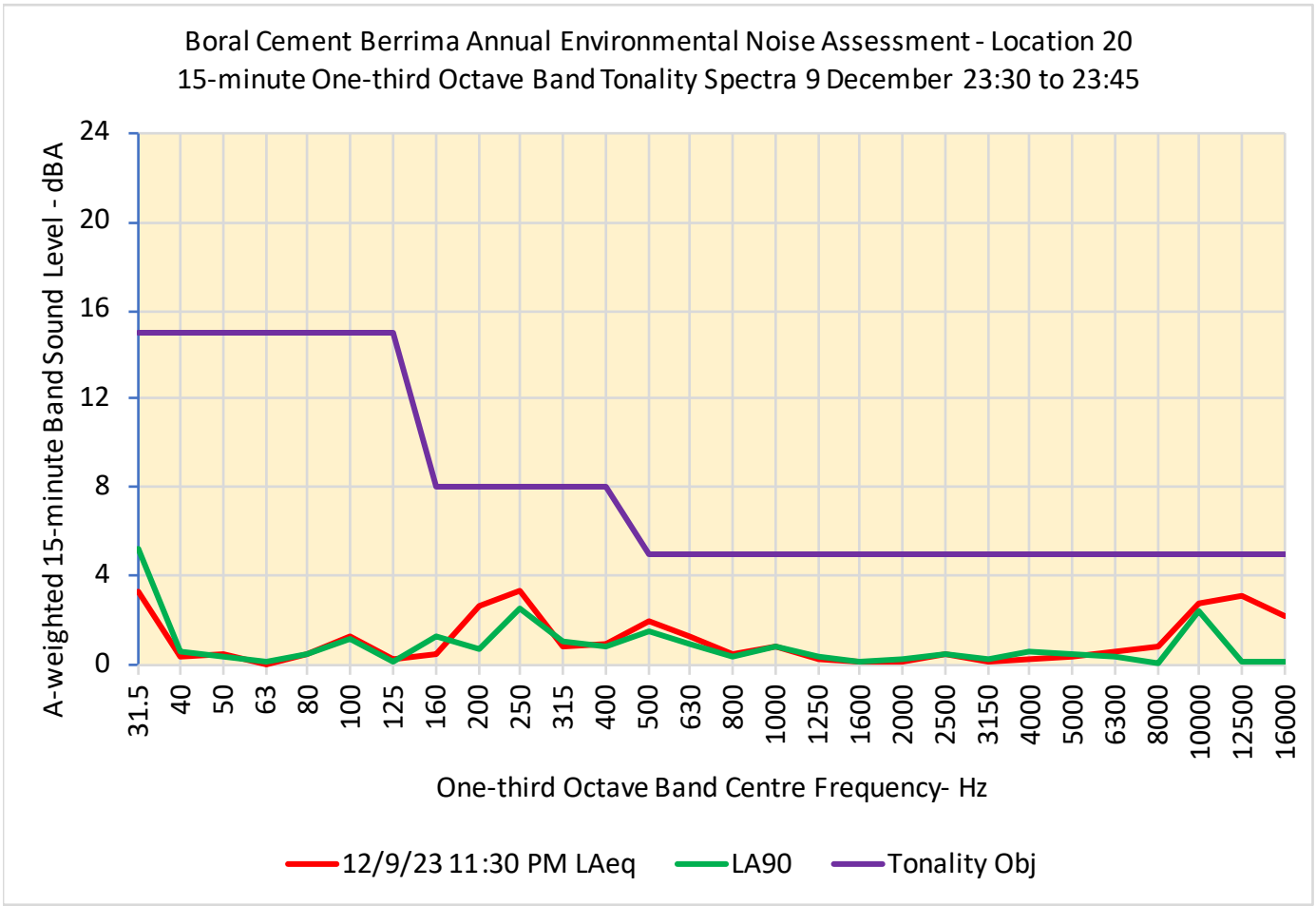


Figure A20: One-third Octave Band Spectra and Tonality for Location 20 9 December 2023 start 23:30

4MS one-third Spectra 15min Leq & L90 1 to 10 Dec 2023 (version 1).xlsb

ABN: 25 153 946 064
ACN: 153 946 064

Appendix B: Unattended environmental sound level results for 4 Melbourne Street

4 Melbourne St. New Berrima

Daytime LAEQ **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	*Maximum*	*Minimum*	*Average*	*SD*
7:00		49	47	53	53	55	57	55	49	50							57	47	52	3.5
7:15		50	47	55	52	53	52	56	51	50							56	47	52	2.6
7:30		49	54	54	58	57	54	52	51								58	49	53	2.9
7:45		55	48	55	55	56	54	54	49								56	48	53	3.2
8:00		51	55	54	52	55	52	53	48								55	48	53	2.3
8:15		55	47	56	54	55	54	53	49								56	47	53	3.1
8:30		51	49	53	53	53	58	52	51								58	49	53	2.8
8:45		51	48	55	54	55	57	56	53								57	48	54	3.0
9:00		54	49	54	53	54	52	52	51								54	49	52	1.7
9:15		55	52	54	52	53	51	52	50								55	50	52	1.6
9:30		53	50	53	55	53	52	54	48								55	48	52	2.2
9:45		53	50	55	52	55	52	53	50								55	50	52	2.1
10:00		49	48	53	52	52	54	53	50								54	48	51	2.3
10:15		50	51	51	52	52	53	54	47								54	47	51	2.0
10:30		49	50	52	55	53	55		49								55	49	52	2.6
10:45		50	50	53	52	54	52	52	47								54	47	51	2.1
11:00		51	50	57	53	52	52	51	48								57	48	52	2.6
11:15	52	50	49	53	53	53	52	52	49								53	49	51	1.5
11:30	54	51	50	55	54	53	50	51	46								55	46	52	2.6
11:45	53	50	50	55	55	53	50	52	49								55	49	52	2.3
12:00	53	49	56	53	52	53	52	51	50								56	49	52	1.9
12:15	55		50	51	51	53	52	54	48								55	48	52	2.1
12:30	53		49	55	51	53	53	52	49								55	49	52	1.9
12:45	53	51	50	54	51	53	52	52	47								54	47	51	2.1
13:00	51	55	49	52	51	53	54	54	46								55	46	52	2.8
13:15	52	66	51	50	54	51	52	51	50								66	50	53	5.0
13:30	53	52	55	51	51	51	53	52	47								55	47	52	2.2
13:45	52	51	63	54	52	52	53	52	49								63	49	53	3.9
14:00	53	50	73	52	53	51	53	52	48								73	48	54	7.4
14:15	53	49	63	55	52	54	54	52	46								63	46	53	4.6
14:30	54	50	51	54	51	53	53	52	47								54	47	52	2.2
14:45	53	50	50	54	52	54	54	52	47								54	47	52	2.4
15:00	53	54	52	54	52	54	54	50	45								54	45	52	3.0
15:15	51	50	53	55	55	53	54	51	47								55	47	52	2.8
15:30	55	50	52	54	53	53	52	51	46								55	46	52	2.8
15:45	51	51	53	53	52	53	53	52	48								53	48	52	1.8
16:00	53	51	54	53	53	53	53	51	50								54	50	52	1.4
16:15	53	52	53	54	53	54	53	52	46								54	46	52	2.5
16:30	53	51	52	52	54	53	52	52	44								54	44	51	2.9
16:45	55	50	59	50	51	53	53	51	45								59	45	52	3.8
17:00	52		54	53	52	52	53	50	44								54	44	51	3.2
17:15	54	48	53	52	53	55	52	49	45								55	45	51	3.0
17:30	52	51	52	52	53	51	52	50	45								53	45	51	2.4
17:45	51	51	52	51	51	52	52	47	46								52	46	50	2.3
18:00	53	71	52	50	50	52	54	48	46								71	46	53	7.3
Max	55	71	73	57	58	57	58	56	53	50							73	50	59	7.3
Min	51	48	47	50	50	51	50	47	44	50							51	44	49	2.3
Ave	53	52	52	53	53	53	53	52	48	50							53	48	52	1.7
SD	1.1	4.3	4.7	1.6	1.5	1.3	1.6	1.7	2.1	0.0							4.7	0.0	2.0	1.4
E Ave	53	57	58	54	53	53	53	52	48	50							58	48	53	2.9

Evening LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	*Maximum*	*Minimum*	*Average*	*SD*
18:00	53	71	52	50	50	52	54	48	46								71	46	53	7.3
18:15	51	52	52	50	49	50	50	48	49								52	48	50	1.3
18:30	50	51	51	49	49	51	49	52	49								52	49	50	1.1
18:45	53	51	53	49	49	52	51	50	52								53	49	51	1.6
19:00	51	53	52	52	47	49	56	48	50								56	47	51	2.7
19:15	50	53	51	47	49	49	48	46	51								53	46	49	2.2
19:30	50	51	51	50	50	46	47	44	51								51	44	49	2.6
19:45	49	51	49	49	48	52	46	45	51								52	45	49	2.3
20:00	71	52	49	47	47	50	50	48	50								71	47	51	7.6
20:15	65	50	48	47	45	50	47	43	50								65	43	50	6.2
20:30	50	50	49	48	45	47	46	44	51								51	44	48	2.3
20:45	50	49	48	46	46	46	45	43	50								50	43	47	2.4
21:00	50	49	47	46	47	47	45	42	50								50	42	47	2.6
21:15	49	49	47	45	44	48	43	43	51								51	43	46	2.9
21:30	50	49	45	47	44	46	44	43	52								52	43	47	3.0
21:45	49	49		45	44	45	46	45	51								51	44	47	2.6
22:00	49	48	47	43	45	44	46	42	52								52	42	46	3.2
Max	71	71	53	52	50	52	56	52	52								71	50	57	8.4
Min	49	48	45	43	44	44	43	42	46								49	42	45	2.3
Ave	52	51	49	47	47	48	48	45	50								52	45	49	2.2
SD	6.2	5.2	2.3	2.3	2.1	2.6	3.4	3.0	1.5								6.2	1.5	3.2	1.5
E Avg	60	59	50	48	47	49	49	46	50								60	46	51	5.1

Night LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	**Maximum**	**Minimum**	**Average**	**SD**
22:00	49	48	47	43	45	44	46	42	52								52	42	46	3.2
22:15	49	50	46	41	45	44	45	42	52								52	41	46	3.7
22:30	48	48	48	44	43	47	45	40	52								52	40	46	3.7
22:45	49	48	47	46	42	46	46	42	52								52	42	46	3.3
23:00	49	48	47	39	45	44	44	43	52								52	39	46	3.8
23:15	49	49	47	44	44	43	48	41	52								52	41	46	3.7
23:30	49	48	46	45	43	44	46	44	52								52	43	46	2.7
23:45	50	47	46	45	43	45	42	45	52								52	42	46	3.2
0:00	48	46	47	41	42	46	41	46	51								51	41	45	3.4
0:15	48	50	47	42	42	43	41	45	51								51	41	45	3.6
0:30	49	45	47	44	43	42	43	44	51								51	42	45	2.9
0:45	49	45	46	42	43	43	41	45	51								51	41	45	3.4
1:00	48	48	46	41	43	42	41	44	51								51	41	45	3.6
1:15	48	47	46	41	45	41	44	44	51								51	41	45	3.3
1:30	49	47	45	41	43	45	43	44	50								50	41	45	3.0
1:45	49	46	48	45	47	43	43	45	50								50	43	46	2.4
2:00	48	47	47	43	43	47	44	43	49								49	43	46	2.4
2:15	48	47	46	44	46	43		45	50								50	43	46	2.1
2:30	48	46	43	42	46	45	48	47	50								50	42	46	2.5
2:45	48	45	46	41	46	45	50	46	50								50	41	46	2.7
3:00	48	43	46	44	47	45	47	47	50								50	43	46	2.1
3:15	47	43	48	46	51	48	52	46	49								52	43	48	2.6
3:30	47	43	48	47	50	47	48	49	49								50	43	48	2.0
3:45	47	44		46	51	47	50	45	49								51	44	47	2.5
4:00	46	45	47	45	51	46	50	47	48								51	45	47	2.1
4:15	47	47	51	48	52	50	46	45	49								52	45	48	2.3
4:30	48	46	48	49	54	49	51	44	49								54	44	49	2.8
4:45	49	45	51	50	52	50	48	48	49								52	45	49	2.1
5:00	49	45	53	51	53	50	50	46	49								53	45	50	2.6
5:15	50	46	50	54	53	52	52	47	49								54	46	50	2.5
5:30	51	52	51	53	54	55	52	47	49								55	47	52	2.6
5:45	50	47	51	52	54	52	52	47	49								54	47	50	2.5
6:00	50	47	54	52	56	53	57	46	49								57	46	51	3.8
6:15	53	47	53	54	54	54	52	47	48								54	47	51	3.1
6:30	53	50	53	52	57	55	55	54	51								57	50	53	2.0
6:45	51	48	56	54	55	57	55	52	49								57	48	53	3.2
7:00	49	47	53	53	55	57	55	49	50								57	47	52	3.5
Max	53	52	56	54	57	57	57	54	52								57	52	55	2.0
Min	46	43	43	39	42	41	41	40	48								48	39	42	2.9
Ave	49	47	48	46	48	47	48	45	50								50	45	47	1.5
SD	1.5	2.0	3.0	4.6	4.9	4.5	4.6	2.7	1.3								4.9	1.3	3.4	1.4
E Avg	49	47	49	48	50	50	50	46	50								50	46	49	1.5
24hr	57	55	55	52	51	52	52	51	49	50							55	49	52	2.1

4 Melbourne St. New Berrima

Daytime LA90 **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	*Maximum*	*Minimum*	*Average*	*SD*
7:00		44	42	44	43	47	46	43	39	46							47	39	44	2.5
7:15		42	43	43	43	48	44	44	38	46							48	38	43	2.5
7:30		42	43	42	44	48	44	40	39								48	39	43	2.6
7:45		43	43	43	45	48	44	41	39								48	39	43	2.7
8:00		43	44	42	46	47	45	40	39								47	39	43	2.9
8:15		42	43	40	45	48	46	38	41								48	38	43	3.2
8:30		42	43	39	44	47	46	39	41								47	39	43	3.1
8:45		42	44	38	43	47	43	39	42								47	38	42	2.9
9:00		41	44	38	43	47	44	38	42								47	38	42	2.9
9:15		42	44	39	42	47	42	38	43								47	38	42	2.8
9:30		45	45	40	42	46	43	38	42								46	38	42	2.9
9:45		41	45	42	42	46	42	38	42								46	38	42	2.4
10:00		41	43	39	42	47	44	37	41								47	37	42	2.9
10:15		41	44	40	43	46	43	37	41								46	37	42	2.7
10:30		42	44	39	44	45	42		42								45	39	43	1.9
10:45		43	44	40	43	46	42	38	40								46	38	42	2.6
11:00	44	42	46	41	43	46	41	37	43								46	37	42	2.9
11:15	45	42	45	41	42	47	42	38	42								47	38	42	2.7
11:30	46	42	46	43	42	47	42	36	40								47	36	42	3.5
11:45	45	42	45	41	42	46	42	36	41								46	36	42	3.1
12:00	45	43	46	41	42	46	44	38	41								46	38	43	2.7
12:15	46		44	40	42	46	46	38	42								46	38	43	2.9
12:30	45		44	41	43	43	45	37	40								45	37	42	2.8
12:45	45	41	44	41	44	43	45	37	39								45	37	42	2.6
13:00	44	48	45	41	44	44	47	37	39								48	37	43	3.8
13:15	45	52	45	40	45	43	46	36	41								52	36	43	4.7
13:30	43	47	47	39	44	42	47	40	39								47	39	43	3.4
13:45	44	44	47	40	43	42	46	39	41								47	39	43	2.9
14:00	44	44	50	41	44	43	46	37	42								50	37	43	3.9
14:15	46	44	44	44	44	44	47	37	41								47	37	43	2.9
14:30	46	44	44	44	44	43	46	39	40								46	39	43	2.5
14:45	46	43	46	43	44	43	46	43	41								46	41	44	1.5
15:00	45	43	46	43	44	45	46	38	39								46	38	43	3.1
15:15	43	44	48	43	44	45	46	38	40								48	38	43	3.3
15:30	45	46	47	43	44	43	45	39	39								47	39	43	3.1
15:45	44	46	50	42	45	43	45	37	40								50	37	43	3.8
16:00	44	47	50	44	44	44	45	39	42								50	39	44	3.3
16:15	46	47	49	41	45	45	46	39	39								49	39	44	3.9
16:30	46	46	48	40	44	45	43	37	39								48	37	43	3.8
16:45	46	46	49	41	43	43	43	37	39								49	37	43	3.6
17:00	46		49	41	44	44	44	37	39								49	37	42	4.1
17:15	47	44	49	43	45	45	44	36	38								49	36	43	4.2
17:30	47	43	49	43	44	44	47	36	37								49	36	43	4.6
17:45	47	41	49	44	43	44	47	35	38								49	35	43	4.5
18:00	47	49	48	44	44	44	45	36	38								49	36	44	4.3
Max	47	52	50	44	46	48	47	44	43	46							52	43	47	2.8
Min	43	41	42	38	42	42	41	35	37	46							46	35	41	3.1
Ave	45	44	46	41	44	45	44	38	40	46							46	38	43	2.6
SD	1.1	2.4	2.3	1.8	1.0	1.7	1.7	1.9	1.4	0.3							2.4	0.3	1.6	0.6
90%	44	41	43	39	42	43	42	36	39	46							46	36	42	2.9
																		Median	42	

Evening LA90

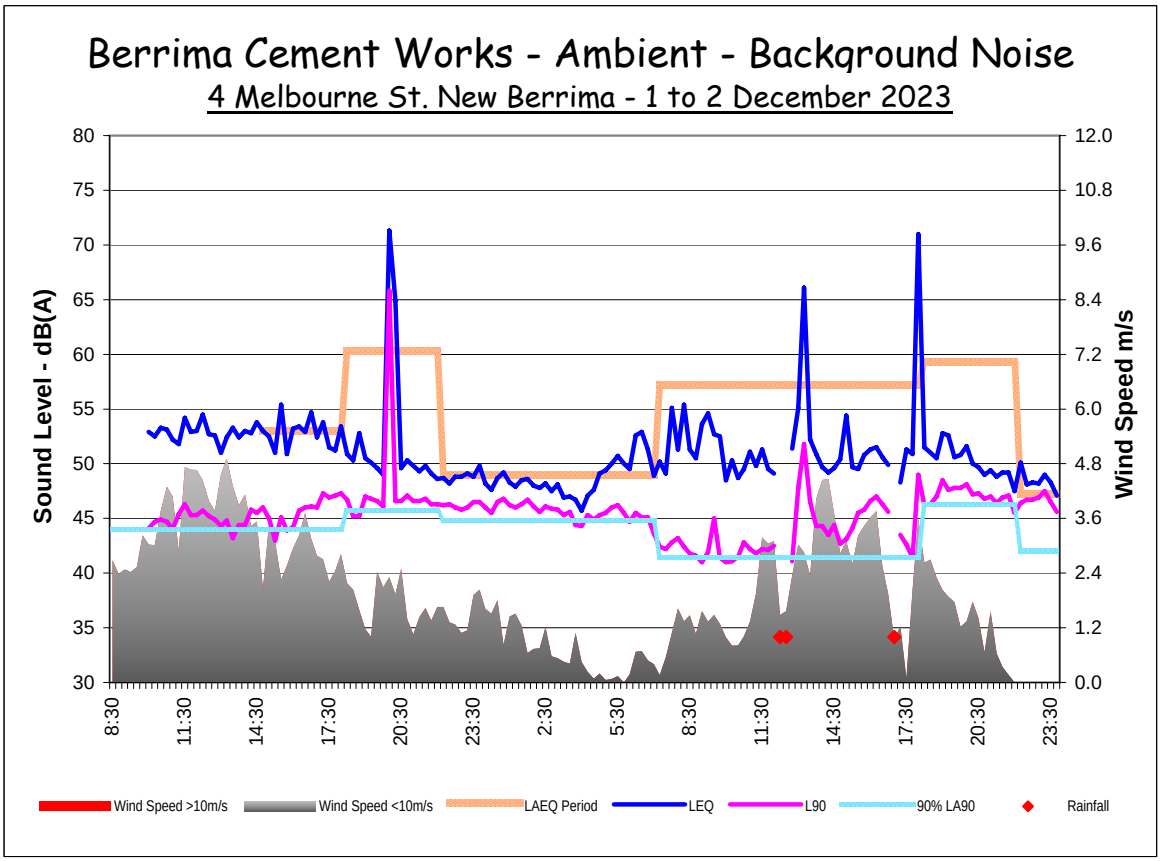
Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	*Maximum*	*Minimum*	*Average*	*SD*
18:00	47	49	48	44	44	44	45	36	38								49	36	44	4.3
18:15	47	46	48	43	42	44	45	37	42								48	37	43	3.3
18:30	45	46	47	42	42	44	42	41	44								47	41	44	2.3
18:45	45	47	48	42	42	43	41	39	45								48	39	43	2.9
19:00	47	49	48	43	42	42	40	39	46								49	39	44	3.6
19:15	47	48	48	41	42	43	40	34	47								48	34	43	4.7
19:30	47	48	48	39	42	42	40	35	46								48	35	43	4.4
19:45	46	48	46	40	42	44	39	35	46								48	35	42	4.3
20:00	66	48	46	42	43	44	41	35	46								48	35	43	4.1
20:15	47	47	45	41	41	43	40	36	47								47	36	43	3.8
20:30	47	47	46	41	41	43	40	33	47								47	33	42	4.9
20:45	47	47	46	40	41	43	38	32	47								47	32	42	5.1
21:00	47	47	45	38	41	43	40	33	47								47	33	42	4.8
21:15	47	46	44	38	41	43	39	32	48								48	32	41	5.1
21:30	47	47	43	39	40	40	38	32	48								48	32	41	5.0
21:45	46	47		38	40	41	39	34	48								48	34	41	5.1
22:00	46	46	44	37	40	41	40	33	49								49	33	41	5.0
Max	66	49	48	44	44	44	45	41	49								66	41	48	7.3
Min	45	46	43	37	40	40	38	32	38								46	32	40	4.3
Ave	48	47	46	41	41	43	40	35	46								48	35	43	4.1
SD	4.7	0.9	1.6	2.0	1.0	1.1	2.0	2.7	2.5								4.7	0.9	2.1	1.2
90%	46	46	44	38	40	41	39	32	43								46	32	41	4.5
																		Median	41	

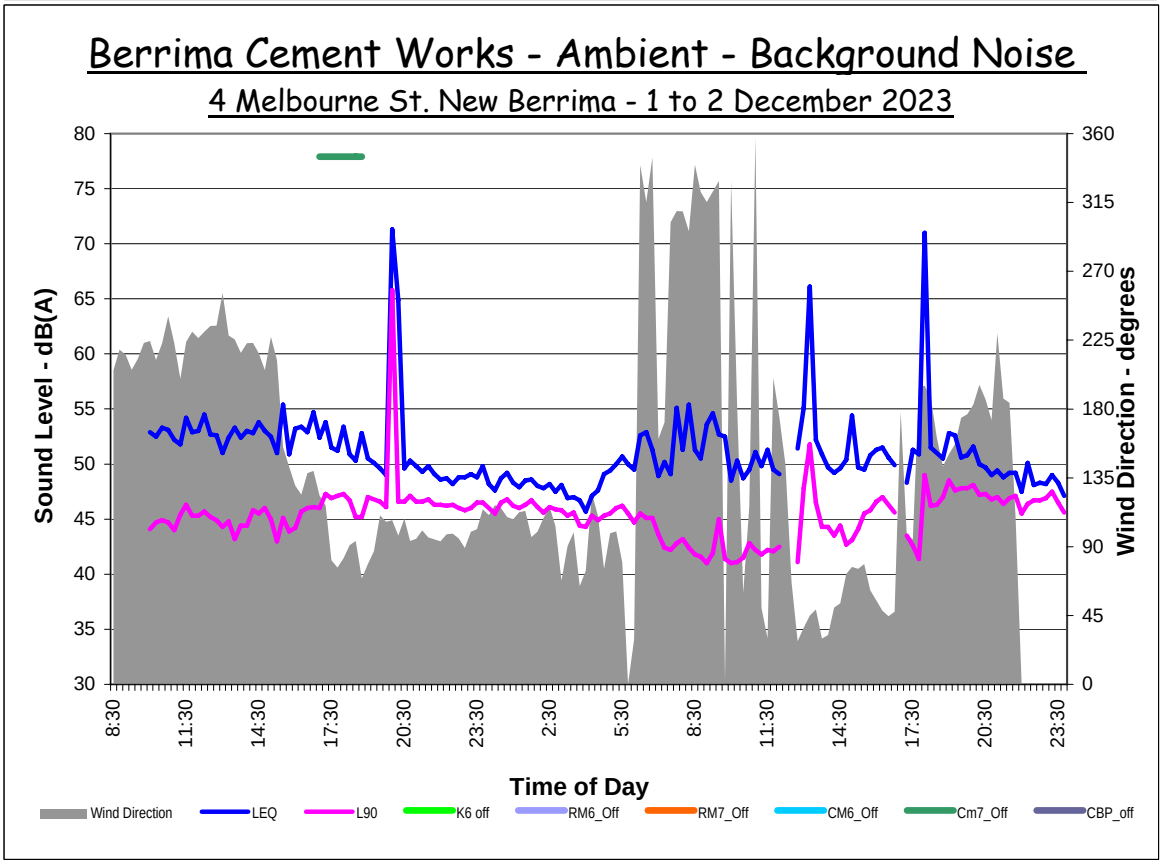
Night LA90

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	**Maximum**	**Minimum**	**Average**	**SD**
22:00	46	46	44	37	40	41	40	33	49								49	33	41	5.0
22:15	46	46	44	37	39	41	41	34	49								49	34	41	5.1
22:30	46	47	44	37	39	40	40	33	49								49	33	41	5.2
22:45	46	47	45	37	39	39	41	34	50								50	34	41	5.3
23:00	46	47	45	36	39	39	39	33	49								49	33	41	5.6
23:15	46	48	45	37	39	39	42	37	49								49	37	42	4.7
23:30	47	47	44	37	40	40	38	41	49								49	37	42	4.1
23:45	47	46	45	37	40	40	37	41	49								49	37	42	4.2
0:00	46	44	45	37	39	39	33	42	48								48	33	41	4.8
0:15	46	42	45	37	40	39	36	43	48								48	36	41	4.2
0:30	47	43	45	37	40	39	38	42	47								47	37	41	3.7
0:45	47	43	45	38	40	38	36	42	48								48	36	41	4.1
1:00	46	45	44	38	41	39	38	42	48								48	38	42	3.6
1:15	46	45	45	38	40	38	39	41	49								49	38	42	3.9
1:30	46	45	44	38	41	39	37	42	48								48	37	42	3.7
1:45	47	45	45	40	43	39	35	43	47								47	35	42	3.9
2:00	46	45	45	39	41	40	35	42	46								46	35	42	3.8
2:15	46	45	44	40	42	40		43	47								47	40	43	2.7
2:30	46	45	41	40	42	40	38	44	47								47	38	42	3.1
2:45	46	43	42	39	43	42	43	42	48								48	39	43	2.4
3:00	46	42	44	40	43	43	42	44	47								47	40	43	2.1
3:15	45	42	43	40	47	43	45	44	47								47	40	44	2.3
3:30	46	42	44	42	48	43	46	45	46								48	42	45	2.0
3:45	44	43		42	48	43	46	43	47								48	42	44	2.5
4:00	44	43	44	42	47	43	42	44	46								47	42	44	1.7
4:15	45	45	44	43	47	44	39	41	46								47	39	44	2.8
4:30	45	44	44	43	47	44	41	40	46								47	40	44	2.5
4:45	45	43	43	43	47	45	39	41	47								47	39	43	2.7
5:00	46	42	43	45	48	45	45	41	47								48	41	44	2.2
5:15	46	42	42	46	48	44	42	41	47								48	41	44	2.7
5:30	46	43	42	45	48	44	41	40	47								48	40	44	2.8
5:45	46	43	43	45	48	45	40	39	46								48	39	43	3.2
6:00	45	43	43	46	48	44	41	38	46								48	38	44	3.2
6:15	46	42	43	46	48	46	41	39	46								48	39	44	3.1
6:30	45	42	43	44	49	46	42	39	46								49	39	44	2.9
6:45	45	42	44	44	48	45	44	40	46								48	40	44	2.4
7:00	44	42	44	43	47	46	43	39	46								47	39	44	2.7
Max	47	48	45	46	49	46	46	45	50								50	45	47	1.7
Min	44	42	41	36	39	38	33	33	46								46	33	39	4.5
Ave	46	44	44	40	44	42	40	40	47								47	40	43	2.6
SD	0.7	1.8	1.0	3.2	3.9	2.6	3.1	3.3	1.2								3.9	0.7	2.3	1.2
90%	45	42	42	37	39	39	36	34	46								46	34	40	4.1
																		Median	39	

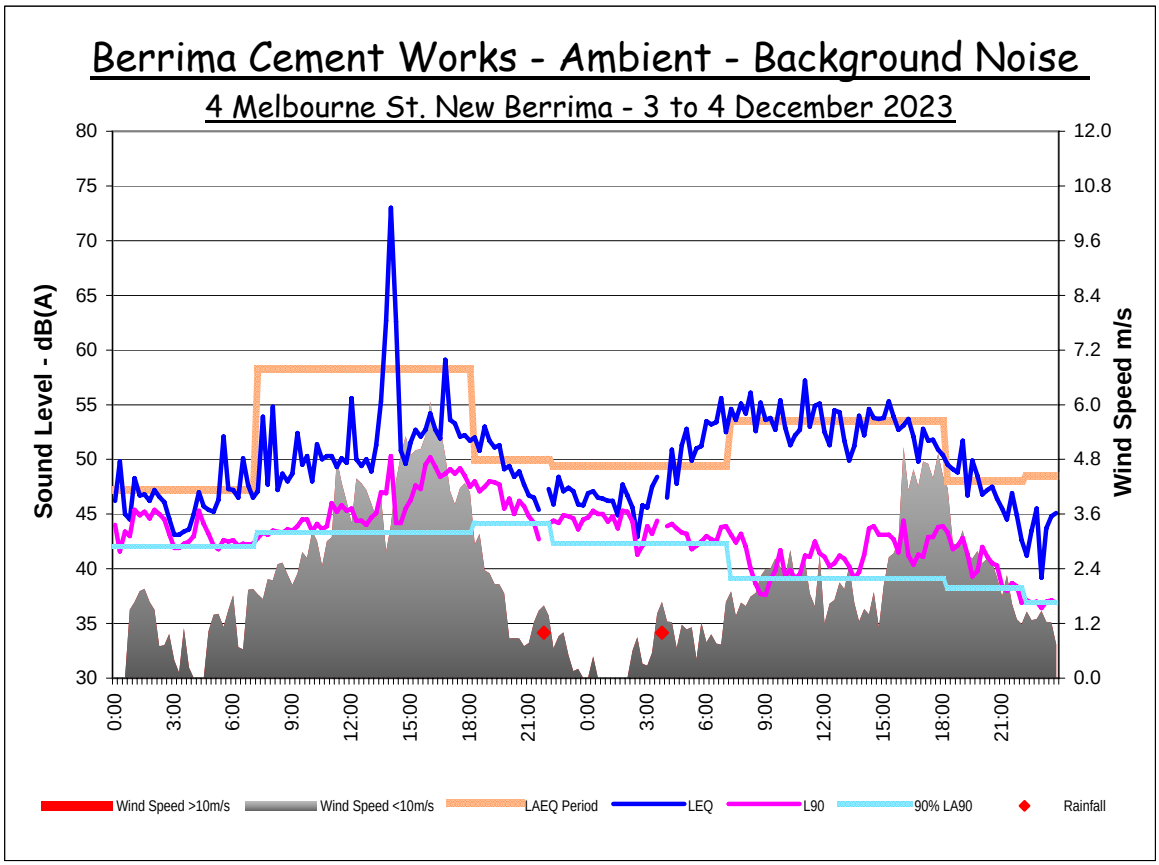
Berrima Melbourne St Dec23 A criteria ver2.xls: LA90

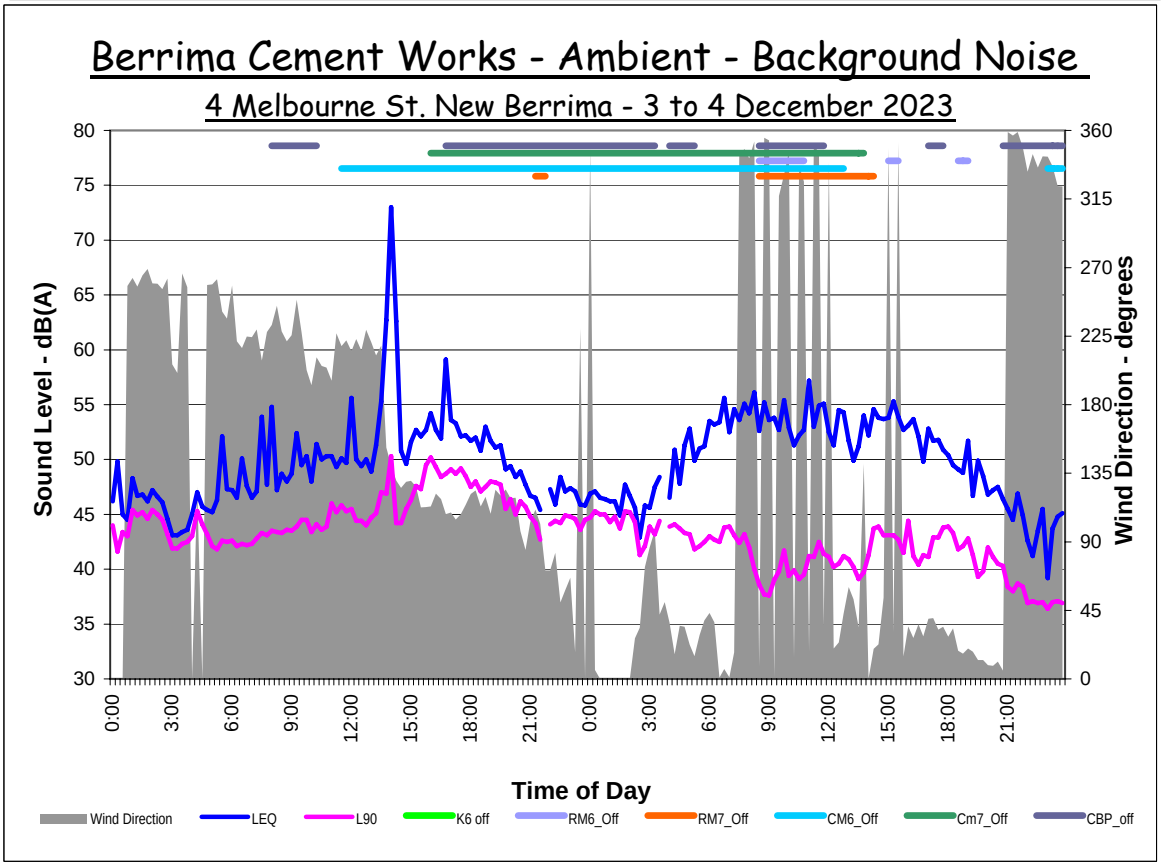
Two Day Results of Ambient Noise Monitoring



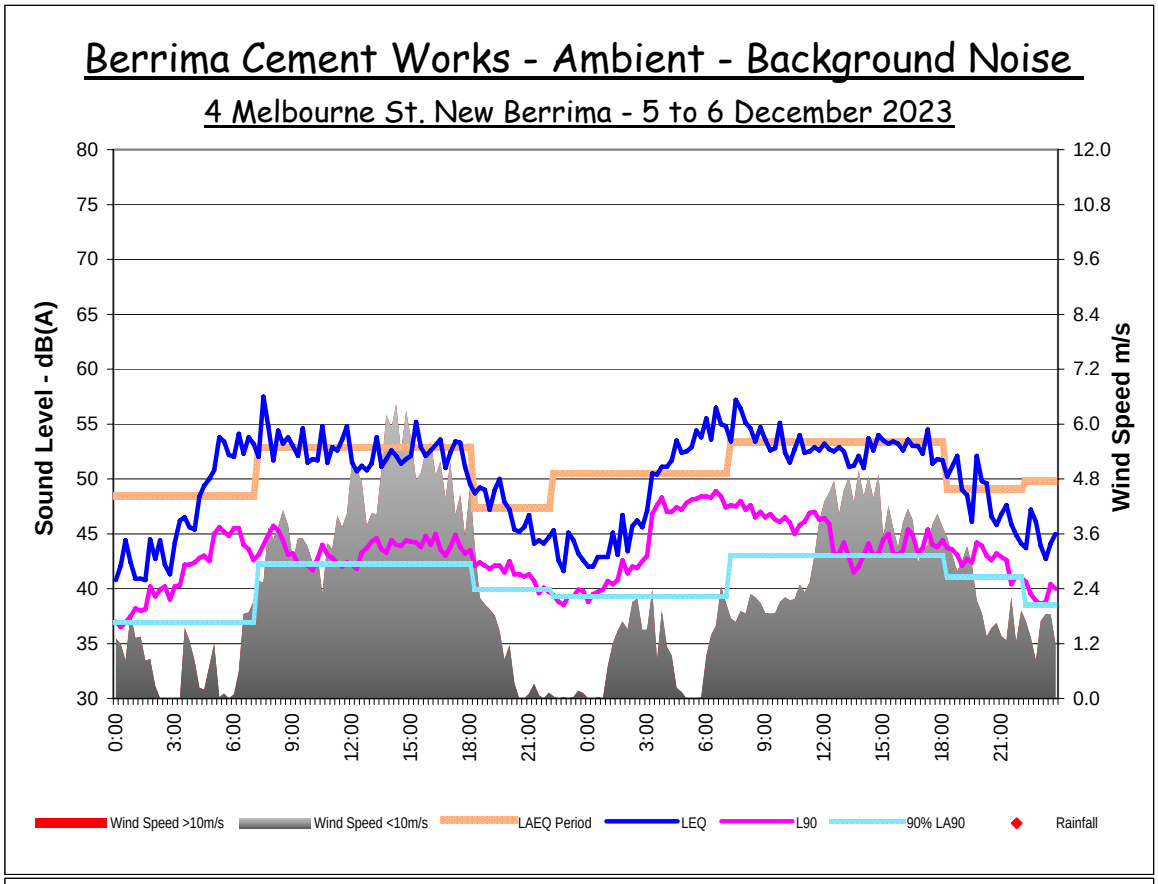


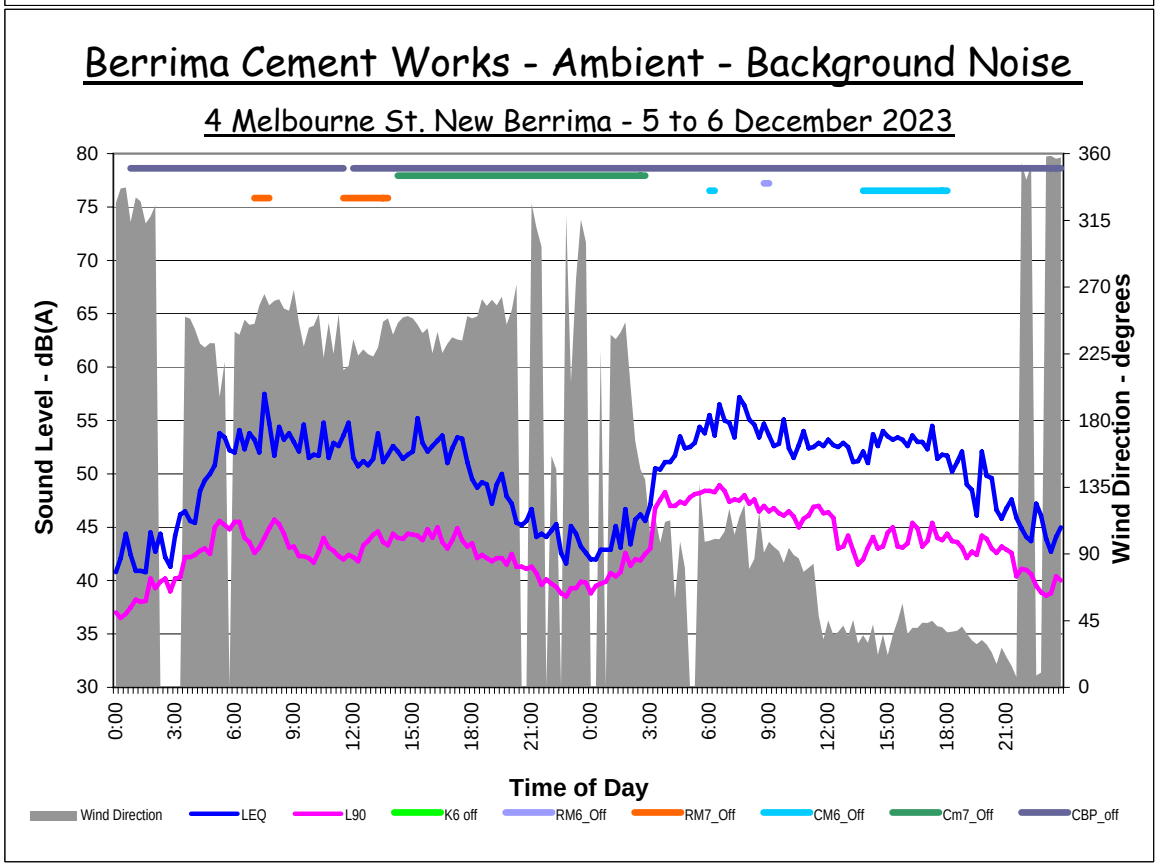
Two Day Results of Ambient Noise Monitoring



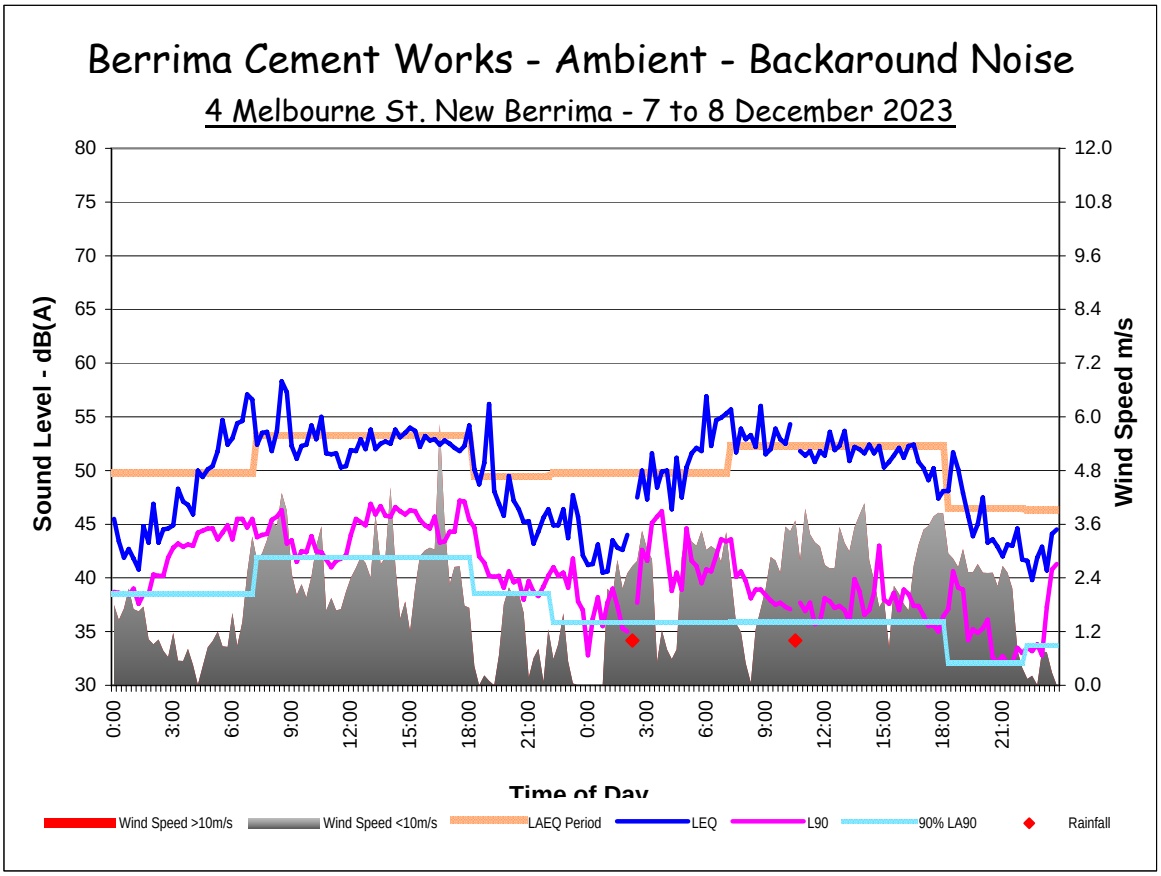


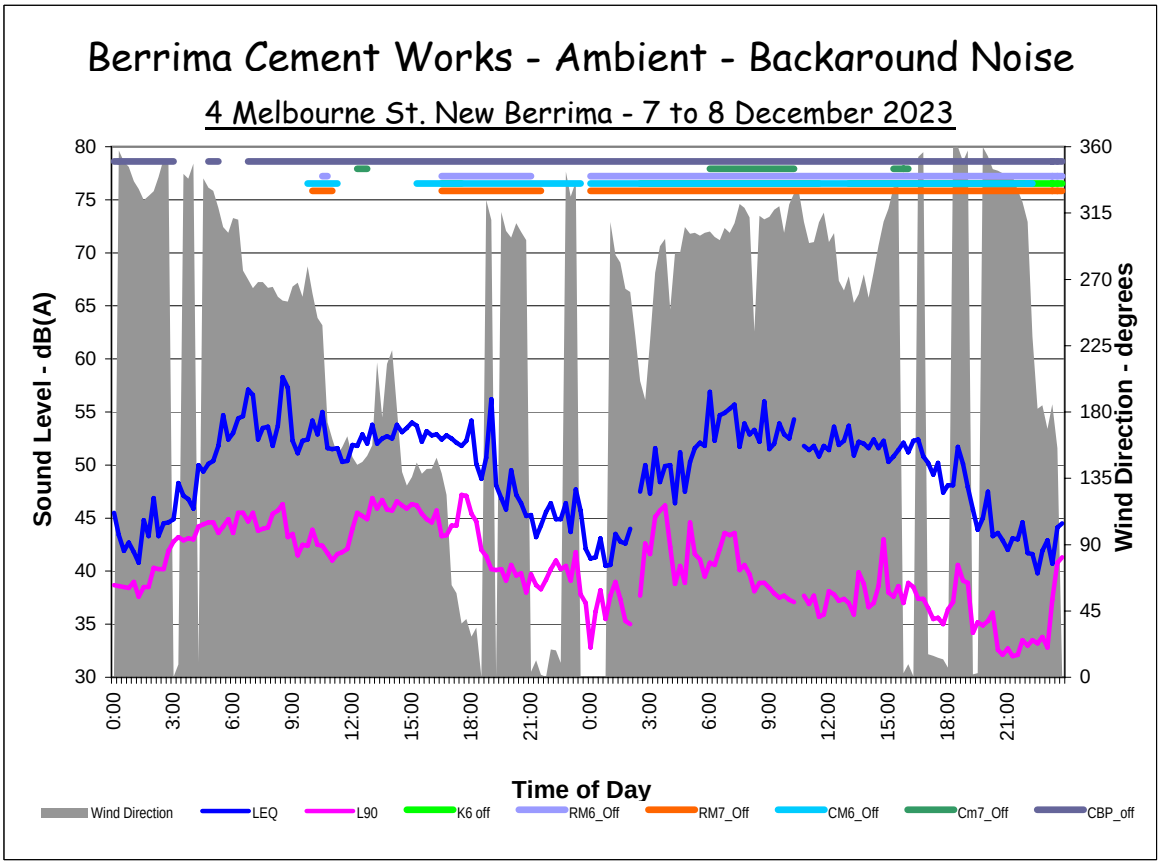
Two Day Results of Ambient Noise Monitoring



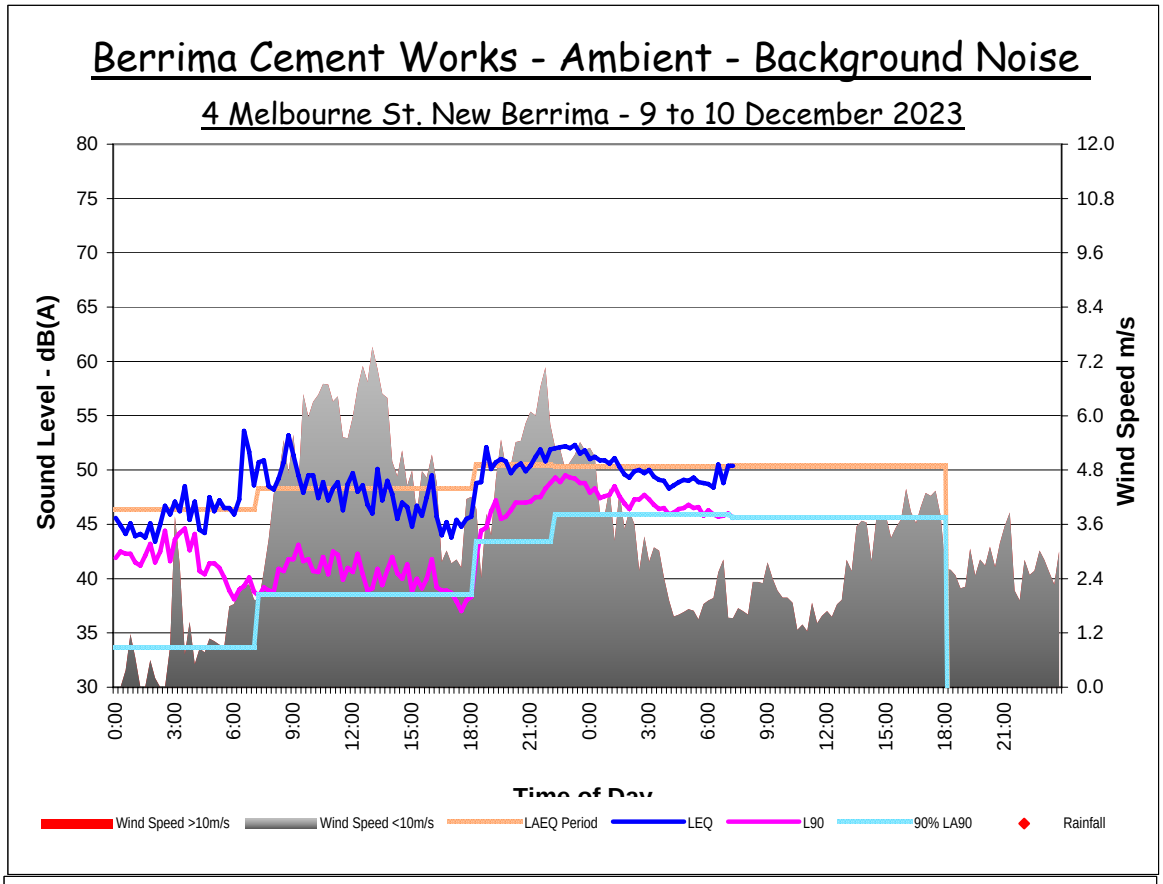


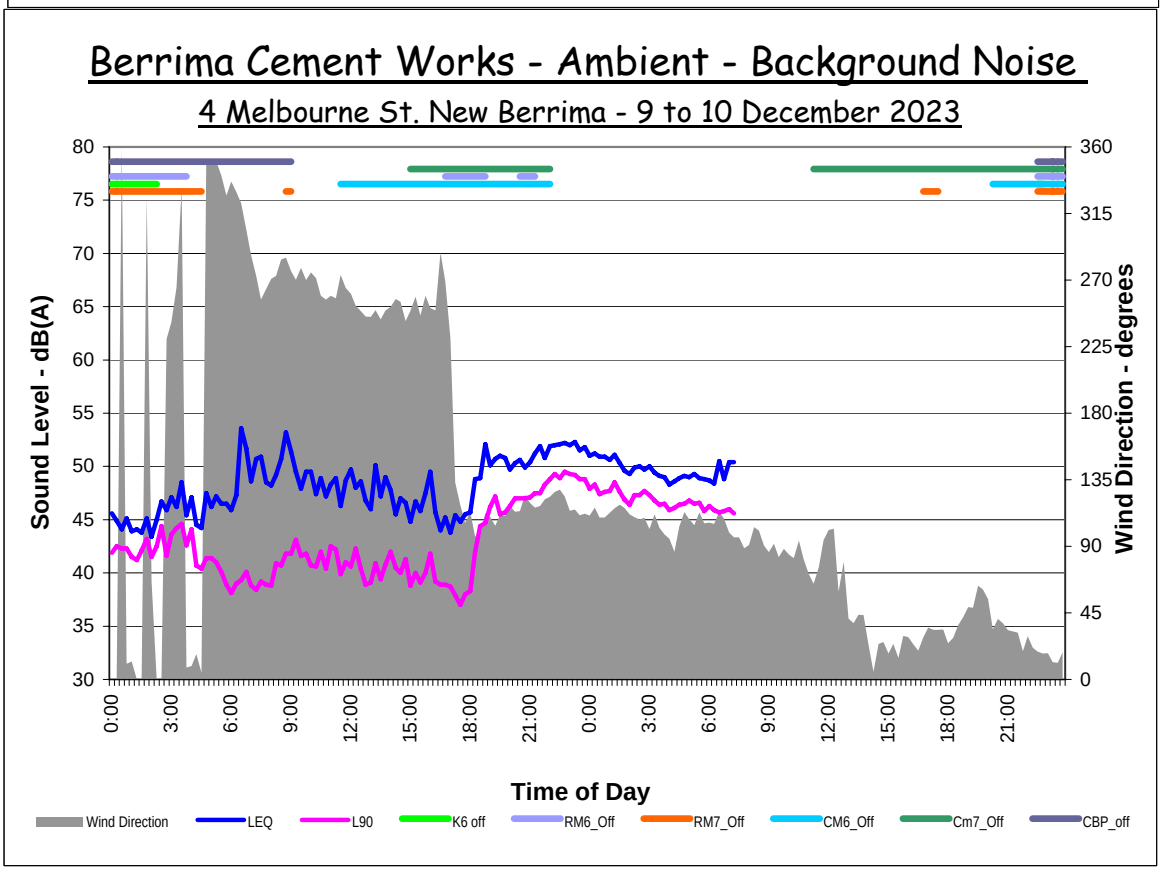
Two Day Results of Ambient Noise Monitoring

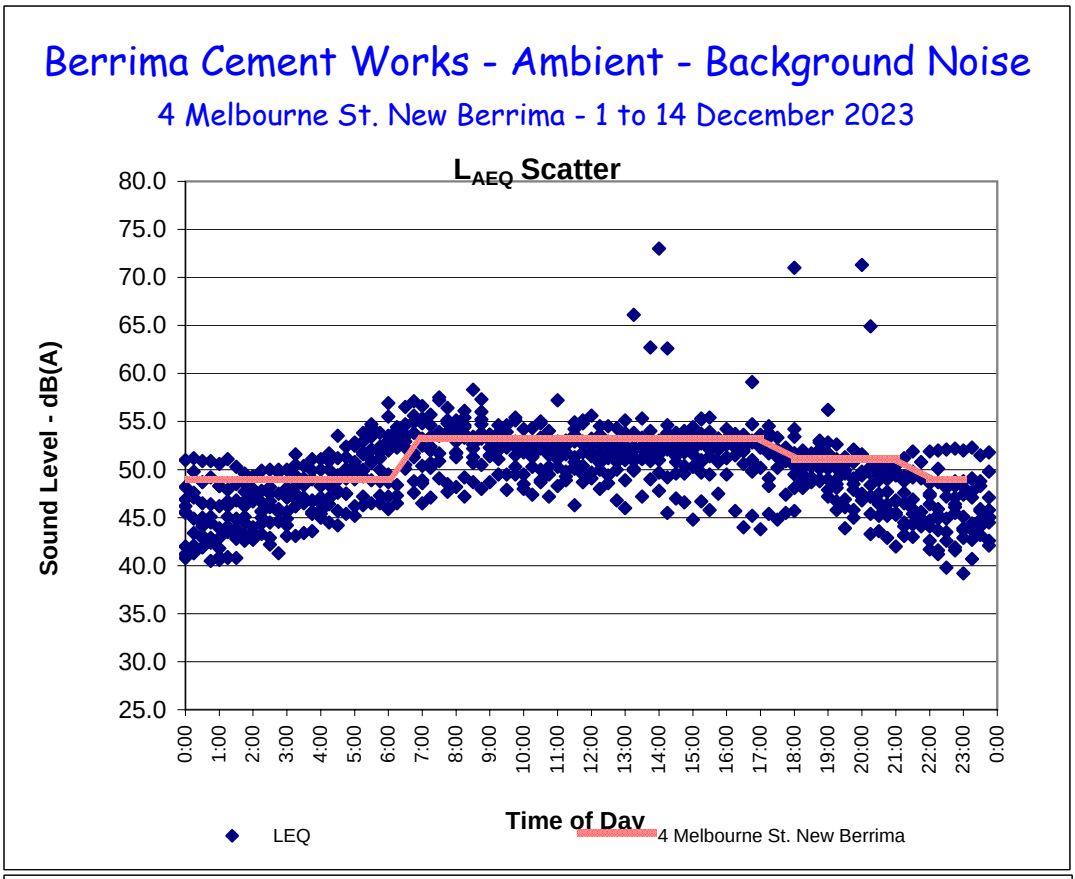


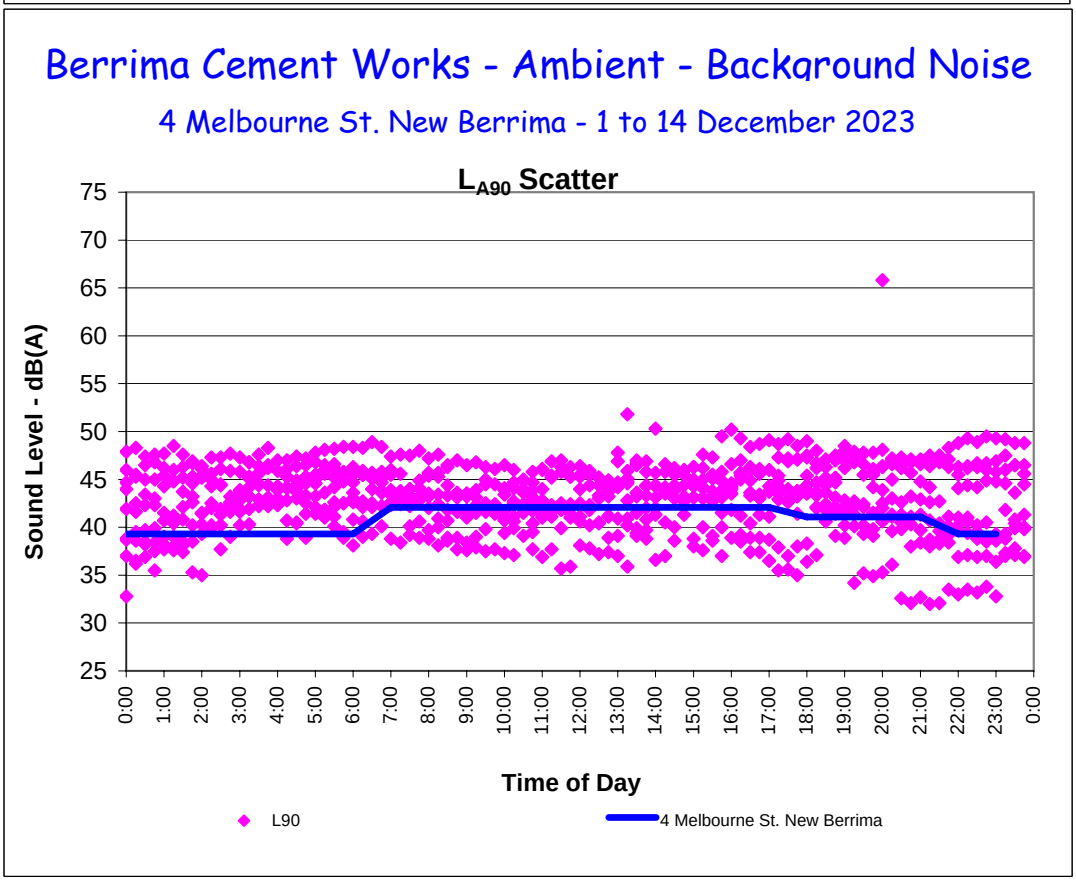


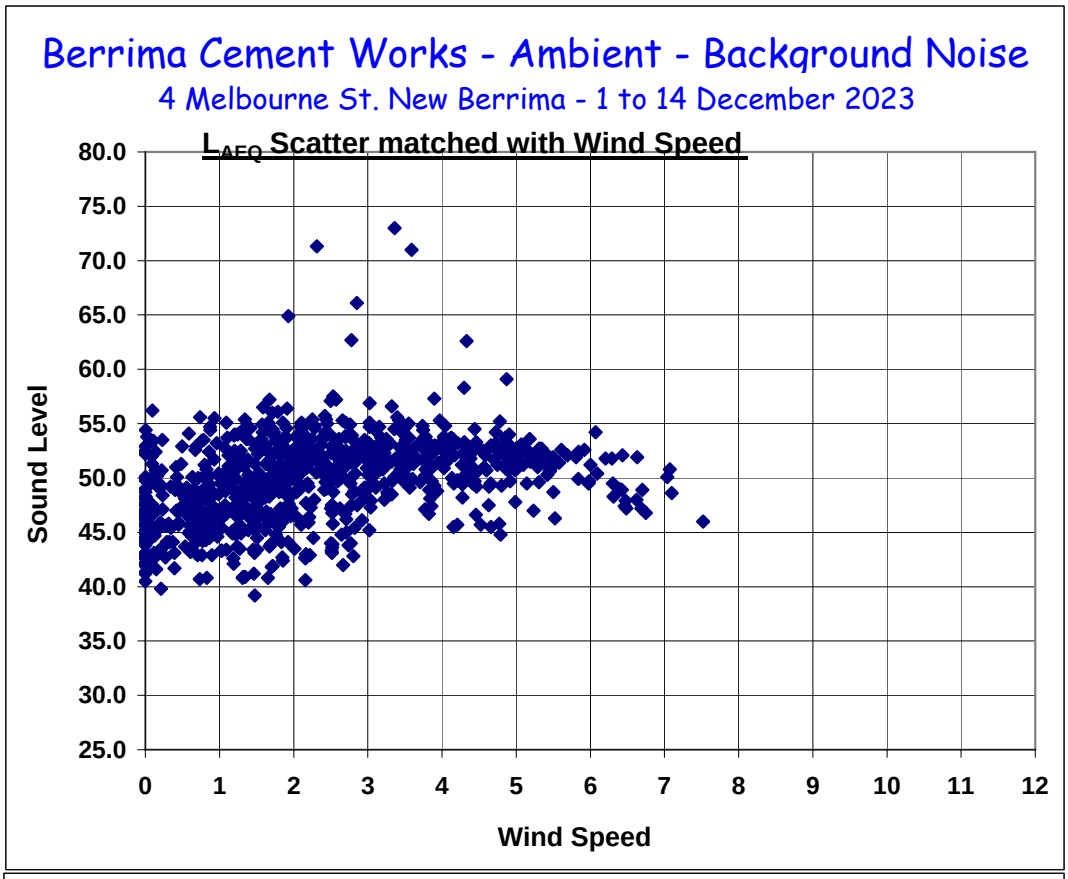
Two Day Results of Ambient Noise Monitoring

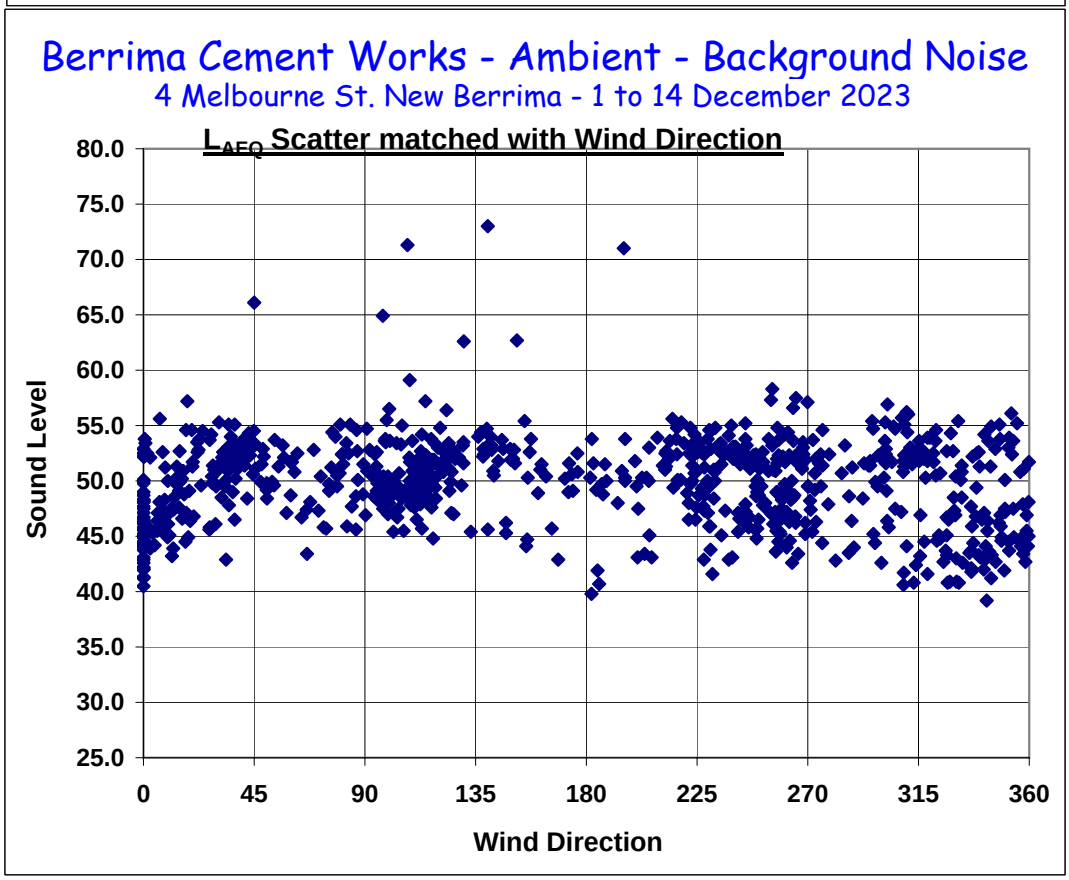


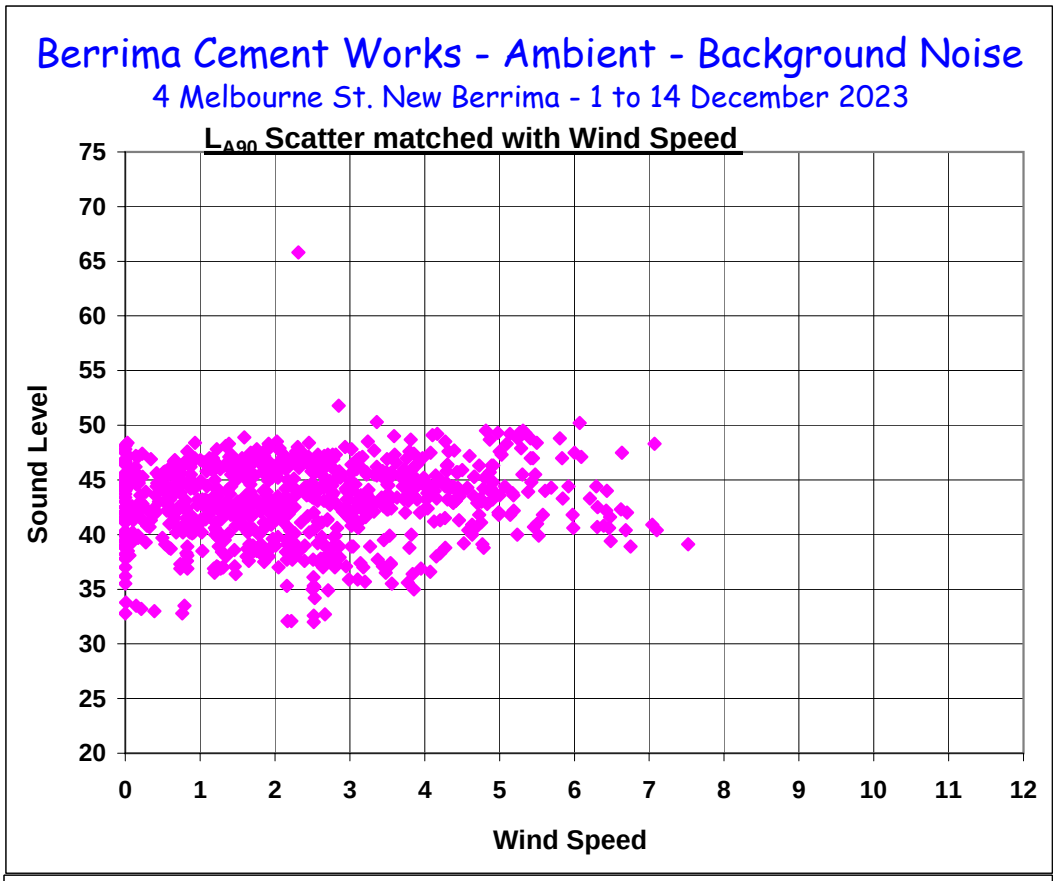


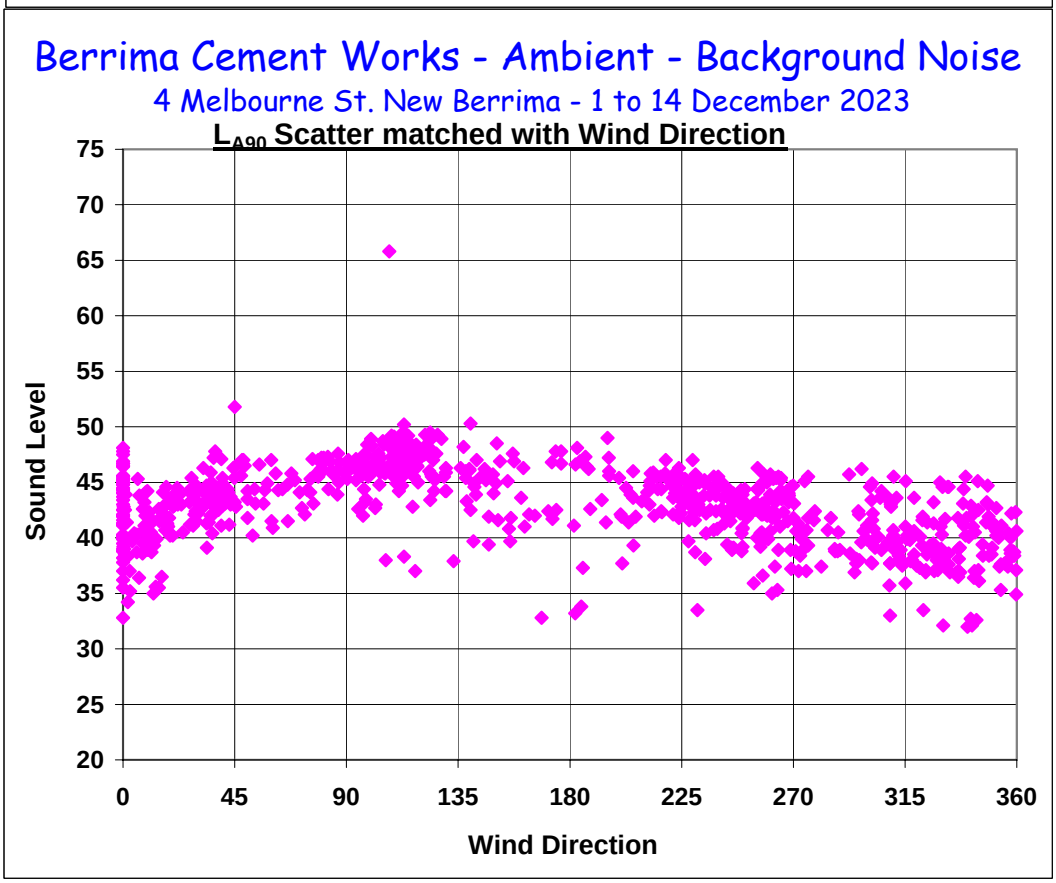

Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
L_{AEQ} Scatter
Sound Level - dB(A)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
LEQ
4 Melbourne St. New Berrima


Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
L_{A90} Scatter
Sound Level - dB(A)
75
70
65
60
55
50
45
40
35
30
25
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
L90
4 Melbourne St. New Berrima


Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
LAFQ Scatter matched with Wind Speed
Sound Level
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed


Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
LAFQ Scatter matched with Wind Direction
Sound Level
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
45
90
135
180
225
270
315
360
Wind Direction


Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
LA90 Scatter matched with Wind Speed
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed


Berrima Cement Works - Ambient - Background Noise
4 Melbourne St. New Berrima - 1 to 14 December 2023
LA90 Scatter matched with Wind Direction
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
45
90
135
180
225
270
315
360
Wind Direction

ABN: 25 153 946 064
ACN: 153 946 064

Appendix C: Unattended environmental sound level results for Northern Boundary

North Fence - Cement Works

Daytime LAEQ **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
7:00		51	51	49	52	53	52	49	47	54	52	56	46	50			56	46	51	2.6
7:15		51	51	53	51	53	52	53	49	53	50	55	48	50			55	48	51	2.1
7:30		51	51	47	51	53	52	46	49	54	50	52	48	51			54	46	50	2.4
7:45		50	51	48	50	53	51	47	49	54	51	52	48	49			54	47	50	2.1
8:00		50	50	54	49	53	49	48	50	54	50	51	47	50			54	47	50	2.0
8:15		50	51	51	49	53	49	47	49	54	49	52	48	50			54	47	50	1.8
8:30		49	51	47	49	53	49	48	49	53	49	53	47	51			53	47	50	2.1
8:45		49	51	47	48	54	49	47	50	53	48	49	49	51			54	47	50	2.2
9:00		49	53	46	49	53	50	48	49	54	49	49	48	52			54	46	50	2.3
9:15		49	51	48	50	53	49	49	49	53	52	51	48	51			53	48	50	1.8
9:30		49	50	46	52	52	49	49	52	54	51	49	48	50			54	46	50	1.9
9:45		50	50	46	50	52	50	46	51	54	50	48	49	51			54	46	50	2.2
10:00		51	52	59	49	53	49	48	50	54	50	50	48	49			59	48	51	2.9
10:15		50	52	47	49	53	49	48	50	54	49	48	47	48			54	47	50	2.1
10:30		50	52	51	50	53	49		47	53	49	48	48	48			53	47	50	2.0
10:45		49	52	48	50	53	50	48	48	51	50	48	48	50			53	48	50	1.6
11:00		50	52	47	50	53	51	47	48	51	49	48	48	49			53	47	50	2.0
11:15		50	52	47	49	53	52	48	49	51	50	51	48	50			53	47	50	1.8
11:30		48	51	48	51	51	51	47	48	50	51	51	49	51			51	47	50	1.6
11:45		55	50	48	50	51	52	47	46	50	51	51	48	51			55	46	50	2.2
12:00		55	51	48	51	51	53	46	47	50	51	50	49	50			55	46	50	2.3
12:15			52	48	52	50	52	47	48	49	50	48	48	54			54	47	50	2.3
12:30			51	48	51	50	53	47	47	49	50	49	49	51			53	47	50	1.7
12:45		52	51	48	50	51	52	47	48	49	51	51	47	53			53	47	50	2.0
13:00		52	52	49	50	51	52	47	50	49	53	52	48	52			53	47	51	1.9
13:15		51	53	50	51	51	53	46	47	49	54	52	49	54			54	46	51	2.5
13:30		51	52	51	49	50	52	47	49	47	52	52	48	54			54	47	50	2.3
13:45		50	53	51	50	52	52	46	48	47	52	53	48				53	46	50	2.2
14:00		52	54	50	49	51	52	45	46	46	53	52	47	53			54	45	50	3.0
14:15		52	56	50	51	51	53	46	47	46	53	52	47	52			56	46	50	3.0
14:30		53	56	49	50	50	53	48	47	46	56	51	48	53			56	46	51	3.1
14:45		53	56	49	50	51	52	48	50	46	53	51	48	54			56	46	51	2.8
15:00		55	57	51	50	50	51	47	51	46	54	52	48	50			57	46	51	3.0
15:15	53	54	57	49	50	52	51	48	60	47	54	51	49				60	47	52	3.6
15:30	53	54	56	49	50	51	49	46	46	45	54	52	48				56	45	50	3.4
15:45	53	53	57	48	49	51	50	46	46	46	54	52	49				57	46	50	3.4
16:00	54	53	57	49	50	51	50	48	45	45	54	51	50				57	45	50	3.5
16:15	54	52	57	50	50	53	52	46	44	46	54	51	49				57	44	51	3.6
16:30	54	51	57	51	51	52	55	46	44	44	54	51	48				57	44	51	4.1
16:45	54	50	56	51	50	52	55	46	44	45	54	53	47				56	44	50	3.9
17:00	55		56	53	50	52	53	45	46	47	54	52	48				56	45	51	3.5
17:15	54	54	56	52	48	52	53	46	52	48	54	52	47				56	46	51	3.0
17:30	52	53	55	51	49	51	53	46	52	48	52	51	55				55	46	51	2.5
17:45	53	55	56	51	48	52	52	47	53	47	53	51	48				56	47	51	2.9
18:00	55	57	56	52	48	54	50	48	54	47	54	52	54				57	47	52	3.4
Max	55	57	57	59	52	54	55	53	60	54	56	56	55	54			60	52	55	2.2
Min	52	48	50	46	48	50	49	45	44	44	48	48	46	48			52	44	48	2.3
Ave	54	51	53	49	50	52	51	47	49	50	52	51	48	51			54	47	51	1.8
SD	0.7	2.1	2.5	2.3	1.0	1.2	1.6	1.3	2.8	3.2	1.9	1.8	1.5	1.7			3.2	0.7	1.8	0.7
E Ave	54	52	54	50	50	52	51	47	50	51	52	51	49	51			54	47	51	1.8

Evening LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
18:00	55	57	56	52	48	54	50	48	54	47	54	52	54				57	47	52	3.4
18:15	54	55	55	50	49	51	50	45	54	48	55	51	50				55	45	51	3.3
18:30	61	56	54	50	46	51	49	45	52	50	55	52	48				61	45	51	4.3
18:45	57	55	53	50	47	52	48	53	53	49	54	51	49				57	47	52	3.2
19:00	54	55	54	50	47	53	49	43	55	49	55	51	48				55	43	51	3.8
19:15	54	56	53	51	47	51	50	47	56	49	54	52	50				56	47	51	2.9
19:30	54	56	53	50	46	51	48	46	56	49	53	51	49				56	46	51	3.3
19:45	54	55	52	50	46	52	46	41	55	50	53	50	47				55	41	50	4.1
20:00	54	56	51	49	47	51	48	41	56	49	53	51	50				56	41	50	4.0
20:15	54	54	51	49	47	51	47	41	56	47	54	50	53				56	41	50	4.2
20:30	54	55	51	49	47	50	47	41	56	47	54	49	50				56	41	50	4.1
20:45	54	55	50	49	48	51	48	43	55	48	54	50	48				55	43	50	3.6
21:00	54	54	51	48	47	50	49	42	57	48	53	50	47				57	42	50	3.9
21:15	54	54	51	48	47	50	49	43	58	46	53	50	48				58	43	50	4.1
21:30	54	54	52	47	46	50	50	45	57	45	53	49	48				57	45	50	4.0
21:45	53	55		48	46	49	49	46	59	45	53	49	50				59	45	50	4.1
22:00	54	55	52	48	48	49	49	46	57	46	53	50	49				57	46	50	3.5
Max	61	57	56	52	49	54	50	53	59	50	55	52	54				61	49	54	3.6
Min	53	54	50	47	46	49	46	41	52	45	53	49	47				54	41	49	3.9
Ave	55	55	52	49	47	51	48	44	56	48	54	50	49				56	44	51	3.5
SD	1.9	0.8	1.7	1.3	0.8	1.3	1.2	3.2	1.6	1.7	0.8	1.0	2.0				3.2	0.8	1.5	0.7
E Avg	55	55	53	49	47	51	49	46	56	48	54	51	50				56	46	51	3.3

Night LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
22:00	54	55	52	48	48	49	49	46	57	46	53	50	49				57	46	50	3.5
22:15	54	55	51	49	48	49	51	48	58	45	53	49	48				58	45	51	3.4
22:30	54	54	50	49	48	50	49	50	57	44	52	49	47				57	44	50	3.4
22:45	54	53	51	48	46	50	46	50	58	46	53	49	49				58	46	50	3.5
23:00	54	50	51	49	45	49	44	51	57	45	53	49	48				57	44	50	3.6
23:15	54	50	52	48	45	48	46	50	57	45	53	47	46				57	45	49	3.7
23:30	54	52	52	48	45	49	49	51	56	46	53	48	48				56	45	50	3.4
23:45	55	51	52	49	45	49	47	51	56	46	54	48	47				56	45	50	3.5
0:00	54	54	51	49	46	48	49	50	57	45	55	48	46				57	45	50	3.7
0:15	54	54	51	49	46	49	49	50	57	45	54	47	47				57	45	50	3.7
0:30	54	55	50	49	47	49	48	51	55	45	54	47	47				55	45	50	3.4
0:45	54	53	51	50	48	49	45	52	55	46	54	48	49				55	45	50	3.2
1:00	54	54	52	49	48	49	45	51	55	46	54	48	49				55	45	50	3.2
1:15	54	54	50	50	49	50	45	51	55	46	54	48	49				55	45	50	3.2
1:30	54	52	48	51	48	50	46	53	56	47	54	48	48				56	46	50	3.1
1:45	53	51	49	51	49	51	47	52	55	48	54	48	48				55	47	50	2.5
2:00	53	50	51	51	51	51	48	53	55	48	53	48	47				55	47	51	2.5
2:15	54	50	51	52	55	52		53	55	49	53	48	47				55	47	52	2.6
2:30	53	51	51	52	55	51	52	54	54	49	53	48	48				55	48	52	2.4
2:45	53	51	51	52	55	51	53	52	54	51	54	48	48				55	48	52	2.1
3:00	52	52	51	52	55	51	50	52	54	52	54	47	50				55	47	51	2.0
3:15	53	53	51	51	55	52	47	49	54	51	54	48	53				55	47	51	2.5
3:30	53	53	51	52	55	52	50	49	54	51	54	48	53				55	48	52	2.0
3:45	53	53		52	55	52	49	48	54	51	53	49	52				55	48	52	2.2
4:00	55	53	53	53	56	53	52	50	54	54	55	50					56	50	53	1.8
4:15	59	53	52	55	55	54	57	51	55	52	54	50	54				59	50	54	2.4
4:30	53	51	49	53	55	52	50	49	54	52	55	50	53				55	49	52	2.2
4:45	54	50	49	54	56	52	49	48	54	51	54	50	51				56	48	52	2.4
5:00	60	52	50	55	55	52	50	48	53	50	54	49	51				60	48	52	3.1
5:15	54	51	50	54	55	53	49	48	53	51	54	49	51				55	48	52	2.3
5:30	54	50	49	52	55	51	49	48	53	50	53	50	52				55	48	51	2.2
5:45	53	50	51	52	55	52	51	49	54	51	52	51	51				55	49	52	1.7
6:00	52	51	51	52	55	52	51	47	54	51	52	50	52				55	47	51	1.8
6:15	51	51	51	51	54	52	50	48	54	51	52	49	52				54	48	51	1.7
6:30	51	52	50	52	54	51	48	47	54	51	53	49	52				54	47	51	2.1
6:45	51	51	50	52	55	51	48	47	54	52	53	47	51				55	47	51	2.4
7:00	51	51	49	52	53	52	49	47	54	52	56	46	50				56	46	51	2.6
Max	60	55	53	55	56	54	57	54	58	54	56	51	54				58	51	55	1.8
Min	51	50	48	48	45	48	44	46	53	44	52	46	46				53	44	48	2.9
Ave	54	52	51	51	51	51	49	50	55	49	53	48	49				55	48	51	2.0
SD	1.7	1.5	1.0	2.0	4.0	1.5	2.6	2.1	1.4	2.8	0.7	1.1	2.2				4.0	0.7	1.9	0.9
E Avg	54	52	51	51	53	51	50	50	55	49	54	49	50				55	49	51	1.9
24hr	54	53	53	50	50	52	51	48	53	52	52	52	49	51			53	48	51	1.6

North Fence - Cement Works

Daytime LA90 **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
7:00		49	49	46	50	51	50	44	45	52	49	51	43	49			52	43	48	3.0
7:15		49	49	44	49	52	50	43	47	51	49	50	43	48			52	43	48	2.8
7:30		48	49	43	47	51	50	43	47	52	49	50	45	48			52	43	48	2.7
7:45		48	49	44	47	51	48	44	47	52	49	49	44	47			52	44	48	2.6
8:00		47	48	44	47	51	48	45	47	51	49	47	44	48			51	44	47	2.3
8:15		47	49	44	46	51	47	45	47	52	48	47	44	48			52	44	47	2.3
8:30		47	49	44	46	51	46	44	46	52	47	48	44	48			52	44	47	2.4
8:45		47	49	44	46	52	46	44	47	51	47	46	44	49			52	44	47	2.6
9:00		47	49	43	46	51	47	44	47	52	47	47	45	50			52	43	47	2.6
9:15		46	48	44	47	51	47	44	46	51	49	48	45	49			51	44	47	2.3
9:30		47	48	44	49	50	47	44	48	52	48	46	45	48			52	44	47	2.2
9:45		48	48	44	47	50	48	43	46	52	48	46	46	48			52	43	47	2.3
10:00		47	50	45	46	50	47	43	47	52	48	47	45	46			52	43	47	2.4
10:15		47	49	45	47	51	46	44	47	52	48	46	44	46			52	44	47	2.4
10:30		48	50	46	47	51	46		45	51	47	45	45	45			51	45	47	2.3
10:45		47	49	45	47	51	47	43	45	49	48	45	46	46			51	43	47	2.2
11:00		48	50	44	47	51	48	43	45	49	47	45	46	46			51	43	47	2.2
11:15		47	48	44	46	50	49	44	46	49	48	48	45	47			50	44	47	2.0
11:30		44	49	45	48	49	49	43	44	49	49	49	46	48			49	43	47	2.2
11:45		46	48	45	48	48	50	44	44	49	49	49	45	48			50	44	47	2.1
12:00		52	49	46	49	48	51	42	44	47	49	48	46	47			52	42	48	2.7
12:15			49	46	49	46	51	42	45	47	48	46	45	48			51	42	47	2.4
12:30			47	45	48	47	51	43	45	48	49	46	45	48			51	43	47	2.0
12:45		50	49	45	48	48	50	43	45	47	50	49	44	49			50	43	47	2.4
13:00		50	48	46	48	48	50	42	47	47	51	50	45	49			51	42	48	2.5
13:15		50	50	48	48	49	50	42	44	47	51	50	46	51			51	42	48	2.7
13:30		50	49	49	47	47	49	44	46	44	50	50	45	51			51	44	48	2.5
13:45		48	50	49	47	48	49	43	45	44	50	51	45				51	43	47	2.6
14:00		49	52	48	47	48	50	42	44	44	51	50	44	50			52	42	48	3.0
14:15		50	53	47	47	49	51	43	44	44	51	50	45	50			53	43	48	3.3
14:30		51	54	47	47	47	50	44	44	44	52	49	45	49			54	44	48	3.1
14:45		51	54	46	47	48	49	44	44	43	51	49	45	50			54	43	48	3.4
15:00		52	55	48	47	47	49	44	44	43	51	50	46	48			55	43	48	3.5
15:15	50	52	55	45	47	49	50	45	44	43	52	49	46				55	43	48	3.5
15:30	50	52	54	45	47	49	47	42	43	43	52	50	46				54	42	48	3.8
15:45	51	51	55	46	47	48	48	43	43	44	52	50	47				55	43	48	3.6
16:00	52	50	55	47	47	49	48	43	43	42	52	49	47				55	42	48	3.8
16:15	52	49	55	48	49	50	49	42	43	42	52	49	47				55	42	48	4.0
16:30	52	47	55	48	48	49	53	42	42	42	52	49	45				55	42	48	4.4
16:45	52	47	54	49	48	49	53	42	43	43	52	51	45				54	42	48	4.2
17:00	52		54	49	47	49	51	42	44	45	52	50	45				54	42	48	3.5
17:15	52	51	54	49	46	49	51	43	48	46	52	49	45				54	43	49	3.2
17:30	50	52	53	49	47	49	50	43	49	46	51	49	45				53	43	48	2.9
17:45	51	53	54	48	46	49	48	43	50	46	52	49	45				54	43	48	3.3
18:00	52	54	54	49	45	49	48	43	52	45	52	50	46				54	43	49	3.6
Max	52	54	55	49	50	52	53	45	52	52	52	51	47	51			55	45	51	2.6
Min	50	44	47	43	45	46	46	42	42	42	47	45	43	45			50	42	45	2.4
Ave	51	49	51	46	47	49	49	43	46	47	50	48	45	48			51	43	48	2.3
SD	0.9	2.3	2.6	1.9	1.0	1.4	1.7	0.8	2.0	3.5	1.7	1.7	0.9	1.4			3.5	0.8	1.7	0.8
90%	50	47	48	44	46	47	47	42	43	43	47	46	44	46			50	42	46	2.3
																		Median	46	

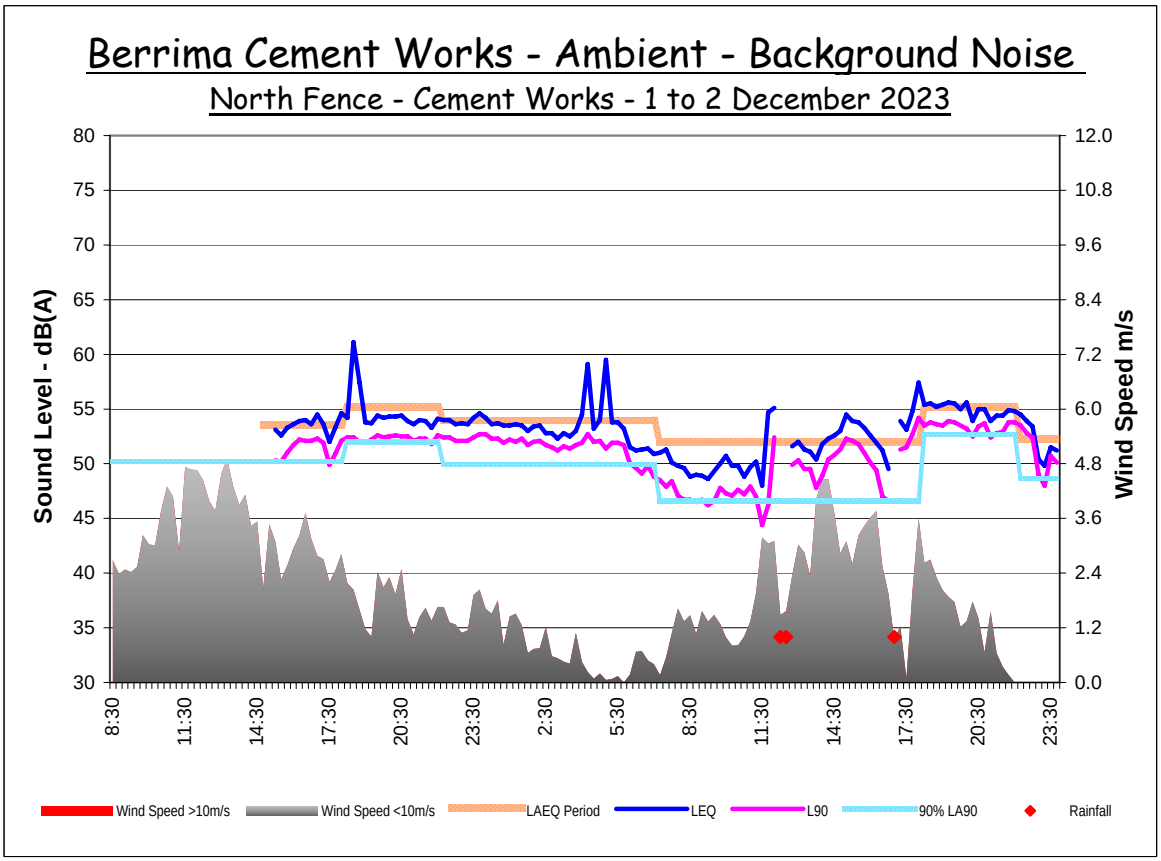
Evening LA90

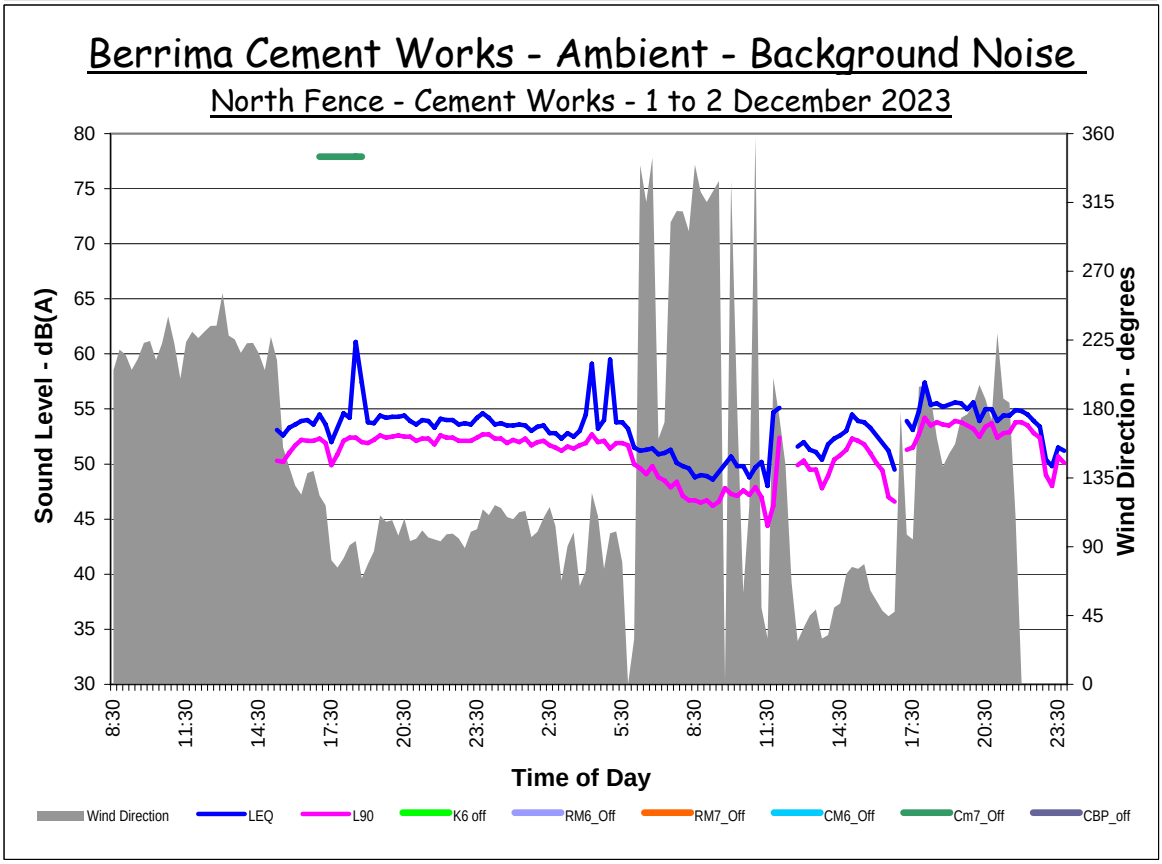
Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
18:00	52	54	54	49	45	49	48	43	52	45	52	50	46				54	43	49	3.6
18:15	52	54	52	49	46	49	48	40	52	46	52	49	45				54	40	48	3.9
18:30	52	54	52	48	45	49	47	40	50	47	53	50	45				54	40	48	3.9
18:45	52	54	51	47	45	50	47	40	51	47	53	49	46				54	40	48	3.8
19:00	52	54	52	48	45	49	46	40	52	47	53	49	46				54	40	49	3.9
19:15	52	54	51	49	45	49	47	42	53	48	53	50	46				54	42	49	3.5
19:30	53	54	51	48	45	49	46	39	53	48	52	49	47				54	39	48	4.0
19:45	52	54	50	48	45	50	44	39	53	48	51	48	45				54	39	48	4.2
20:00	53	53	50	46	46	50	45	39	54	47	52	48	45				54	39	48	4.2
20:15	53	53	49	46	46	50	45	39	53	45	52	48	49				53	39	48	4.0
20:30	53	53	49	47	46	48	45	39	54	46	52	47	47				54	39	48	4.0
20:45	53	54	49	47	46	49	45	40	53	46	52	48	46				54	40	48	3.8
21:00	52	52	50	45	45	49	47	40	54	46	51	49	45				54	40	48	3.9
21:15	52	53	50	45	45	48	47	41	55	44	52	48	46				55	41	48	4.2
21:30	52	53	50	45	45	48	47	41	55	43	51	48	46				55	41	48	4.1
21:45	52	54		46	45	47	47	43	56	42	51	48	48				56	42	48	4.2
22:00	53	54	51	46	46	47	47	43	55	44	51	48	47				55	43	48	3.8
Max	53	54	54	49	46	50	48	43	56	48	53	50	49				56	43	50	3.5
Min	52	52	49	45	45	47	44	39	50	42	51	47	45				52	39	47	4.0
Ave	52	53	51	47	45	49	46	40	53	46	52	49	46				53	40	48	3.8
SD	0.3	0.5	1.3	1.2	0.5	0.9	1.1	1.5	1.6	1.8	0.6	1.0	1.2				1.8	0.3	1.0	0.5
90%	52	53	49	45	45	48	45	39	51	43	51	48	45				53	39	47	4.0
																		Median	48	

Night LA90

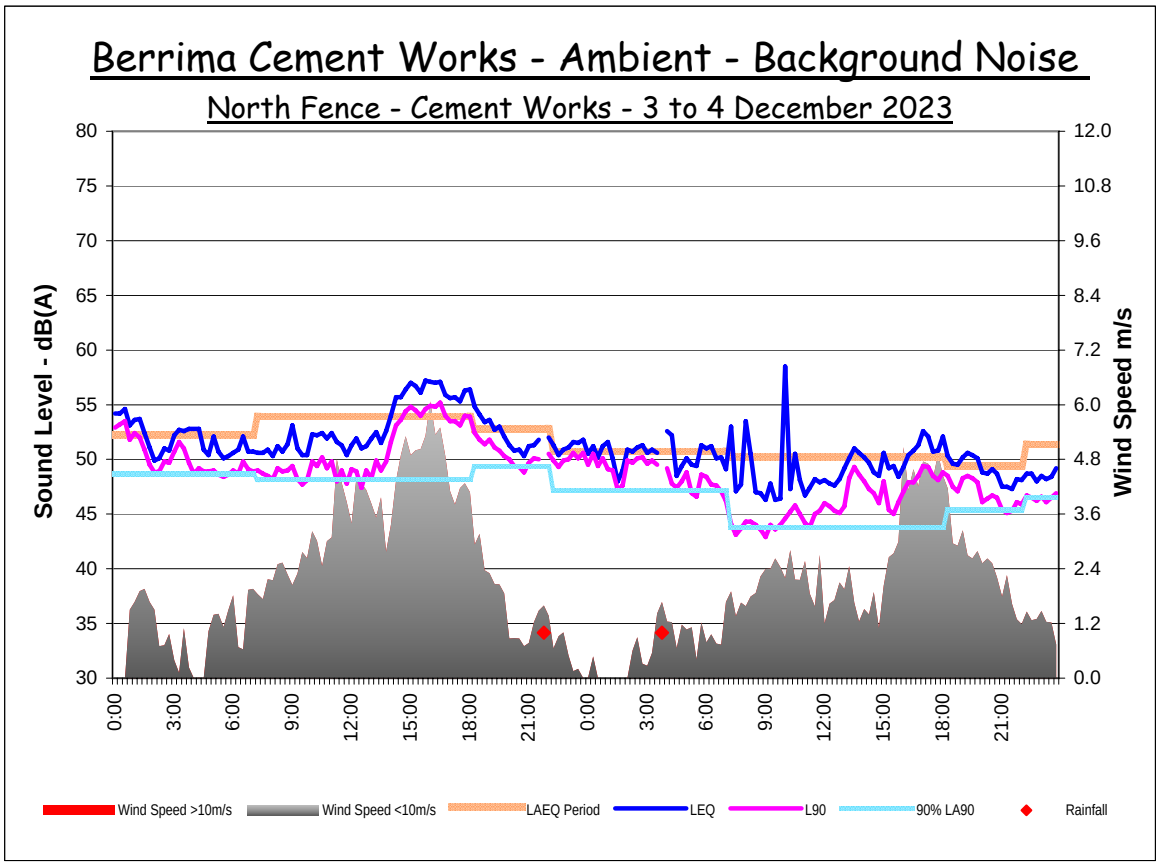
Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
22:00	53	54	51	46	46	47	47	43	55	44	51	48	47				55	43	48	3.8
22:15	52	54	50	47	46	47	49	47	56	43	51	47	45				56	43	48	3.6
22:30	52	53	49	47	46	49	43	48	55	43	51	47	45				55	43	48	3.6
22:45	52	52	50	46	44	48	43	49	55	44	51	47	47				55	43	48	3.5
23:00	52	49	50	47	44	47	38	49	54	44	52	46	45				54	38	47	4.1
23:15	52	48	51	46	44	47	42	49	55	44	52	45	43				55	42	47	3.9
23:30	52	51	50	47	44	47	46	49	54	44	52	46	45				54	44	48	3.3
23:45	53	50	51	47	44	47	45	49	54	43	52	46	45				54	43	48	3.5
0:00	53	53	50	48	45	47	47	48	54	43	53	46	44				54	43	48	3.7
0:15	52	53	51	47	45	46	47	48	55	44	53	45	45				55	44	48	3.8
0:30	52	54	49	47	45	47	46	49	53	44	53	45	44				54	44	48	3.6
0:45	52	52	50	48	47	47	43	50	53	45	53	45	46				53	43	48	3.4
1:00	52	52	49	48	46	47	42	49	53	45	53	46	47				53	42	48	3.5
1:15	52	52	49	49	47	48	42	50	53	45	53	46	48				53	42	48	3.4
1:30	52	51	47	49	47	48	42	52	54	46	52	46	46				54	42	48	3.4
1:45	52	50	48	50	48	49	45	49	53	46	52	46	47				53	45	48	2.5
2:00	52	49	50	49	49	50	45	52	53	47	52	46	46				53	45	49	2.6
2:15	52	49	50	50	53	50		52	53	48	52	46	46				53	46	50	2.6
2:30	52	50	50	51	53	50	51	54	52	48	52	45	46				54	45	50	2.7
2:45	52	50	50	50	54	50	51	51	53	50	52	46	46				54	46	50	2.3
3:00	51	51	50	51	53	50	44	50	52	50	53	45	47				53	44	50	2.8
3:15	52	52	50	49	53	51	44	46	52	50	53	45	50				53	44	50	2.9
3:30	51	51	50	51	53	51	47	47	52	50	52	46	49				53	46	50	2.3
3:45	52	50		50	53	51	46	47	52	50	52	46	49				53	46	50	2.4
4:00	52	49	49	50	53	51	49	47	52	51	53	46					53	46	50	2.2
4:15	53	49	48	52	54	50	49	47	52	50	53	47	51				54	47	50	2.2
4:30	52	49	47	52	54	50	47	47	52	50	53	47	50				54	47	50	2.5
4:45	52	49	48	52	54	50	45	46	52	50	52	47	49				54	45	49	2.8
5:00	51	49	49	53	54	49	46	46	52	49	52	47	49				54	46	50	2.6
5:15	52	49	47	52	54	51	46	46	51	49	53	47	49				54	46	50	2.6
5:30	52	48	47	50	54	49	46	46	52	49	52	47	50				54	46	49	2.5
5:45	52	49	49	49	53	50	47	46	52	49	51	47	50				53	46	49	2.1
6:00	50	49	48	49	53	50	48	45	52	49	51	47	50				53	45	49	2.2
6:15	50	49	48	49	52	49	47	45	52	49	51	46	50				52	45	49	2.2
6:30	49	50	48	50	53	49	45	44	52	49	51	46	50				53	44	49	2.6
6:45	50	49	47	50	53	49	45	45	53	49	51	43	50				53	43	49	2.9
7:00	49	49	46	50	51	50	44	45	52	49	51	43	49				52	43	48	3.1
Max	53	54	51	53	54	51	51	54	56	51	53	48	51				56	48	52	2.0
Min	49	48	46	46	44	46	38	43	51	43	51	43	43				51	38	45	3.7
Ave	52	50	49	49	50	49	45	48	53	47	52	46	47				53	45	49	2.3
SD	1.0	1.8	1.3	1.9	3.9	1.6	2.6	2.4	1.1	2.7	0.7	1.1	2.2				3.9	0.7	1.9	0.9
90%	50	49	47	47	44	47	42	45	52	43	51	45	45				52	42	47	2.9
																		Median	47	

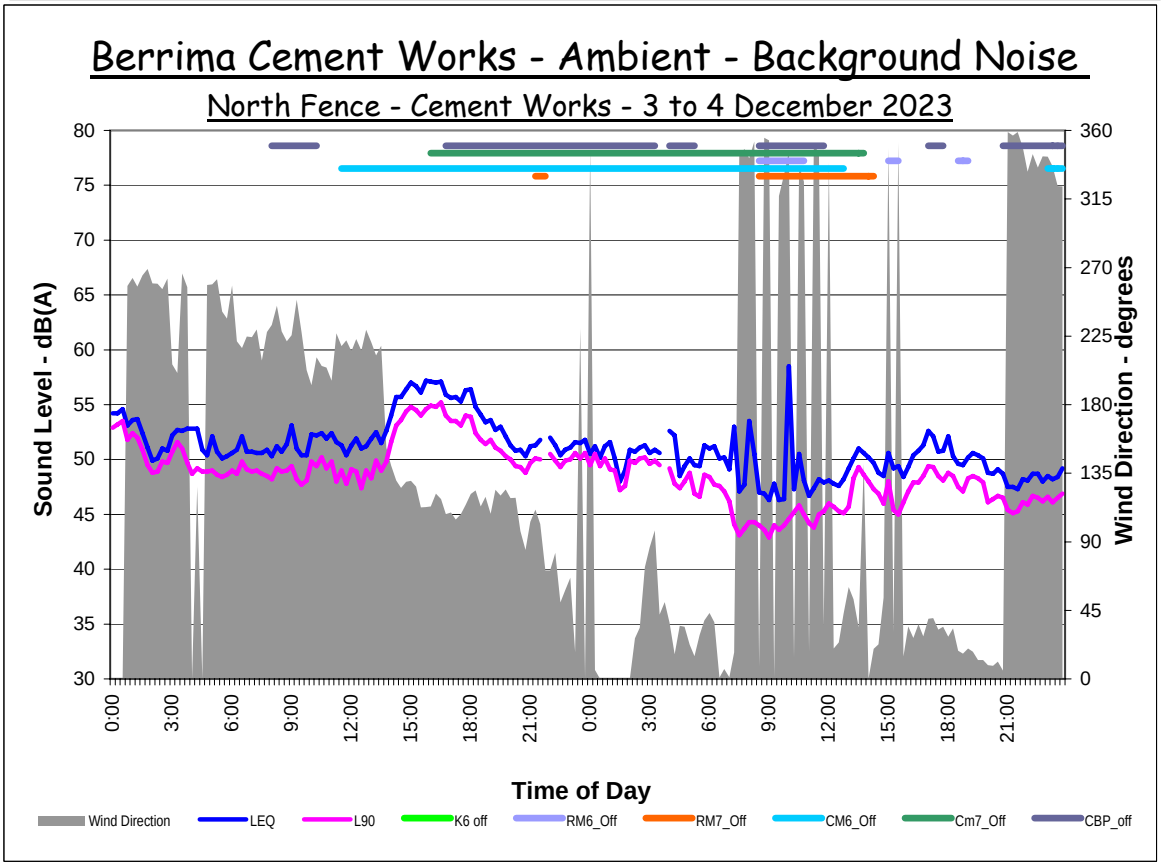
Two Day Results of Ambient Noise Monitoring



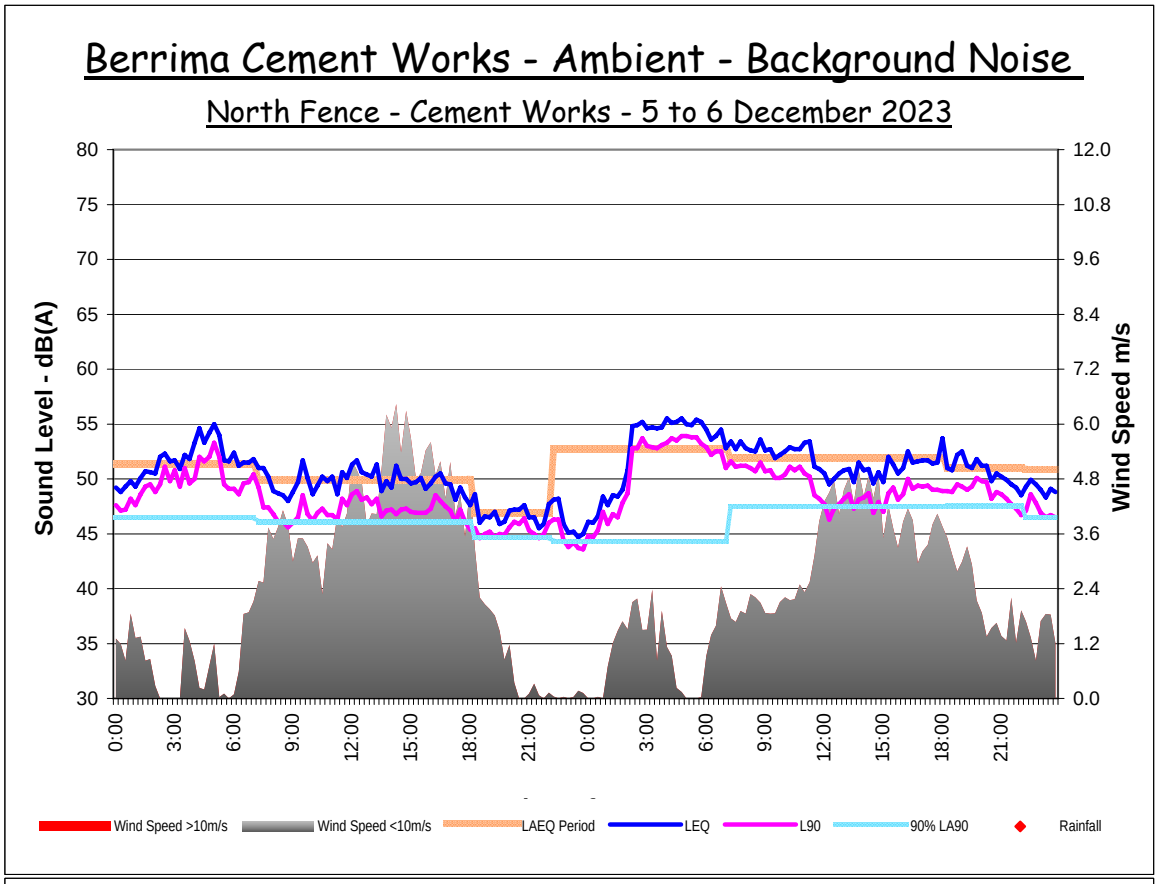


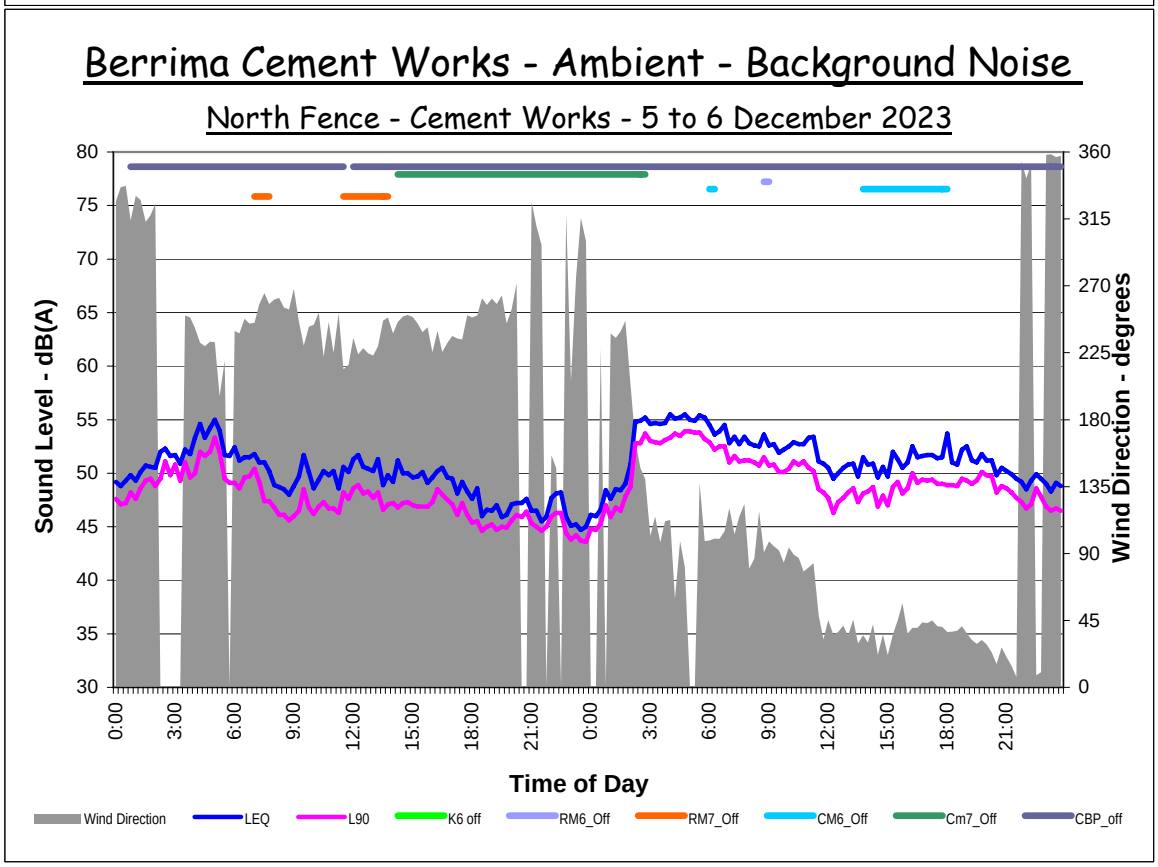
Two Day Results of Ambient Noise Monitoring



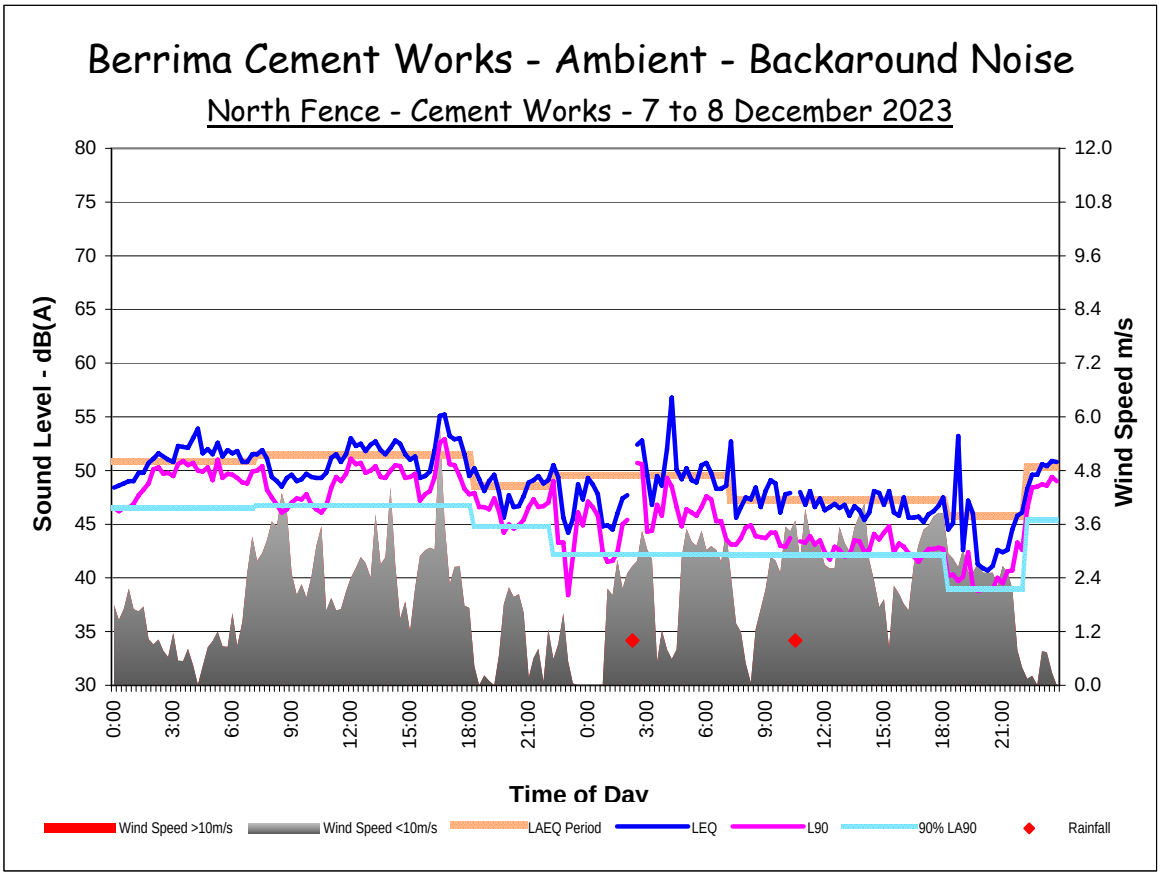


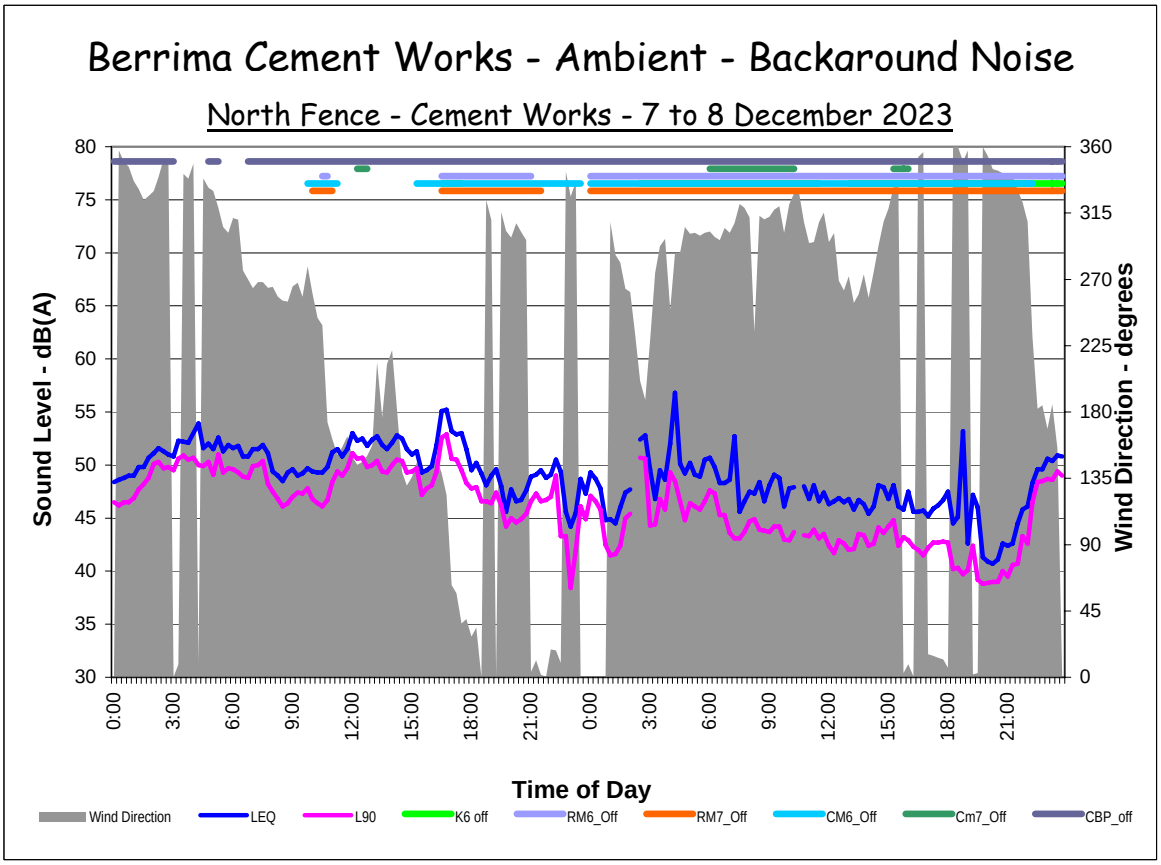
Two Day Results of Ambient Noise Monitoring



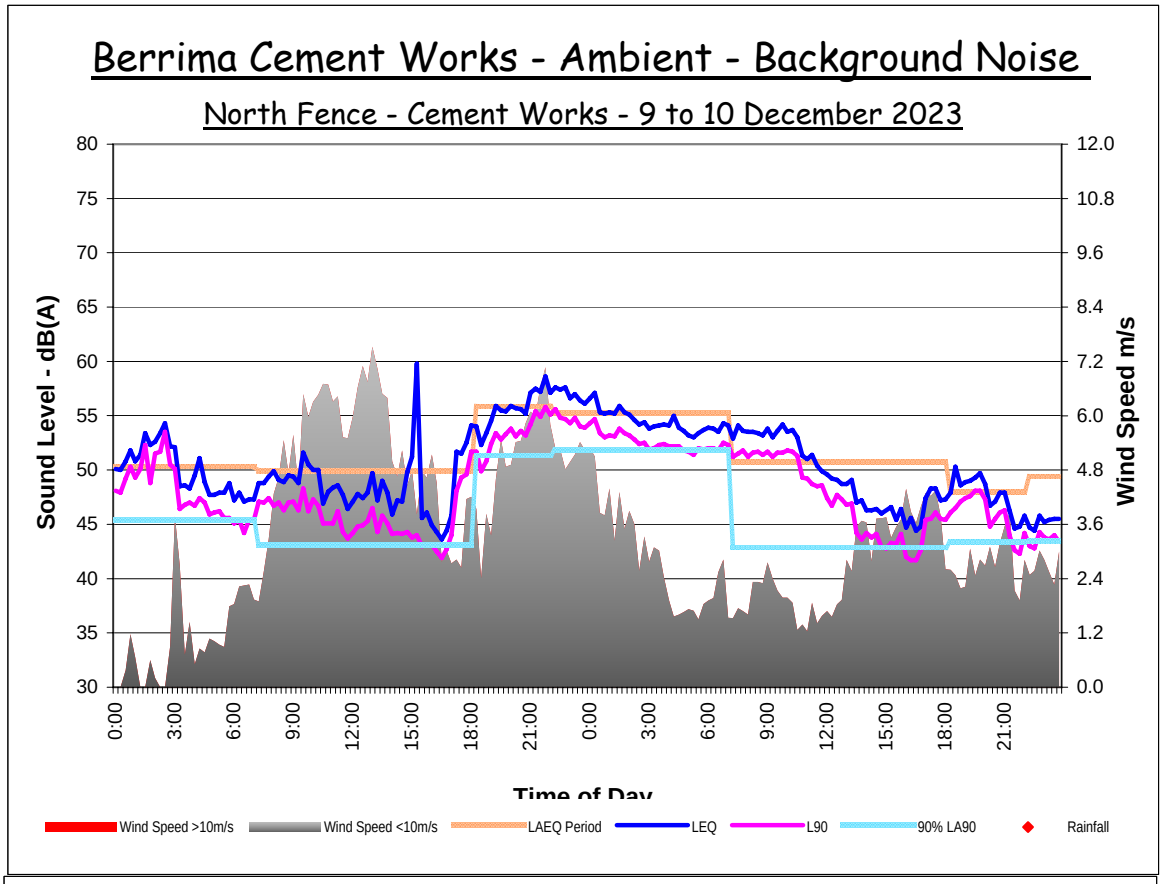


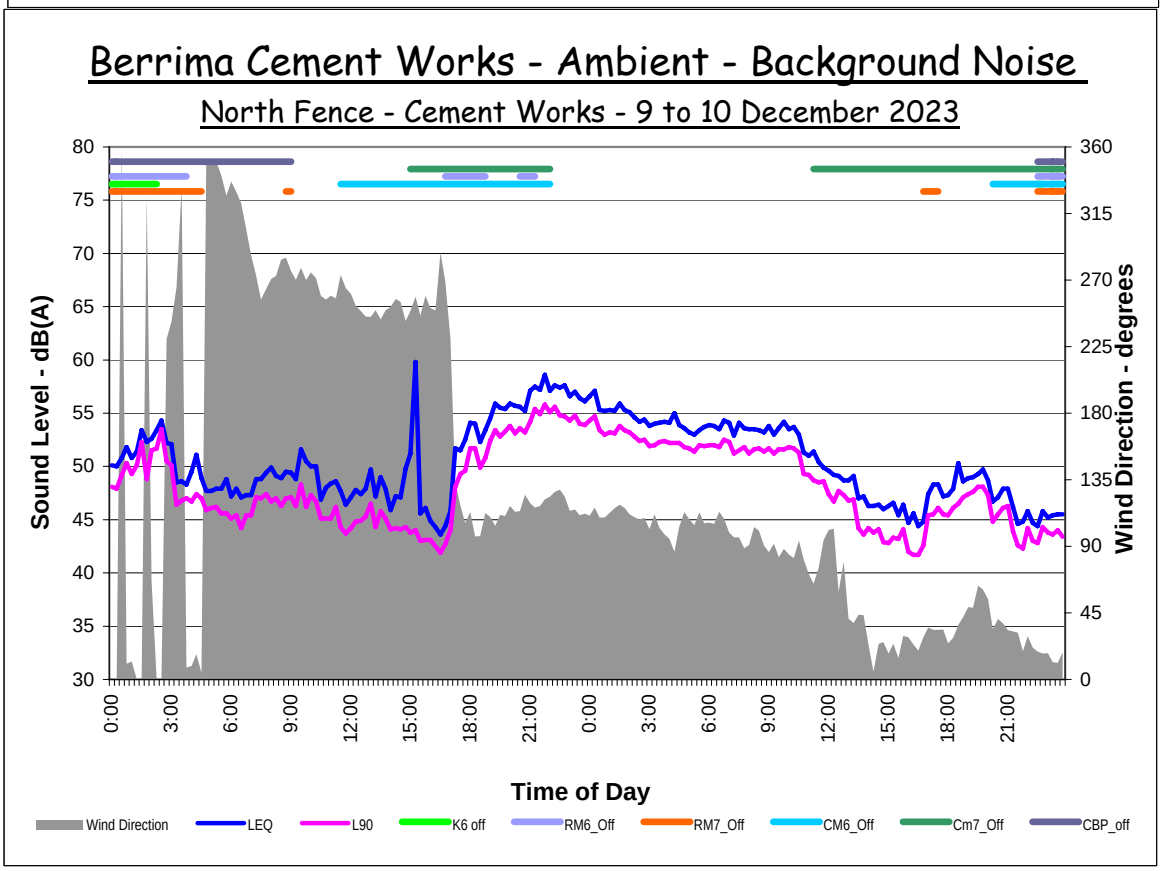
Two Day Results of Ambient Noise Monitoring



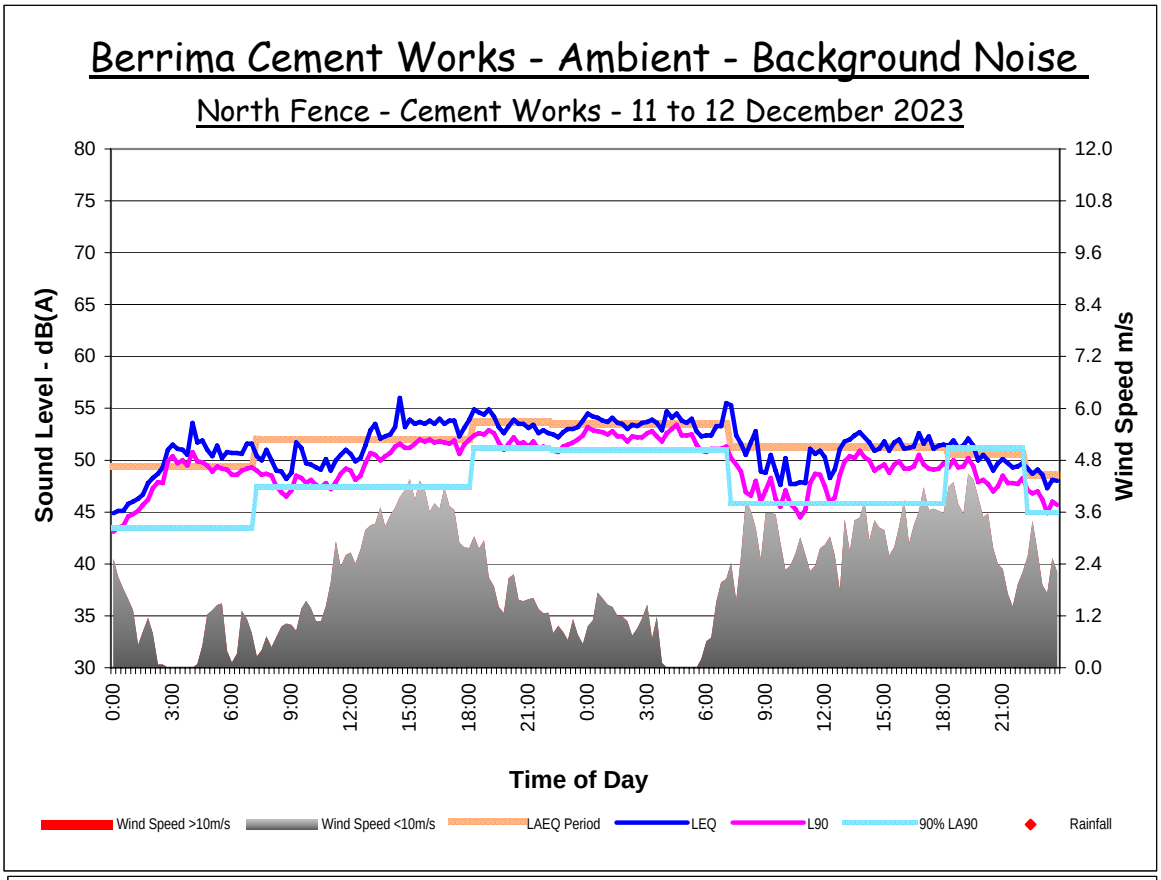


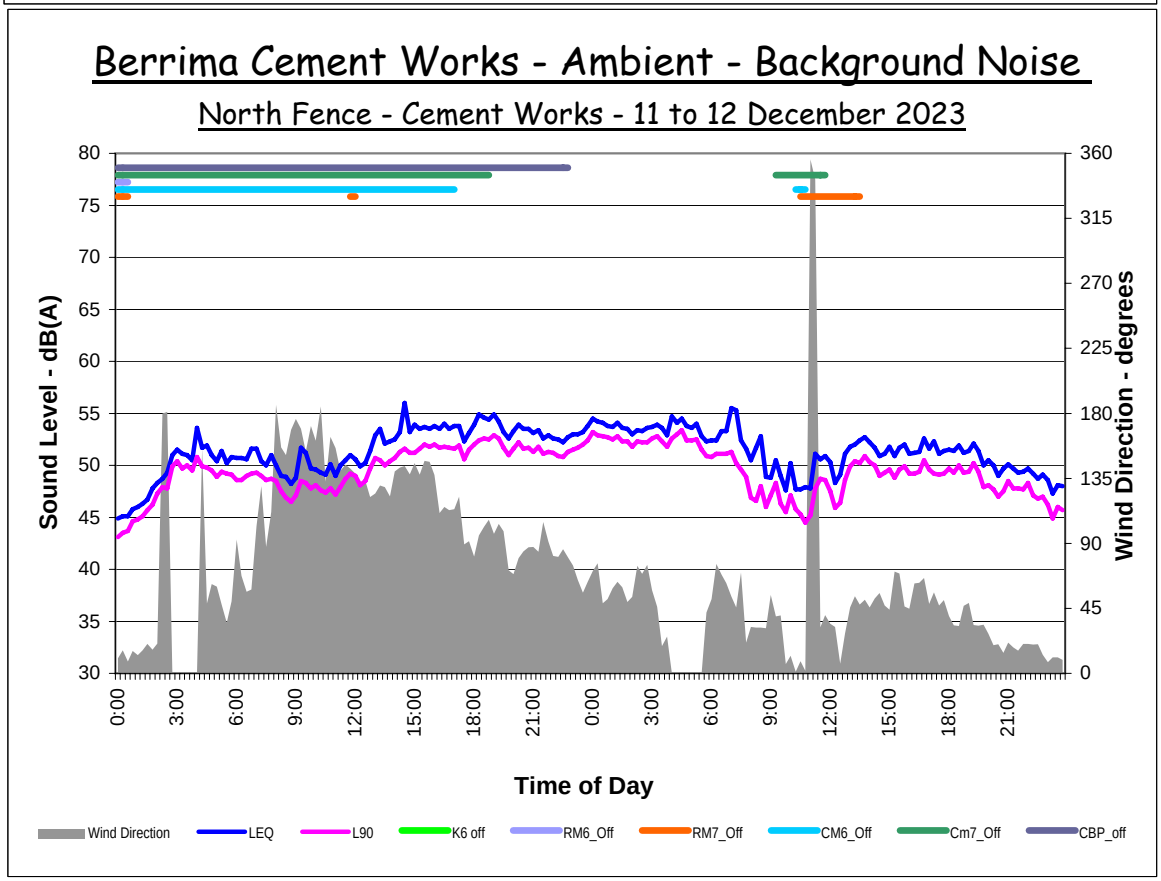
Two Day Results of Ambient Noise Monitoring

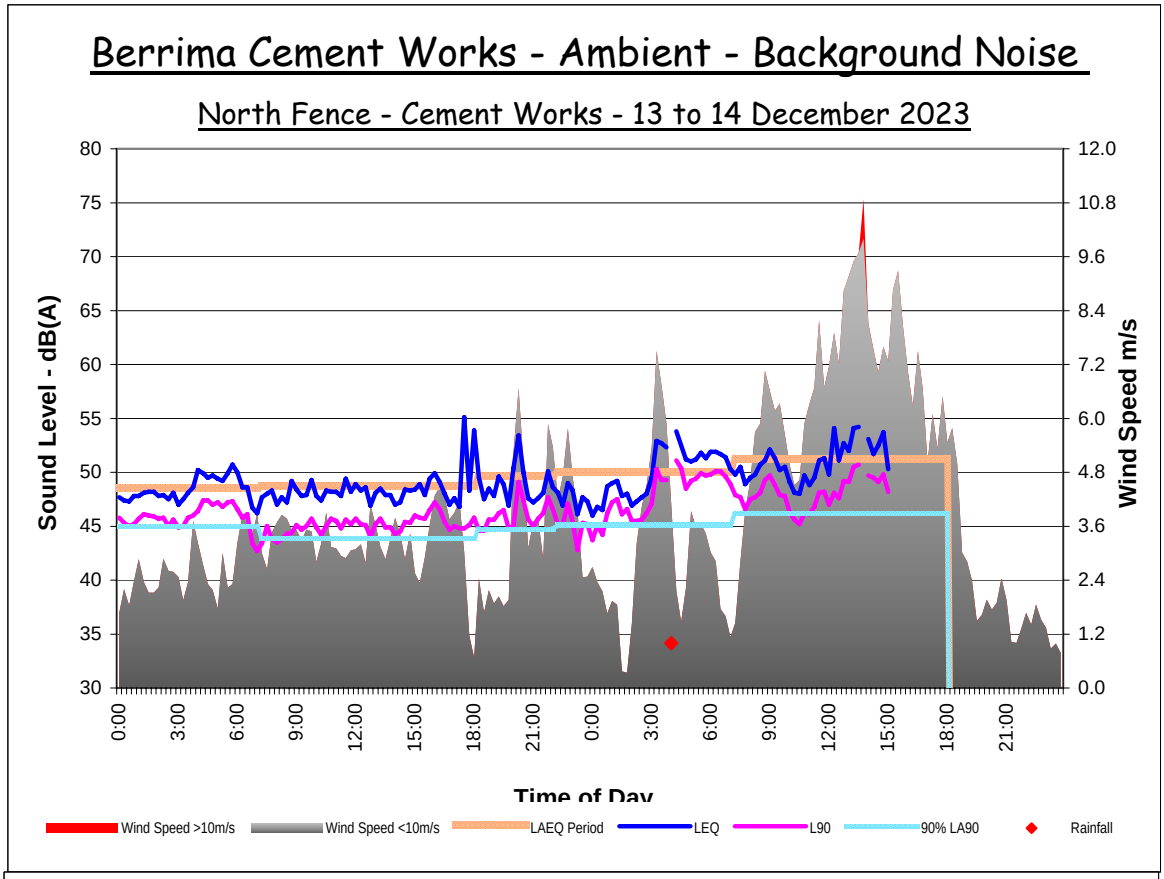


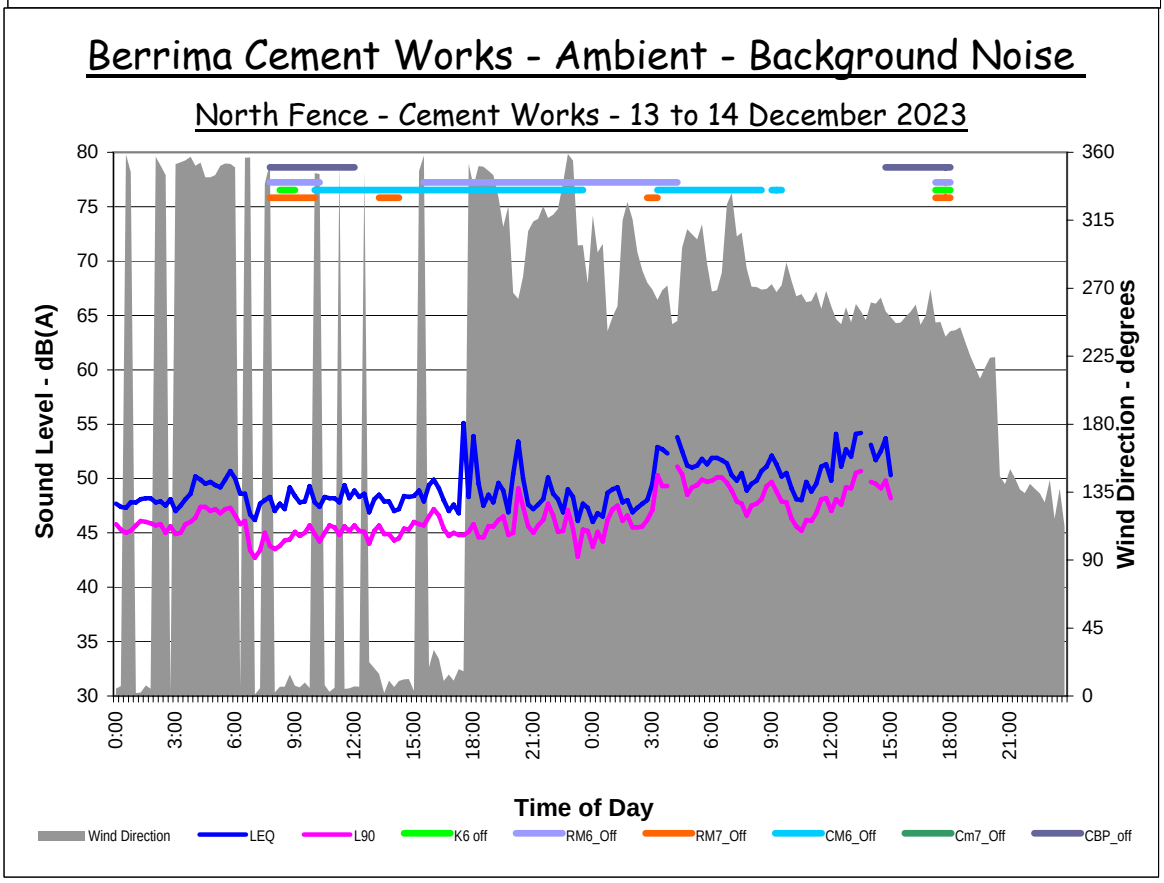


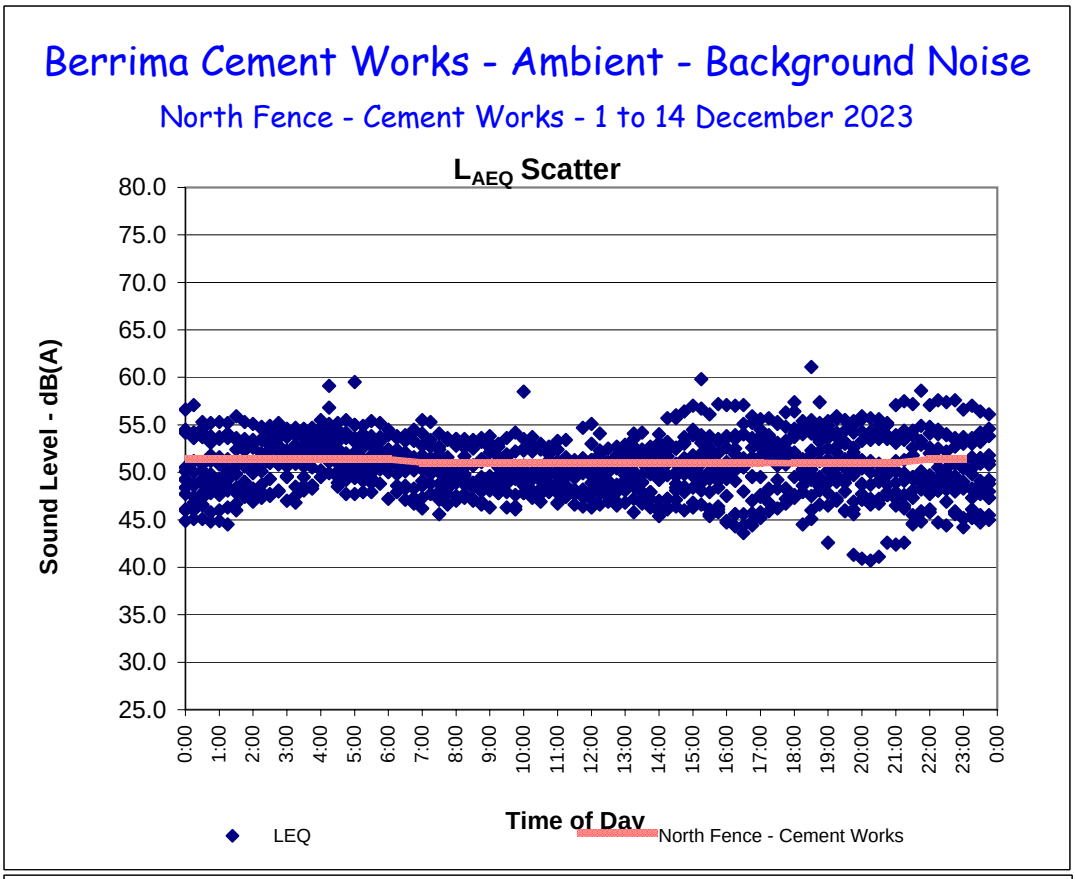
Two Day Results of Ambient Noise Monitoring

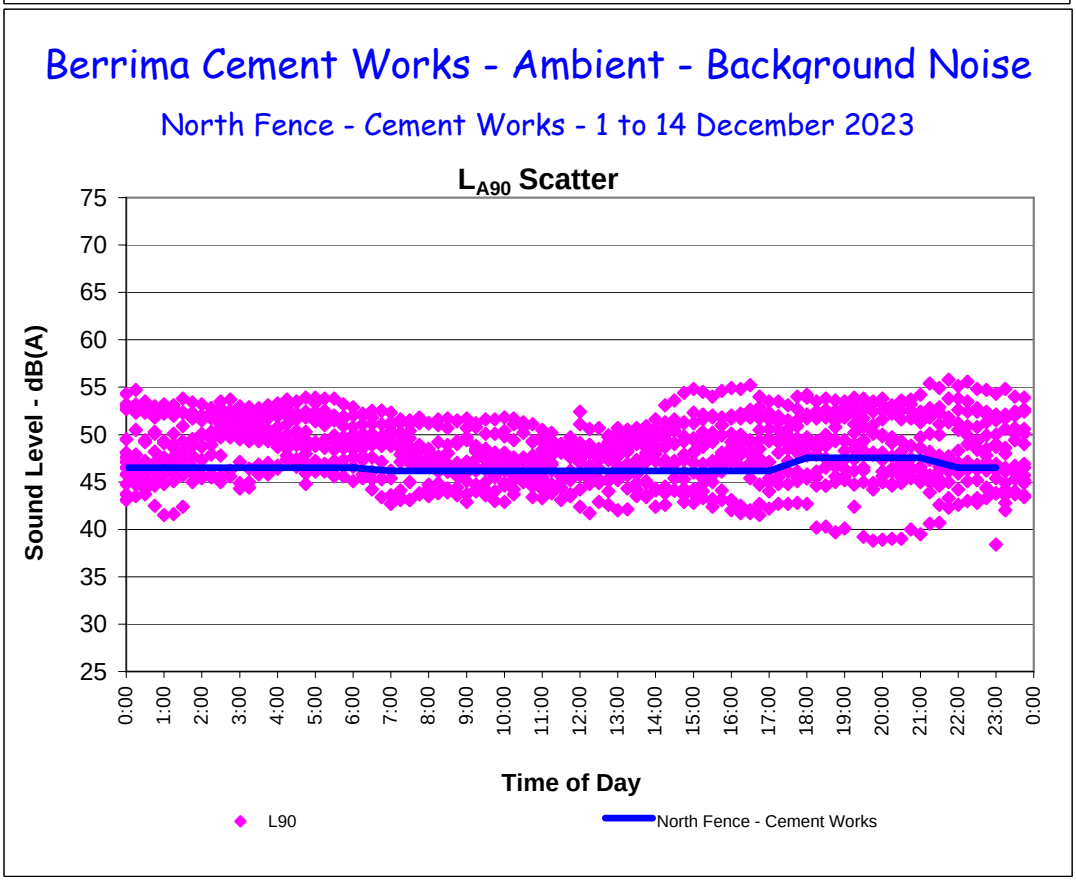


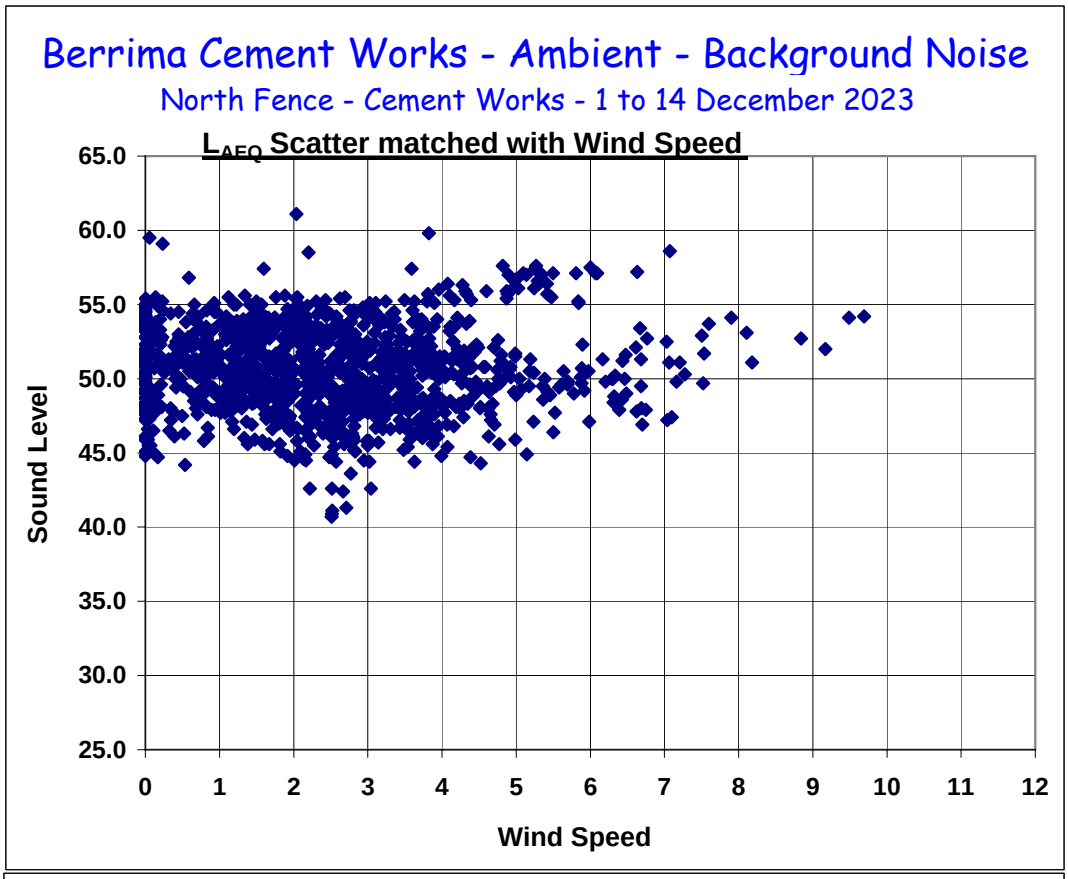


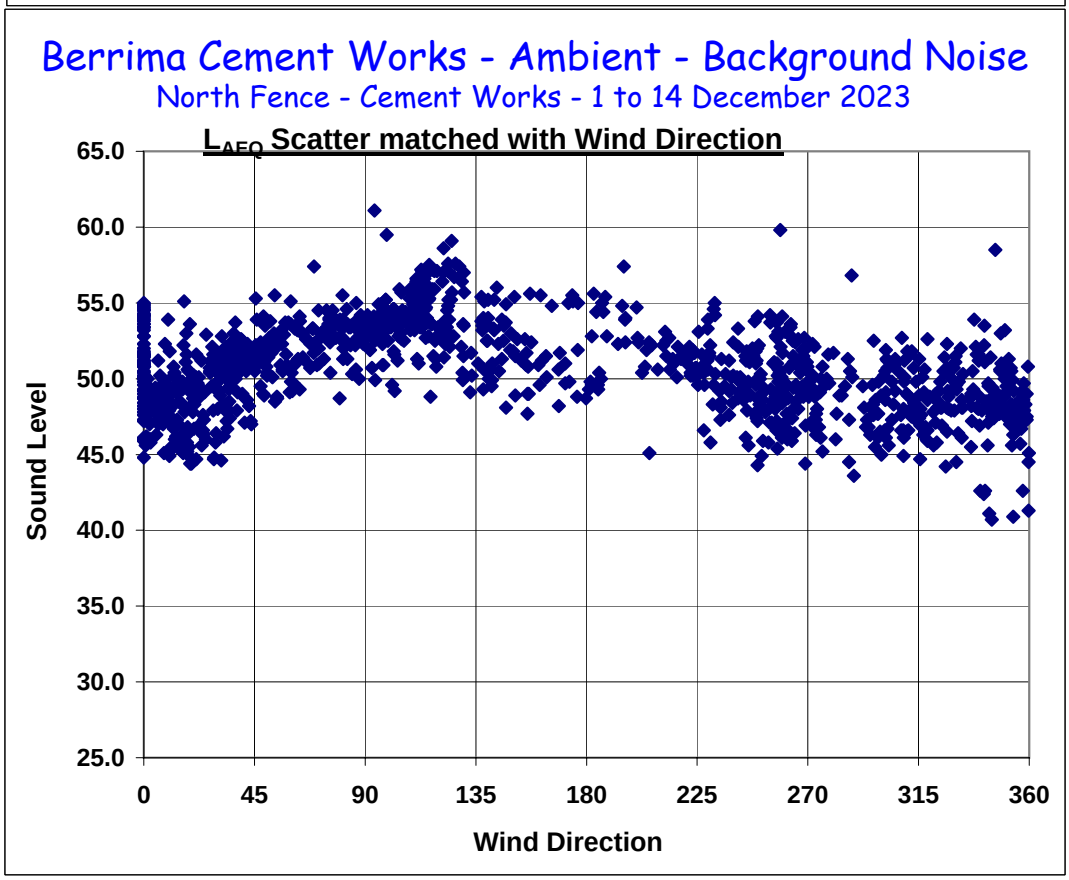

Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 13 to 14 December 2023
Sound Level - dB(A)
Wind Speed m/s
Time of Day
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

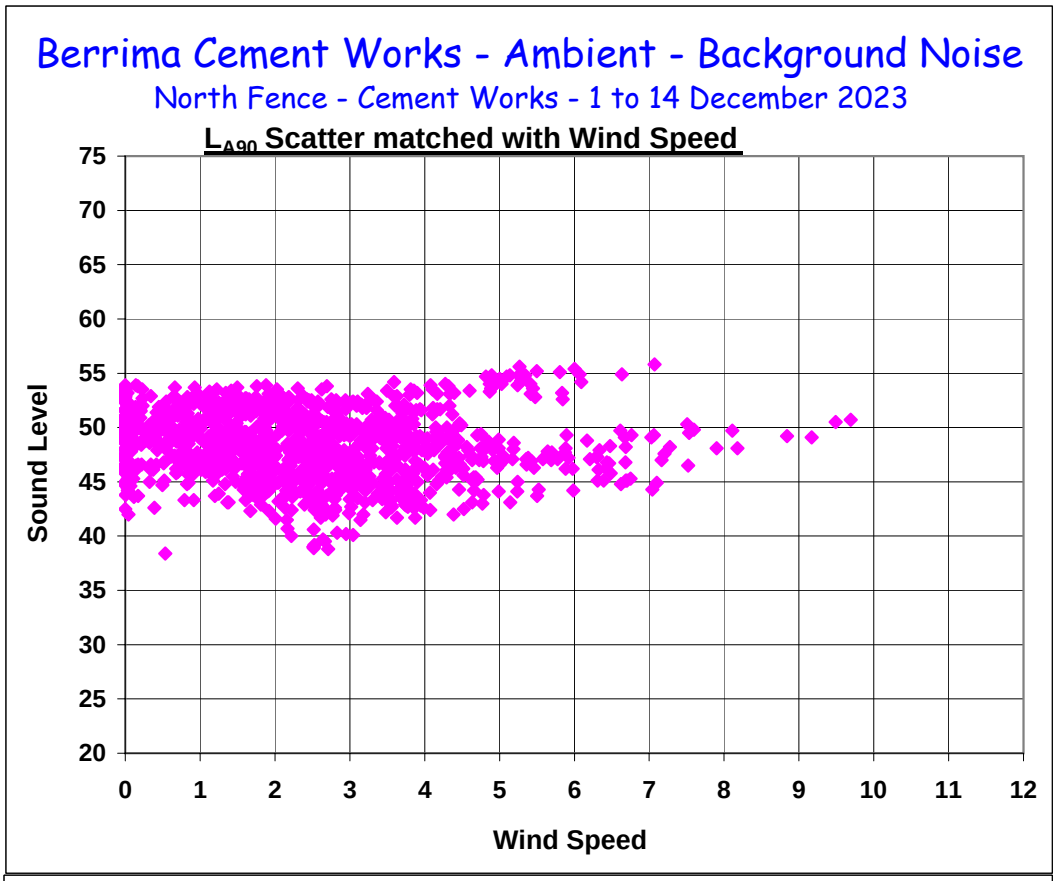

Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 13 to 14 December 2023
Sound Level - dB(A)
Wind Direction - degrees
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

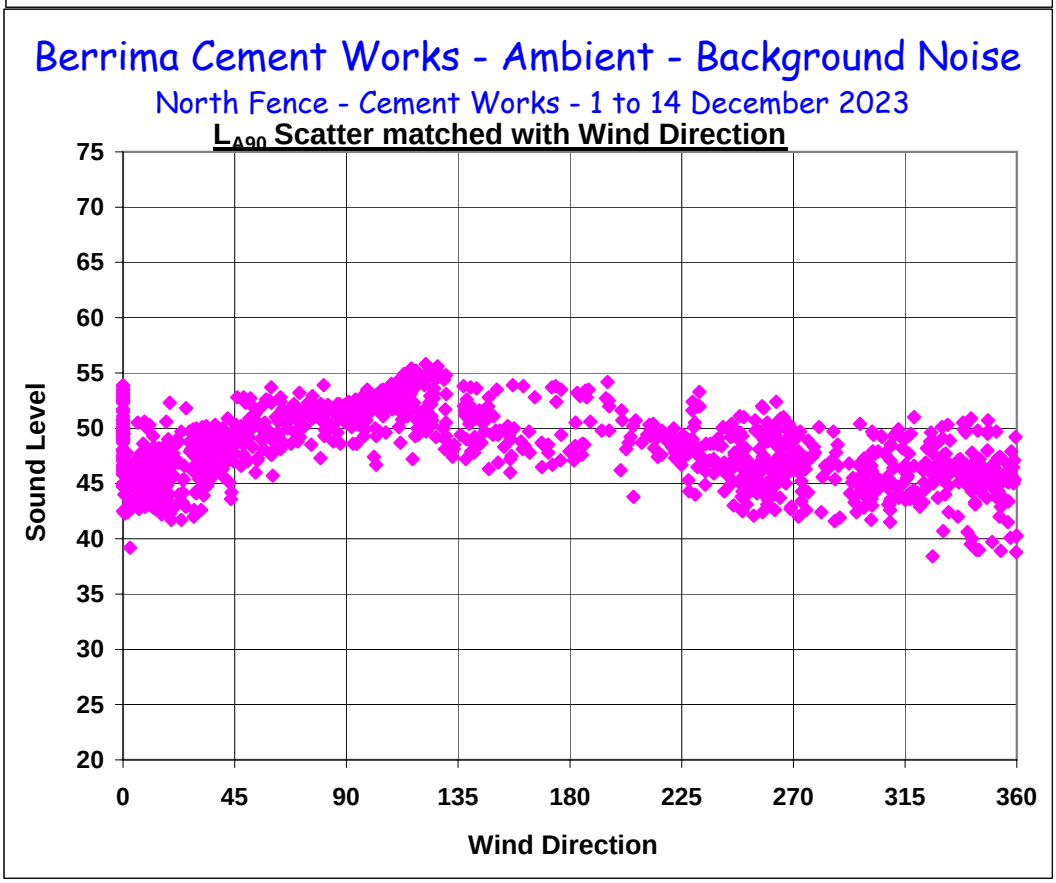

Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
L_{AEQ} Scatter
Sound Level - dB(A)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
LEQ
North Fence - Cement Works


Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
L_{A90} Scatter
Sound Level - dB(A)
75
70
65
60
55
50
45
40
35
30
25
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
L90
North Fence - Cement Works


Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
LAEQ Scatter matched with Wind Speed
Sound Level
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed


Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
LAEQ Scatter matched with Wind Direction
Sound Level
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
45
90
135
180
225
270
315
360
Wind Direction


Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
LA90 Scatter matched with Wind Speed
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed


Berrima Cement Works - Ambient - Background Noise
North Fence - Cement Works - 1 to 14 December 2023
LA90 Scatter matched with Wind Direction
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
45
90
135
180
225
270
315
360
Wind Direction

ABN: 25 153 946 064
ACN: 153 946 064

Appendix D: Unattended environmental sound level results for Compliance Monitoring Location 20 - Store Yard Close

Location 20 - Cement Works

Daytime LAEQ **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
7:00		58	55	58	57	60	59	61	53	58	58	59	60	59			61	53	58	2.1
7:15		57	55	55	60	59	58	58	54	58	57	57	60	56			60	54	57	1.8
7:30		57	55	54	58	58	56	55	53	58	57	58	58	60			60	53	57	1.9
7:45		57	55	54	59		56	59	53	59	59	60	57	56			60	53	57	2.2
8:00		57	56	58	58	58	60	58	54	58	59	63	55	56			63	54	58	2.4
8:15		56	56	57	57	60	57	55	55	57	58	59	57	58			60	55	57	1.5
8:30		57	55	56	59	60	59	50	57	58	57	60	60	62			62	50	58	2.9
8:45		56	55	60	58	60	61	58	56	58	60	59	56	55			61	55	58	2.2
9:00		57	55	57	57	59	57	58	55	58	55	57	58	55			59	55	57	1.6
9:15		57	55	52	56	59	59	56	56	58	53	58	54				59	52	56	2.1
9:30		56	55	54	57	59	57	56	54	58	54	56	58				59	54	56	1.7
9:45		58	56	55	56	62	56	52	55	58	52	56	61				62	52	56	3.1
10:00		56	55	58	56	58	60	59	54	58	56	59	56				60	54	57	1.8
10:15		56	55	57	59	59	56	61	54	58	58	60	58				61	54	58	2.0
10:30		54	55	53	60	59	56		54	58	59	56	58				60	53	57	2.3
10:45		56	55	56	57	59	59	57	54	57	57	57	60				60	54	57	1.8
11:00		55	56	59	57	60	58	53	54	57	55	62	57				62	53	57	2.4
11:15		55	56	55	57	59	57	58	55	57	54	54	57				59	54	56	1.7
11:30		55	56	57	60	57	58	58	54	57	52	57	60				60	52	57	2.2
11:45		55	56	58	57	60	57	56	55	55	63	57	56				63	55	57	2.3
12:00		55	56	57	59	62	57	56	54	53	54	56	61				62	53	57	2.8
12:15			56	56	56	61	60	60	54	53	55	56	55				61	53	56	2.5
12:30			56	57	56	59	58	59	54	53	54	58	57				59	53	56	2.1
12:45		57	55	55	58	59	59	59	55	53	58	59	59				59	53	57	2.1
13:00		59	56	56	56	59	59	57	53	53	57	58	58				59	53	57	2.0
13:15		63	56	58	59	58	57	56	53	53	55	58	58				63	53	57	2.6
13:30		57	55	56	58	57	58	59	53	53	54	59	61				61	53	57	2.4
13:45		57	55	57	57	60	58	59	53	53	58	60	58				60	53	57	2.3
14:00		57	55	61	56	57	60	58	53	54	60	59	60				61	53	57	2.5
14:15		56	55	55	61	59	59	55	52	53	56	58	58				61	52	56	2.5
14:30		56	55	57	56	59	57	54	53	53	56	62	57				62	53	56	2.5
14:45		57	57	57	56	60	56	55	53	52	57	60	57	57			60	52	56	2.1
15:00		56	58	56	57	57	56	56	54	51	57	56	56	56			58	51	56	1.6
15:15		57	59	58	57	58	58	53	54	51		57	56	56			59	51	56	2.3
15:30	58	57	59	57	59	56	55	56	54	54	59	58	55	56			59	54	57	1.9
15:45	55	58	60	56	55	57	57	55	52	51	57	56	56	56			60	51	56	2.2
16:00	57	57	60	57	55	58	56	54	52	51	57	57	56	56			60	51	56	2.3
16:15	57	57	60	56	54	59	55	55	52	51	58	57	56	55			60	51	56	2.4
16:30	58	58	58	56	54	56	52	52	52	55	58	56	54	55			58	52	55	2.4
16:45	57	57	59	55	53	55	53	53	51	52	57	56	55	55			59	51	55	2.4
17:00	59		59	55	53	57	53	52	51	50	57	57	55				59	50	55	3.0
17:15	59	56	59	55	53	59	55	51	52	50	57	55	55				59	50	55	3.0
17:30	57	56	59	55	58	58	59	51	51	50	56	56	54				59	50	55	3.1
17:45	57	55	58	56	52	55	58	51	51	51	56	56	54				58	51	55	2.7
18:00	57	66	58	55	52	55	56	51	51	51	56	56	54				66	51	55	4.0
Max	59	66	60	61	61	62	61	61	57	59	63	63	61	62			66	57	61	2.3
Min	55	54	55	52	52	55	52	50	51	50	52	54	54	55			55	50	53	1.8
Ave	57	57	56	56	57	59	57	56	53	55	57	58	57	57			59	53	57	1.3
SD	1.0	2.0	1.8	1.7	2.1	1.7	1.9	2.9	1.4	2.9	2.1	1.9	2.1	2.0			2.9	1.0	2.0	0.5
E Ave	57	58	57	57	57	59	58	57	54	56	57	58	58	57			59	54	57	1.2

Evening LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
18:00	57	66	58	55	52	55	56	51	51	51	56	56	54				66	51	55	4.0
18:15	57	58	58	57	52	56	56	51	55	51	56	55	53				58	51	55	2.5
18:30	56	57	57	56	53	56	55	51	54	52	55	56	54				57	51	55	1.9
18:45	57	58	58	56	52	56	55	51	55	52	57	56	55				58	51	55	2.4
19:00	58	61	59	57	52	55	54	52	56	52	57	56	54				61	52	56	2.7
19:15	58	59	57	55	52	55	54	49	56	52	59	56	54				59	49	55	3.0
19:30	58	59	56	55	51	56	54	47	55	53	58	56	54				59	47	55	3.2
19:45	57	59	56	55	52	56	54	46	56	52	58	56	54				59	46	55	3.4
20:00	57	59	56	56	51	56	54	46	57	53	58	56	54				59	46	55	3.5
20:15	57	59	56	55	51	56	56	46	57	52	57	56	55				59	46	55	3.5
20:30	58	58	55	55	51	56	54	44	58	52	57	56	55				58	44	55	3.9
20:45	58	58	55	55	52	56	53	44	58	53	56	55	54				58	44	54	3.8
21:00	59	58	54	55	54	56	54	43	58	52	57	55	55				59	43	55	4.0
21:15	58	57	54	55	54	56	54	43	58	51	57	55	57				58	43	55	3.9
21:30	58	58	53	55	52	56	53	45	58	51	57	55	55				58	45	54	3.6
21:45	58	58		55	52	56	55	45	58	52	57	55	54				58	45	55	3.8
22:00	58	57	54	54	51	56	54	45	59	52	57	55	54				59	45	54	3.5
Max	59	66	59	57	54	56	56	52	59	53	59	56	57				66	52	57	3.6
Min	56	57	53	54	51	55	53	43	51	51	55	55	53				57	43	53	3.4
Ave	58	59	56	55	52	56	54	47	57	52	57	56	54				59	47	55	3.1
SD	0.8	2.2	1.8	0.7	0.8	0.4	0.9	3.2	2.0	0.5	1.0	0.6	0.9				3.2	0.4	1.2	0.8
E Avg	58	60	56	55	52	56	55	48	57	52	57	56	55				60	48	55	3.0

Night LAEQ

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
22:00	58	57	54	54	51	56	54	45	59	52	57	55	54				59	45	54	3.5
22:15	58	57	54	54	51	56	54	48	60	50	57	55	54				60	48	54	3.5
22:30	58	57	55	55	50	56	54	51	60	49	57	54	54				60	49	55	3.1
22:45	58	58	55	55	50	56	54	53	61	49	57	55	54				61	49	55	3.2
23:00	58	58	54	54	52	55	55	52	60	50	57	55	54				60	50	55	2.8
23:15	58	58	54	55	52	56	55	53	60	50	57	55	54				60	50	55	2.8
23:30	58	57	54	55	52	56	53	54	61	50	56	55	53				61	50	55	2.8
23:45	58	57	54	55	53	55	48	54	61	51	56	55	54				61	48	55	3.2
0:00	58	56	54	55	52	55	48	54	60	51	57	54	54				60	48	54	3.1
0:15	58	56	54	55	52	55	49	55	60	52	57	54	54				60	49	55	2.9
0:30	59	57	54	55	51	55	53	55	59	51	56	55	54				59	51	55	2.6
0:45	59	56	54	55	51	55	53	54	60	51	57	54	54				60	51	55	2.7
1:00	58	58	54	55	51	55	53	54	60	50	58	55	54				60	50	55	2.8
1:15	58	59	54	55	51	56	53	54	60	50	57	55	54				60	50	55	2.9
1:30	58	59	53	55	52	56	54	55	59	51	57	55	54				59	51	55	2.5
1:45	58	58	54	55	54	55	53	55	59	50	57	55	54				59	50	55	2.3
2:00	58	58	54	55	54	56	52	54	59	51	57	55	54				59	51	55	2.4
2:15	58	57	53	55	55	56		54	58	51	57	55	55				58	51	56	2.1
2:30	58	57	52	55	54	56	53	56	59	51	57	55	54				59	51	55	2.3
2:45	57	56	53	56	53	56	54	55	59	53	57	55	53				59	53	55	2.0
3:00	58	56	54	56	57	57	55	56	59	53	57	55	54				59	53	56	1.6
3:15	57	56	53	57	58	57	54	56	58	53	57	55	55				58	53	56	1.8
3:30	58	56	54	57	58	56	56	57	58	53	57	55	53				58	53	56	1.7
3:45	57	56		57	59	56	57	56	59	54	57	55	53				59	53	56	1.6
4:00	57	57	54	57	58	56	55	56	58	54	57	54					58	54	56	1.5
4:15	57	58	54	57	60	57	53	55	58	54	58	54	56				60	53	56	2.1
4:30	57	58	54	57	59	57	54	54	58	54	58	56	55				59	54	56	1.9
4:45	57	57	53	58	60	58	55	54	58	54	59	55	58				60	53	57	2.1
5:00	60	56	58	60	61	59	58	53	58	56	60	59	60				61	53	58	2.1
5:15	59	56	53	60	60	61	56	53	58	54	59	60	57				61	53	57	2.7
5:30	59	56	54	60	61	59	60	54	58	55	60	60	61				61	54	58	2.5
5:45	59	57	57	58	59	61	57	54	58	54	57	58	61				61	54	58	2.1
6:00	59	56	56	58	60	59	59	53	58	55	58	59	58				60	53	57	2.0
6:15	59	55	56	57	59	58	58	54	57	54	60	58	56				60	54	57	1.9
6:30	62	55	58	55	60	58	56	53	58	56	59	60	56				62	53	57	2.5
6:45	60	55	56	58	61	60	59	53	58	58	60	60	57				61	53	58	2.3
7:00	58	55	58	57	60	59	61	53	58	58	59	60	59				61	53	58	2.1
Max	62	59	58	60	61	61	61	57	61	58	60	60	61				61	57	60	1.3
Min	57	55	52	54	50	55	48	45	57	49	56	54	53				57	45	52	3.7
Ave	58	57	54	56	55	57	55	54	59	52	58	56	55				59	52	56	1.8
SD	0.9	1.1	1.5	1.7	3.9	1.6	2.9	2.2	1.1	2.4	1.2	2.0	2.2				3.9	1.1	2.0	0.8
E Avg	58	57	55	57	57	57	55	54	59	53	58	56	56				59	53	56	1.6
24hr	58	58	57	56	56	58	57	55	56	56	56	58	57	57			58	55	57	0.8

Location 20 - Cement Works

Daytime LA90 **1 to 14 December 2023**

Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
7:00		55	54	52	54	56	55	50	51	56	53	56	53	54			56	50	54	1.9
7:15		55	54	52	54	56	55	50	51	56	53	56	53	55			56	50	54	1.9
7:30		55	54	52	55	56	54	49	51	56	53	56	53	55			56	49	54	2.1
7:45		55	54	52	55		54	51	52	57	54	55	47	55			57	47	53	2.6
8:00		55	54	51	55	56	55	49	52	56	54	55	47	54			56	47	53	2.7
8:15		54	54	49	54	56	54	49	53	56	53	54	49	54			56	49	53	2.6
8:30		54	54	49	54	56	55	49	53	56	53	54	51	54			56	49	53	2.3
8:45		53	54	49	53	55	54	49	53	56	53	54	50	52			56	49	53	2.2
9:00		53	53	49	53	56	53	50	53	56	53	53	51	53			56	49	53	2.0
9:15		53	54	50	52	56	52	50	53	56	52	53	51				56	50	53	2.1
9:30		53	54	50	52	56	52	49	52	56	51	53	51				56	49	53	2.1
9:45		53	54	50	52	56	52	49	52	56	51	51	52				56	49	52	2.0
10:00		53	54	50	52	56	53	50	52	56	51	52	52				56	50	53	1.9
10:15		53	54	50	53	55	53	49	52	56	52	53	52				56	49	53	1.8
10:30		53	53	51	53	55	53		52	56	52	52	52				56	51	53	1.6
10:45		53	53	52	53	56	53	51	52	56	52	52	53				56	51	53	1.5
11:00		53	54	52	53	56	52	49	52	56	52	52	53				56	49	53	1.9
11:15		54	54	52	53	56	52	50	52	56	52	51	52				56	50	53	1.8
11:30		53	54	52	53	56	52	51	51	55	51	51	53				56	51	53	1.6
11:45		53	53	52	52	56	52	51	52	53	52	51	53				56	51	53	1.3
12:00		54	54	51	52	55	54	49	51	52	51	53	53				55	49	53	1.6
12:15			53	51	52	55	54	51	51	52	52	53	53				55	51	52	1.5
12:30			54	52	53	54	54	50	51	52	52	54	53				54	50	53	1.3
12:45		54	53	52	53	55	54	50	51	52	52	54	53				55	50	53	1.4
13:00		56	54	53	53	55	55	50	51	52	52	54	54				56	50	53	1.7
13:15		57	53	54	54	54	55	49	51	51	52	53	53				57	49	53	2.0
13:30		56	53	53	54	55	55	49	51	52	52	53	53				56	49	53	1.7
13:45		55	53	52	53	55	54	49	50	52	53	55	53				55	49	53	2.0
14:00		55	53	54	53	55	54	48	51	52	54	56	53				56	48	53	2.0
14:15		54	53	54	53	54	54	49	50	52	53	56	54				56	49	53	2.0
14:30		54	53	55	52	54	54	49	51	51	54	56	53				56	49	53	1.9
14:45		53	55	54	51	55	54	49	50	50	54	56	52	53			56	49	53	2.1
15:00		54	55	54	52	54	54	49	52	50	54	54	52	53			55	49	53	1.9
15:15		55	57	54	51	54	54	50	51	50		54	53	53			57	50	53	2.1
15:30	53	55	57	54	51	53	54	51	51	50	54	54	53	53			57	50	53	1.8
15:45	53	55	58	53	51	54	54	50	51	50	54	54	52	53			58	50	53	2.3
16:00	53	56	58	54	51	54	54	51	50	50	55	54	52	53			58	50	53	2.3
16:15	54	55	57	53	51	55	53	50	51	50	55	54	53	53			57	50	53	2.2
16:30	55	55	56	52	51	54	50	49	50	50	55	54	52	53			56	49	52	2.3
16:45	55	55	57	53	51	53	51	49	50	50	55	54	53	53			57	49	53	2.3
17:00	56		57	53	51	53	51	49	50	49	55	54	53				57	49	52	2.6
17:15	56	54	57	53	51	54	53	48	50	49	55	53	53				57	48	53	2.6
17:30	56	54	57	53	51	54	56	48	49	49	55	54	52				57	48	53	2.9
17:45	55	53	56	53	51	54	56	47	49	49	54	54	52				56	47	52	2.8
18:00	55	57	56	54	51	54	54	48	50	50	54	54	52				57	48	53	2.7
Max	56	57	58	55	55	56	56	51	53	57	55	56	54	55			58	51	55	1.8
Min	53	53	53	49	51	53	50	47	49	49	51	51	47	52			53	47	51	2.1
Ave	55	54	55	52	53	55	54	49	51	53	53	54	52	53			55	49	53	1.5
SD	1.2	1.1	1.6	1.6	1.2	0.9	1.3	0.9	1.0	2.8	1.3	1.4	1.4	0.8			2.8	0.8	1.3	0.5
90%	53	53	53	50	51	54	52	49	50	50	51	52	51	53			54	49	51	1.6
																		Median	51	

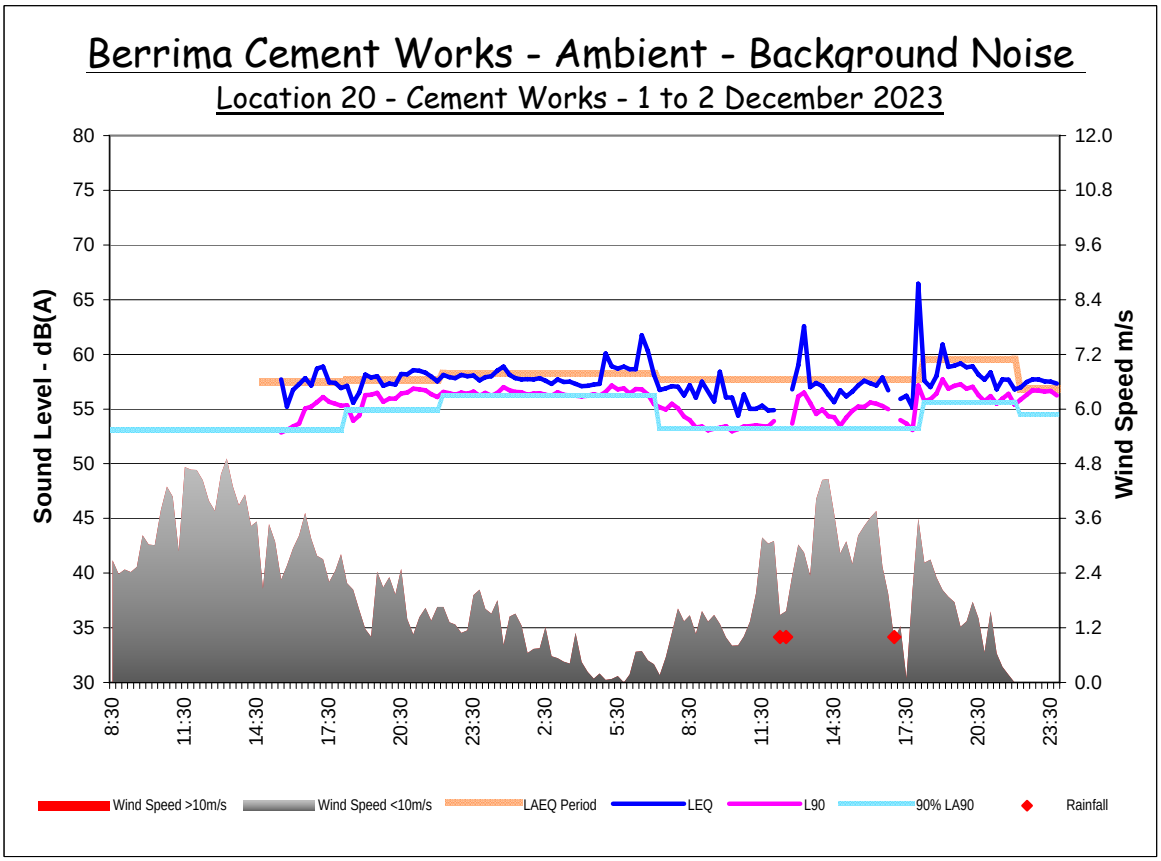
Evening LA90

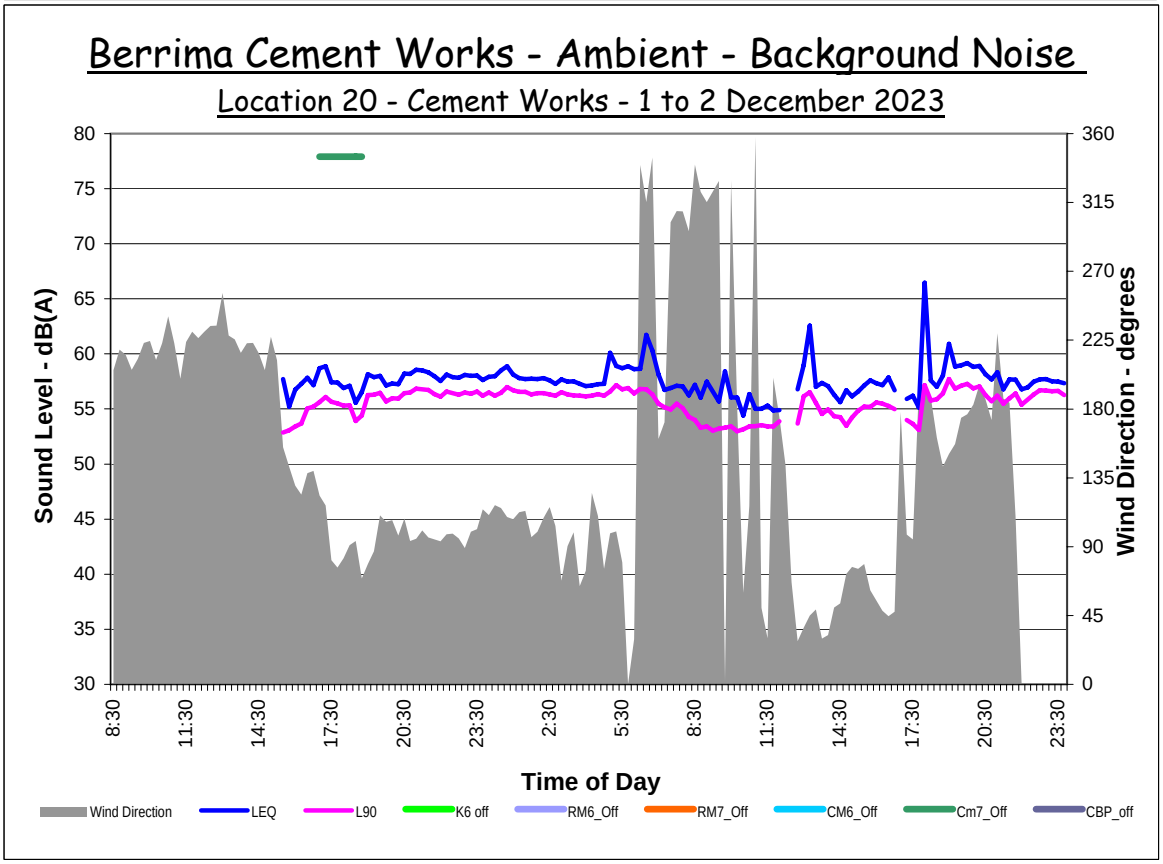
Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
18:00	55	57	56	54	51	54	54	48	50	50	54	54	52				57	48	53	2.7
18:15	55	56	56	54	51	54	54	47	52	50	54	53	51				56	47	53	2.5
18:30	54	56	55	54	51	54	54	48	52	51	53	54	52				56	48	53	2.2
18:45	54	56	56	54	50	54	53	48	53	50	55	54	52				56	48	53	2.5
19:00	56	58	57	54	51	54	53	47	54	50	55	54	53				58	47	53	2.9
19:15	56	57	55	54	51	54	53	43	54	51	56	54	52				57	43	53	3.6
19:30	56	57	55	53	50	54	53	43	53	51	56	54	52				57	43	53	3.6
19:45	56	57	54	53	50	54	53	43	54	51	56	54	52				57	43	53	3.6
20:00	56	57	54	54	51	54	53	44	55	52	56	54	52				57	44	53	3.5
20:15	56	57	54	54	50	54	53	44	55	51	56	54	53				57	44	53	3.4
20:30	56	56	54	54	51	54	53	42	55	51	56	55	53				56	42	53	3.7
20:45	57	56	53	53	51	55	52	42	56	52	55	53	52				56	42	52	3.7
21:00	57	56	53	53	52	55	53	42	56	51	55	53	52				56	42	53	3.7
21:15	57	55	52	53	52	55	52	42	56	50	55	53	54				56	42	53	3.7
21:30	57	56	52	53	51	54	52	42	56	50	55	53	54				56	42	52	3.7
21:45	56	56		53	51	55	52	43	56	51	55	53	53				56	43	53	3.7
22:00	56	55	53	52	50	55	52	43	57	51	56	53	52				57	43	53	3.6
Max	57	58	57	54	52	55	54	48	57	52	56	55	54				58	48	55	2.7
Min	54	55	52	52	50	54	52	42	50	50	53	53	51				55	42	51	3.3
Ave	56	56	54	54	51	54	53	44	54	51	55	54	52				56	44	53	3.2
SD	0.8	0.7	1.5	0.5	0.5	0.4	0.8	2.3	1.9	0.4	0.8	0.4	0.7				2.3	0.4	0.9	0.6
90%	55	56	53	53	50	54	52	42	52	50	54	53	52				56	42	52	3.4
																		Median	53	

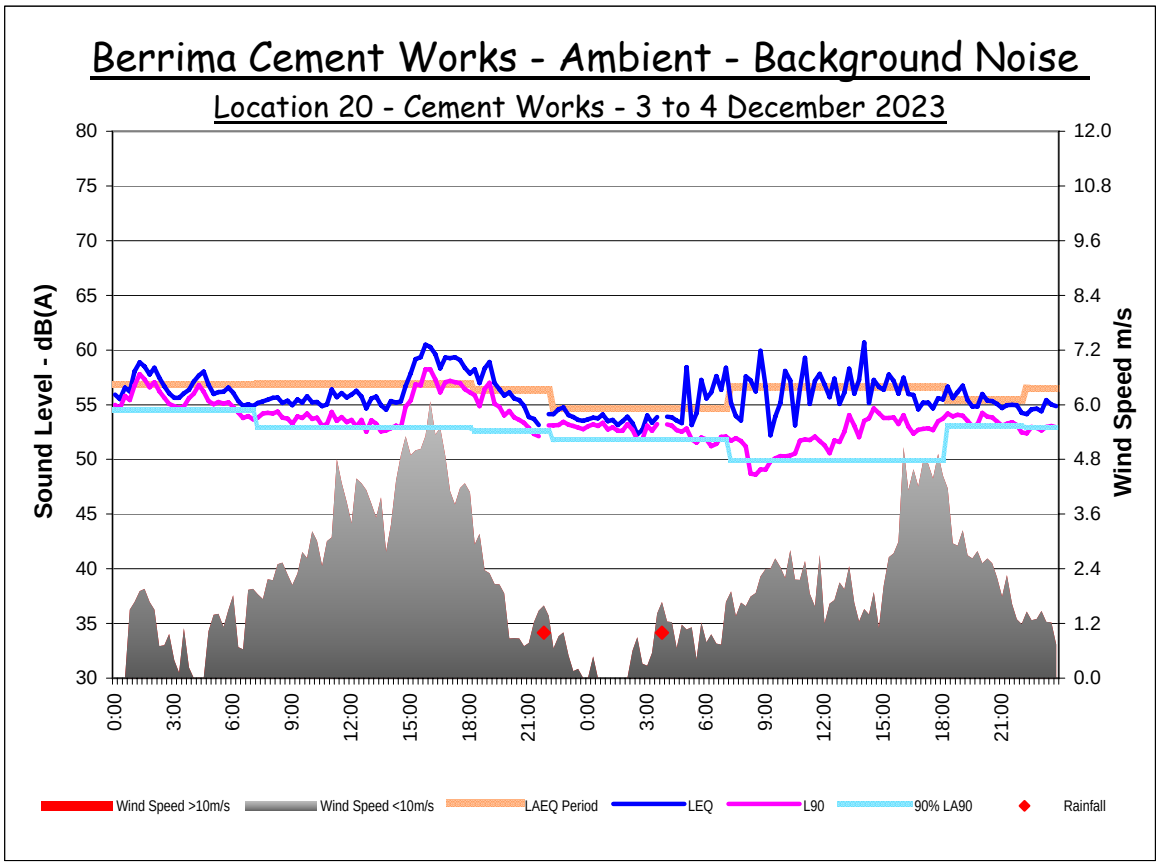
Night LA90

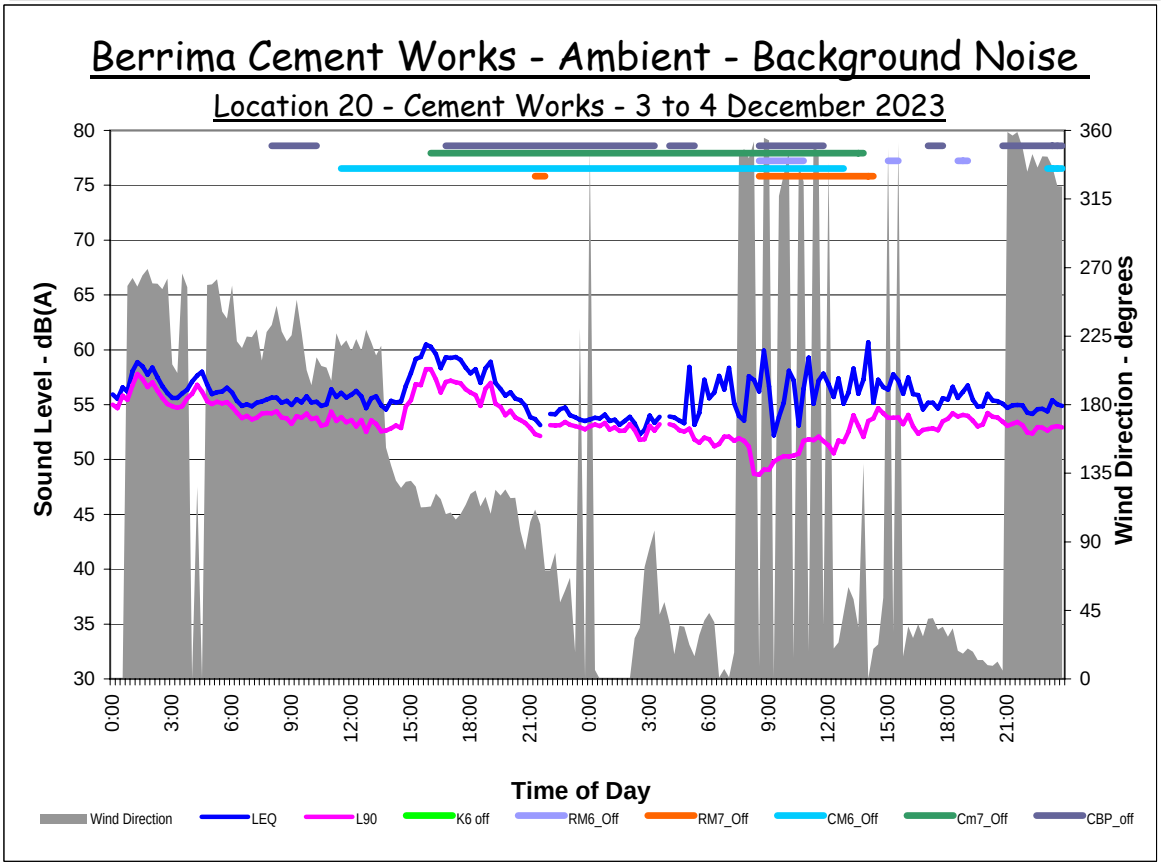
Time	1/12	2/12	3/12	4/12	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12	13/12	14/12	15/12	16/12	Maximum	Minimum	Average	SD
22:00	56	55	53	52	50	55	52	43	57	51	56	53	52				57	43	53	3.6
22:15	57	56	53	52	50	54	53	45	58	48	56	53	52				58	45	53	3.7
22:30	56	56	53	53	49	54	53	46	58	47	55	53	52				58	46	52	3.5
22:45	56	57	53	53	50	54	53	51	59	47	55	53	52				59	47	53	3.2
23:00	57	57	53	53	51	54	53	50	58	49	55	54	52				58	49	53	2.7
23:15	56	57	53	53	51	54	54	51	58	49	55	53	52				58	49	53	2.6
23:30	57	57	53	53	51	54	47	53	59	49	55	53	51				59	47	53	3.1
23:45	56	56	53	53	52	54	46	53	58	50	55	53	52				58	46	53	3.1
0:00	56	55	53	53	51	54	45	52	57	50	55	53	52				57	45	53	3.0
0:15	56	55	53	53	51	53	46	53	58	50	55	52	52				58	46	53	2.9
0:30	56	56	53	53	50	53	50	53	57	49	55	53	52				57	49	53	2.4
0:45	57	55	53	54	50	54	51	52	58	49	56	52	53				58	49	53	2.4
1:00	57	57	53	54	50	54	52	52	58	49	56	53	52				58	49	53	2.6
1:15	57	58	53	53	50	54	52	52	58	49	56	53	53				58	49	53	2.7
1:30	57	57	53	54	51	54	52	53	57	49	56	53	53				57	49	53	2.4
1:45	56	57	53	54	52	54	51	54	57	49	56	52	53				57	49	53	2.2
2:00	56	57	53	54	52	54	50	53	57	50	56	53	53				57	50	53	2.3
2:15	56	56	53	54	53	55		53	56	50	56	54	54				56	50	54	1.8
2:30	56	56	52	54	53	55	51	55	57	50	56	54	52				57	50	54	2.2
2:45	56	55	52	55	52	55	52	53	57	51	56	53	52				57	51	54	1.9
3:00	57	55	53	54	54	55	52	55	57	52	55	53	52				57	52	54	1.6
3:15	56	55	53	55	57	56	53	55	57	52	56	53	52				57	52	54	1.7
3:30	56	55	53	56	57	55	54	57	56	52	56	53	52				57	52	55	1.8
3:45	56	56		56	57	55	55	55	57	53	56	53	51				57	51	55	1.8
4:00	56	56	53	56	57	55	52	55	56	54	56	52					57	52	55	1.7
4:15	56	57	53	55	57	55	52	53	56	53	56	53	53				57	52	54	1.8
4:30	56	56	53	55	57	56	53	53	56	53	56	53	53				57	53	54	1.6
4:45	56	55	53	55	57	55	53	53	56	53	56	53	53				57	53	54	1.6
5:00	57	55	53	55	57	55	54	52	56	54	56	53	54				57	52	54	1.4
5:15	57	55	52	56	57	55	53	52	56	53	56	54	55				57	52	55	1.6
5:30	57	55	52	56	57	55	53	52	56	53	56	54	55				57	52	55	1.8
5:45	57	55	52	56	57	55	51	52	56	53	56	54	54				57	51	54	1.9
6:00	56	55	52	56	57	55	51	52	56	53	56	54	53				57	51	54	2.0
6:15	57	54	51	55	57	55	51	52	56	53	56	53	53				57	51	54	2.0
6:30	57	54	51	54	57	55	49	51	56	53	55	54	54				57	49	54	2.3
6:45	56	54	52	54	57	55	49	52	56	53	55	53	54				57	49	54	2.0
7:00	55	54	52	54	56	55	50	51	56	53	56	53	54				56	50	54	1.9
Max	57	58	53	56	57	56	55	57	59	54	56	54	55				59	53	56	1.7
Min	55	54	51	52	49	53	45	43	56	47	55	52	51				56	43	51	3.9
Ave	56	56	53	54	54	55	51	52	57	51	56	53	53				57	51	54	1.9
SD	0.3	1.0	0.6	1.1	3.1	0.7	2.2	2.7	0.9	2.1	0.4	0.5	1.0				3.1	0.3	1.3	0.9
90%	56	55	52	53	50	54	48	50	56	49	55	52	52				56	48	52	2.7
																		Median	52	

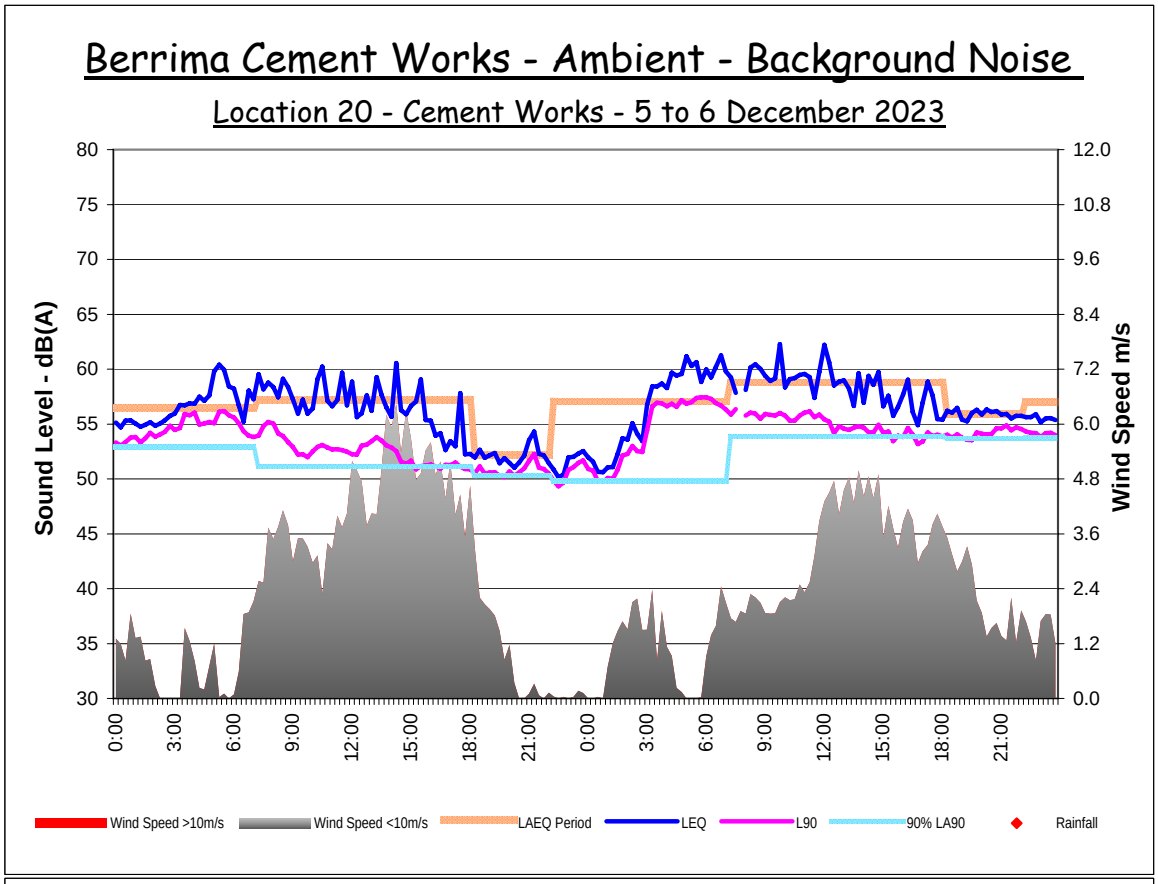
Two Day Results of Ambient Noise Monitoring

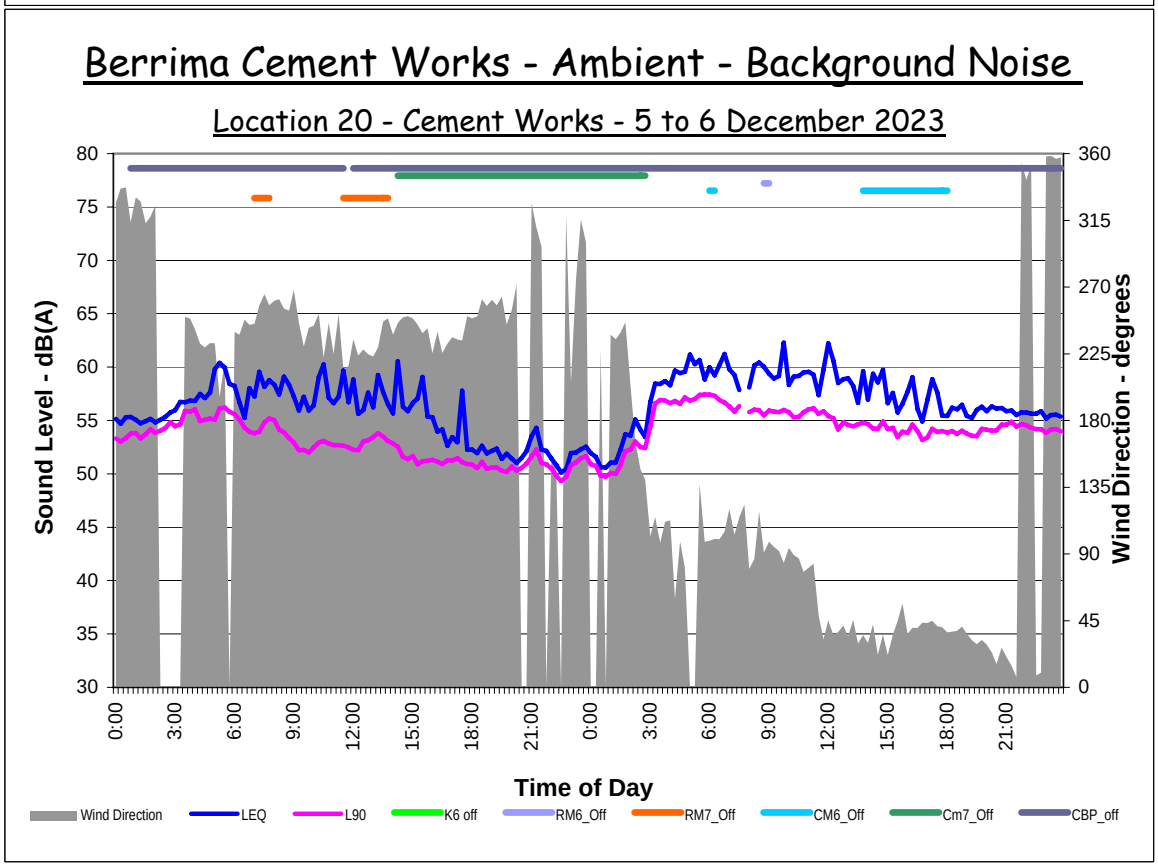


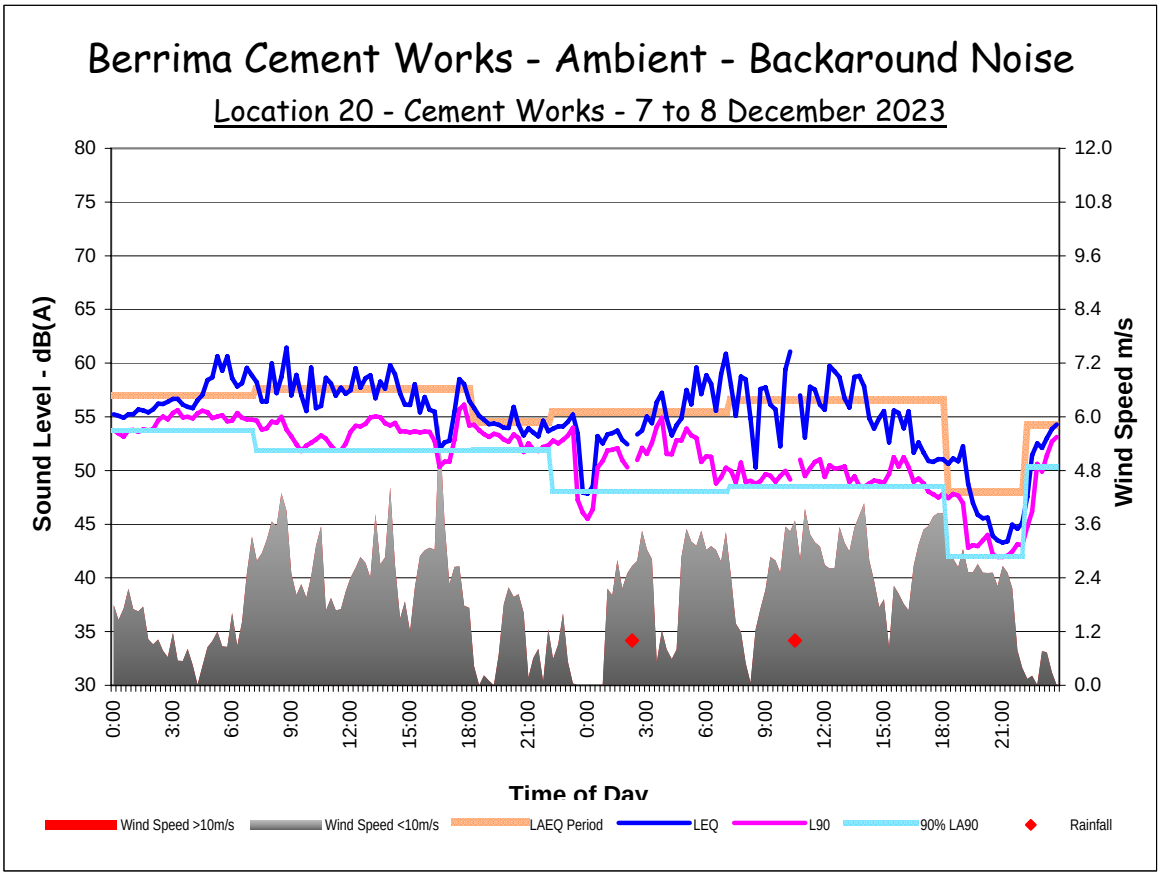


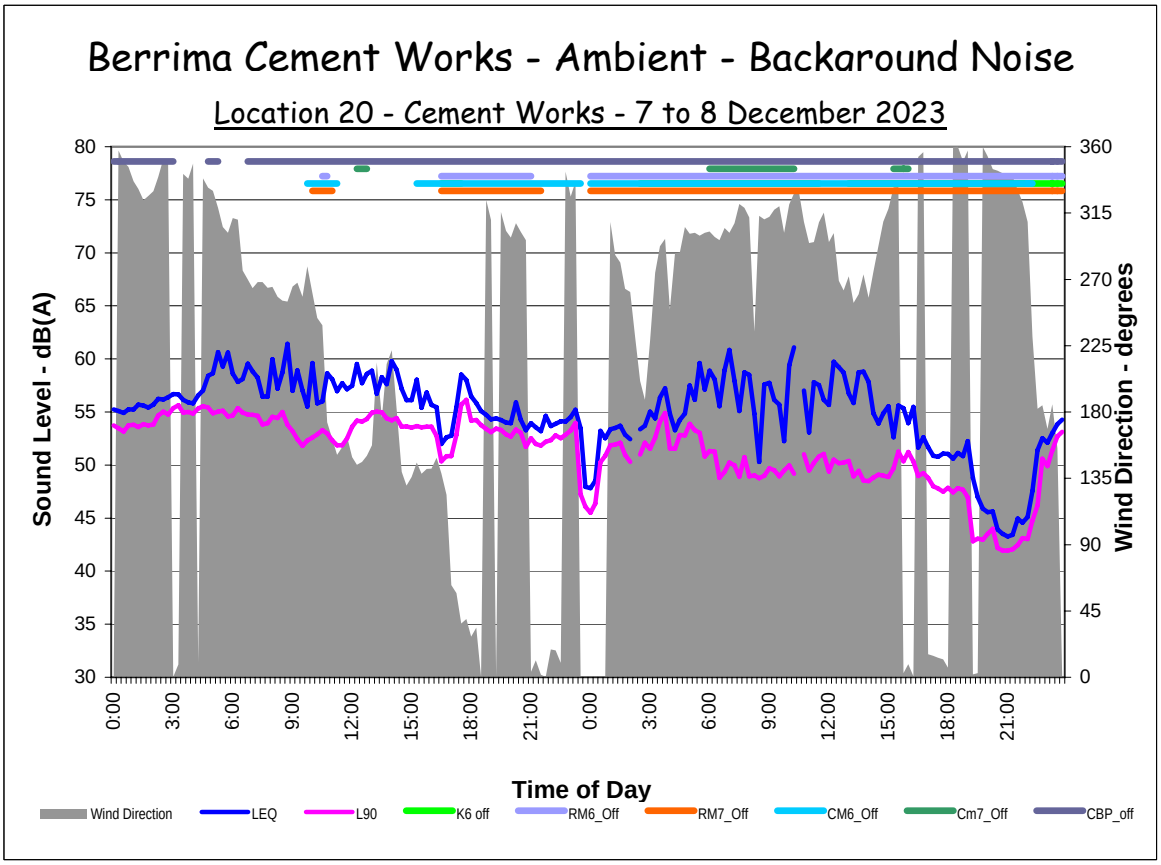

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 3 to 4 December 2023
Sound Level - dB(A)
Wind Speed m/s
80
75
70
65
60
55
50
45
40
35
30
12.0
10.8
9.6
8.4
7.2
6.0
4.8
3.6
2.4
1.2
0.0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

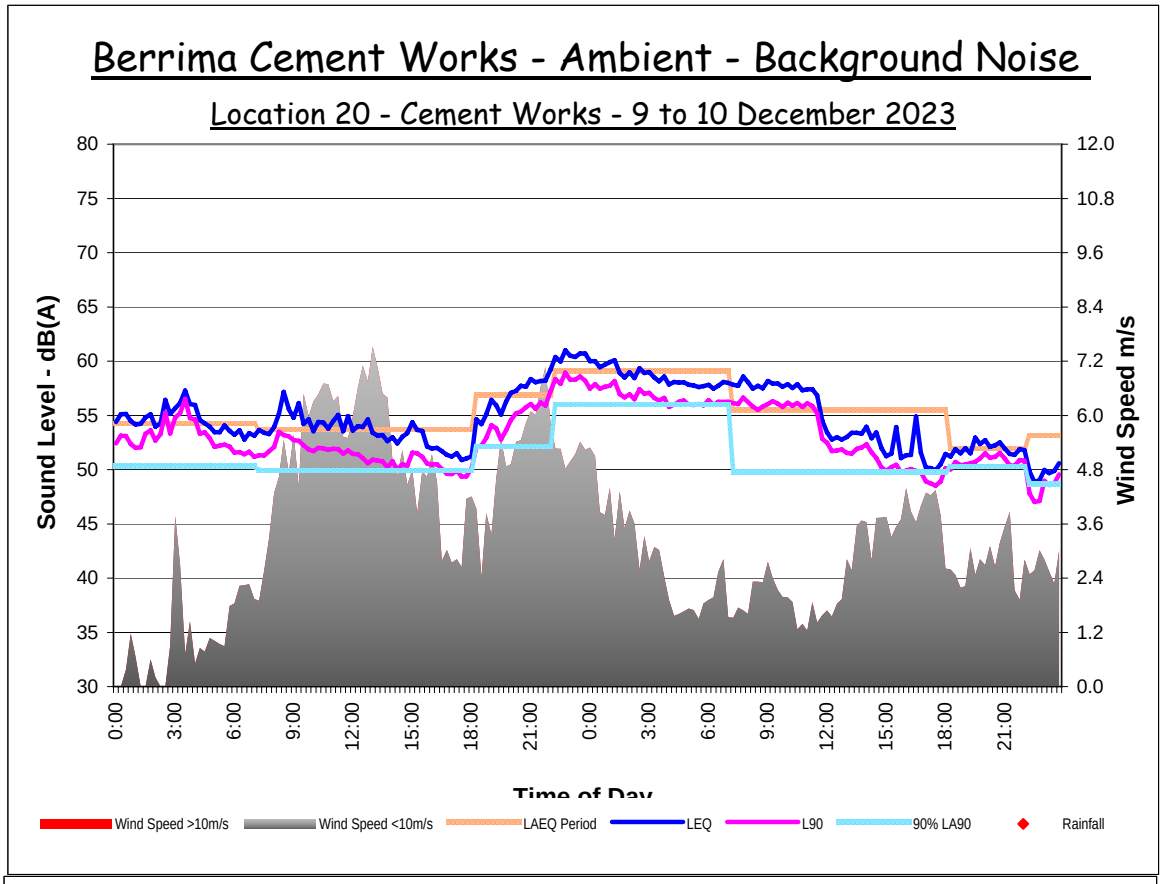

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 3 to 4 December 2023
Sound Level - dB(A)
Wind Direction - degrees
80
75
70
65
60
55
50
45
40
35
30
360
315
270
225
180
135
90
45
0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

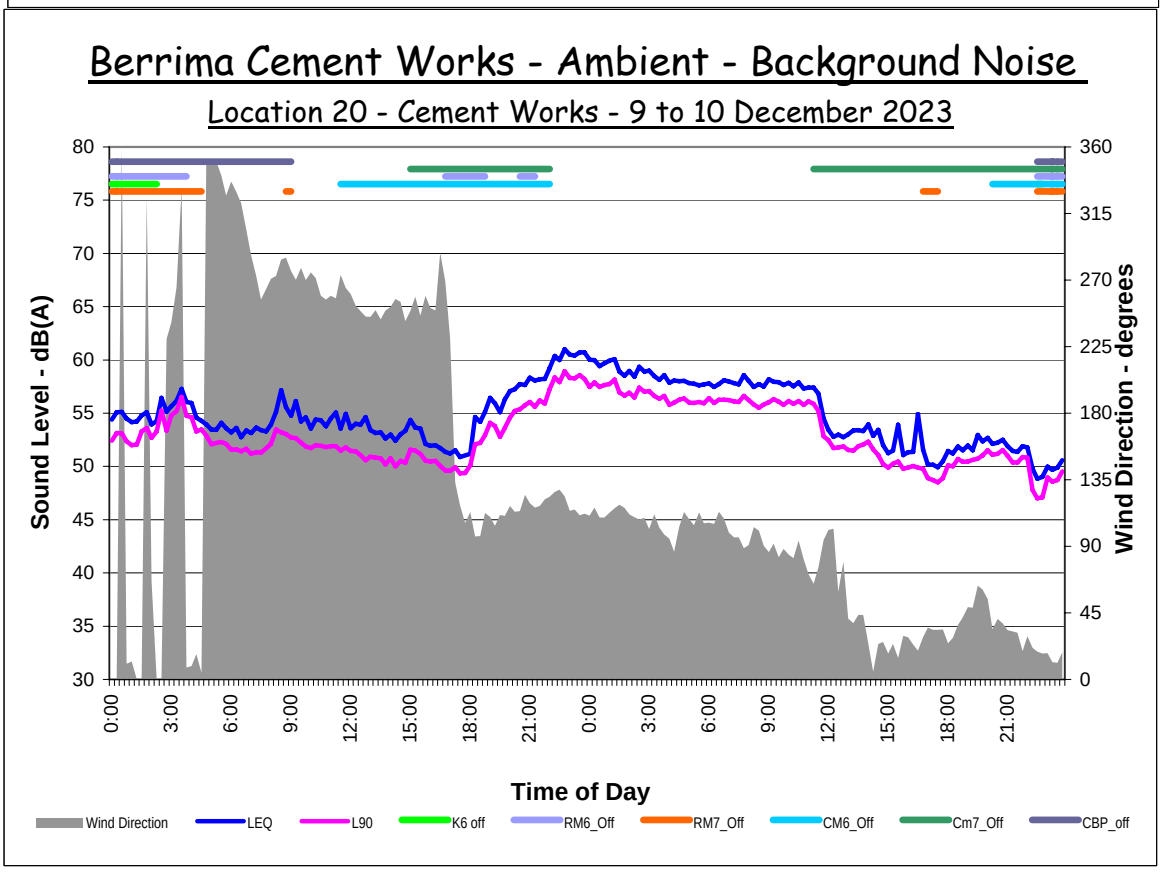

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 5 to 6 December 2023
Sound Level - dB(A)
Wind Speed m/s
80
75
70
65
60
55
50
45
40
35
30
12.0
10.8
9.6
8.4
7.2
6.0
4.8
3.6
2.4
1.2
0.0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

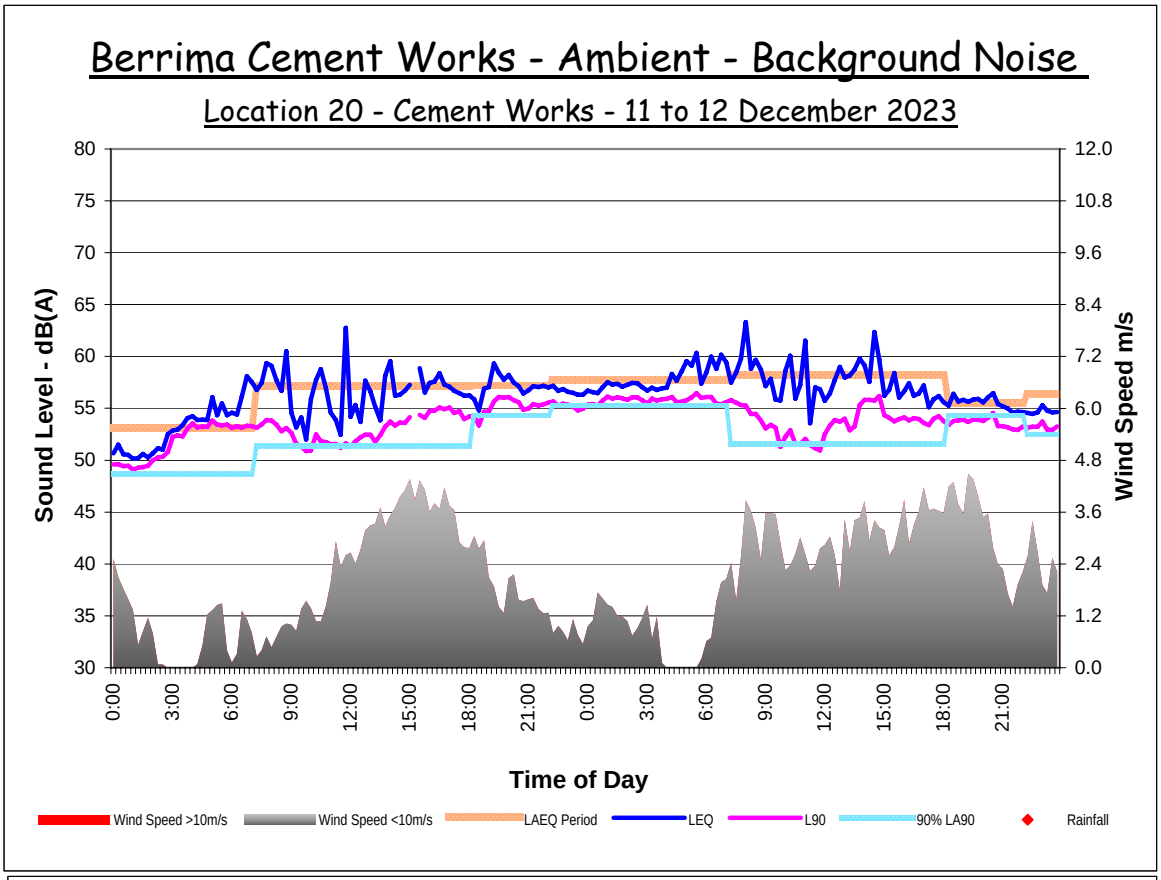

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 5 to 6 December 2023
Sound Level - dB(A)
Wind Direction - degrees
80
75
70
65
60
55
50
45
40
35
30
360
315
270
225
180
135
90
45
0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

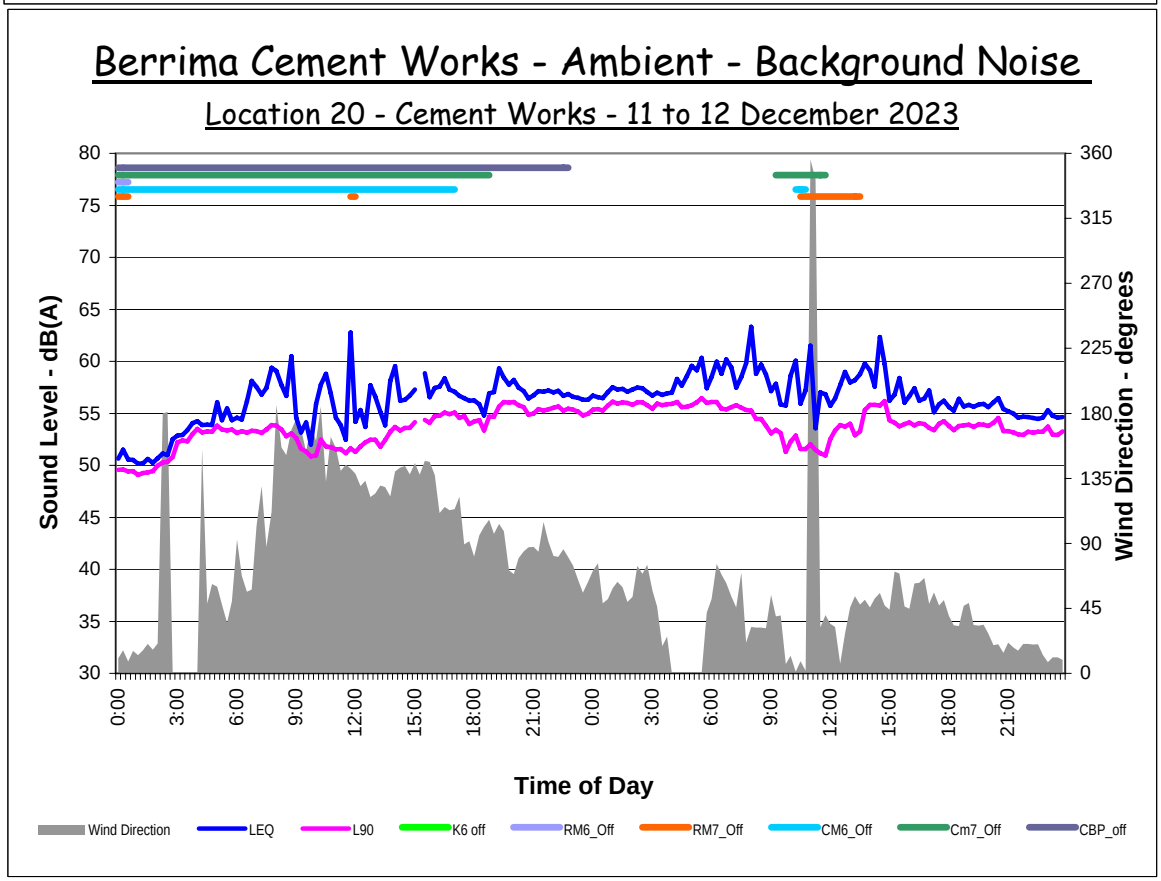

Berrima Cement Works - Ambient - Backaround Noise
Location 20 - Cement Works - 7 to 8 December 2023
Sound Level - dB(A)
Wind Speed m/s
Time of Day
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

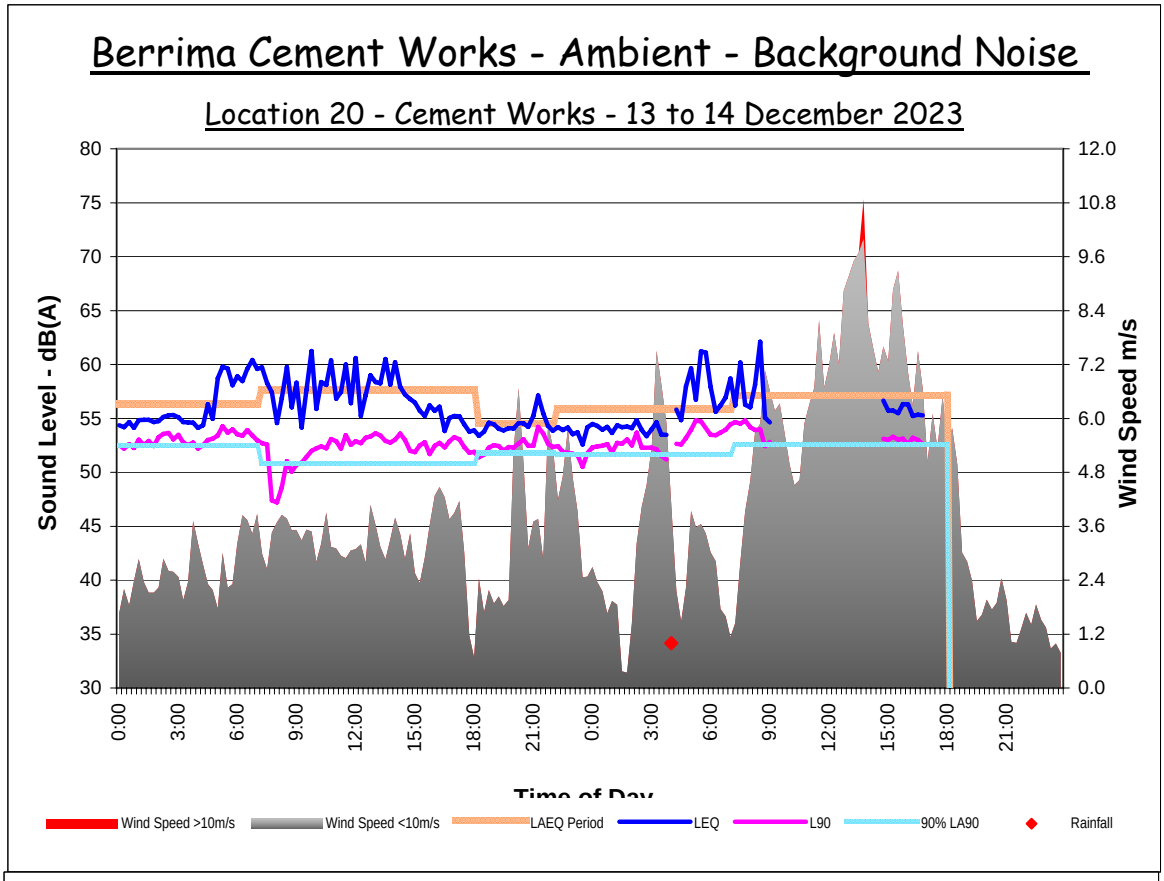

Berrima Cement Works - Ambient - Backaround Noise
Location 20 - Cement Works - 7 to 8 December 2023
Sound Level - dB(A)
Wind Direction - degrees
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

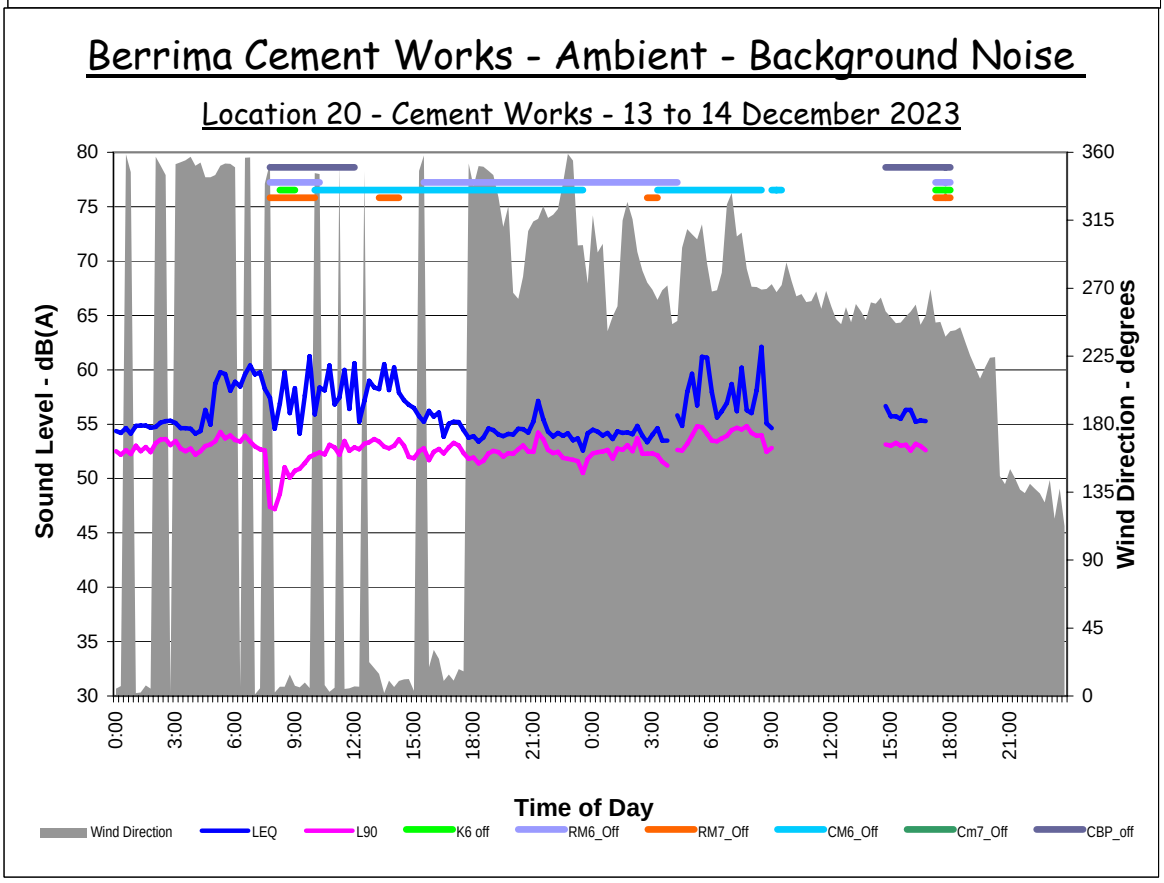

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 9 to 10 December 2023
Sound Level - dB(A)
Wind Speed m/s
80
75
70
65
60
55
50
45
40
35
30
12.0
10.8
9.6
8.4
7.2
6.0
4.8
3.6
2.4
1.2
0.0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Time of Day
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

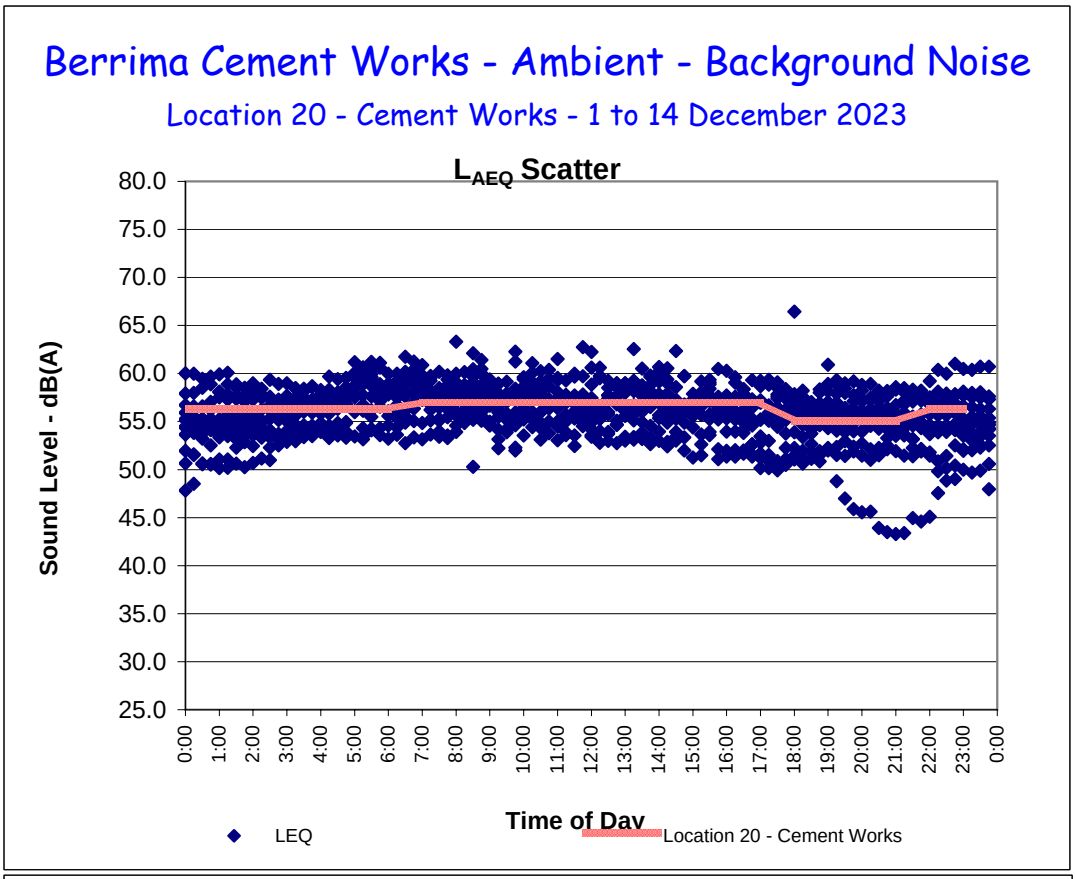

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 9 to 10 December 2023
Sound Level - dB(A)
Wind Direction - degrees
80
75
70
65
60
55
50
45
40
35
30
360
315
270
225
180
135
90
45
0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

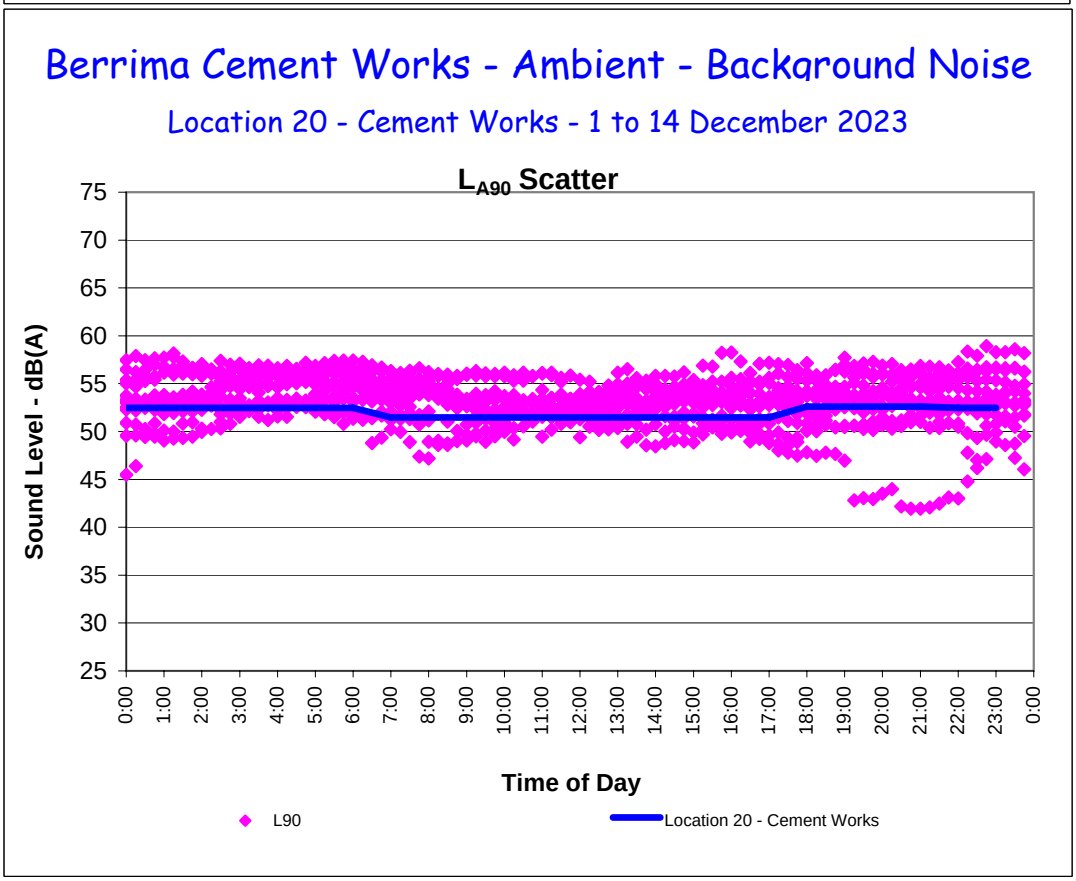

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 11 to 12 December 2023
Sound Level - dB(A)
Wind Speed m/s
Time of Day
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

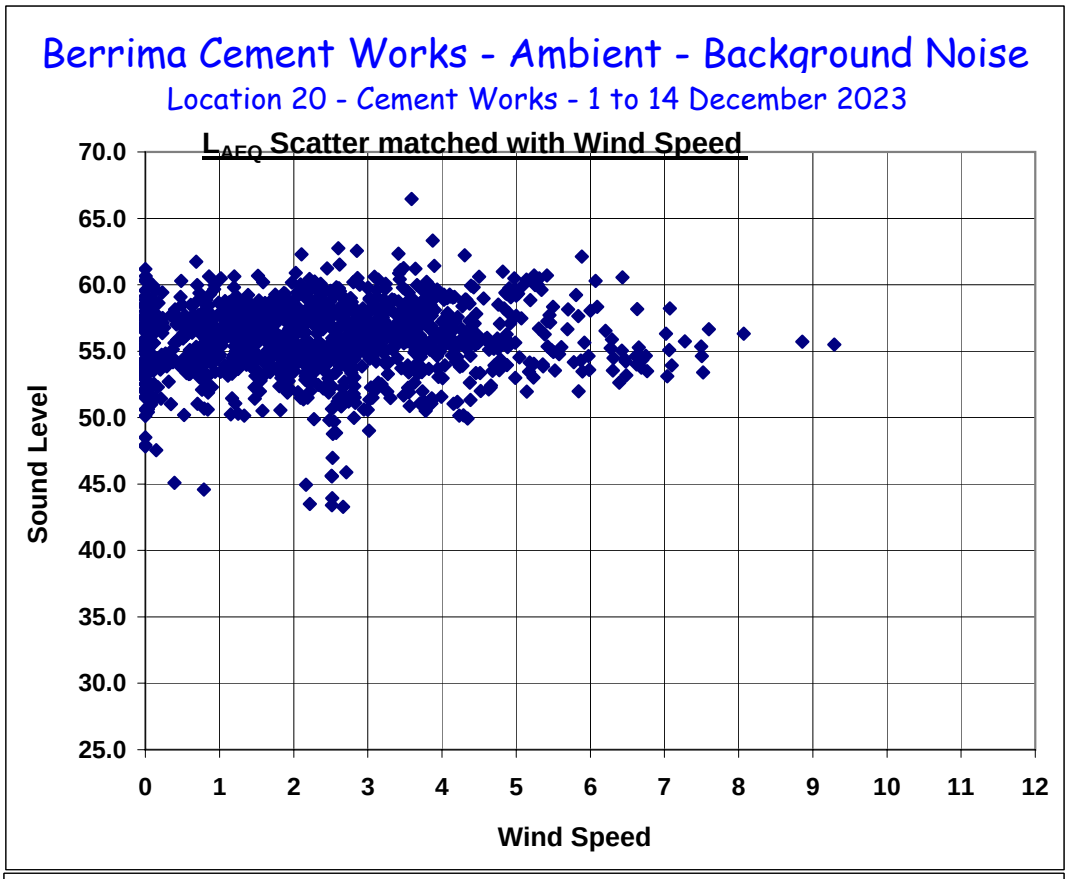

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 11 to 12 December 2023
Sound Level - dB(A)
Wind Direction - degrees
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

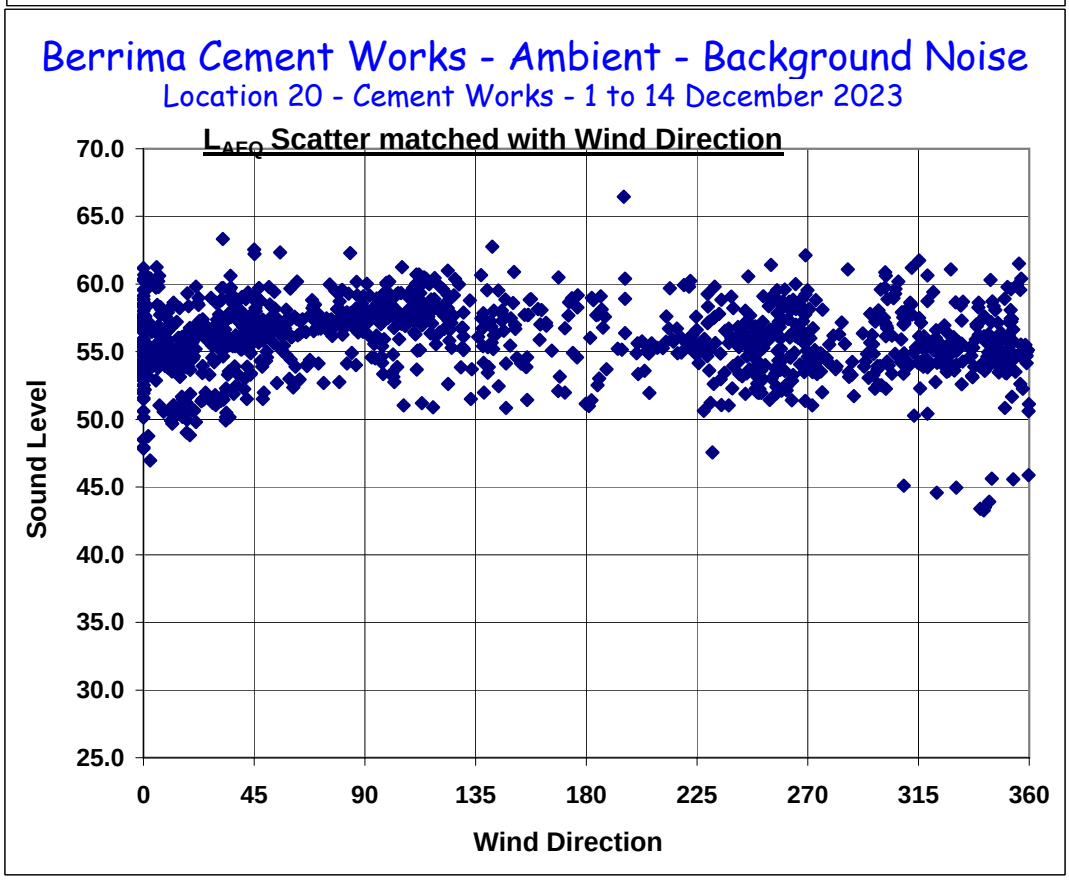

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 13 to 14 December 2023
Sound Level - dB(A)
Wind Speed m/s
Time of Day
Wind Speed >10m/s
Wind Speed <10m/s
LAEQ Period
LEQ
L90
90% LA90
Rainfall

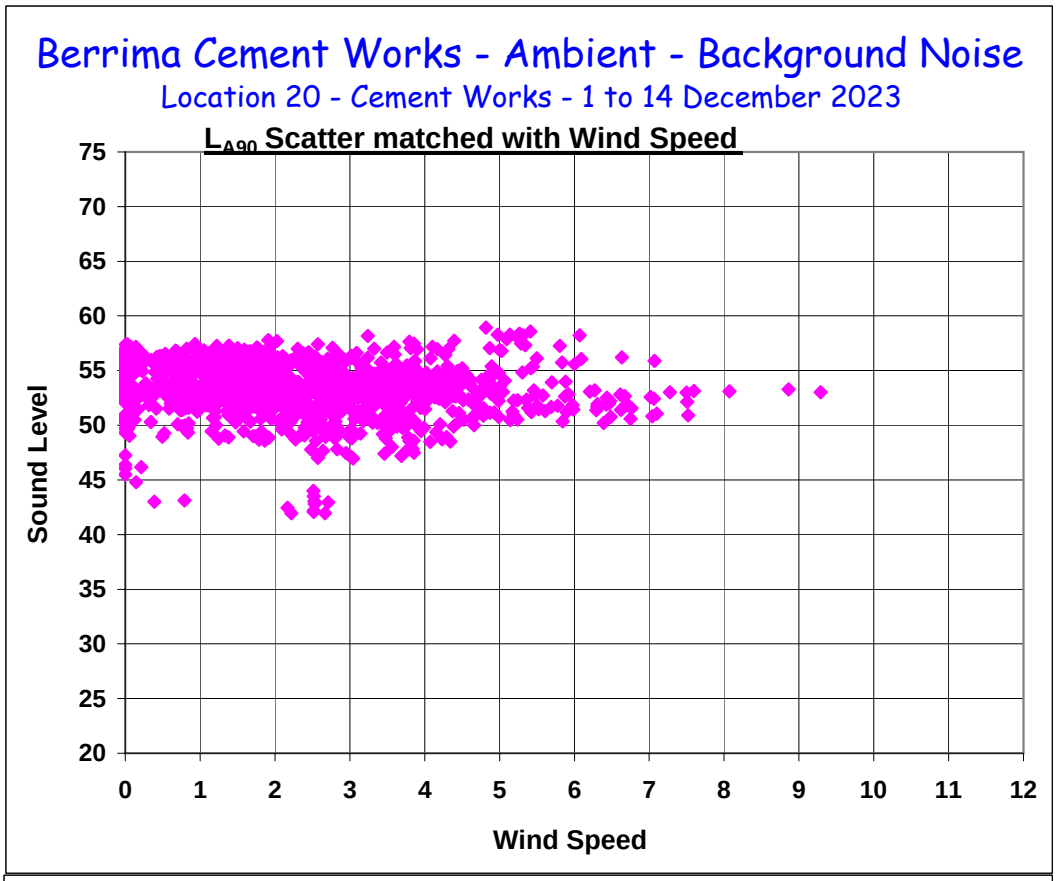

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 13 to 14 December 2023
Sound Level - dB(A)
Wind Direction - degrees
Time of Day
Wind Direction
LEQ
L90
K6 off
RM6_Off
RM7_Off
CM6_Off
Cm7_Off
CBP_off

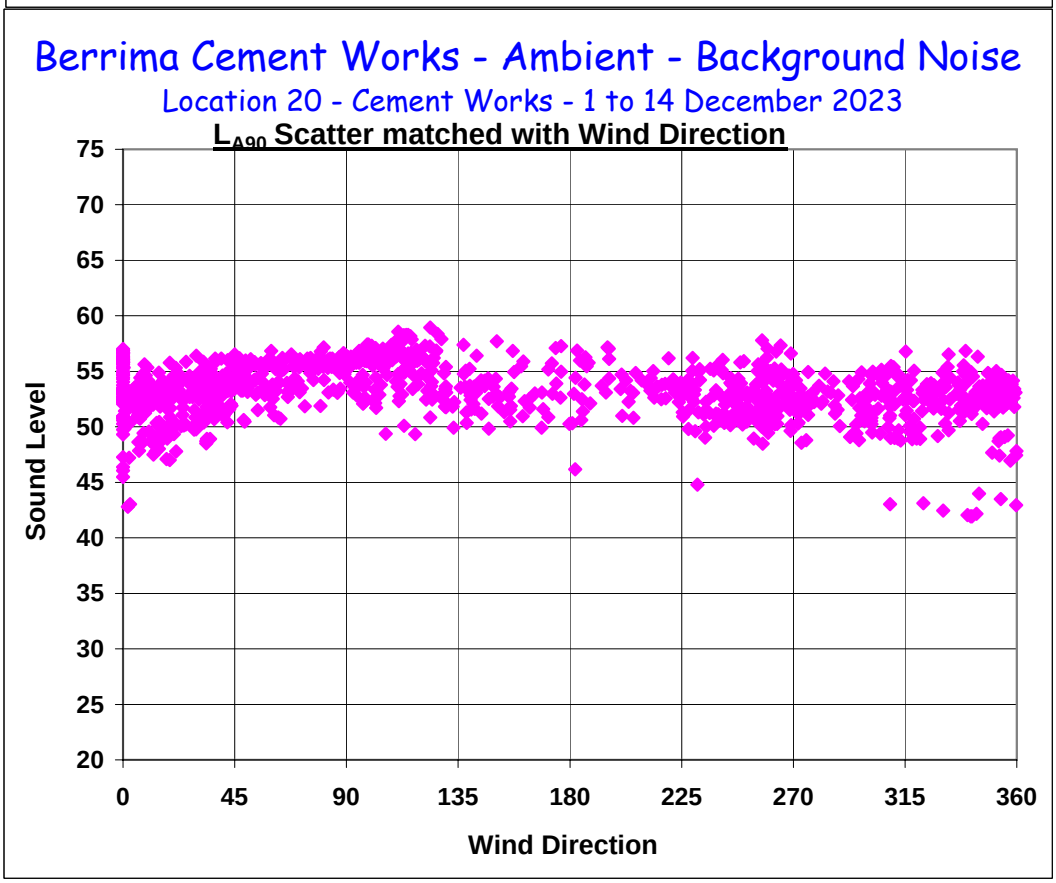

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
LAEQ Scatter
Sound Level - dB(A)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
LEQ
Location 20 - Cement Works


Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
LA90 Scatter
Sound Level - dB(A)
75
70
65
60
55
50
45
40
35
30
25
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time of Day
L90
Location 20 - Cement Works


Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
LAFQ Scatter matched with Wind Speed
Sound Level
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed

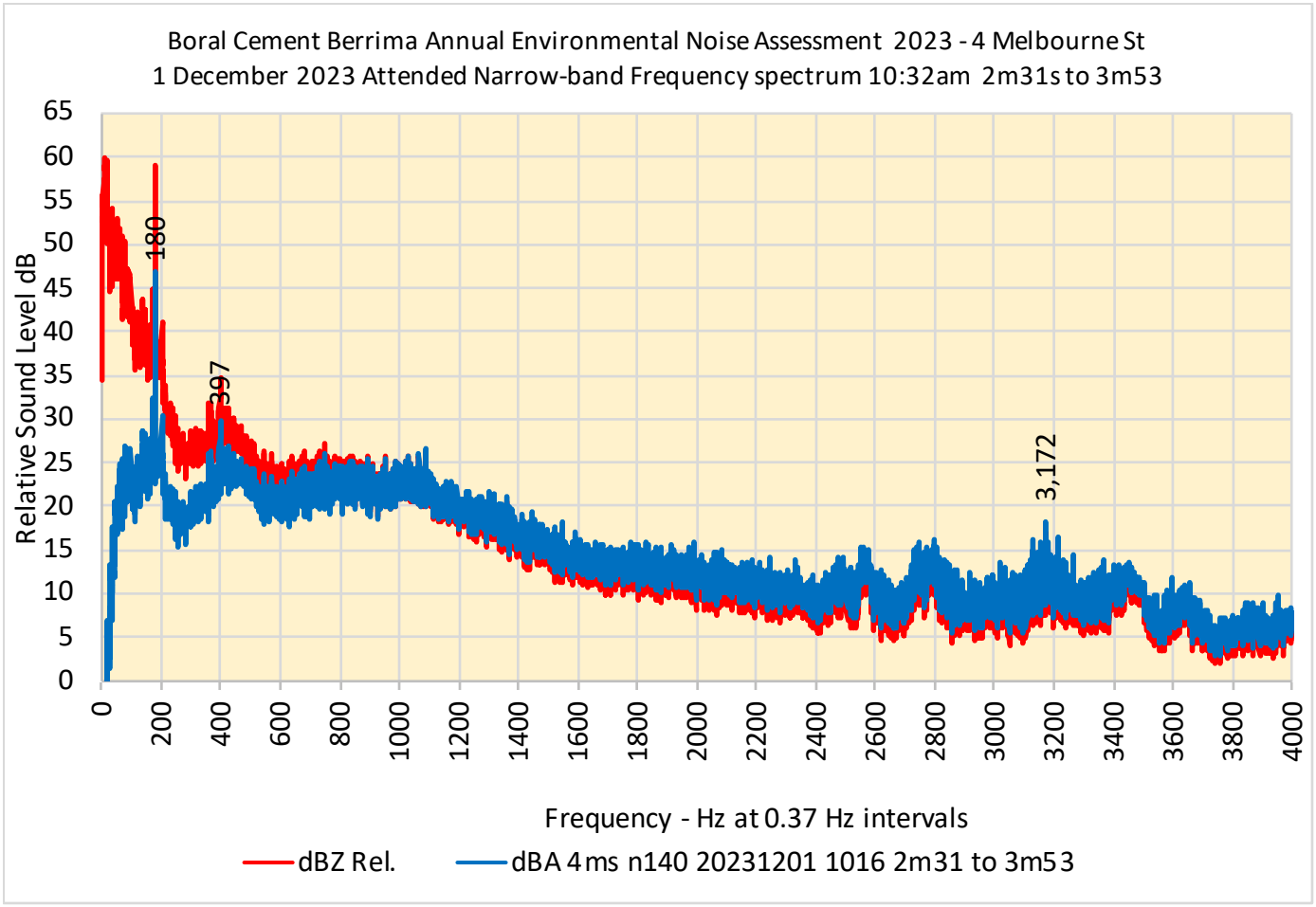

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
LAFQ Scatter matched with Wind Direction
Sound Level
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
0
45
90
135
180
225
270
315
360
Wind Direction


Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
L_{A90} Scatter matched with Wind Speed
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
1
2
3
4
5
6
7
8
9
10
11
12
Wind Speed

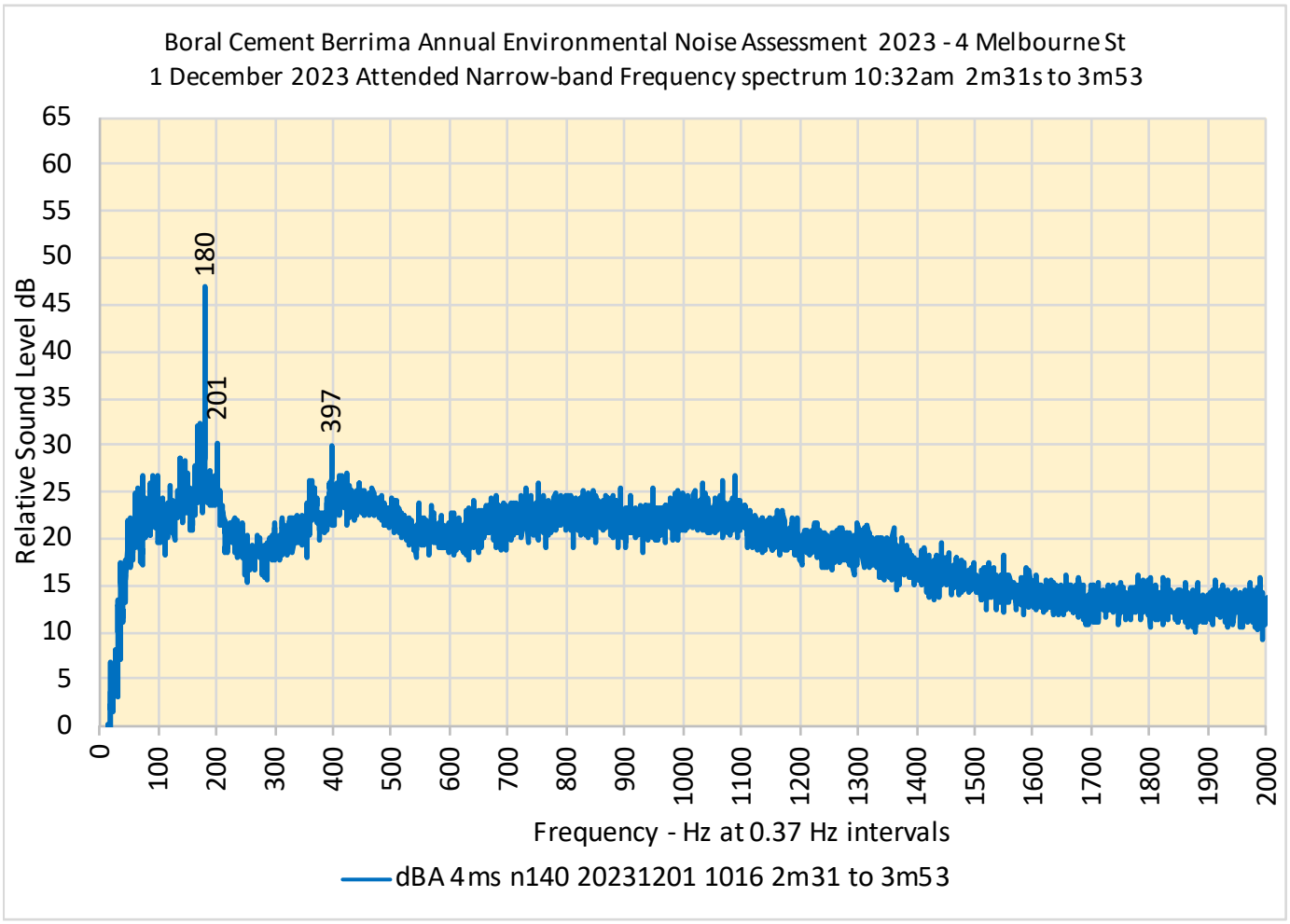

Berrima Cement Works - Ambient - Background Noise
Location 20 - Cement Works - 1 to 14 December 2023
L_{A90} Scatter matched with Wind Direction
Sound Level
75
70
65
60
55
50
45
40
35
30
25
20
0
45
90
135
180
225
270
315
360
Wind Direction

ABN: 25 153 946 064
ACN: 153 946 064

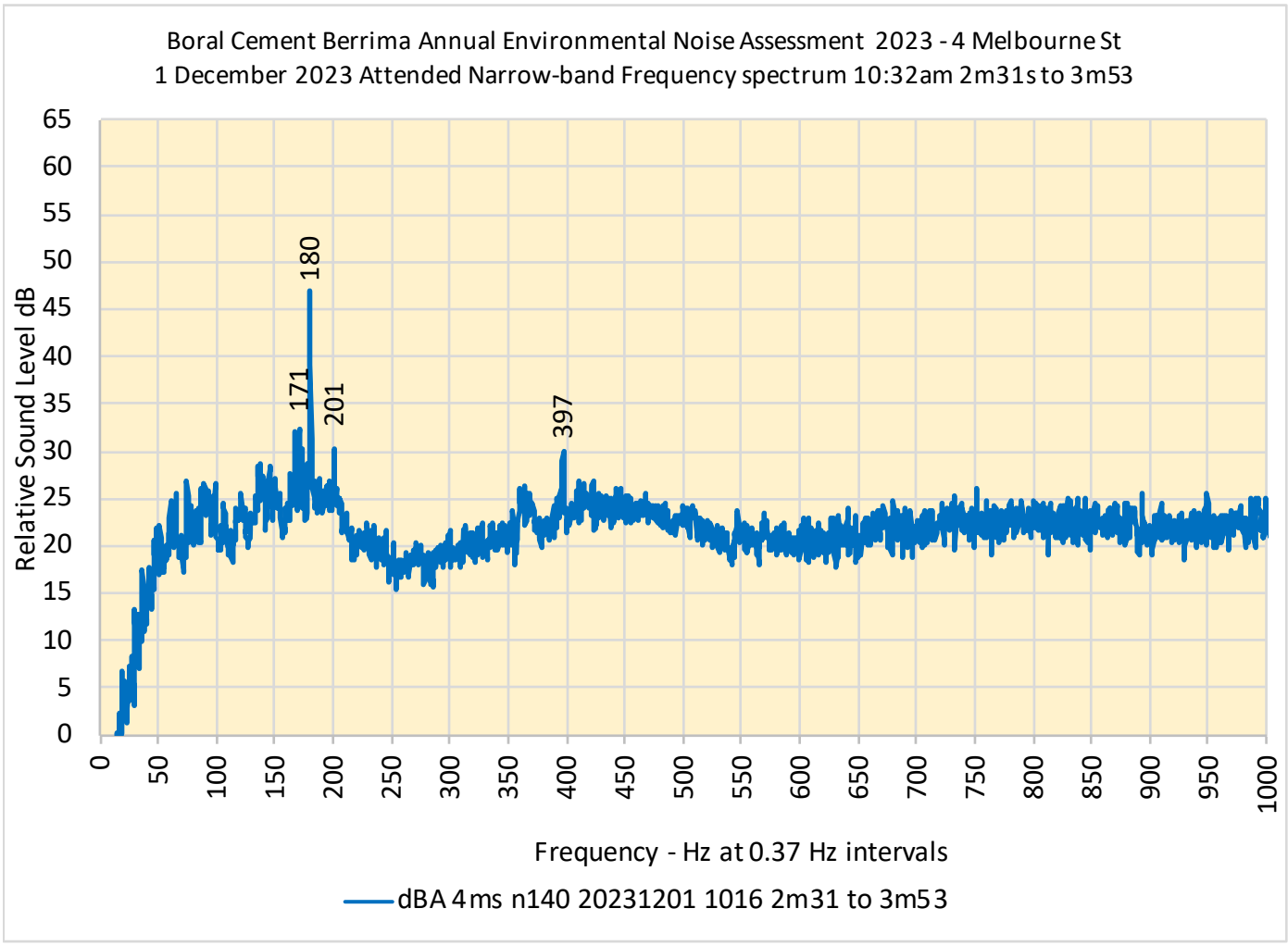
Appendix E: Narrow-band spectra from attended measurement recordings



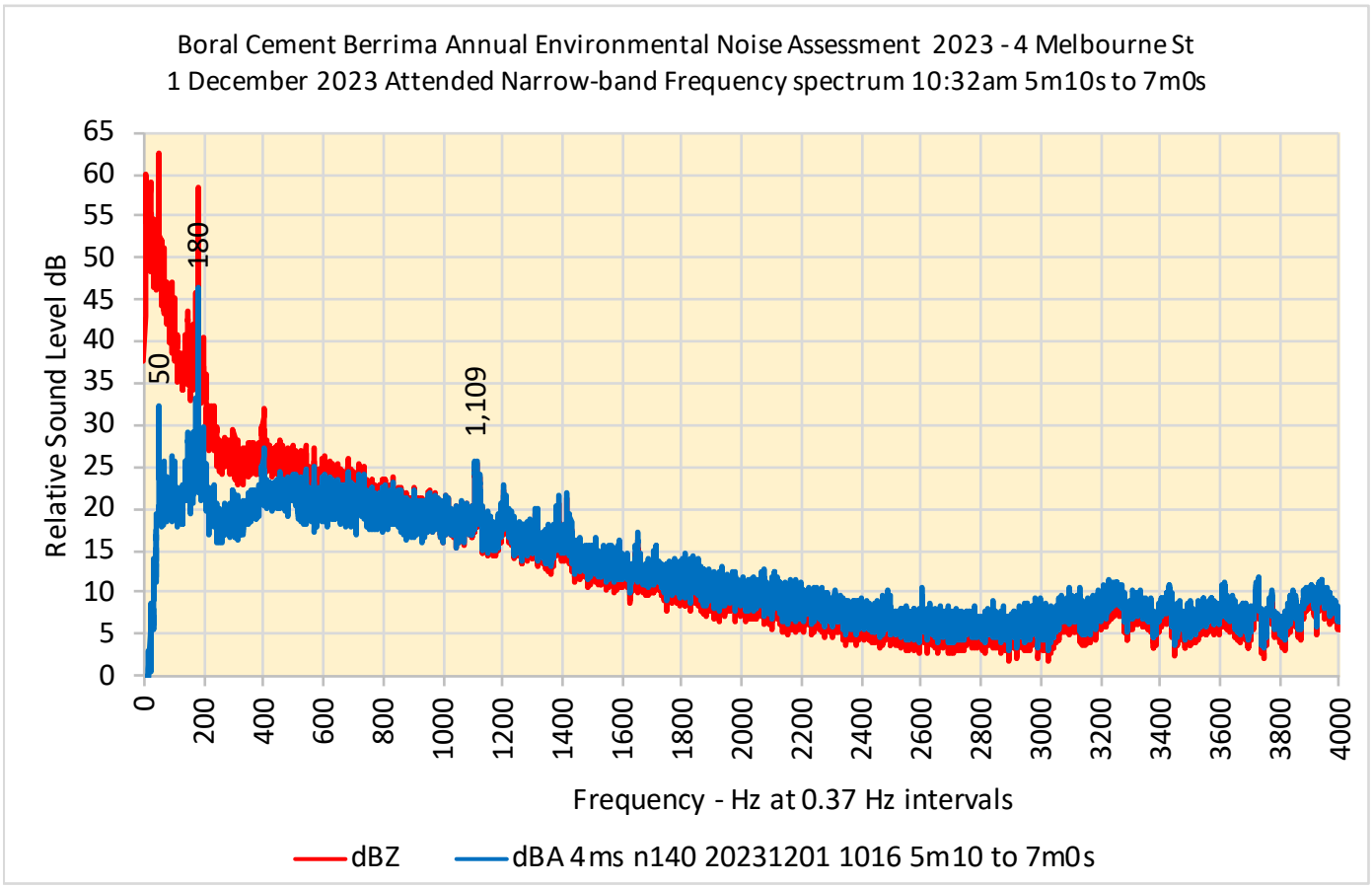
Appendix E Figure E 1A: 4 Melbourne St 1/12/23 10:32 2m31s 0-4000Hz



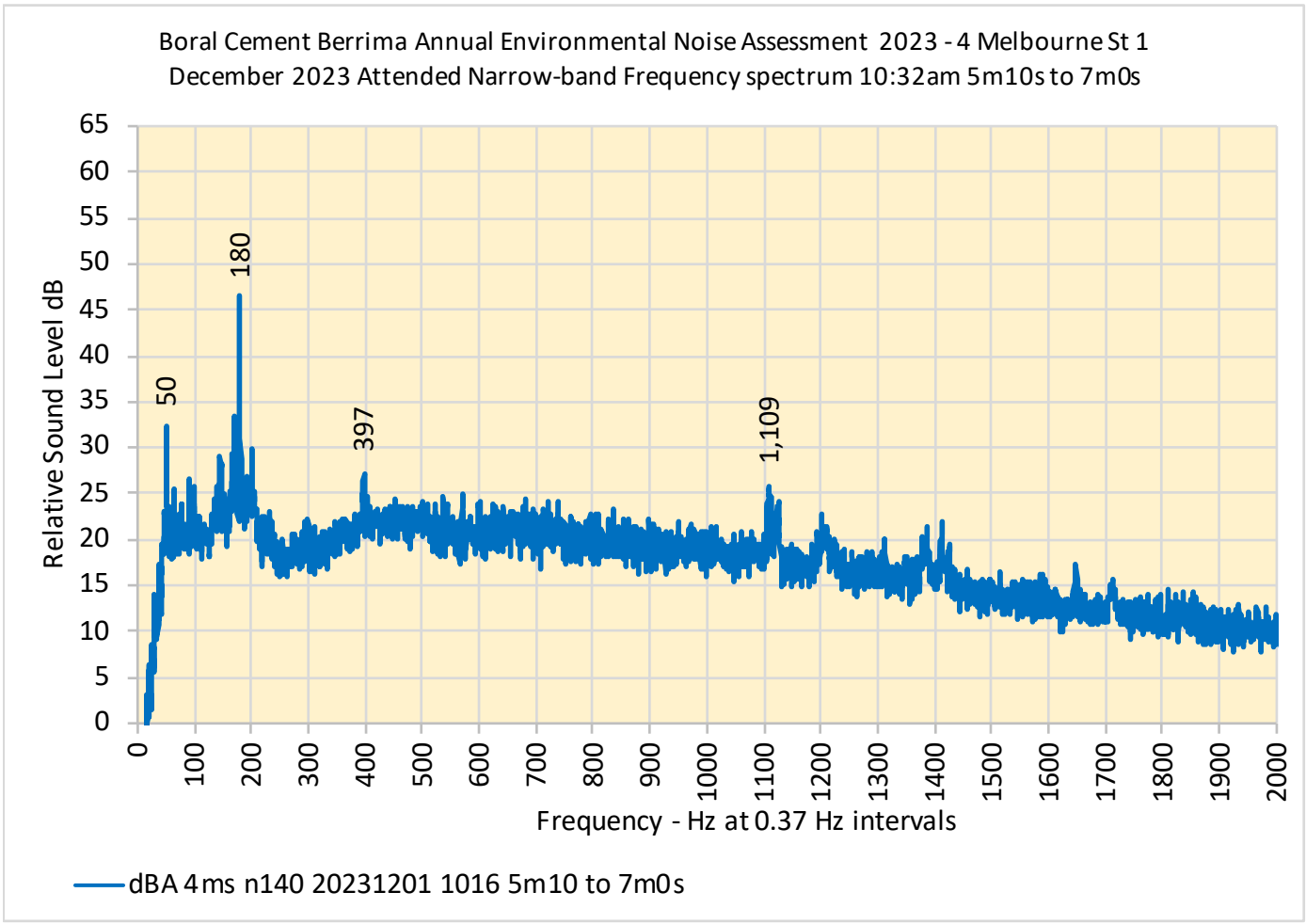
Appendix E Figure E 1B: 4 Melbourne St 1/12/23 10:32 2m31s 0-2000Hz



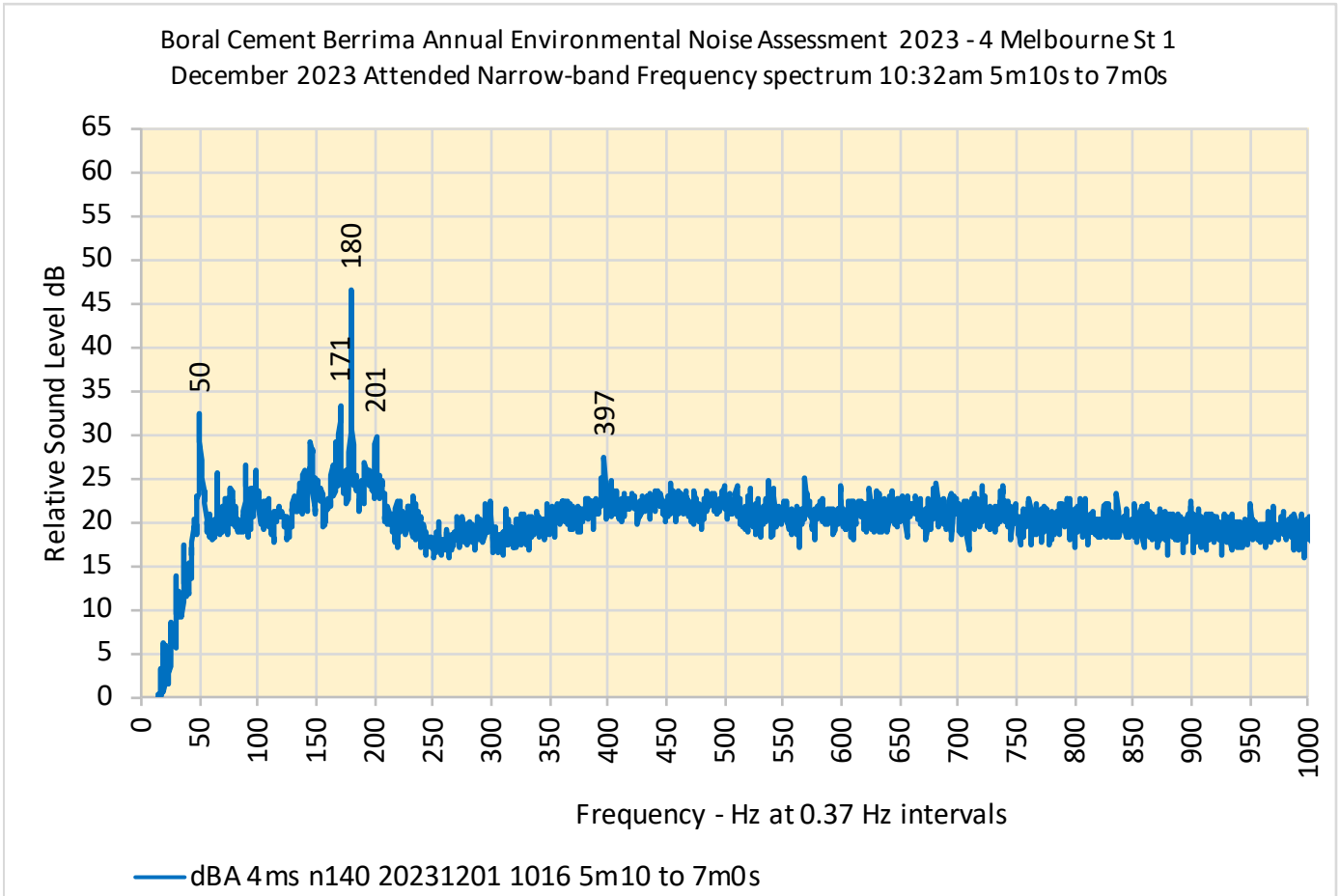
Appendix E Figure E 1C: 4 Melbourne St 1/12/23 10:32 2m31s 0-1000Hz



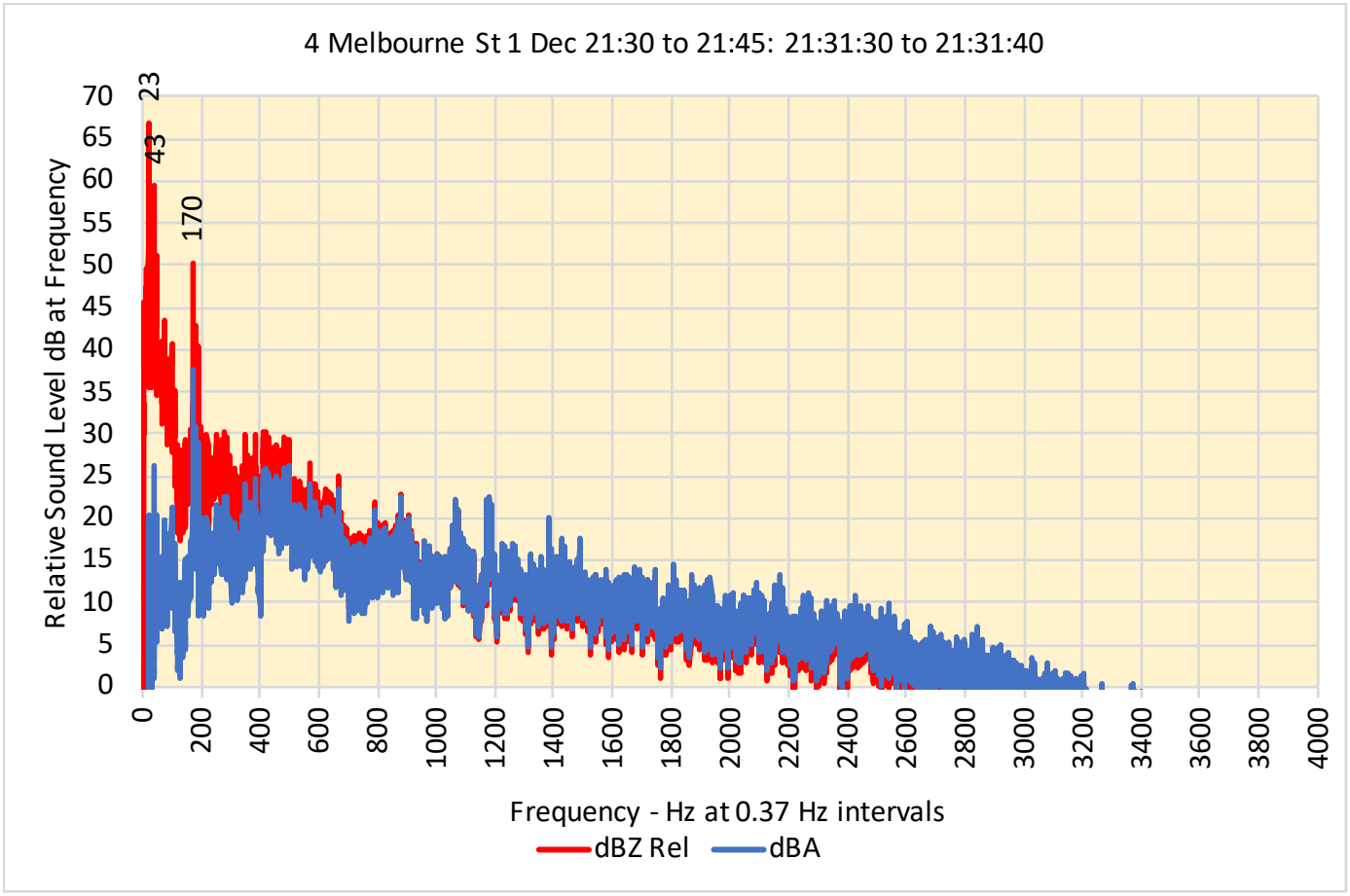
Appendix E Figure E 1D: 4 Melbourne St 1/12/23 10:32 5m10s 0-4000Hz



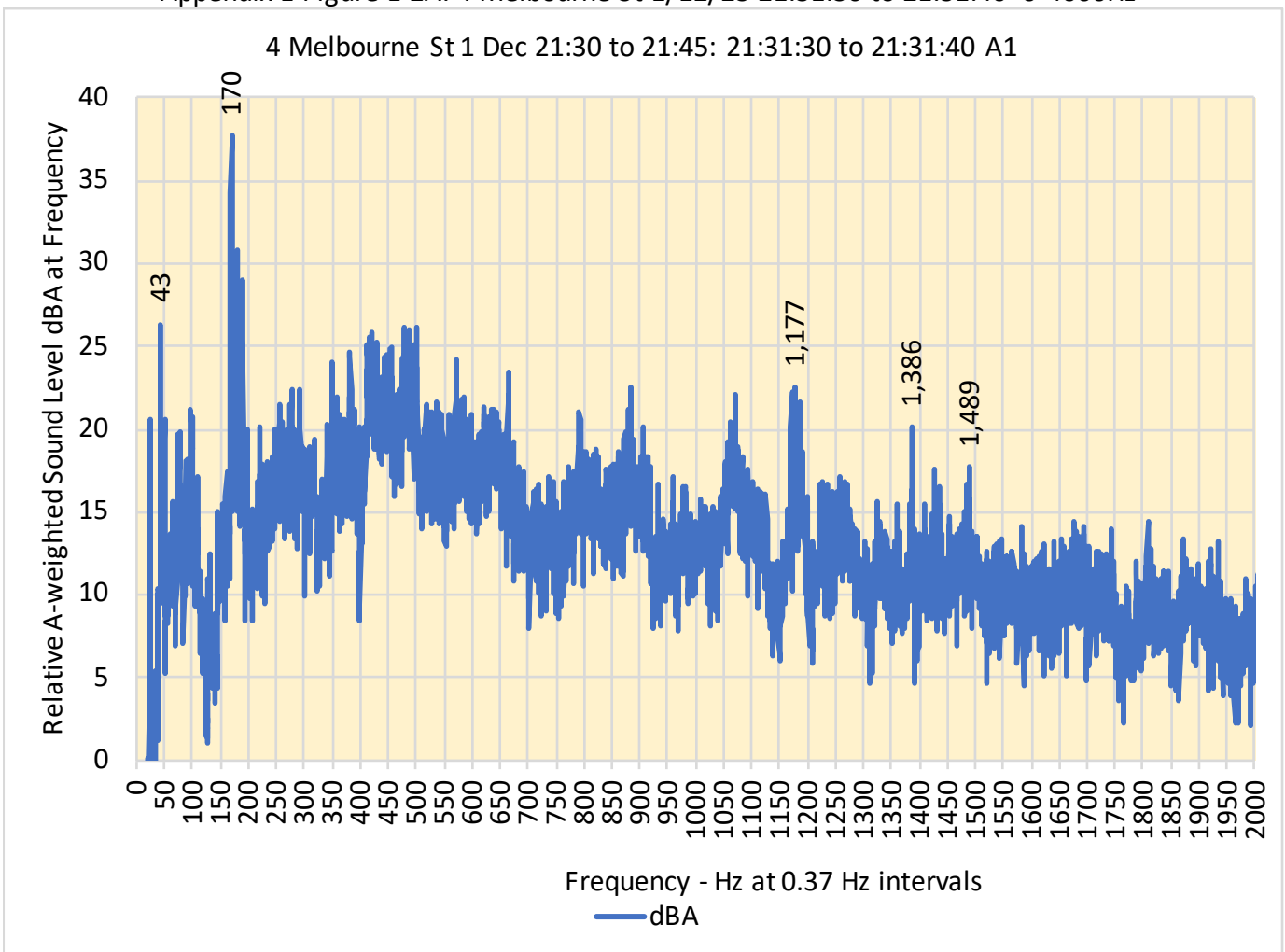
Appendix E Figure E 1E: 4 Melbourne St 1/12/23 10:32 5m10s 0-2000Hz



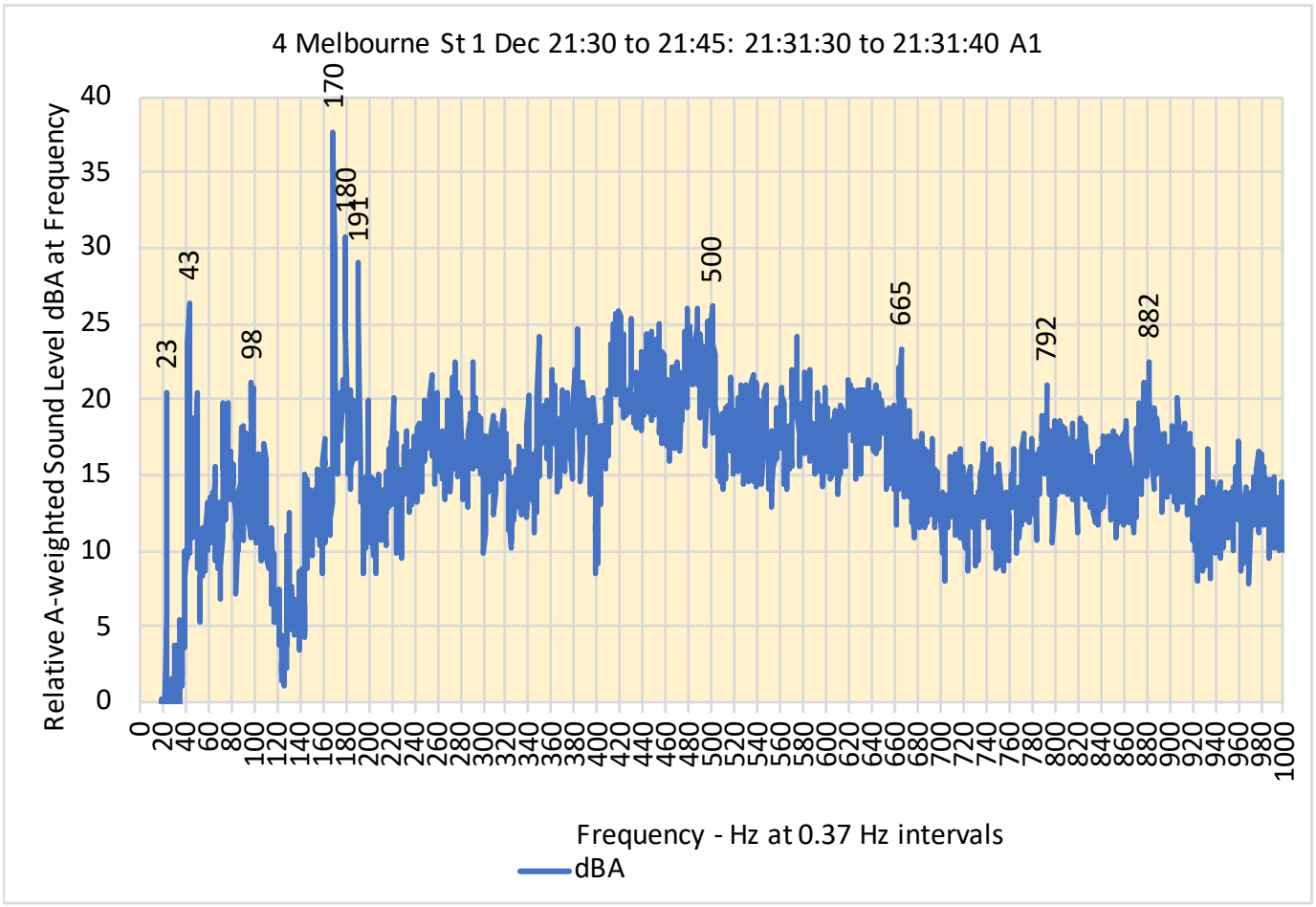
Appendix E Figure E 1F: 4 Melbourne St 1/12/23 10:32 5m10s 0-2000Hz



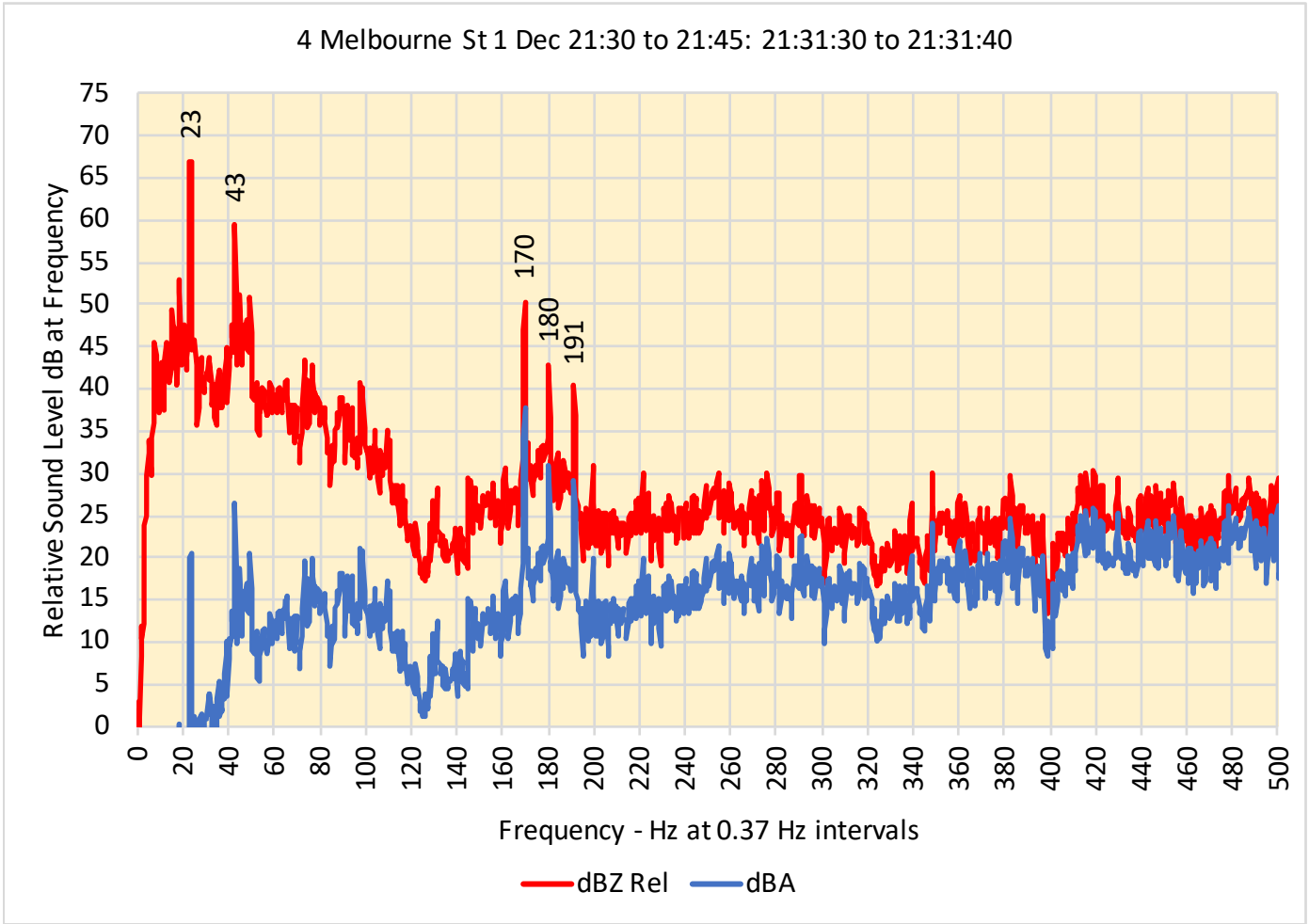
Appendix E Figure E 2A: 4 Melbourne St 1/12/23 21:31:30 to 21:31:40 0-4000Hz



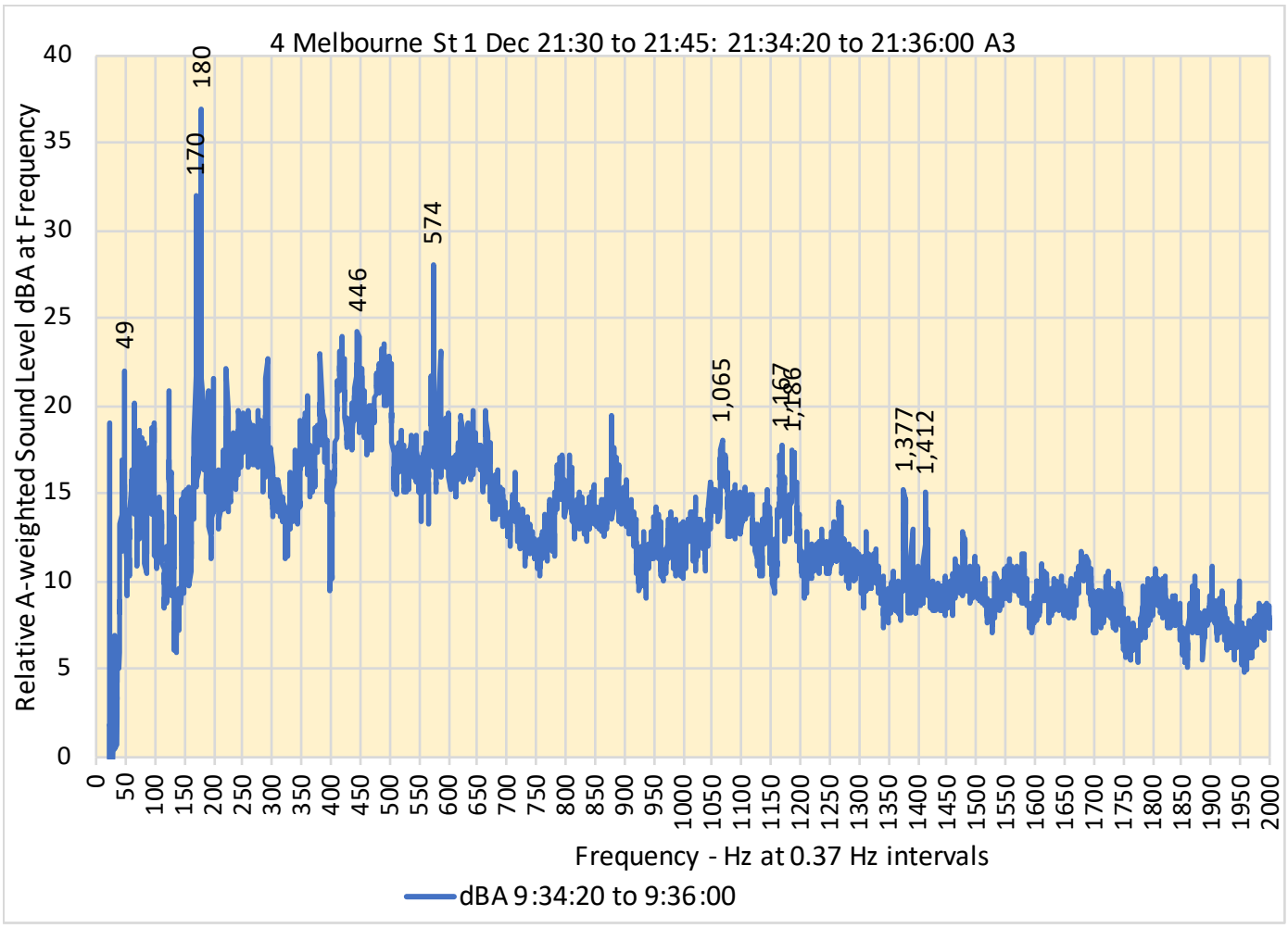
Appendix E Figure E 2B: 4 Melbourne St 1/12/23 21:31:30 to 21:31:40 0-2000Hz



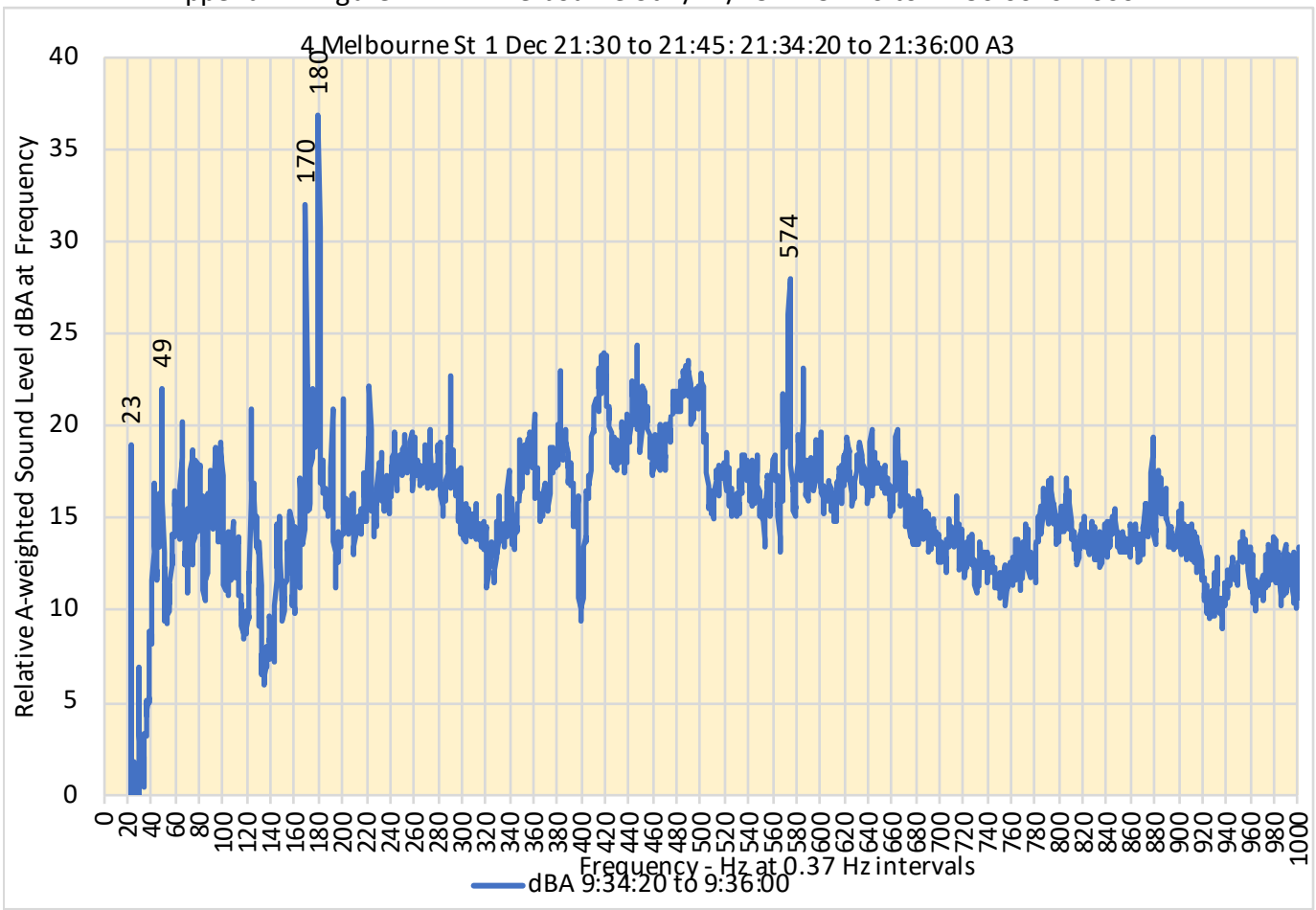
Appendix E Figure E 2C: 4 Melbourne St 1/12/23 21:31:30 to 21:31:40 0-1000Hz



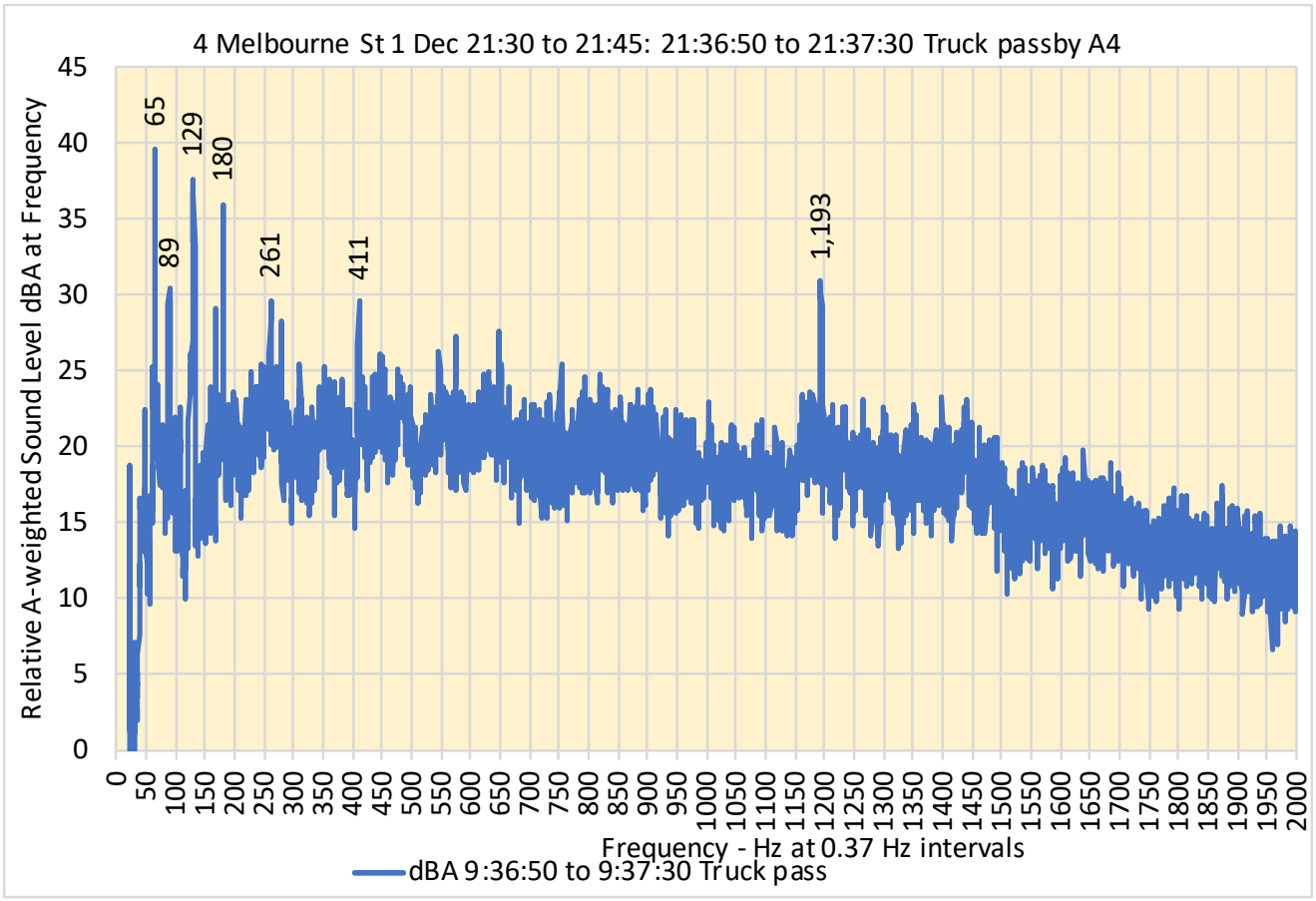
Appendix E Figure E 2D: 4 Melbourne St 1/12/23 21:41:20 to 21:41:40 0-500Hz



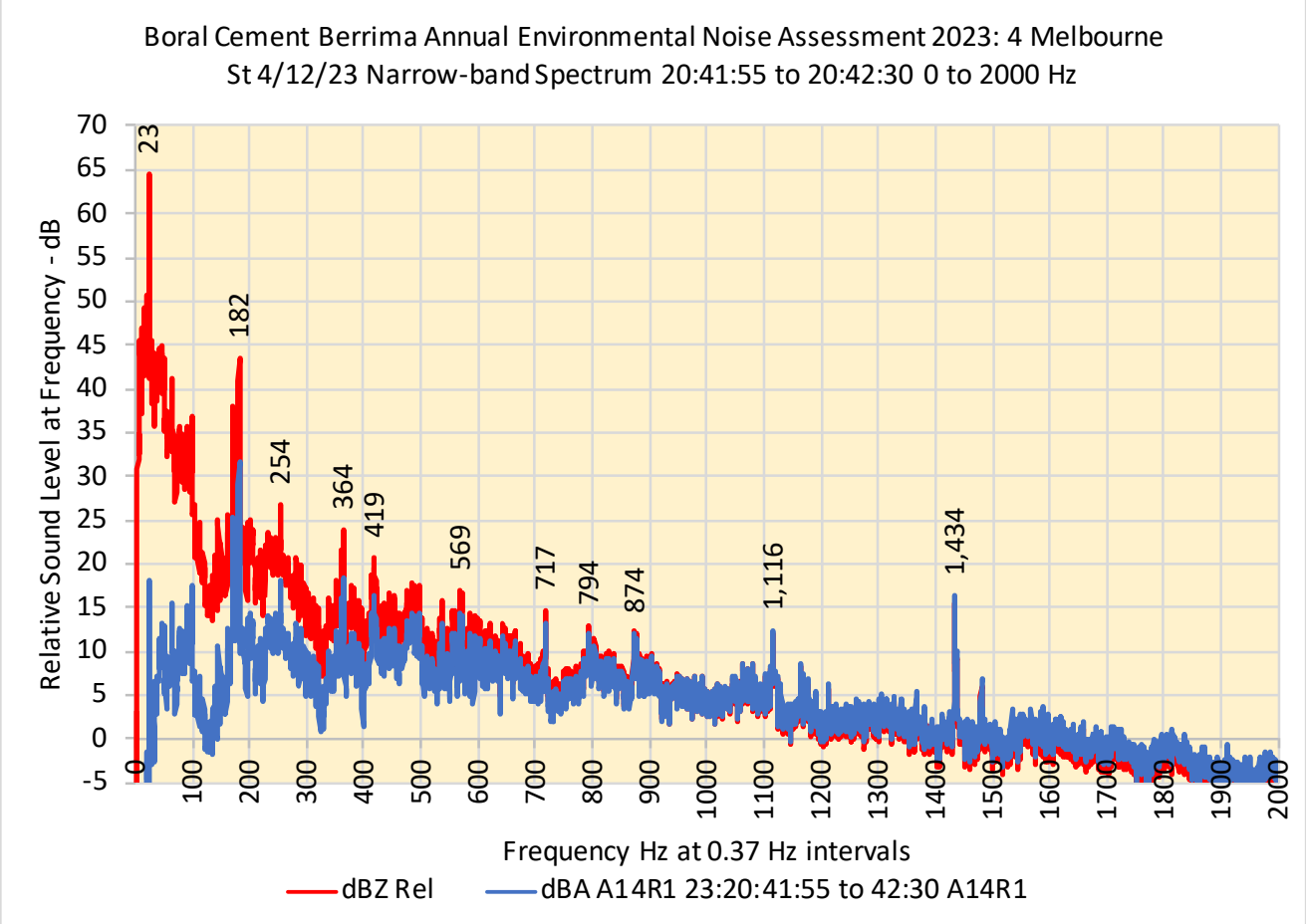
Appendix E Figure E 2E: 4 Melbourne St 1/12/23 21:34:20 to 21:36:00 0-2000Hz



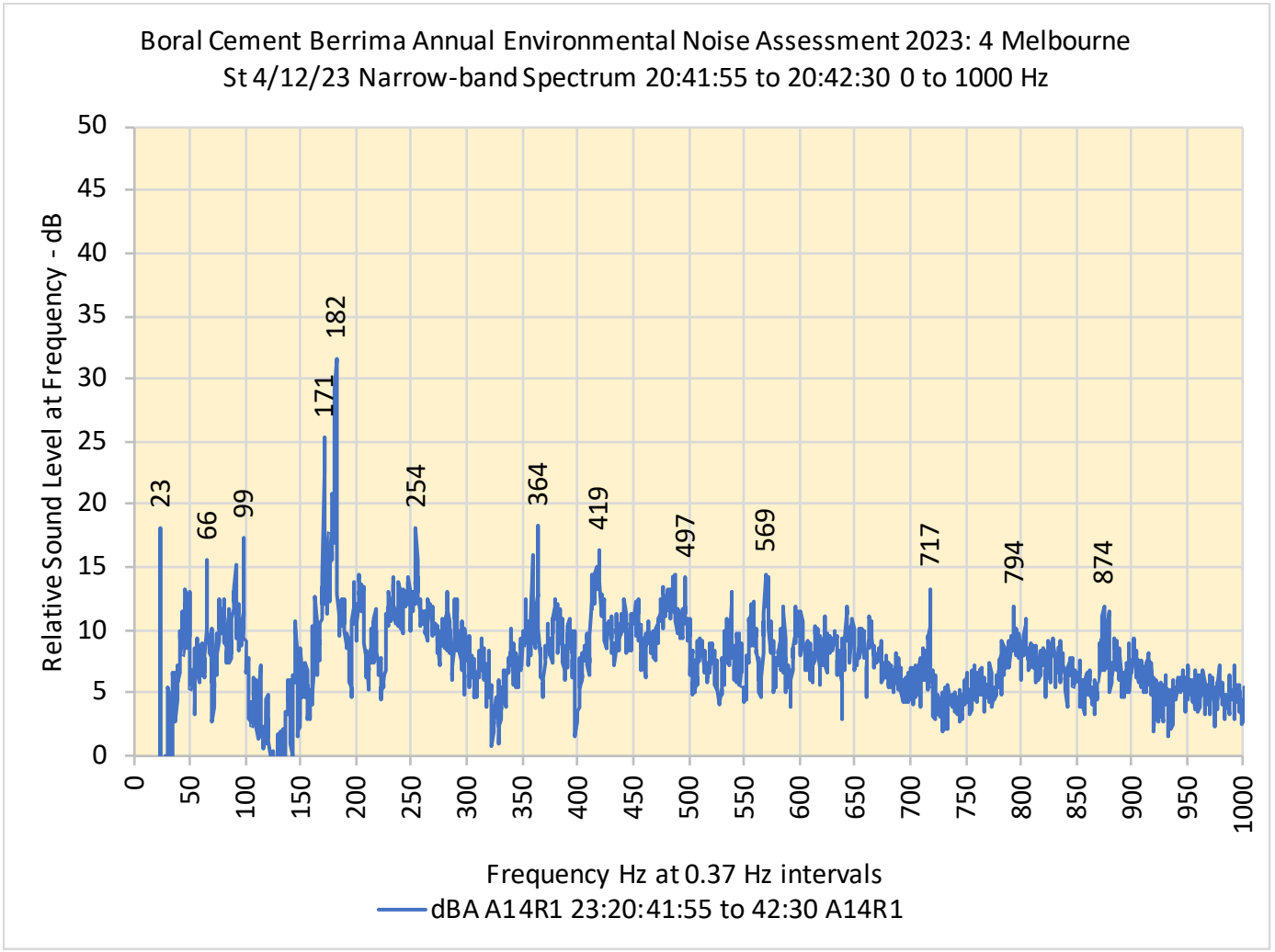
Appendix E Figure E 2F: 4 Melbourne St 1/12/23 21:34:20 to 21:36:00 0-1000Hz



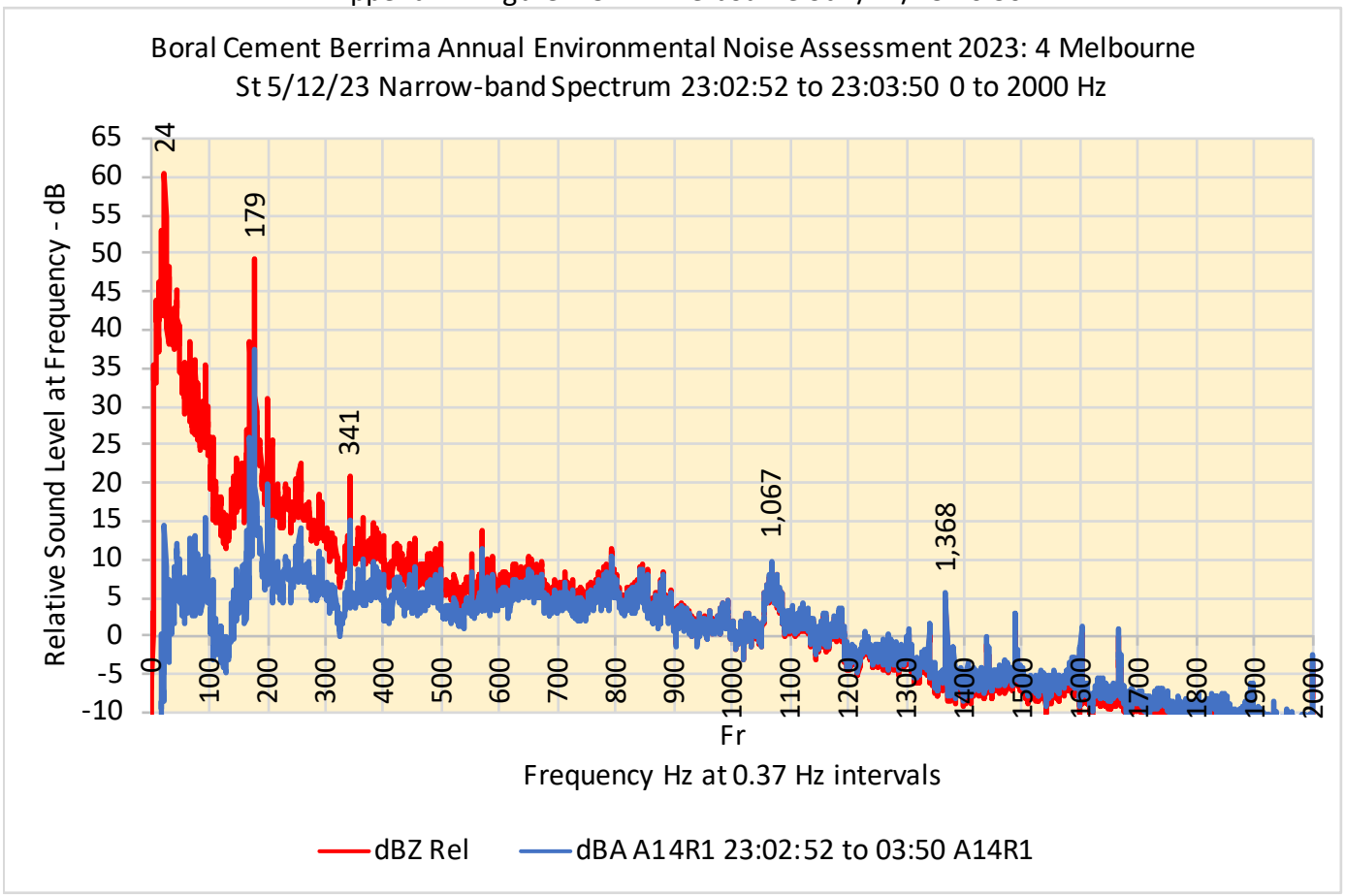
Appendix E Figure E 2G: 4 Melbourne St 1/12/23 21:36:50 to 21:37:30 Truck pass 0-2000Hz



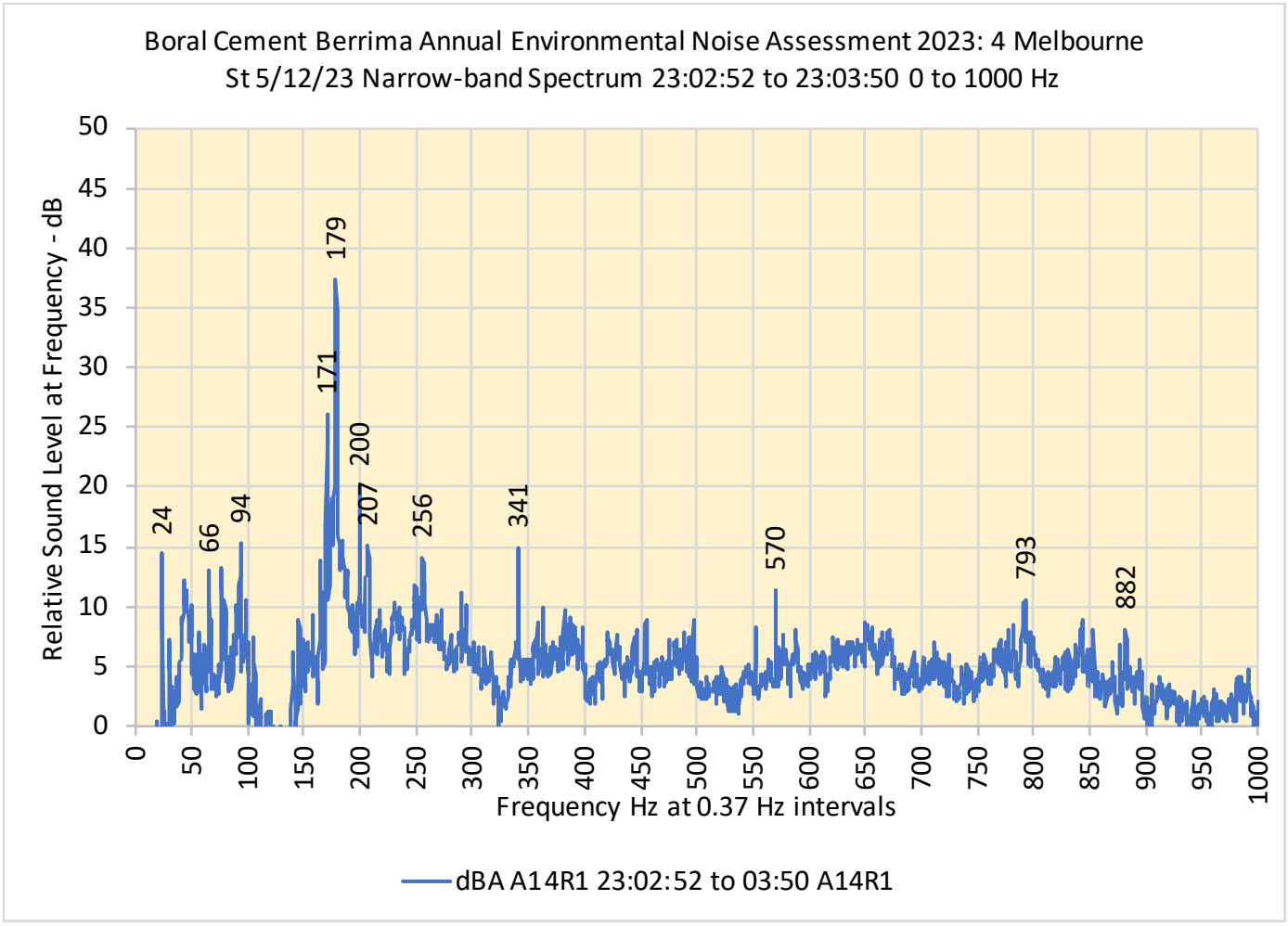
Appendix E Figure E 3A: 4 Melbourne St 4/12/23 20:30



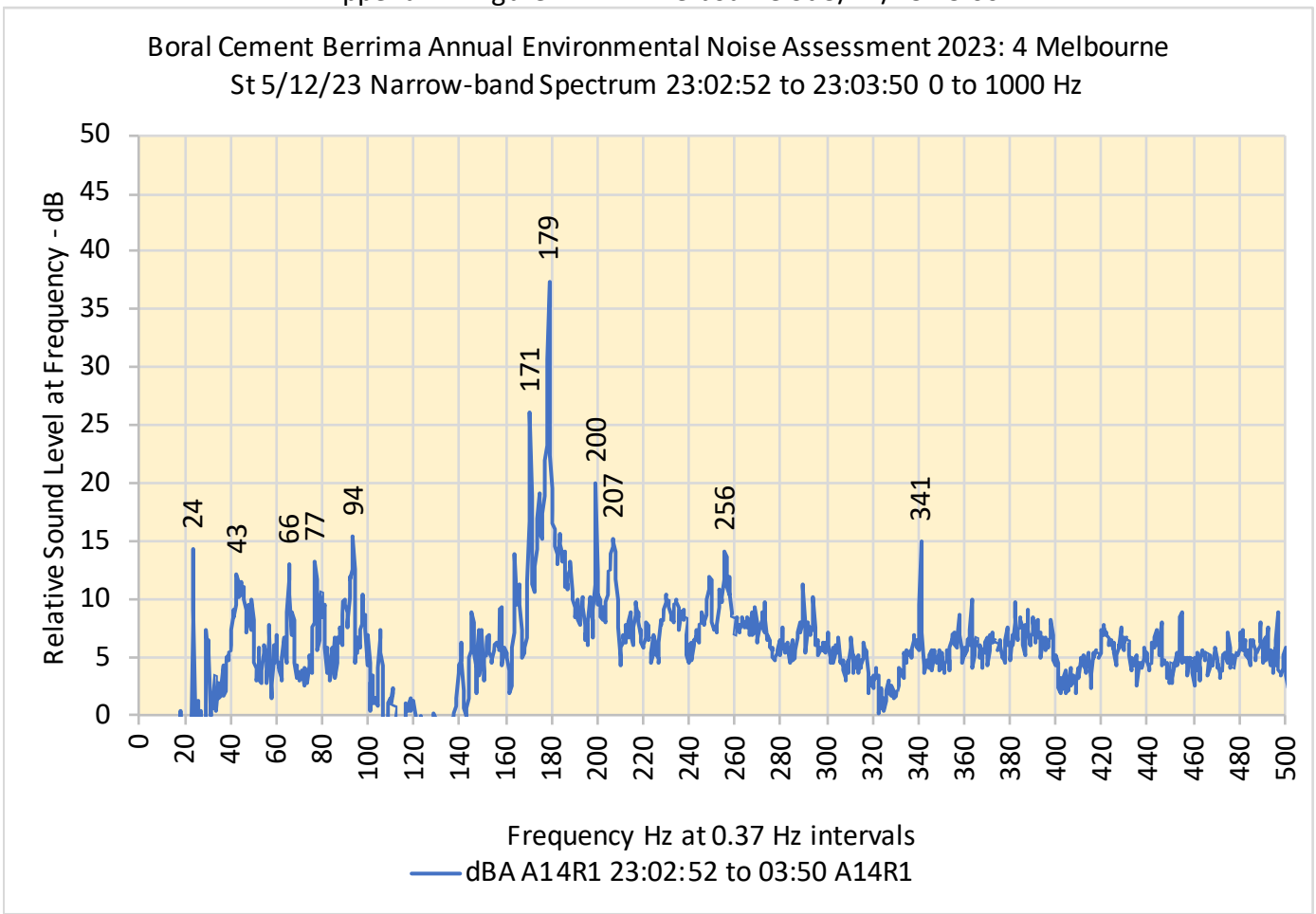
Appendix E Figure E 3B: 4 Melbourne St 4/12/23 20:30



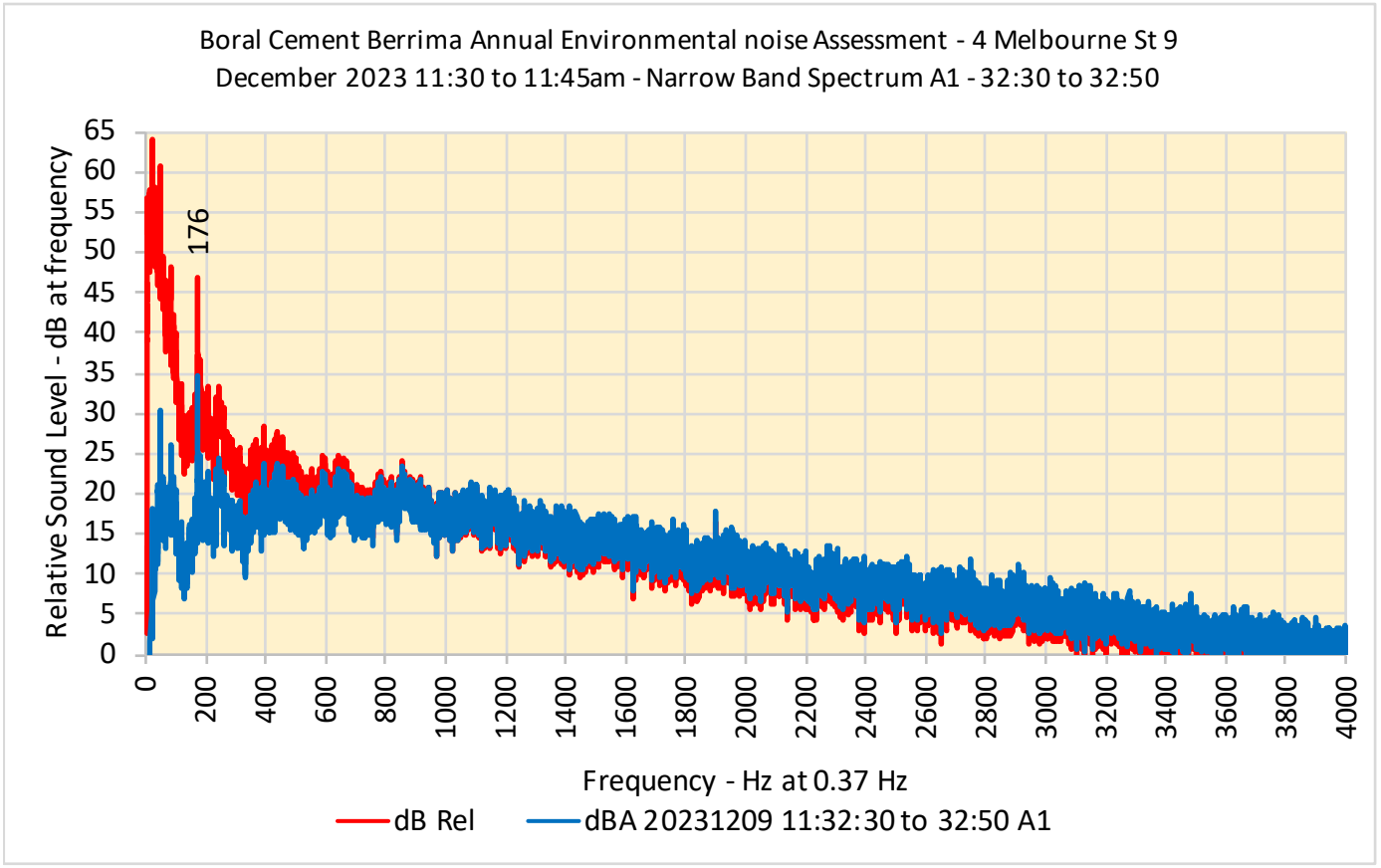
Appendix E Figure E 4A: 4 Melbourne St 5/12/23 23:00



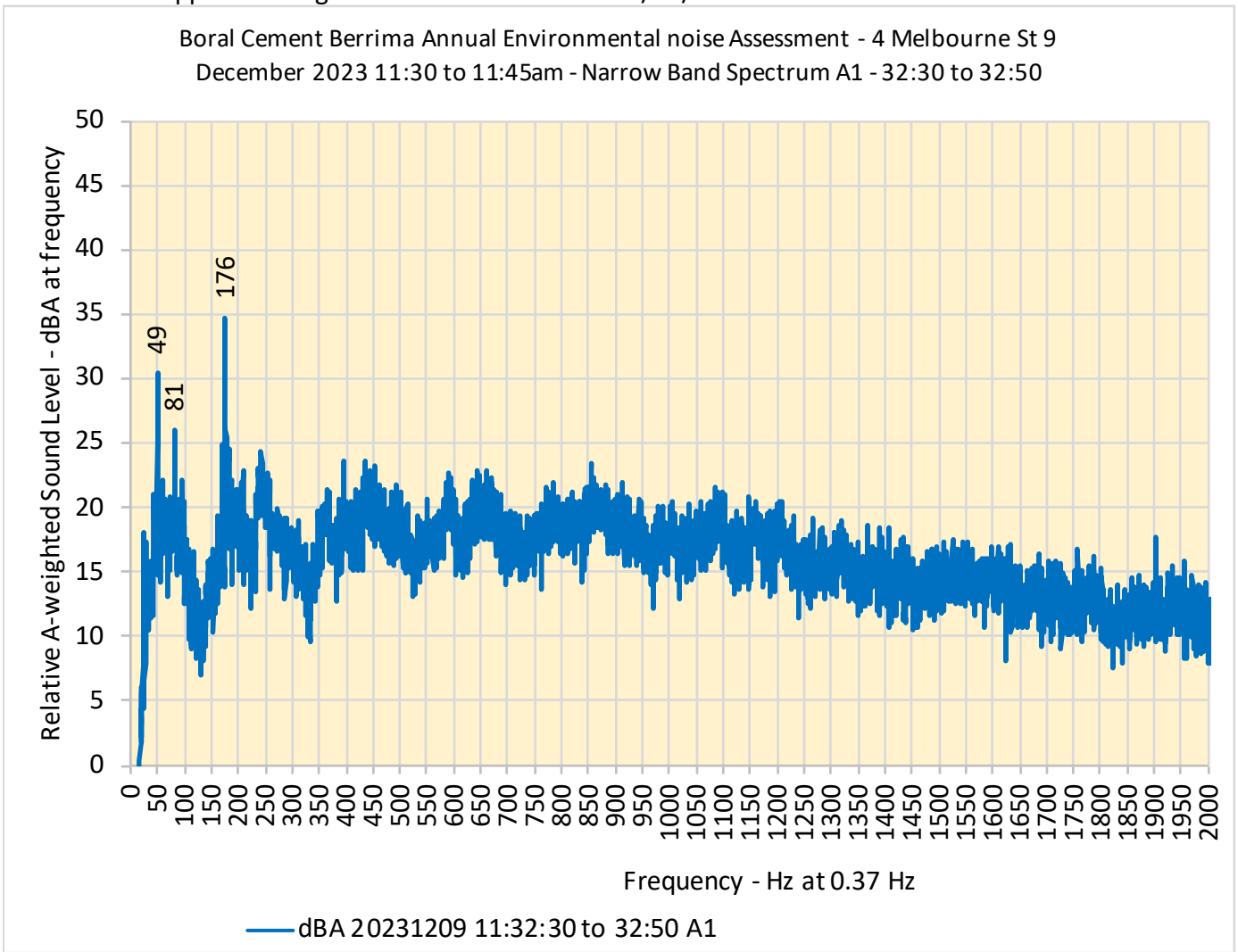
Appendix E Figure E 4B: 4 Melbourne St 5/12/23 23:00



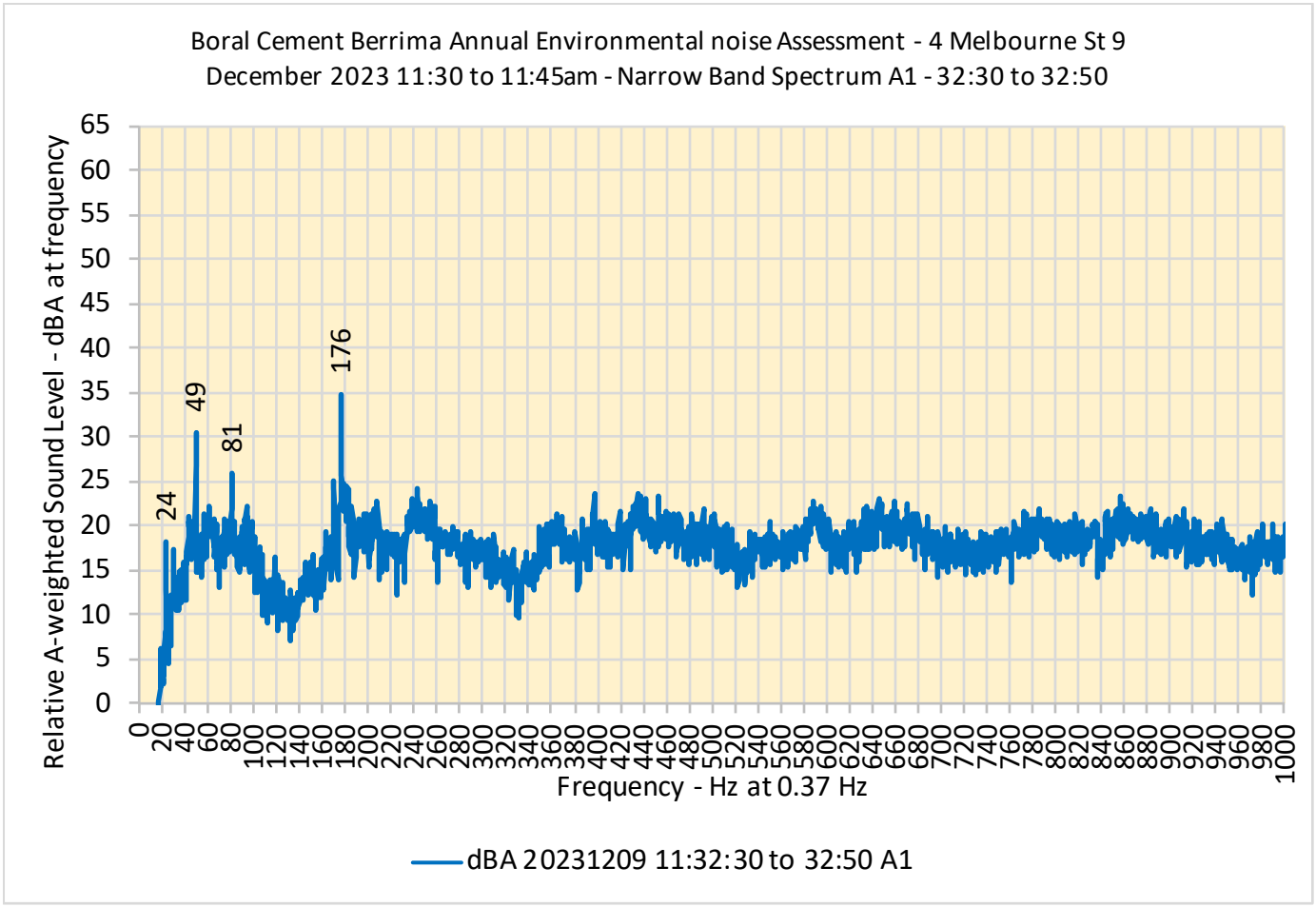
Appendix E Figure E 4C: 4 Melbourne St 5/12/23 23:00



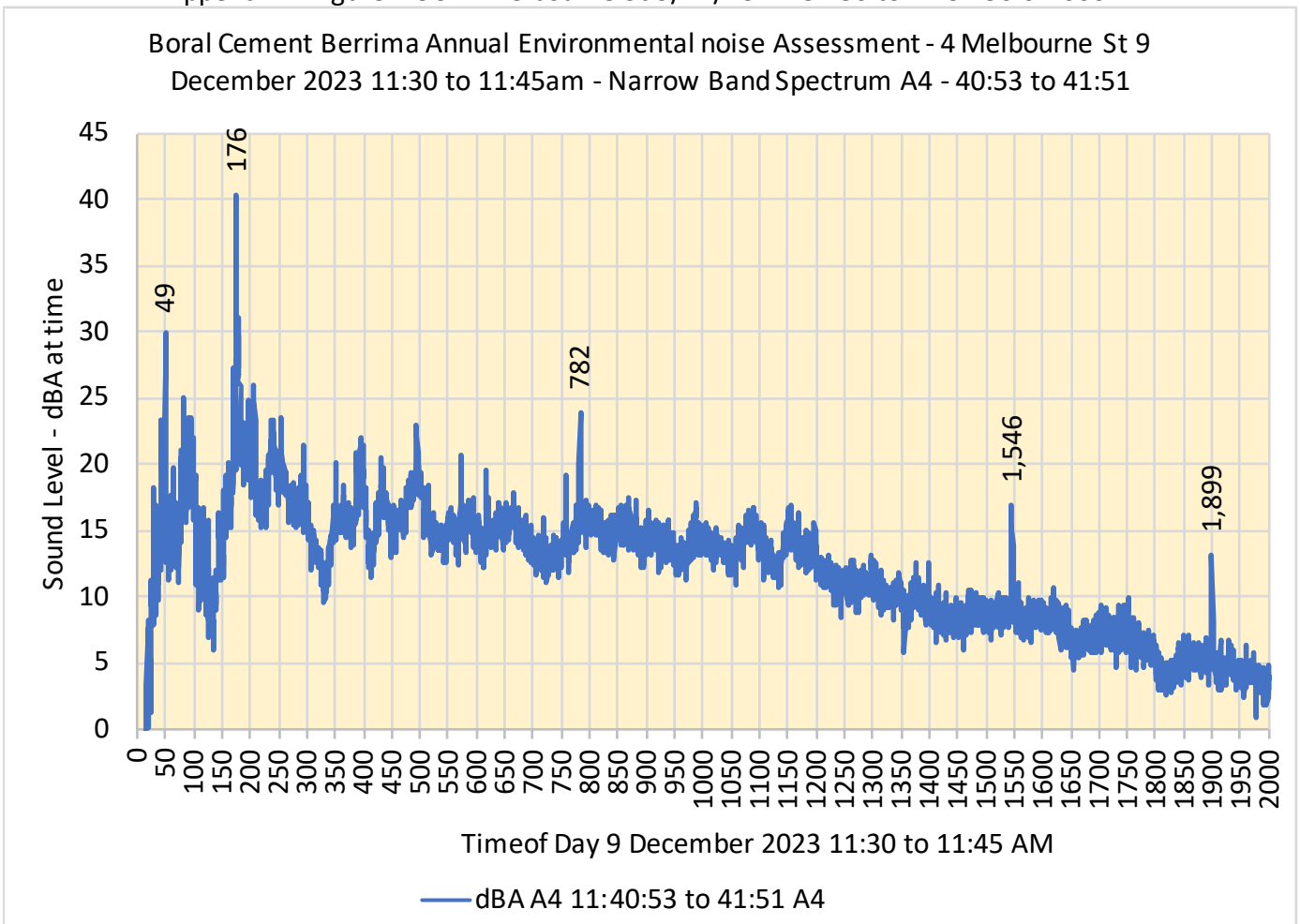
Appendix E Figure E 5A: 4 Melbourne St 9/12/23 11:32:30 to 11:32:50 0-4000 Hz



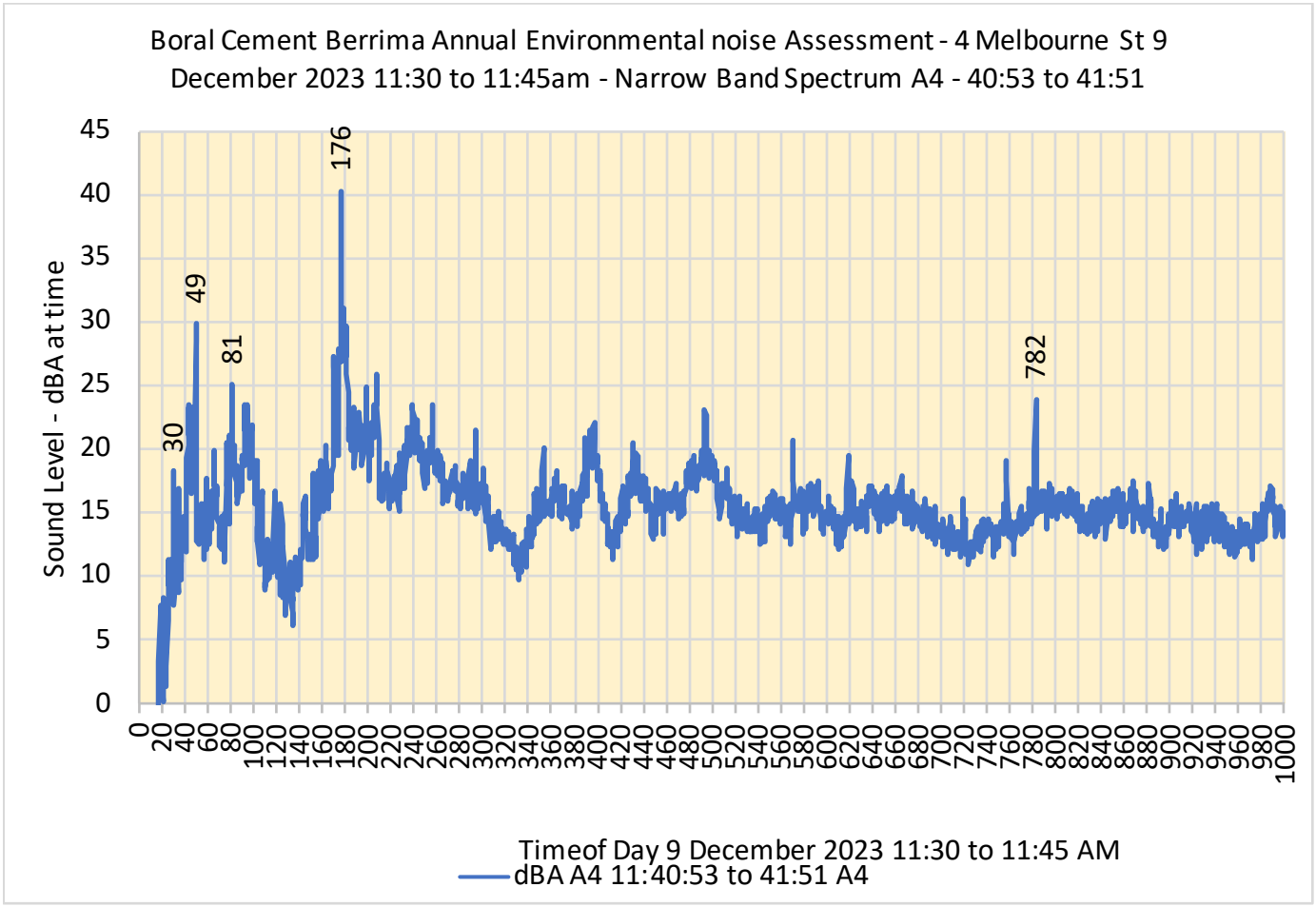
Appendix E Figure E 5B: 4 Melbourne St 9/12/23 11:32:30 to 11:32:50 0-2000 Hz



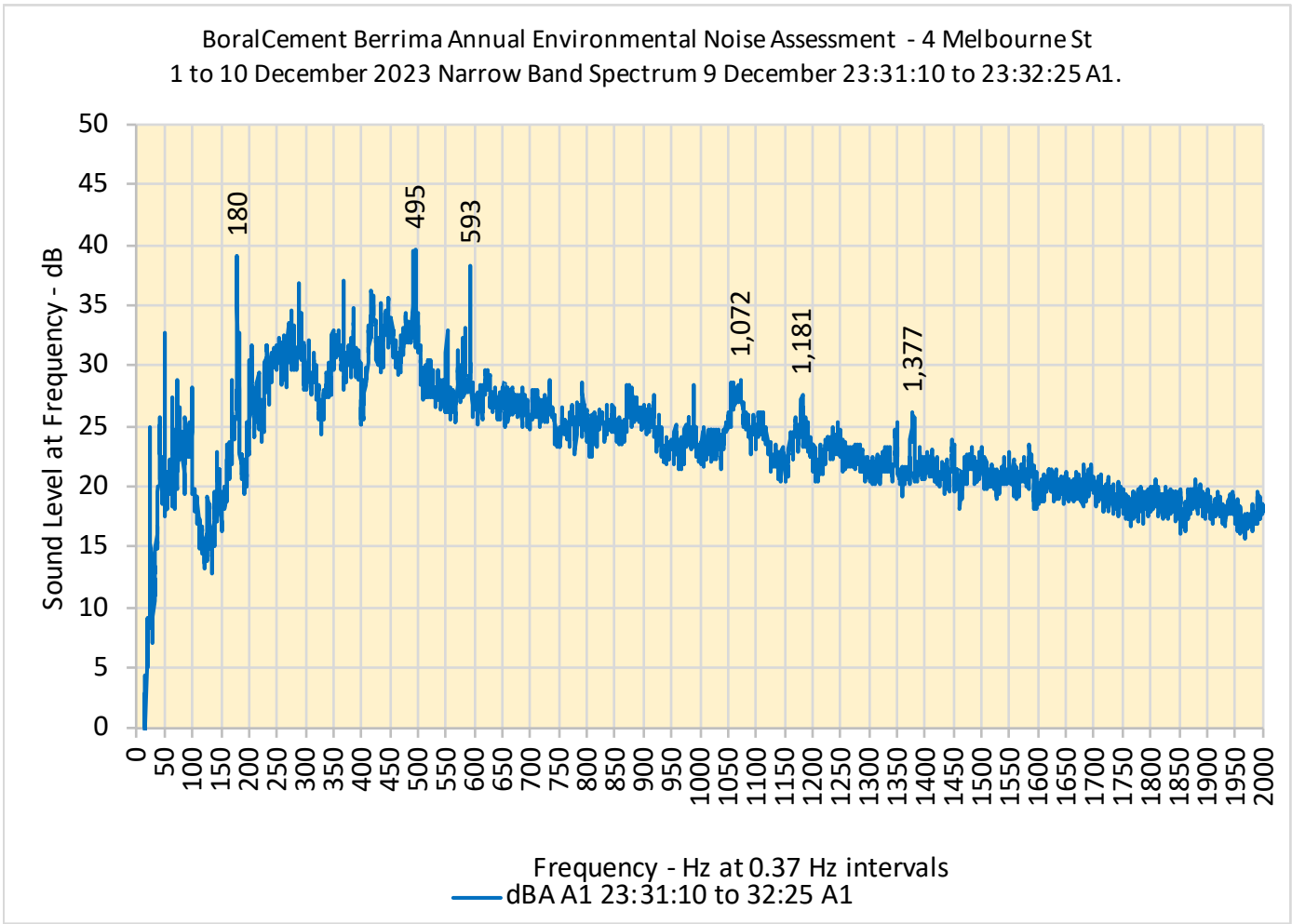
Appendix E Figure E 5C: 4 Melbourne St 9/12/23 11:32:30 to 11:32:50 0-1000 Hz



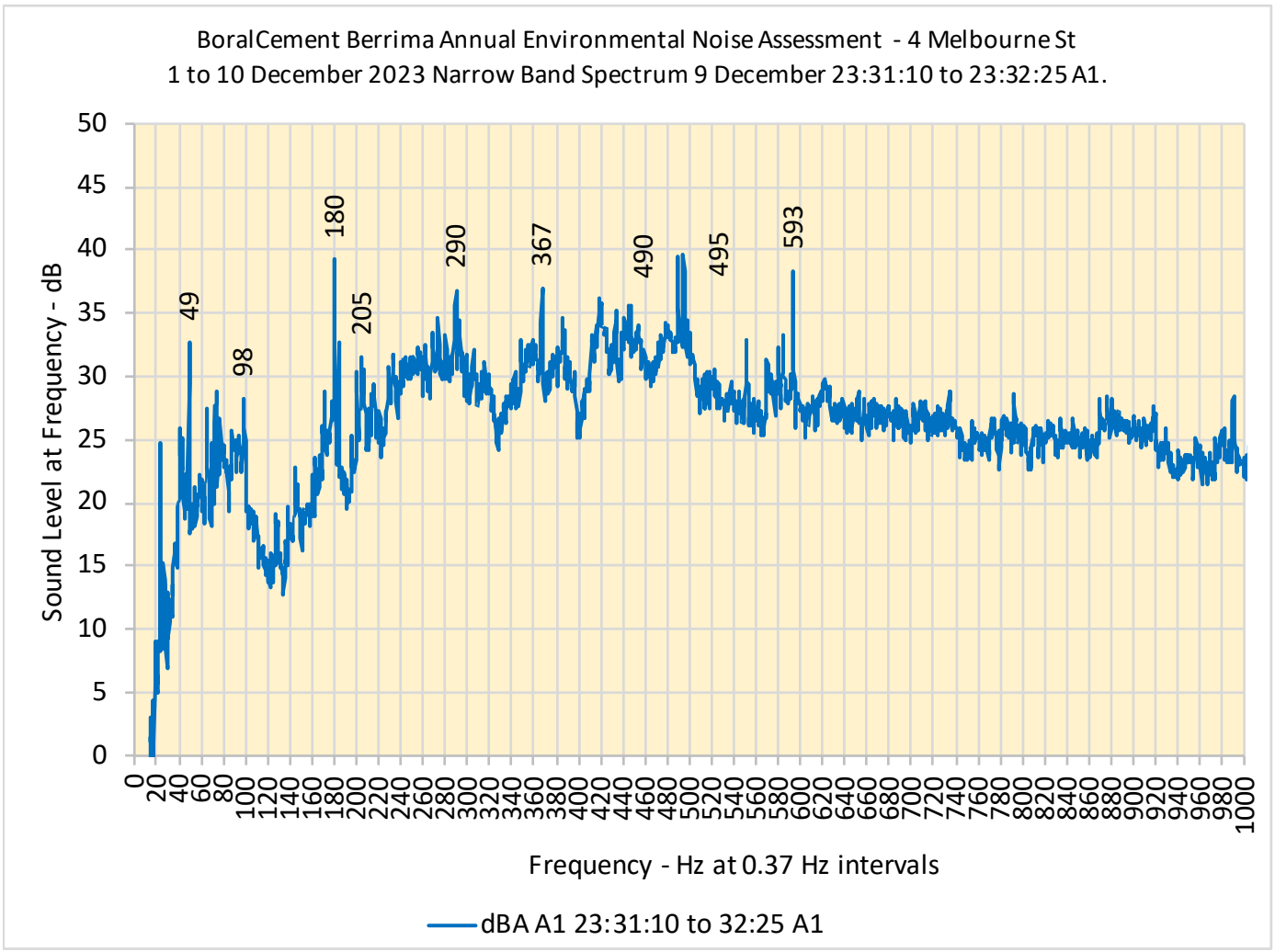
Appendix E Figure E 5D: 4 Melbourne St 9/12/23 11:40:53 to 11:41:51 0-2000 Hz



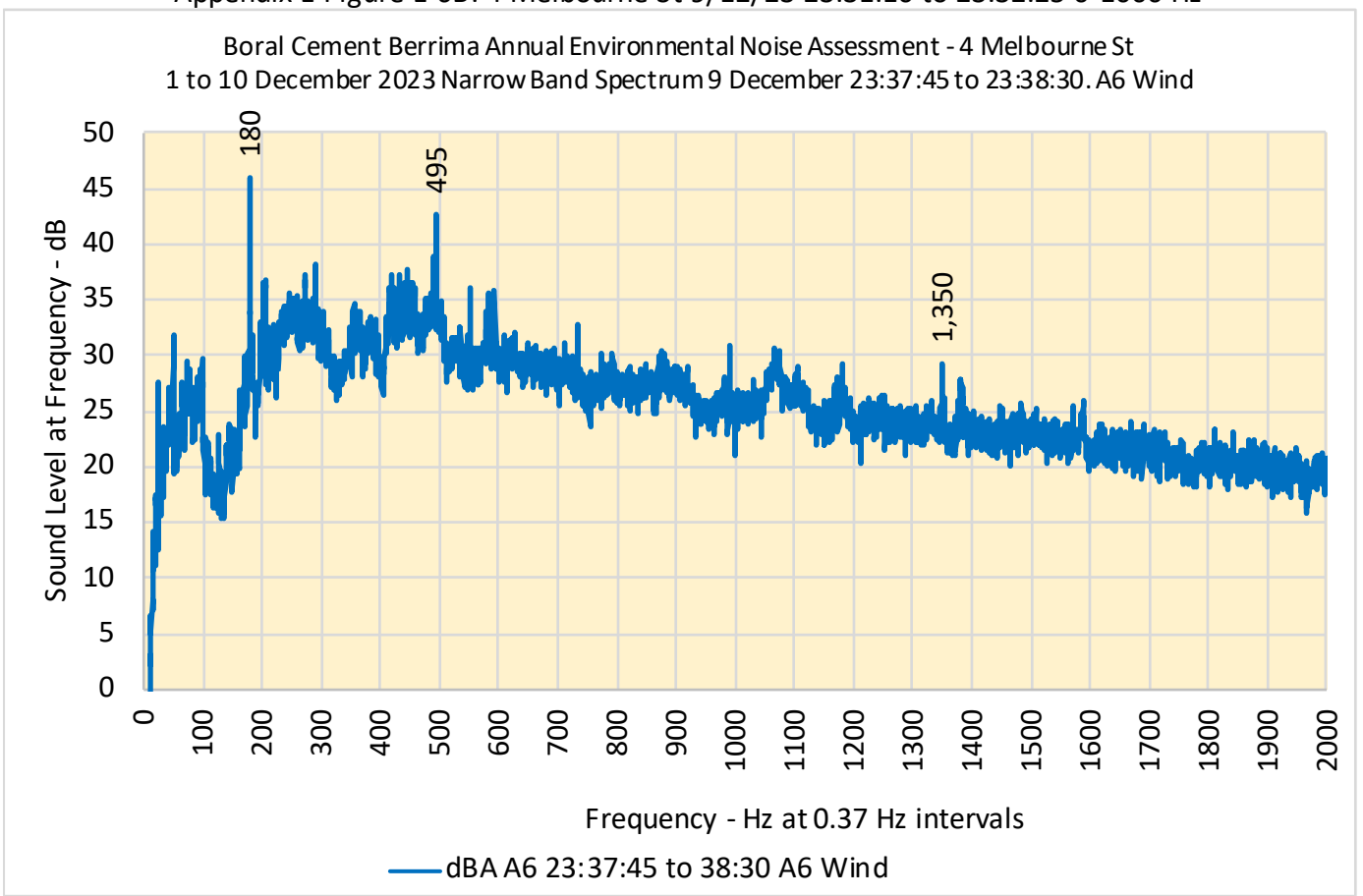
Appendix E Figure E 5E: 4 Melbourne St 9/12/23 11:40:53 to 11:41:51 0-1000 Hz



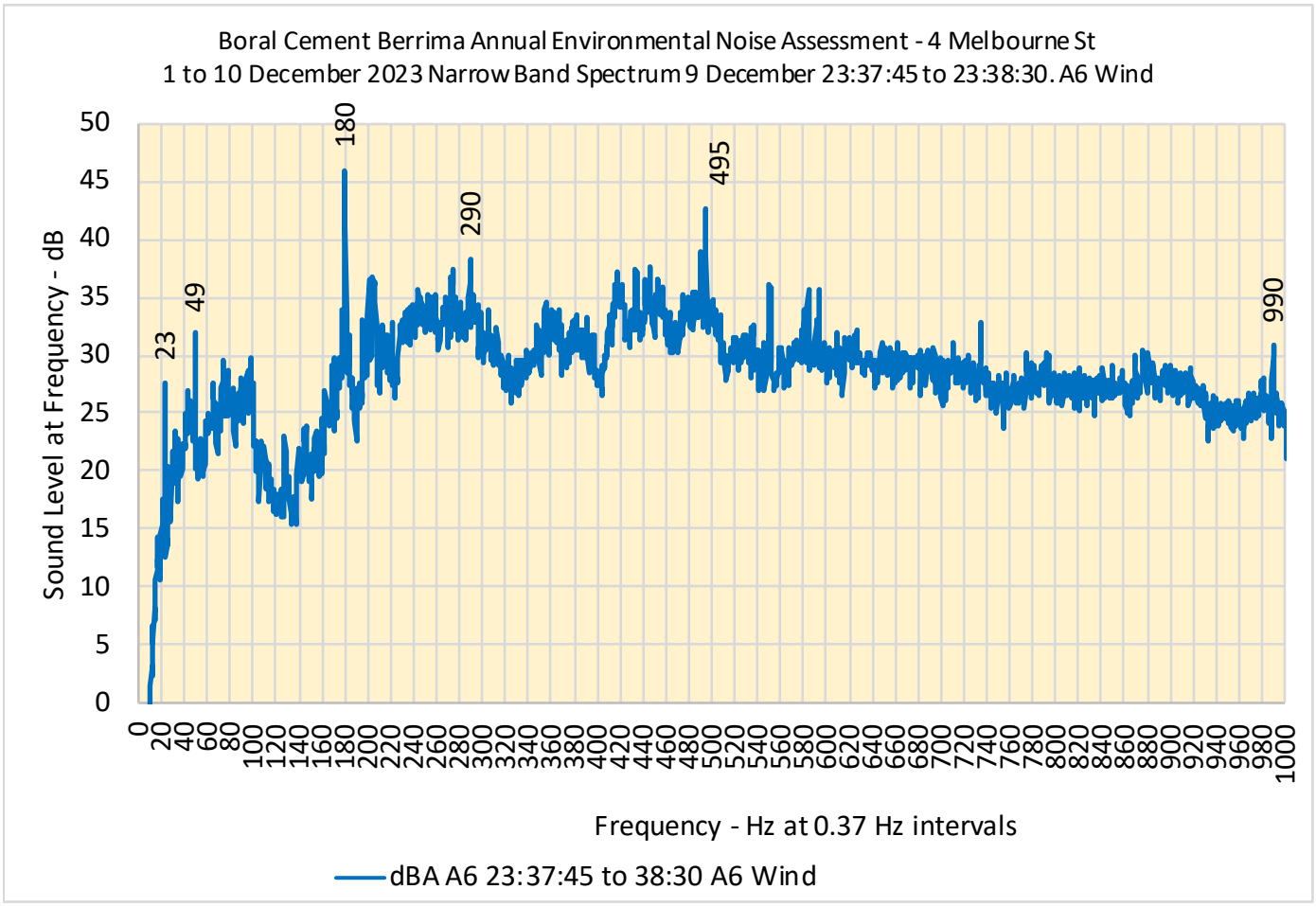
Appendix E Figure E 6A: 4 Melbourne St 9/12/23 23:31:10 to 23:32:25 0-2000 Hz



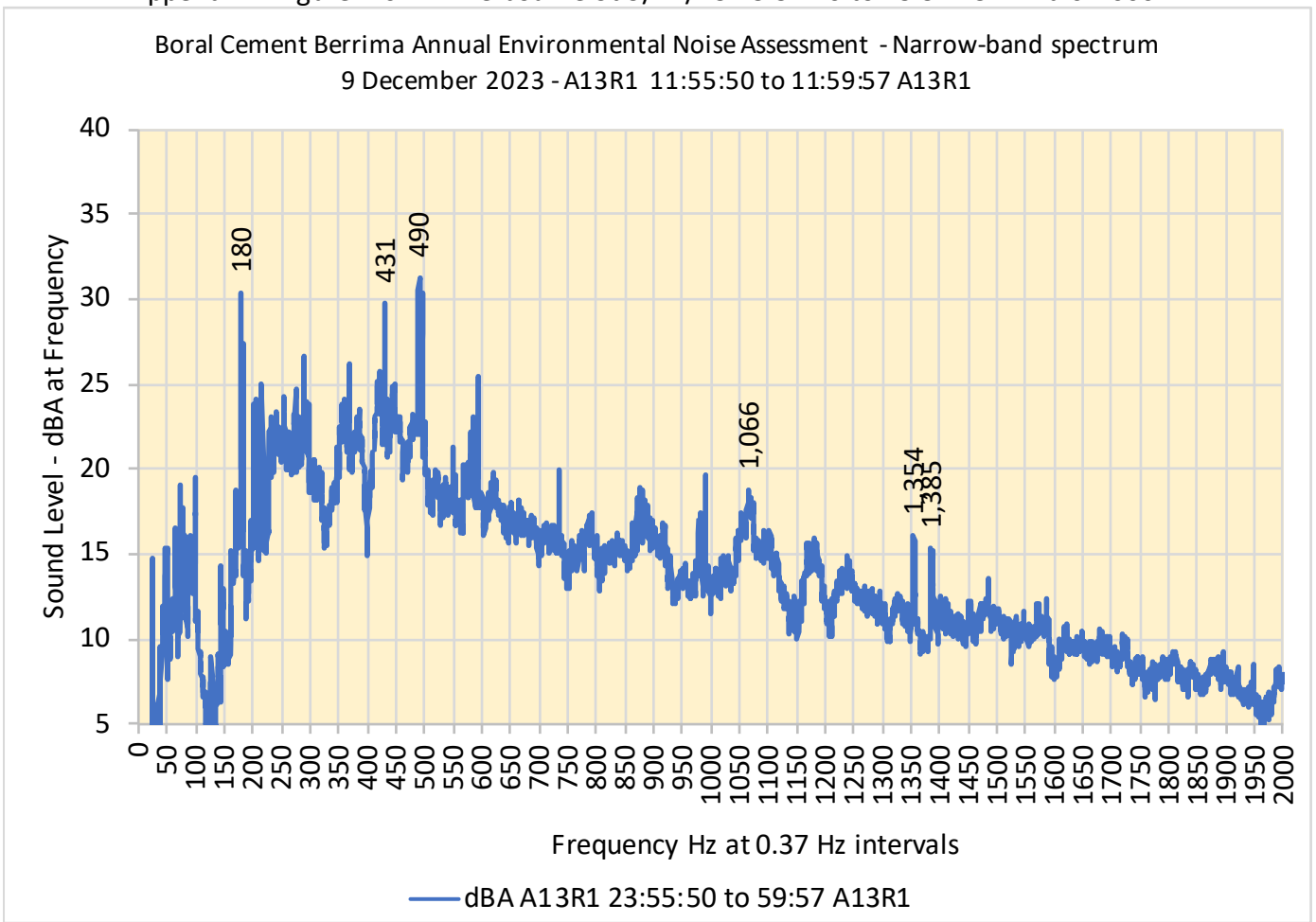
Appendix E Figure E 6B: 4 Melbourne St 9/12/23 23:31:10 to 23:32:25 0-1000 Hz



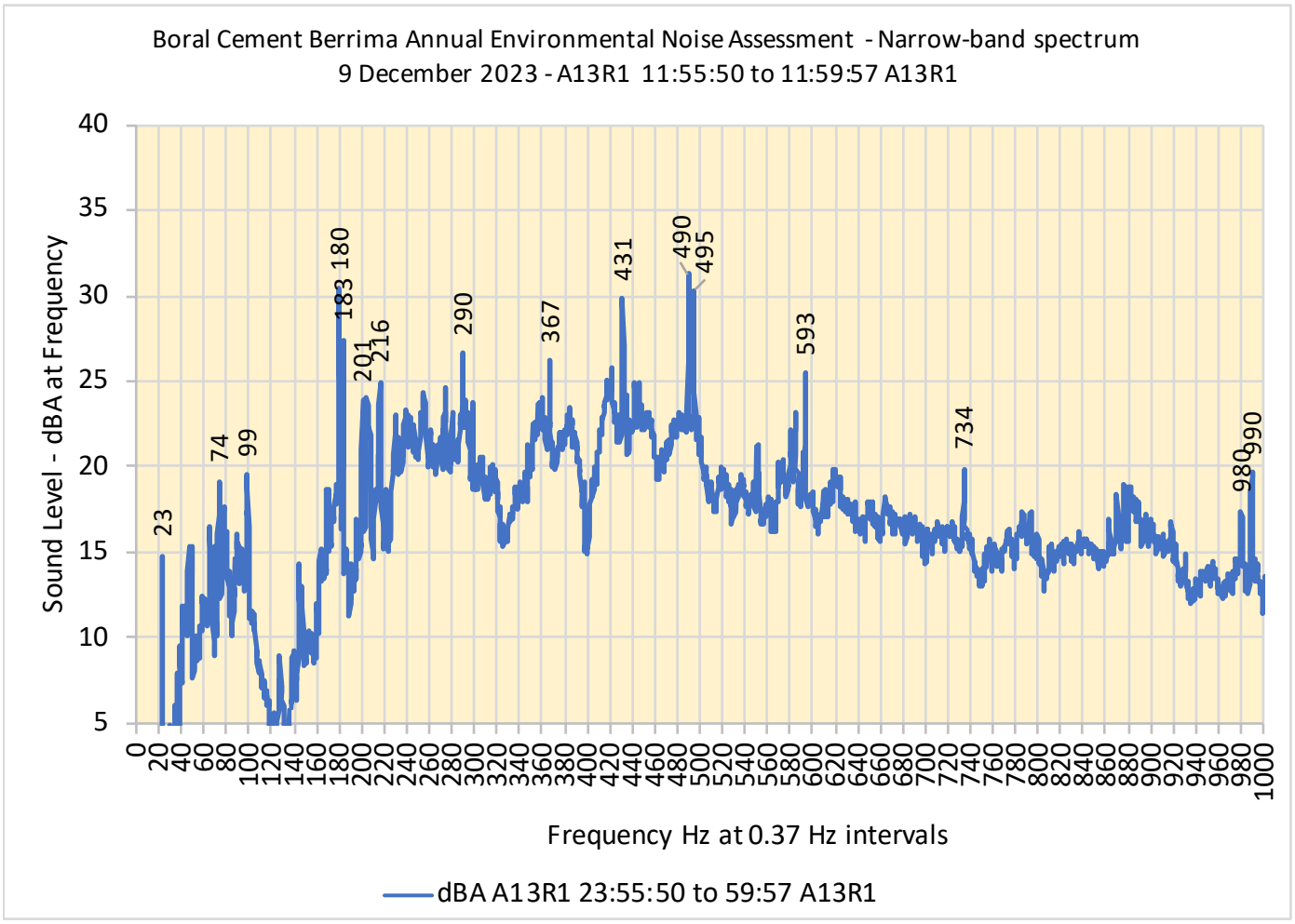
Appendix E Figure E 6C: 4 Melbourne St 9/12/23 23:31:10 to 23:32:25 Wind 0-2000 Hz



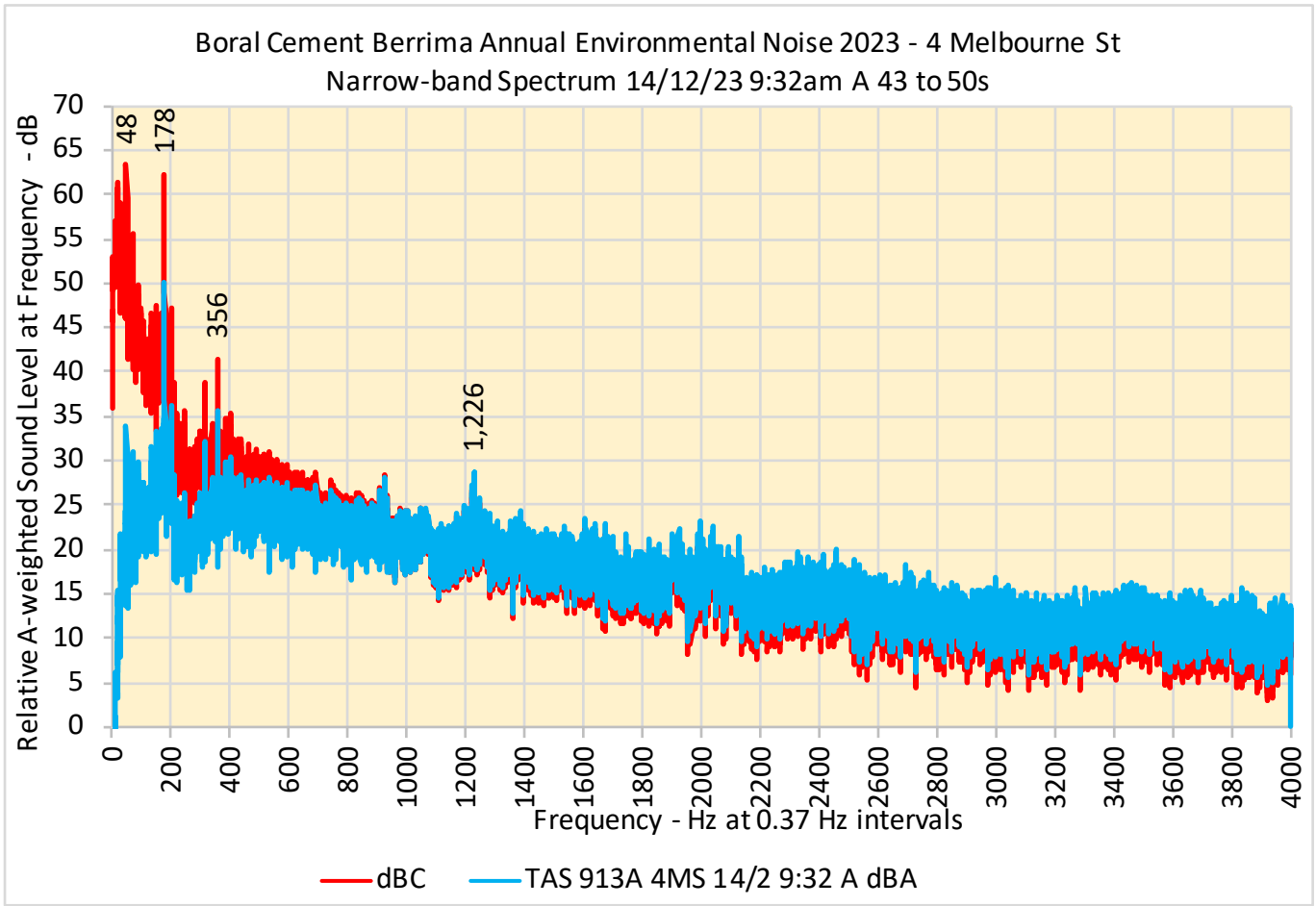
Appendix E Figure E 6D: 4 Melbourne St 9/12/23 23:31:10 to 23:32:25 Wind 0-1000 Hz



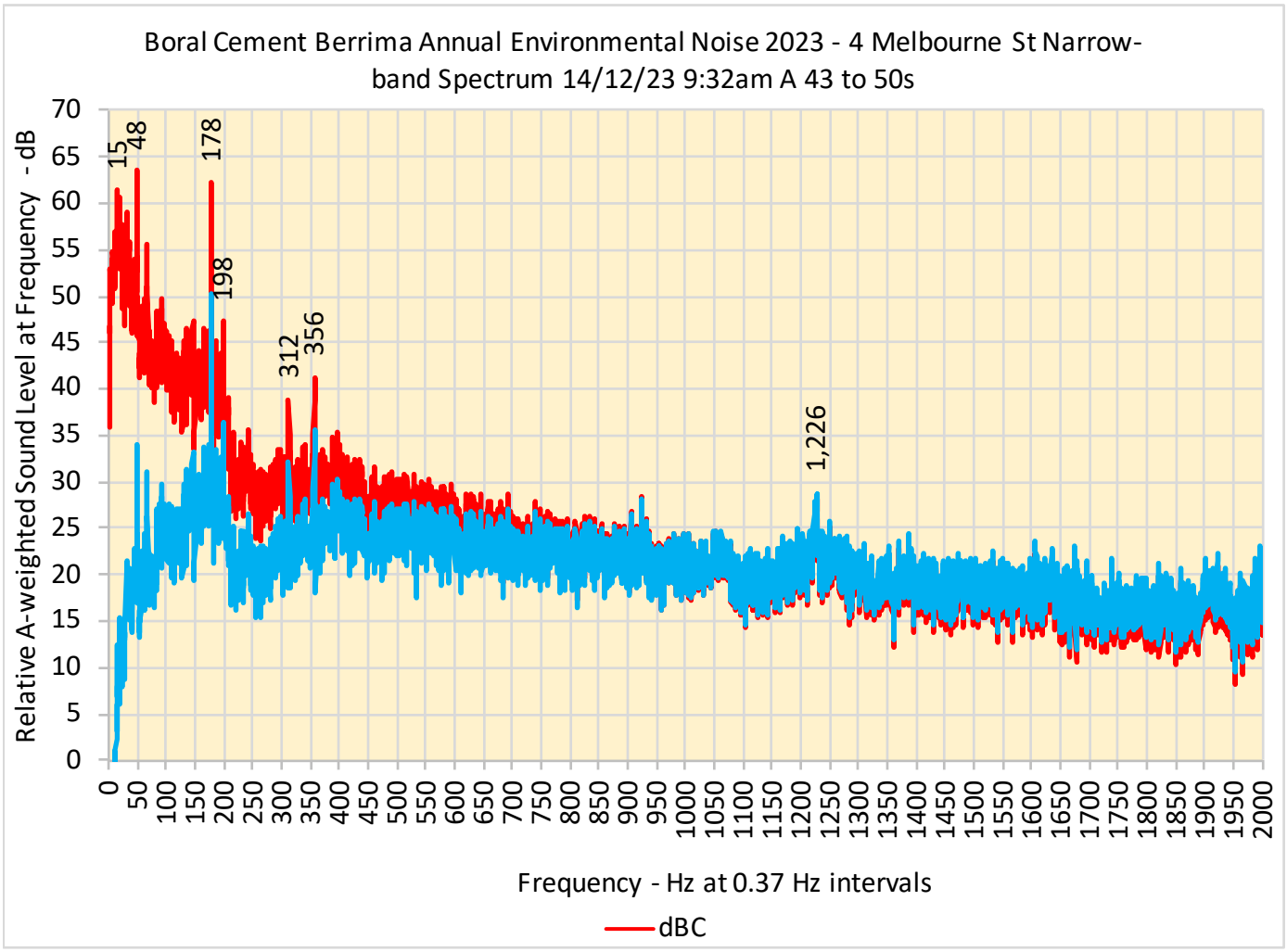
Appendix E Figure E 6E: 4 Melbourne St 9/12/23 23:55:50 to 23:59:57 Wind 0-2000 Hz



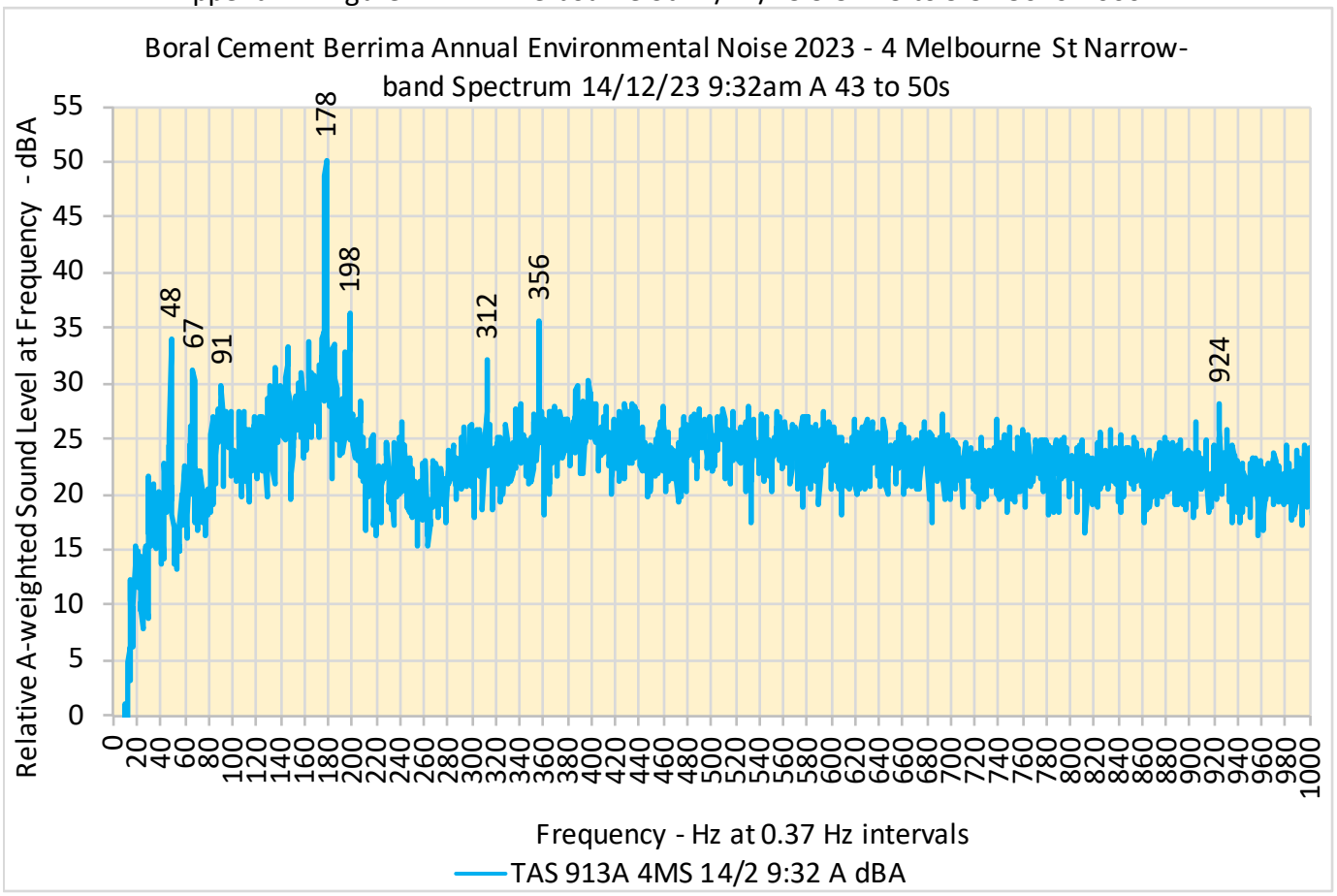
Appendix E Figure E 6f: 4 Melbourne St 9/12/23 23:55:50 to 23:59:57 Wind 0-1000 Hz



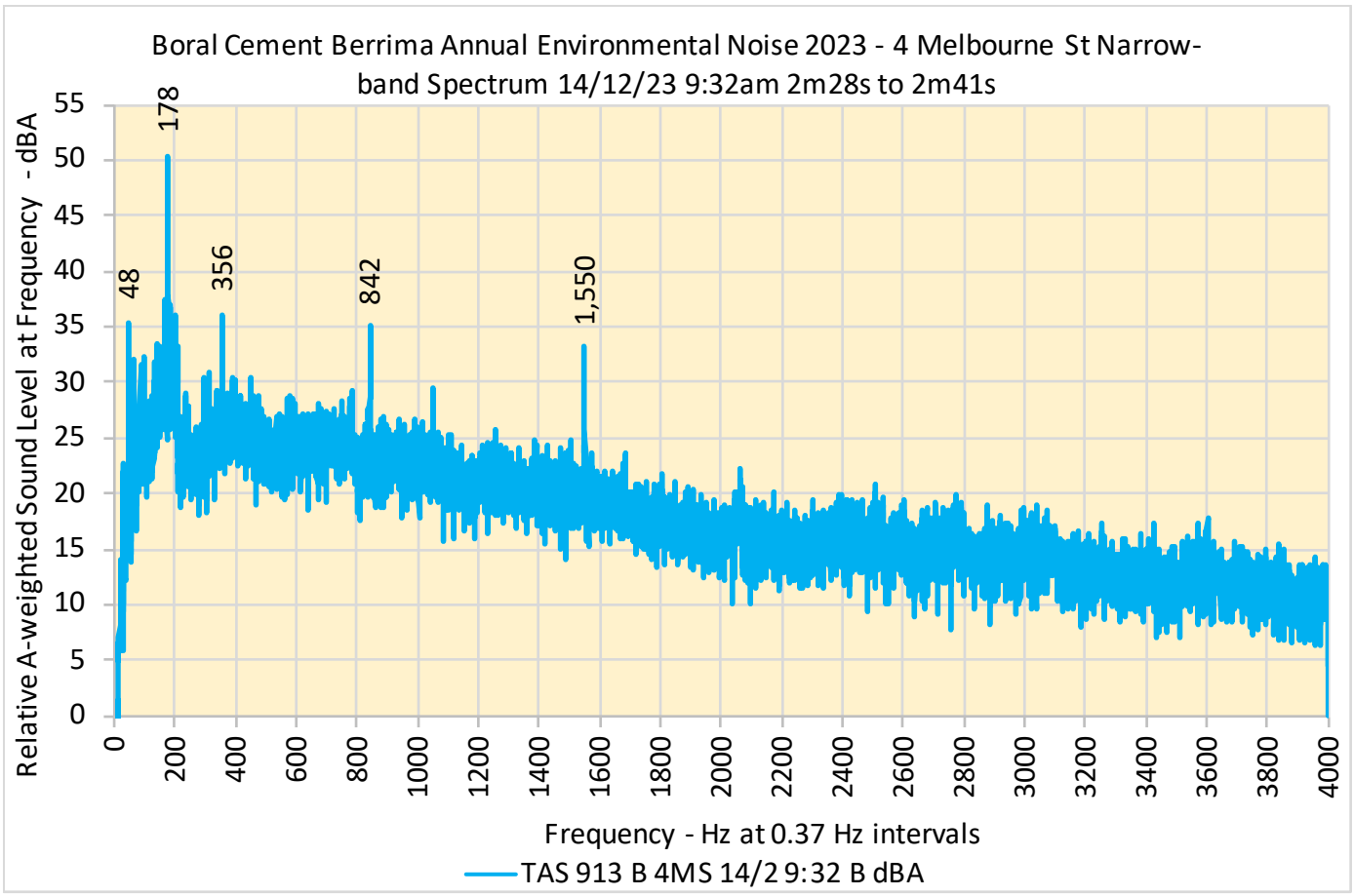
Appendix E Figure E 7A: 4 Melbourne St 14/12/23 9:32:43 to 9:32:50 0-4000 Hz



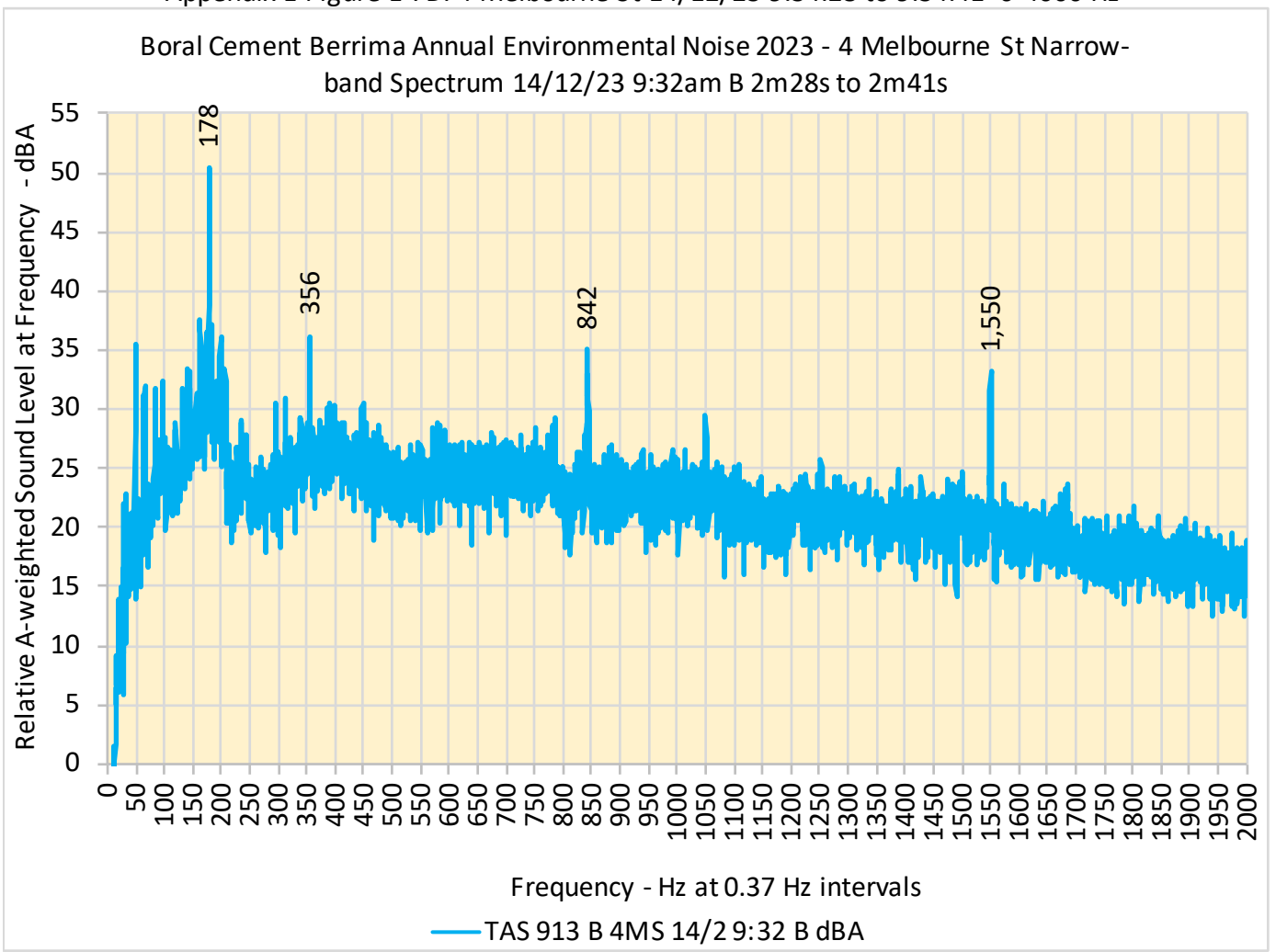
Appendix E Figure E 7B: 4 Melbourne St 14/12/23 9:32:43 to 9:32:50 0-2000 Hz



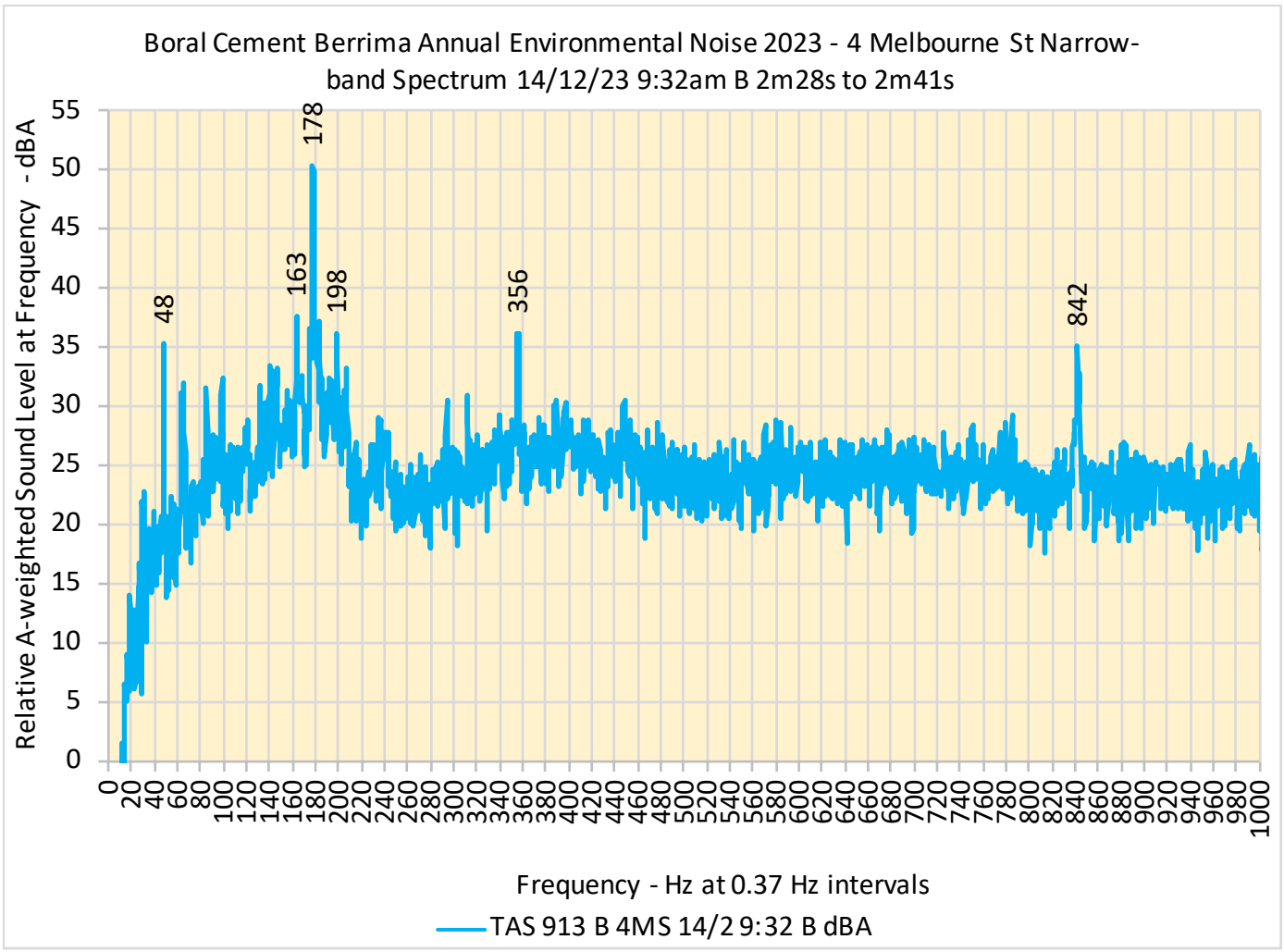
Appendix E Figure E 7C: 4 Melbourne St 14/12/23 9:32:43 to 9:32:50 0-1000 Hz



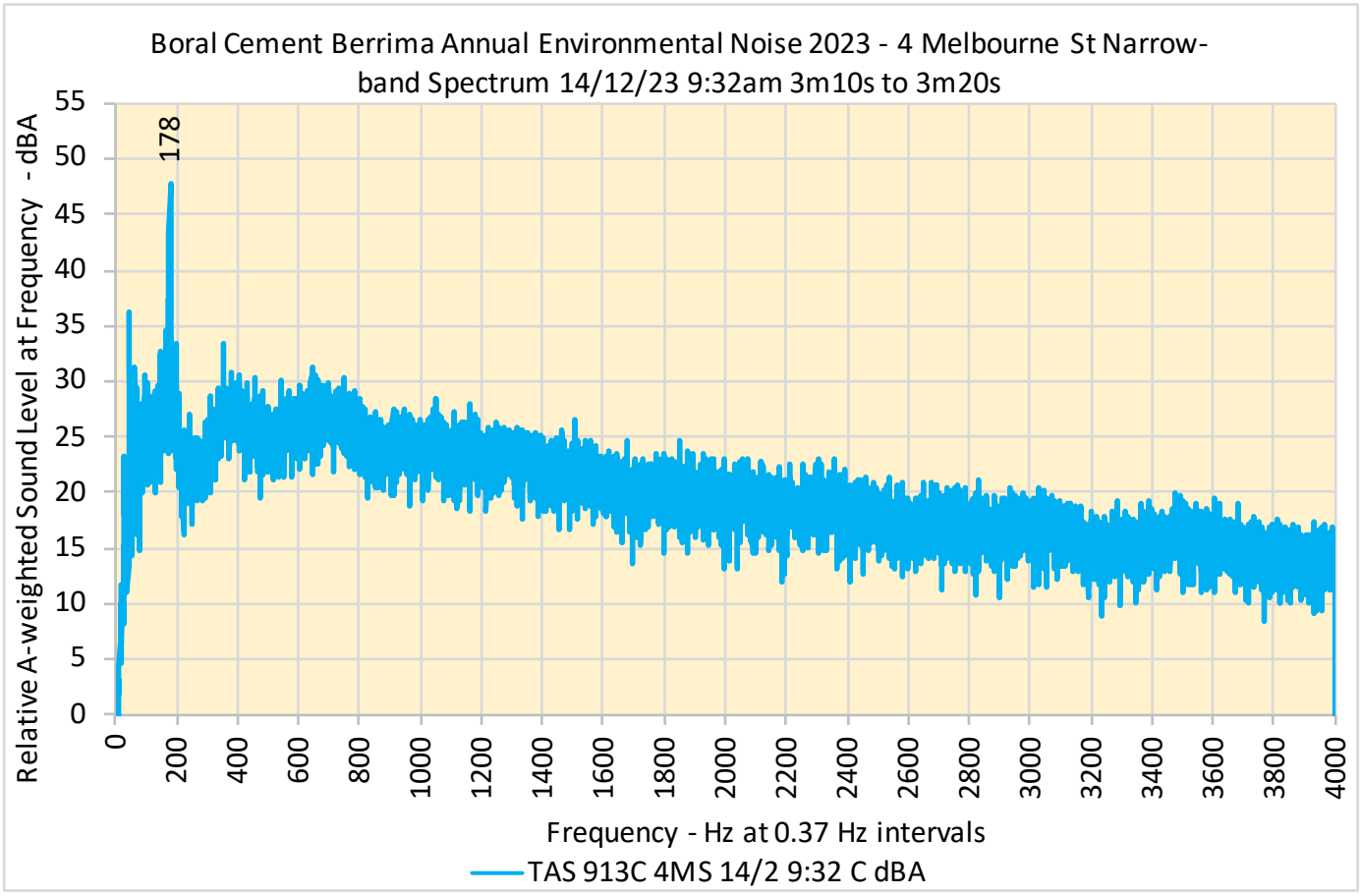
Appendix E Figure E 7D: 4 Melbourne St 14/12/23 9:34:28 to 9:34:41 0-4000 Hz



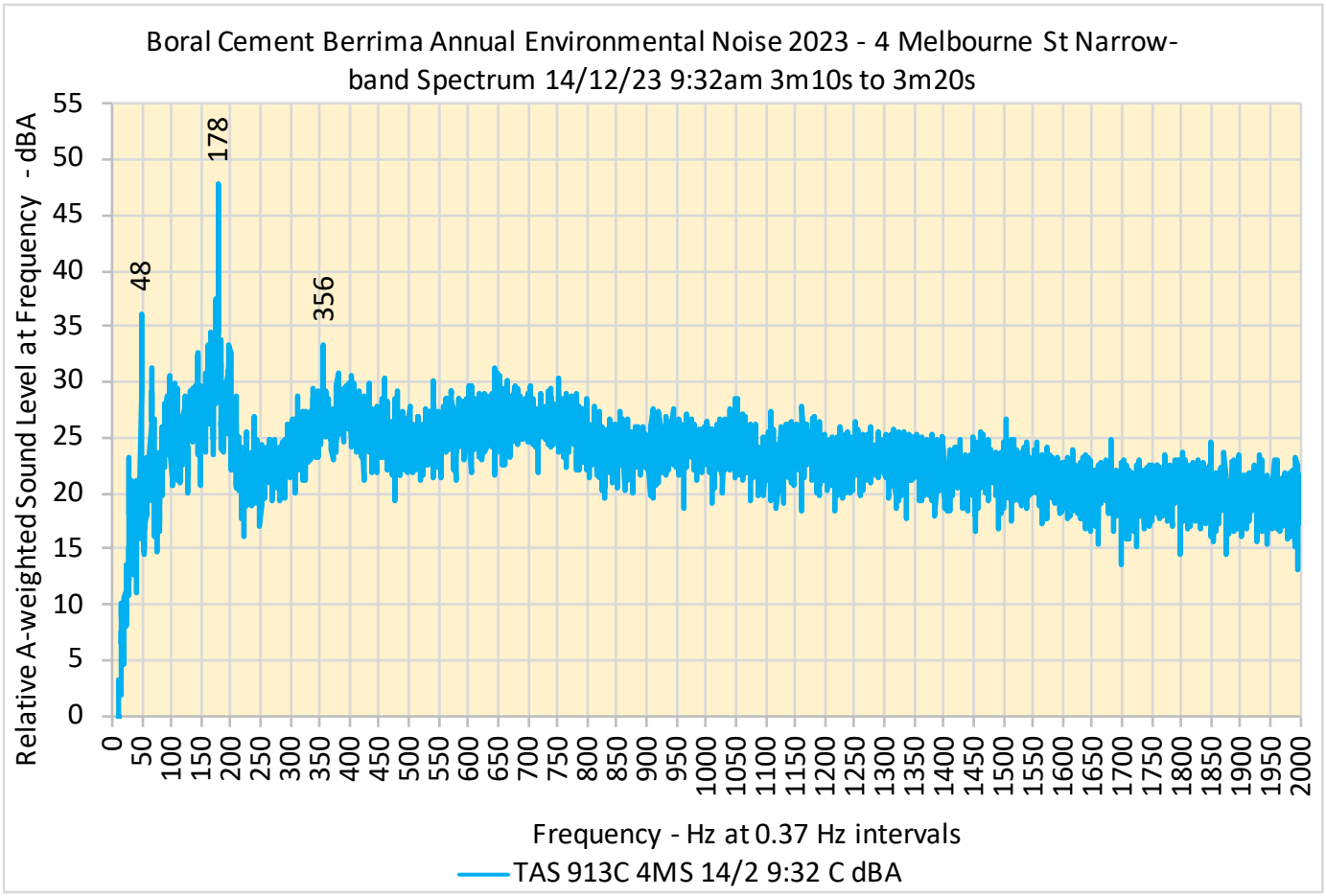
Appendix E Figure E 7E: 4 Melbourne St 14/12/23 9:34:28 to 9:34:41 0-2000 Hz



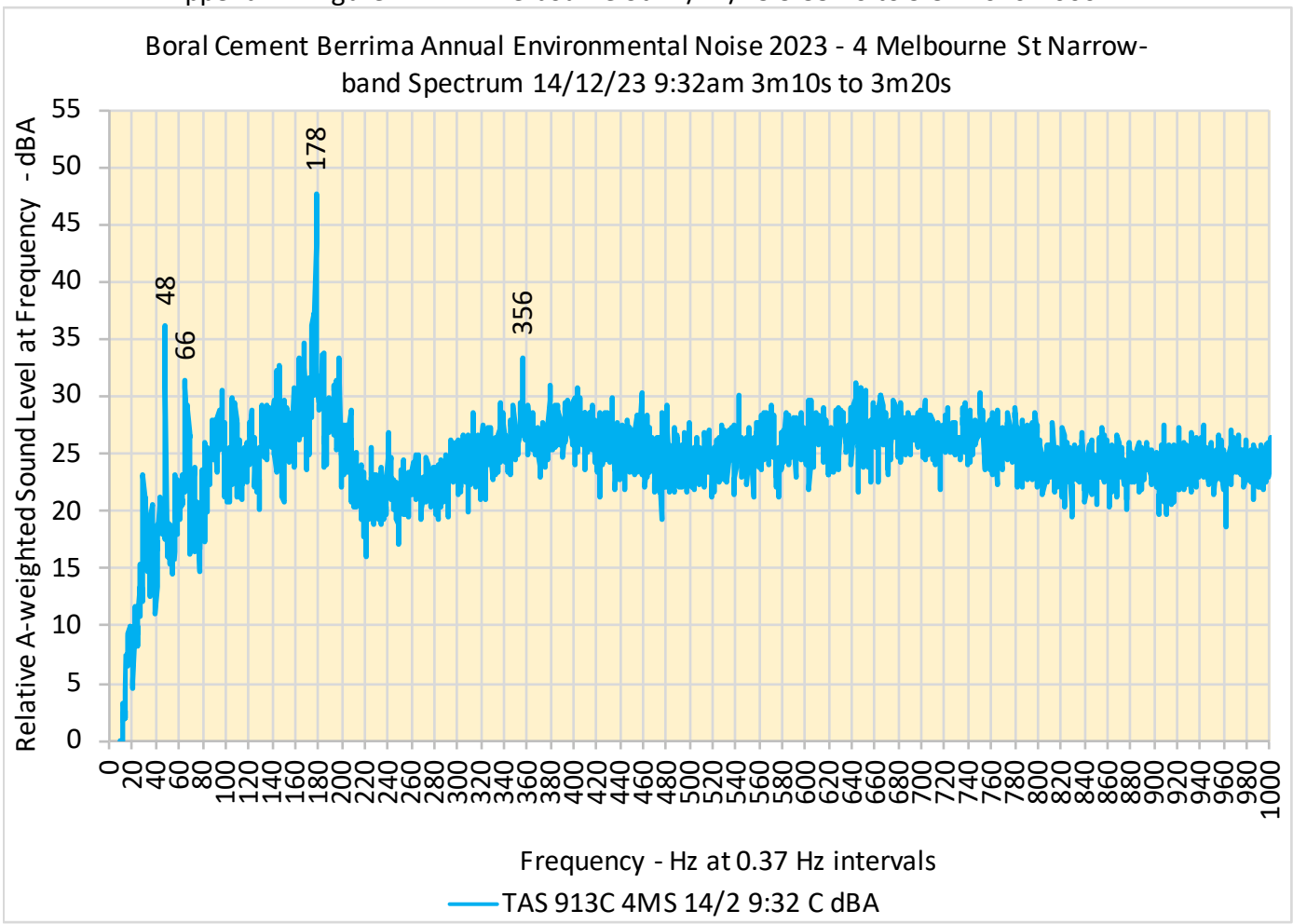
Appendix E Figure E 7F: 4 Melbourne St 14/12/23 9:34:28 to 9:34:41 0-1000 Hz



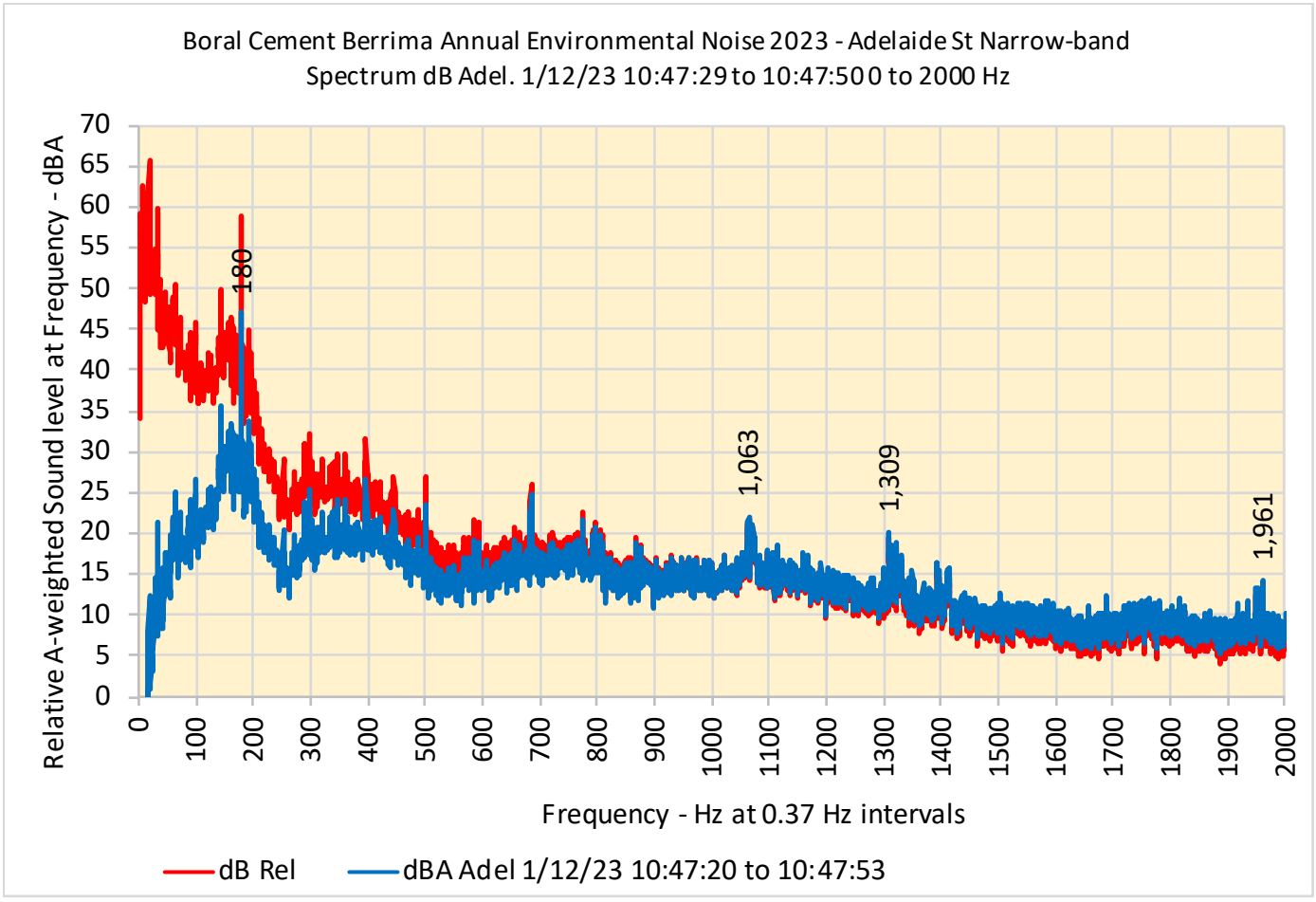
Appendix E Figure E 7G: 4 Melbourne St 14/12/23 9:35:10 to 9:34:20 0-4000 Hz



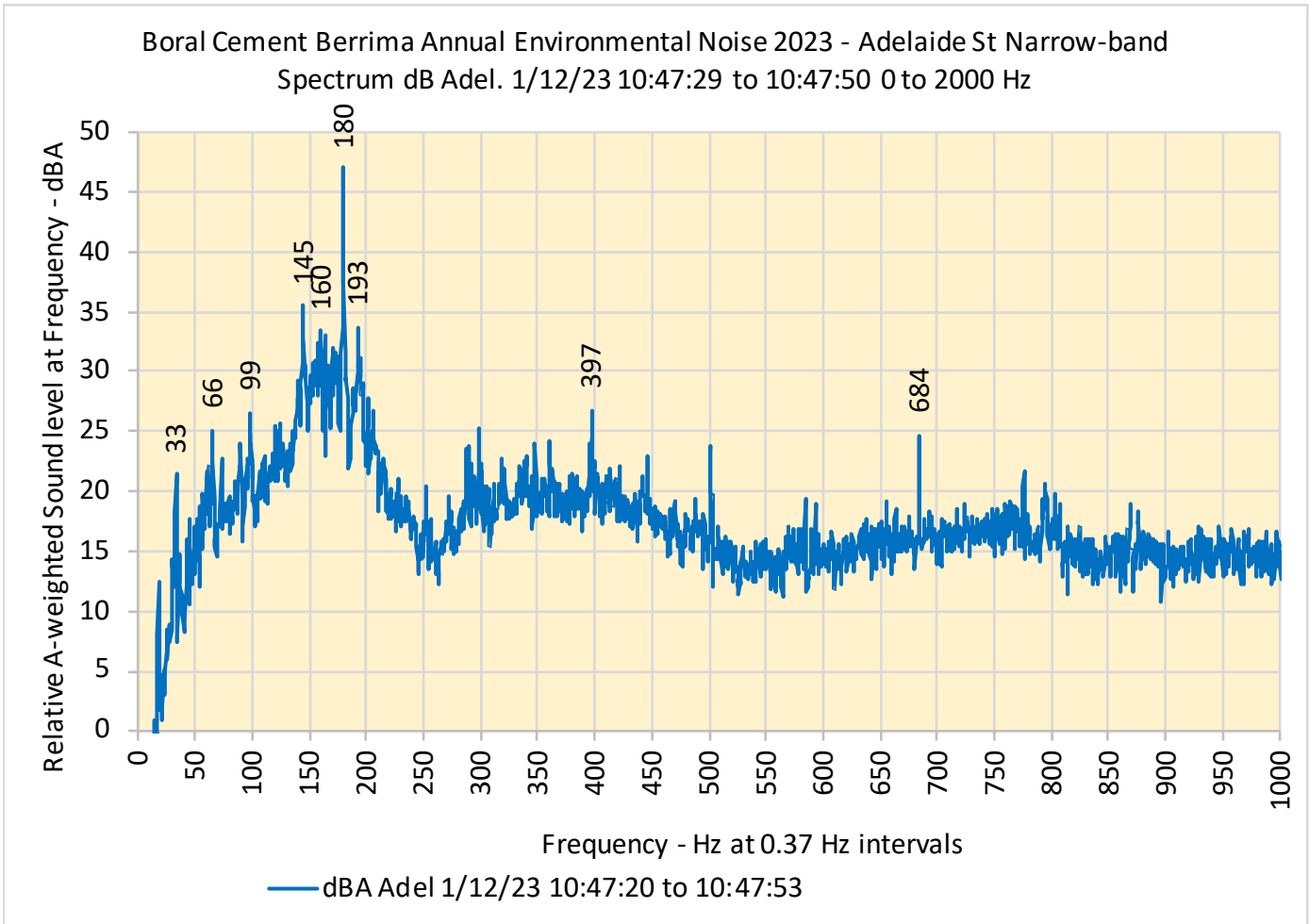
Appendix E Figure E 7H: 4 Melbourne St 14/12/23 9:35:10 to 9:34:20 0-2000 Hz



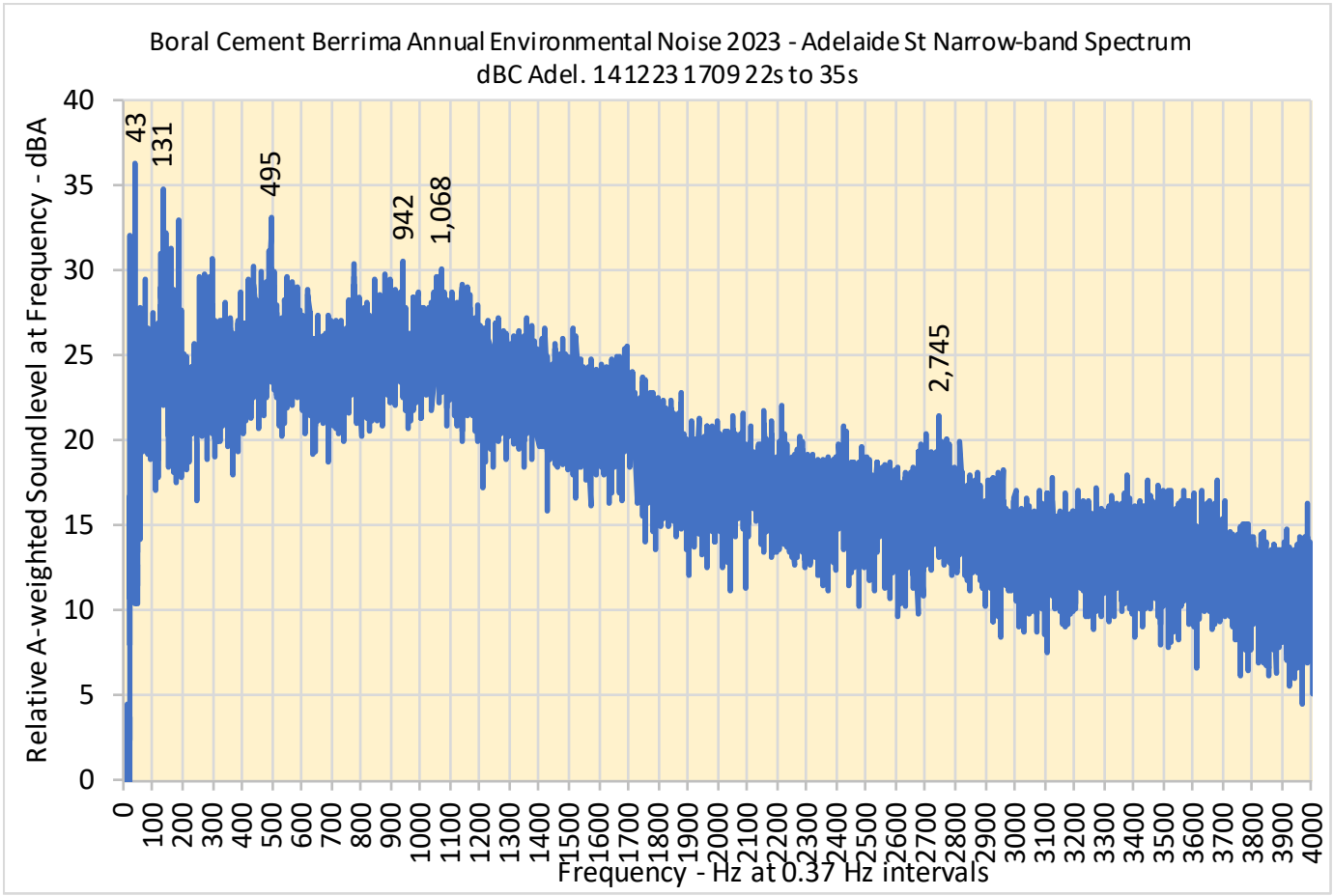
Appendix E Figure E 7I: 4 Melbourne St 14/12/23 9:35:10 to 9:34:20 0-1000 Hz



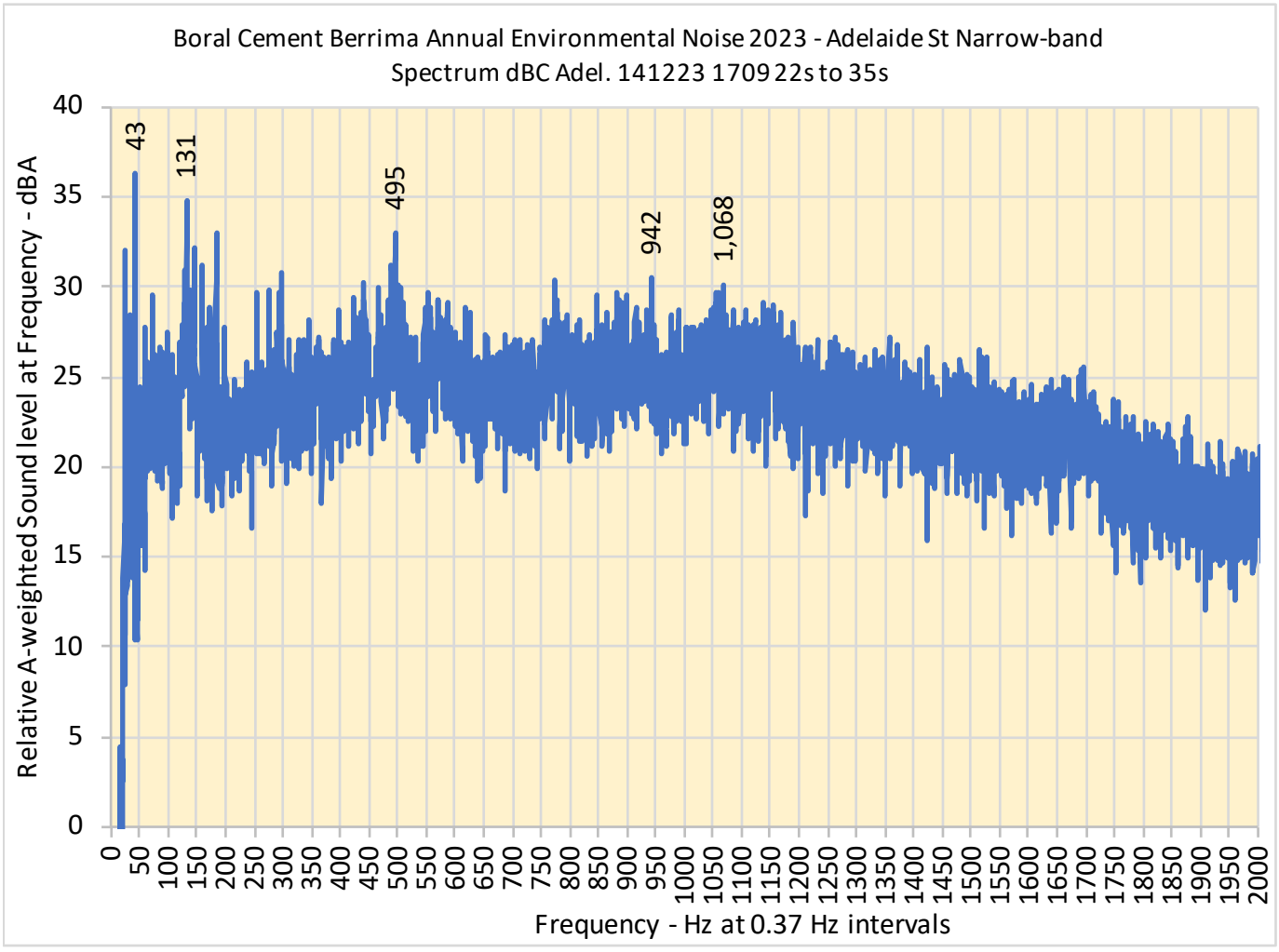
Appendix E Figure E 8A: Adelaide St near Taylor Ave 1/12/23 10:47:20 to 10:47:53 0-2000 Hz



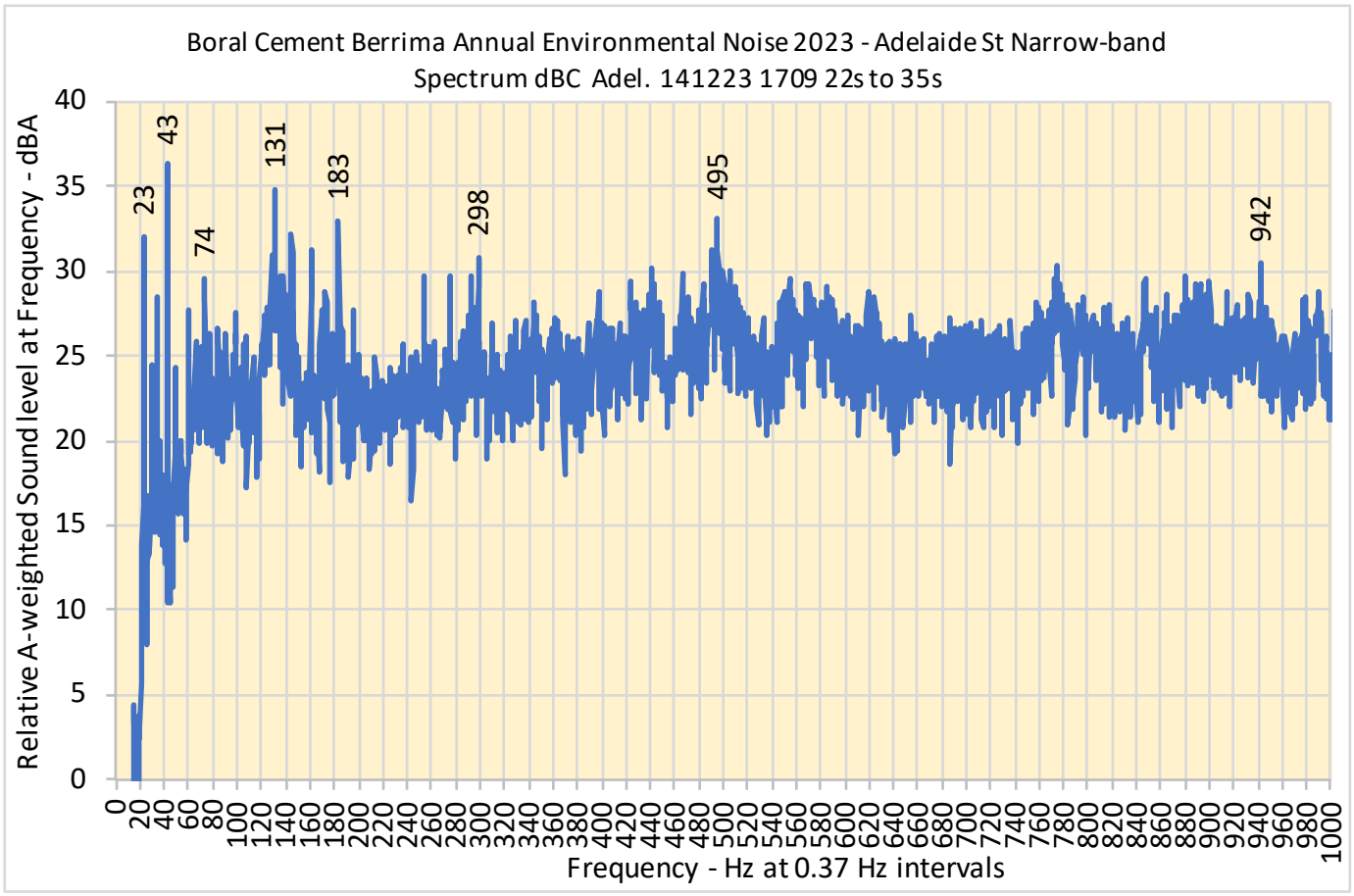
Appendix E Figure E 8B: Adelaide St near Taylor Ave 1/12/23 10:47:20 to 10:47:53 0-1000 Hz



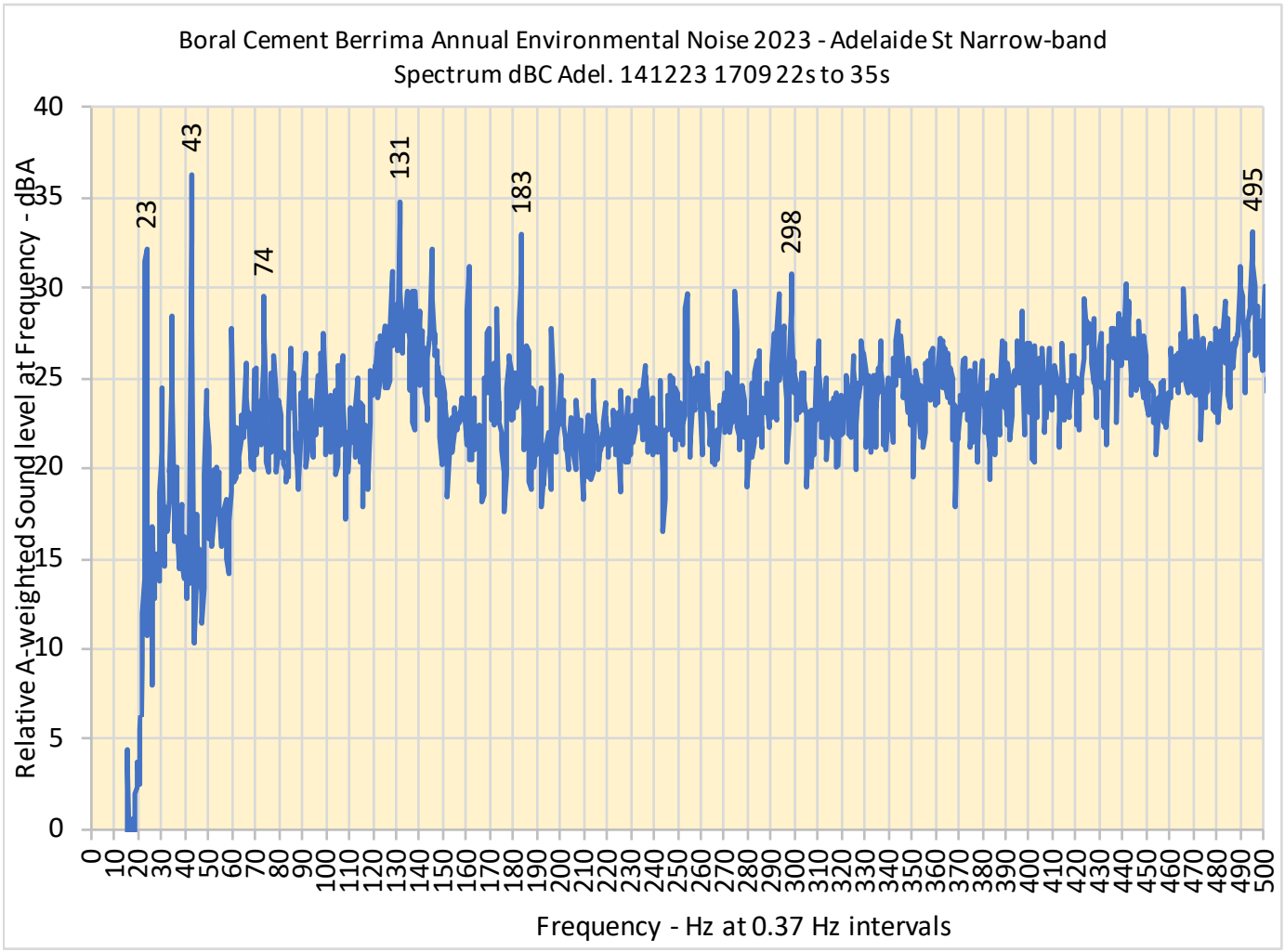
Appendix E Figure E 9A: Adelaide St near Taylor Ave 14/12/23 17:09:22 to 17:09:35 0-4000 Hz



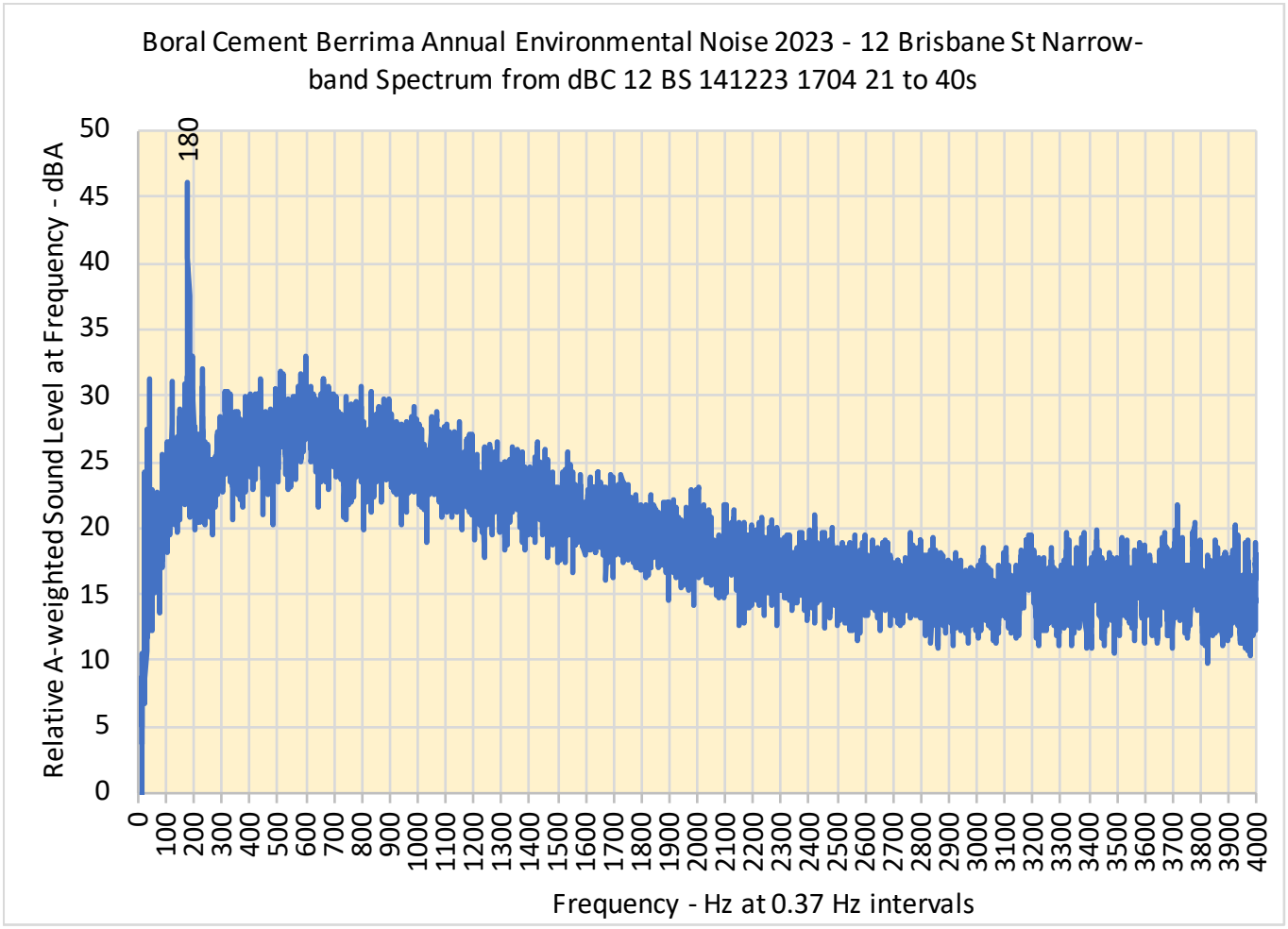
Appendix E Figure E 9B: Adelaide St near Taylor Ave 14/12/23 17:09:22 to 17:09:35 0-2000 Hz



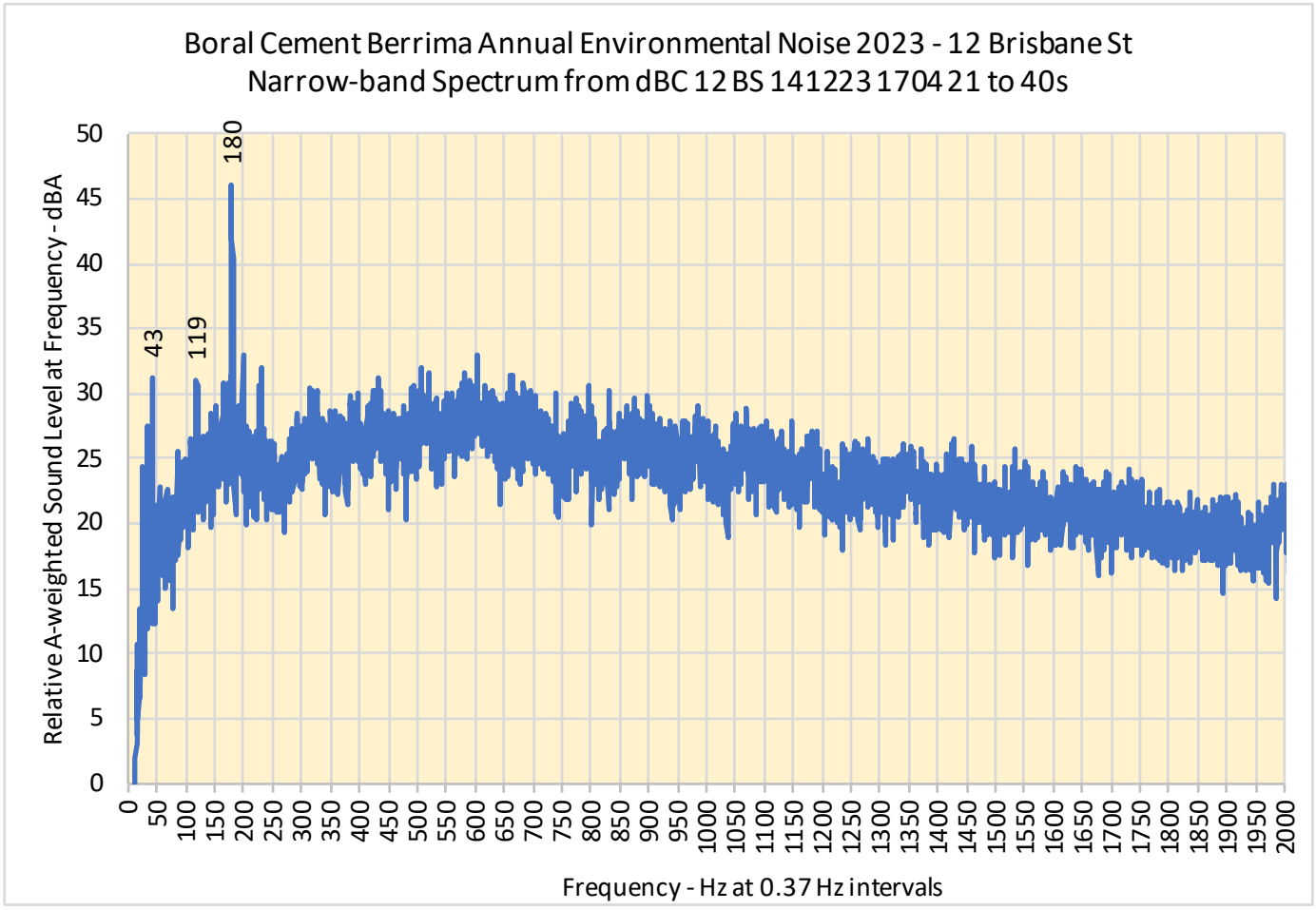
Appendix E Figure E 9C: Adelaide St near Taylor Ave 14/12/23 17:09:22 to 17:09:35 0-1000 Hz



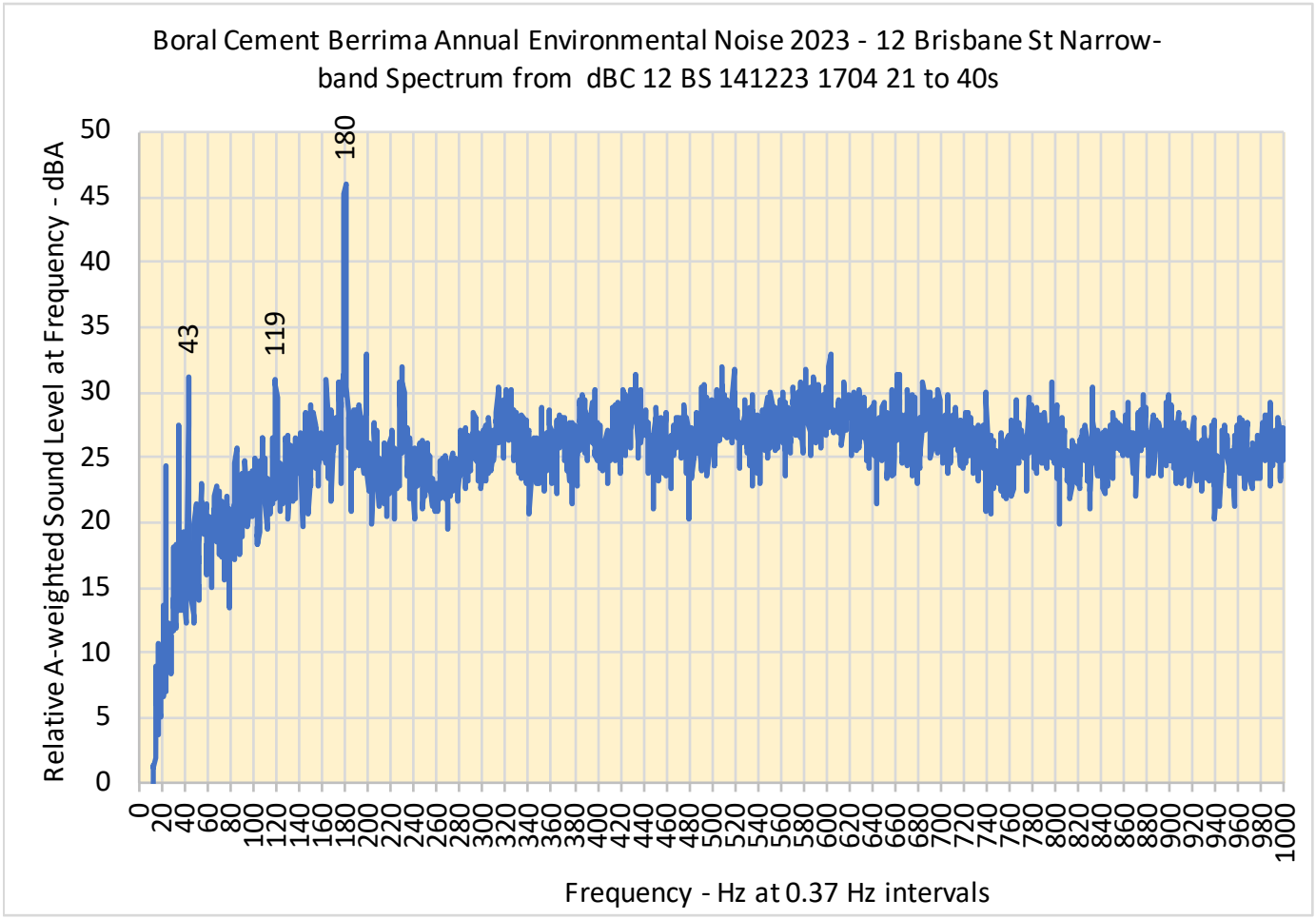
Appendix E Figure E 9D: Adelaide St near Taylor Ave 14/12/23 17:09:22 to 17:09:35 0-500 Hz



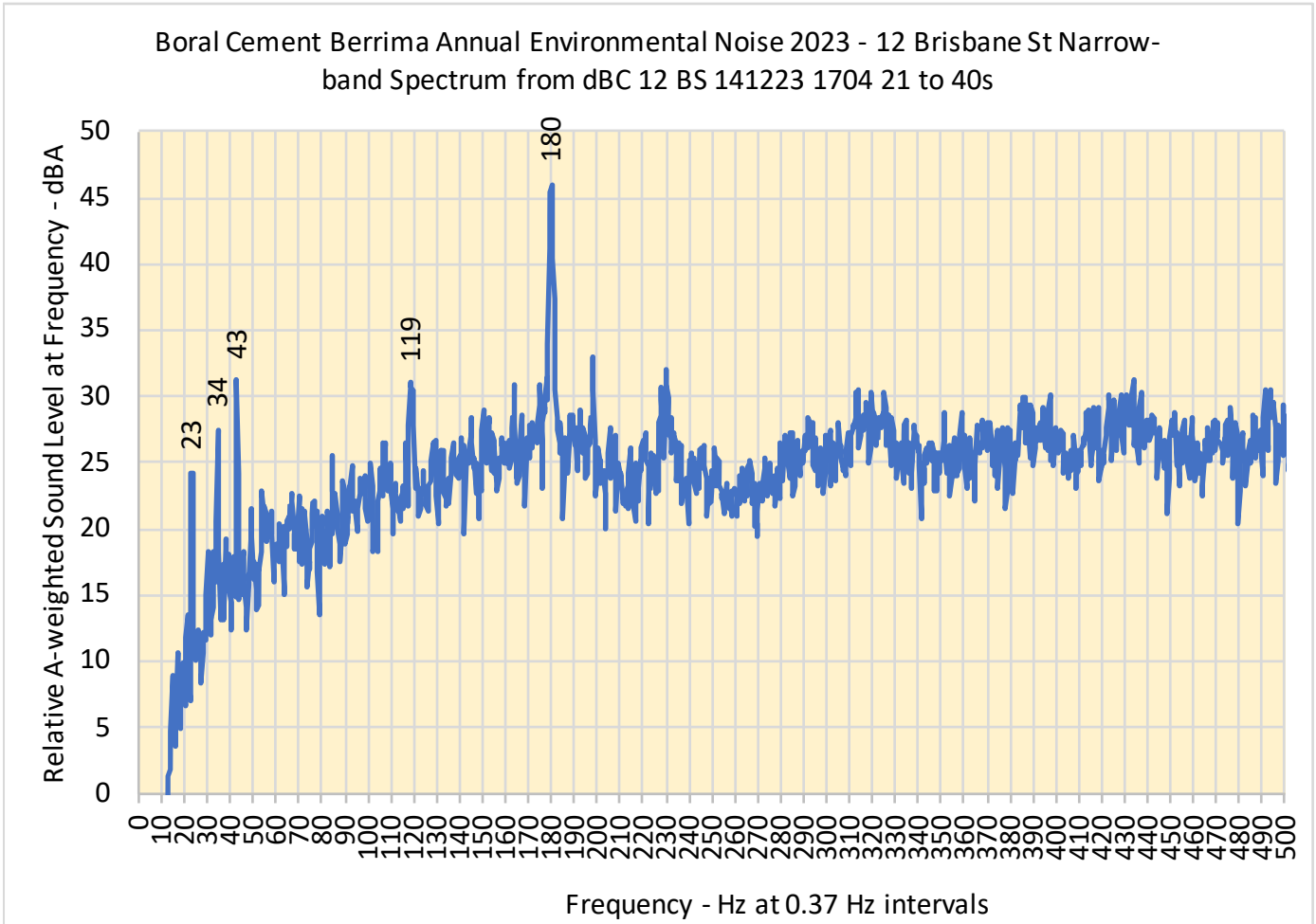
Appendix E Figure E 10A: 12 Brisbane St 14/12/23 17:04:21 to 17:04:40 0-4000 Hz



Appendix E Figure E 10B: 12 Brisbane St 14/12/23 17:04:21 to 17:04:40 0-2000 Hz



Appendix E Figure E 10C: 12 Brisbane St 14/12/23 17:04:21 to 17:04:40 0-1000 Hz



Appendix E Figure E 10D: 12 Brisbane St 14/12/23 17:04:21 to 17:04:40 0-500 Hz

ABN: 25 153 946 064
ACN: 153 946 064

Appendix F: Attended monitoring results

Enviromental Noise Level Assessment Report

for : *Commencing on:* Friday, 1 December 2023

Berrima Cement Annual Compliance Noise Study - 2023

Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	weighting	Duration (secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Day	4 Melbourne St	Norsonic 140	0	A	900	1/12/2023	9:16 AM	69	48	59	73	14.6	Overcast, 7/8 cc low level alto stratus. 19oC, wind 0 to 1m/s SSW to S from plant to here. Resident in No.4 advised truck noise is an issue - especially empoty trucks bumping on the road surface. Traffic noise is main variablesource above ambient plant noise. Quiet is 48 to 50, cars 55 to 65, trucks 69 to 71 on road and in plant
		Hourly Average											
		Temp °C	Wind speed (Km/hr)	Direction degrees									
		19	9	213									
	Adelaide St 20m to Taylor level with front of house	Norsonic 140	0	A	900	1/12/2023	9:36 AM	75	50	62	75	12.3	One cement bulk truck DaHon Cooma verv Dog barking 59 to 65; Quiet 49 to 52, cars 56 to 71. Truck out 77, trucks 67 to 77. Plant is background but fan noise not as strong here.
		Hourly Average											
		Temp °C	Wind speed (Km/hr)	Direction degrees									
		19	9	213									
	12 Brisbane St.	Norsonic 150	0	A	900	1/12/2023	10:30 AM	65	46	53	66	12.4	26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Industry Heard 46-48 Car 53,49,55 Truck 55 64 over bump, ,61,63,67,62 Car Local 72,65 Birds 48,60,53
		Hourly Average											
		Temp °C	Wind speed (Km/hr)	Direction degrees									
		21	12	221									
	North Fence	Norsonic 150	0	A	900	1/12/2023	2:15 PM	60	51	54	70	16.9	26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Industry Heard 50-51 Truck 53, 55 , 55 High frequecy noise observed Airplane 55, 60-62
		Hourly Average											
		Temp °C	Wind speed (Km/hr)	Direction degrees									
		24	13	220									

Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	weighting	Duration (secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Day	Loc 20	Norsonic 150	70	A	900	1/12/2023	2:43 PM	60	54	56	72	15.6	Wind S-SW Industry Heard 55 surge to 58, 61 Thump SW side of site 58 repeating; to 61 Car 61 Alarm 56
		Hourly Average											
		Temp °C	*Wind speed (Km/hr)*	*Direction degrees*									
		24	13	220									
	4 Melbourne St	Ngara	2311	A	900	9/12/2023	11:30 AM	55	40	46	62	16.0	34.5oC, 27%rh, wind 5.5m/s W. Mainly cars and birds with wind in tree noise, background bottom is possibly Cement plant noise or vegetation in wind noise. 35 cars, one truck pass, 1 plane.
		Hourly Average											
		Temp °C	*Wind speed (Km/hr)*	*Direction degrees*									
		35	22	262									
	4 Melbourne St	Ngara	2323	A	900	9/12/2023	11:45 PM	57	49	52	65	13.0	16.3oC, 42%rh, wind ave 5.2m/s ESE to 7.9m/s at 23:47. Three vehicle passes. Plant noise varies on wind by 5 to 7 dB over 20 seconds on occasions.
		Hourly Average											
		Temp °C	*Wind speed (Km/hr)*	*Direction degrees*									
		17	18	116									
	4 Melbourne St	Rion NA-28	2 - M	A	900	14/12/2023	9:16 AM	69	46	57	69	12.3	26oC, sunny and clear, 7/8 cc. Wind 0.5-3.5 ave. 1.5 m/s N-NW. Trucks on bumps in Taylor 68-73, cars 60-63, quiet ambient 45 to 47. Plant varies 45 to 49 on wind. Corellas 60
		Hourly Average											
		Temp °C	*Wind speed (Km/hr)*	*Direction degrees*									
		26	24	270									

Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	weighting	Duration (secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Day	North Fence	Norsonic 140	63	A	900	14/12/2023	3:31 PM	60	50	53	72	18.6	Industry Heard 49-51 surging 54 Truck taylor 54 High frequecy noise observed Airplane 55, 60-62
		Hourly Average	Temp °C	Wind speed (Km/hr)	Direction degrees								
			29	30	250								
	Loc 20	Norsonic 150	64	A	900	14/12/2023	4:11 PM	60	51	54	75	21.0	Industry Heard 55-56 surge to 57 to 60 Thump SW side of site 58 repeating; to 61 Truck Taylor 55 Birds 54
		Hourly Average	Temp °C	Wind speed (Km/hr)	Direction degrees								
			28	26	253								
	12 Brisbane St.	Rion NA-28	108 -	A	900	14/12/2023	4:47 PM	60	47	51	67	15.8	31oC, wind 1-2m/s to 4 on gusts S-SW. WITN 50-54, Cars to 58 mostly < WITN. Plant is bottom 49-53 on wind LF is audible. Distant trucks to W audible. Cars on street 63-68. Trucks 60-64 TAS 918 C80
		Hourly Average	Temp °C	Wind speed (Km/hr)	Direction degrees								
			28	26	253								
	Adelaide St 20m to Taylor level with front of house	Rion NA-28	109 -	A	900	14/12/2023	5:10 PM	73	47	60	71	11.2	TAS 919 C80. Mainly WITN here. Plant barely audible unlike Brisbane. Trucks 68. Cars 58-68. Quiet 45. Wind at mic 0.5-1.5 avg. 0.8 SW
		Hourly Average	Temp °C	Wind speed (Km/hr)	Direction degrees								
			27	21	254								

Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	weighting	Duration (secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Evening	4 Melbourne St	Ngara	2321	A	900	1/12/2023	9:00 PM	59	47	50	66	16.6	16oC, wind 1 to 3.5m/s E, 90%rh. 6 cars and 5 trucks pass, some close to the meter in Melbourne St, Cement plant noise is background but relatively constant. Occasional increases over a 20 second period on the wind. No.birds or dogs. Plant noise had no significant events.
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			16	5	96								
	4 Melbourne St	Ngara	2320	A	900	4/12/2023	8:30 PM	59	41	48	64	16.5	Ambient 42 Car horn / Dog - 67 , 55 Birds 45 ,55 Car 54, 54, 54, 53, 61, 53, 59, 51, 51, 53 Truck 61 distant Traffic cicadas
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			15	9	10								
Night	4 Melbourne St	Ngara	2323	A	900	2/12/2023	11:30 PM	55	47	48	66	17.2	13oC, 97%rh, calm wind. Fairly constant sound level. 5 car passes, 1 truck pass and 1 jet aircraft.
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			13	0	0								
	4 Melbourne St	Ngara	2323	A	900	5/12/2023	11:00 PM	57	39	45	62	16.9	Ambient Noise 39-43 Truck 66 over bump 64 Truck 61 over bump 63 (3 bumps & rattling suspension Car 58 Car over bump 58
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			19	0	279								

Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	weighting	Duration (secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Night	4 Melbourne St	Ngara	2322	A	900	9/12/2023	10:45 PM	57	50	52	67	15.2	Ambient 49 - 52 dBA Car 55, 59 Thump 53, 53 Wind noise in leaves & on mic occassionally
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			18	21	125								
	North Fence	Norsonic 140	92	A	900	9/12/2023	10:45 PM	63	55	58	72	13.9	16.4oC, 42% rh, wind ave. 4.8m/s ESE to 5m/s at 23:30. Mostly wind noise from vegetation and on mic occasionly; Noise varing on Wind ; a Moaning noise 3:36min in 60 dBA; rattle 6min in ; Bangs and Thumps 10to 12min in 58 to 63 dBA
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			18	21	125								
	Location 20	Norsonic 150	0	A	900	9/12/2023	10:45 PM	65	59	61	74	12.7	Wind over mic masked the defining of noise. possible voices heard (2min) possible vechicle movement (2min 30) bang 66,65,63 possible Vechicle movement 62 (7min 36) Wind over mic 66 Clang 69 , 66, 67, 62, 63
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			18	21	125								
	Location 20	Norsonic 150	150	A	900	9/12/2023	11:30 PM	65	59	61	73	12.4	Wind over mic masked the defining of noise. possible vechicle movements (4 min, 6min 30, 13min 30)) bang 63-65 Wind over mic 63 Air release
			Hourly Average										
			Temp °C	*Wind speed (Km/hr)*	*Direction degrees*								
			17	18	116								

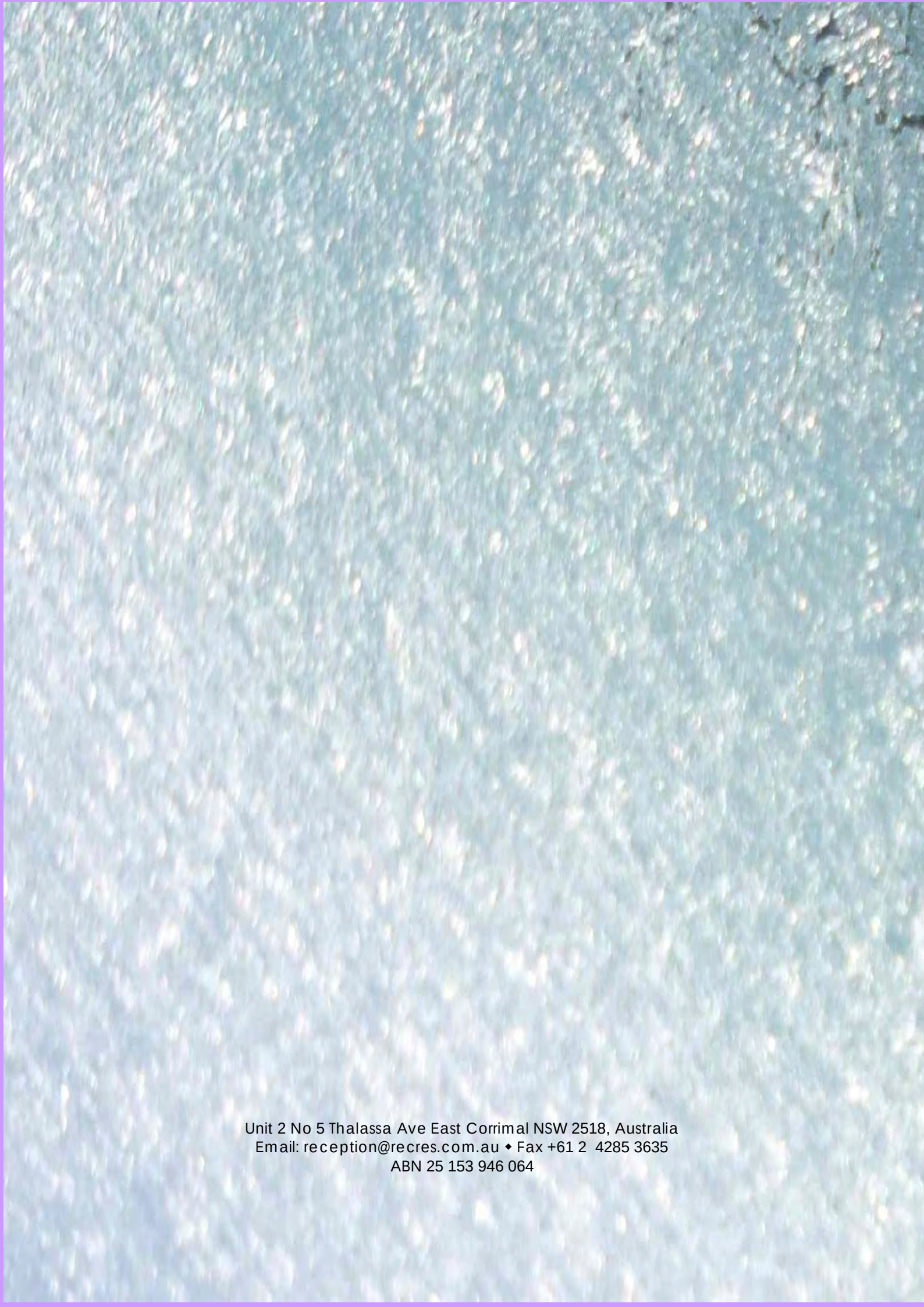
Berrima Cement Annual Compliance Noise Study - 2023

Condition	Description	Meter	Ref #	Duration weighting	(secs)	Date	Time	L01	L90	Leq	Lceq	Lceq -Laeq	Comments:
Night	4 Melbourne St	Ngara	2323	A	900	9/12/2023	11:30 PM	56	49	52	65	13.4	16.4oC, 42% rh, wind ave. 5.4m/s ESE to 8.8m/s at 23:30. Mostly wind noise from vegetation with background plant constant noise. High event 'click' at 23:36:20 probably a stick hitting the microphone and a bump noise a few seconds later. Some variation of plant noise on wind over 20 to 30 seconds of 5 to 7 dB. 5 cars and 1 truck pass.

Hourly Average

Temp °C	Wind speed (Km/hr)	Direction degrees
17	18	116

Instrument :	Serial No	Calibrate Date	Measurement Date :	Pre Cal :	Post Cal :
Ngara	878158	24/11/2025			
			1/12/2023	94	94.2
			2/12/2023	94	94.2
			4/12/2023	94	94.2
			5/12/2023	94	94.2
			9/12/2023	94	94.2
Norsonic 140	1406081	26/06/2025			
			1/12/2023	94	93.8
			9/12/2023	94	93.6
			14/12/2023	94	93.6
Norsonic 150	15030670	11/09/2025			
			1/12/2023	94	93.6
			9/12/2023	94	93.6
			14/12/2023	94	93.6
Rion NA-28	860028	12/12/2025			
			14/12/2023	93.7	93.7
			14/12/2023	93.9	93.7



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APPENDIX 2 – COMMUNITY COMPLAINTS REGISTER MAY 23 TO APRIL 24

Date	Complainant	Contact	Nature of complaint	Response
19.5.23	Berrima Resident	Direct to Site	dust on car	Car inspected and Voucher provided to clean car
14.09.23	Berrima Resident	Direct to Site	Dust on solar panels	inspected and information provided
18.9.23	Berrima Resident	Direct to Site	dust on solar panels	inspected and information provided
21.9.23	Berrima Resident	Direct to Kate Woodbridge	general concern about operations at night, uncovered trains, dust and concerns about solar panels	Spoken to by site on numerous occasions as well as Kate Woodbridge
18.11.23	EPA	Direct to Environment team	complaint received to the EPA about emission on Saturday night	Cause of emission and response investigated and reported to the EPA
20.11.23	Neighbour	Direct to Site	dust coming from site on car and collection in water tank	voucher provided to clean car. Water removed from water tanks and replaced. Cause was from a Dust collector valve being left isolated
20.11.23	Berrima Resident	Direct to Kate Woodbridge	visual dust from the plant on Sat 18/11/23.	
21.11.23	Berrima Resident	direct to site	query on the cleaning of solar panels	information provided
12.12.23	Berrima Resident	Direct to Site	layer of dust on car from a number of days	Car inspected and Voucher provided to clean car.
28.12.23	EPA	Direct to Environment team	Reported on 16th January. EPA received an e-mail and video back dated to the 28.12.23 showing stack picture during precipitator trip.	cause of emission and response investigated and reported to the EPA
23.12.23	EPA	Direct to Environment team	emission from operations	cause of emission and response investigated and reported to the EPA. Cause from an ESP trip due to power failure

Date	Complainant	Contact	Nature of complaint	Response
17.4.24	Berrima Resident	Direct to Site	layer of dust on car from a number of days	Car inspected and Voucher provided to clean car.
11.4.24	EPA	Direct to Environment team	E-mailed to EPA that was visual dust emission from kiln stack on the 9/4/24.	cause of emission and response investigated and reported to the EPA. Investigated and found that there was no kiln stack dust emission on the 9/4/24, but it was a precipitator trip on the 8/4/24 at 19:30. .
23.4.24	Berrima Resident	direct to site	cars had cement dust on them and they could not see out of their windows.	Car inspected and Voucher provided to clean car.
22.4.24	Berrima Resident	E-mailed Sydney Office	Sent e-mail to Sydney about dust on complainants car and attached photos. Explaining that the cars were really bad and destroying the paint.	
27.4.24	Berrima Resident	direct to site	Cars are both covered in dust.	Car inspected and Voucher provided to clean car.