APPENDIX 1 – ANNUAL ENVIRONMENTAL NOISE ASSESSMENT

Recognition Research

Boral Cement

Annual Environmental Noise Assessment
September - October 2017

For

Berrima Cement Plant

30 November, 2017

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Boral Cement Berrima

Annual Environmental Noise Assessment
September - October 2017

Report of assessment

30 November 2017

RRRep:003

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Executive Summary

The Boral Cement Berrima works has noise limit conditions on two major projects – No.6 Kiln Upgrade and No.7 Cement mill. Sound levels at the plant and in the residential community affected by the noise emissions from the site have been measured regularly since 2002 and since the completion of each of these projects. Monitoring on these previous occasions has confirmed that the Projects are in compliance with their noise limit conditions.

A recommended noise objective for a nominated monitoring site inside but close to the plant boundary has been proposed to the NSW EPA. At this location noise emissions from sources other than the Cement Plant are not significant, whereas residential receiver locations are affected by such other noise sources as road traffic and are considered not suitable for such assessment monitoring.

This annual environmental noise assessment evaluates noise emission from the Cement Plant by the following:

- comparative measurements at the same locations around major plant sources of noise which have been assessed previously as in compliance with the limit conditions;
- calculation of the contribution sound levels at residential receiver locations from those source emission locations which are higher than in the past and comparison with a contribution objective.

The findings of this 2017 annual environmental noise assessment are that the two projects are in considered to be compliance with their noise limit conditions 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 indicate that the Cement Plant is not increasing its emissions.

From the measurements at the proposed in-plant annual environmental noise monitoring location in the Store Yard, it is also considered that the plant is achieving its proposed objectives of 56 dBA for long-term $L_{A90.period}$ and 58 dBA $L_{A90.15\text{-}minutes}$ (unaffected by transient noise sources).

Some sources of noise at the Cement Plant had increased sound levels from previous measurements. These included:

- Radicon cooler fans on most levels of the cooler.
- RM7 Roof magnete impact plate cover and bucket elevator upper platform door acoustic cladding
- RM7 switchroom ventilation fan western duct
- FA210 inlet silencer
- FA211 inlet – no silencer is currently in place
- Raw meal silo baghouse DC30 discharge
- DC70 FA63 discharge tone at 63 Hz
- Coal Mill fan discharge silencer
- Cement Mill No.6 western wall fans discharge silencer
- Cement Mill No.5 building FA502 fan discharge
- Openings at the bottom of all main roller doors be able to seal to ground, not left open 50 to 100mm

It is recommended that these items be reviewed for condition and silencers cleaned, replaced or installed if appropriate.

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1 Introduction

Boral Cement Limited operates the cement works at New Berrima, 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 rest of the Berrima cement works are not included in the current Pollution Control Licence for the site. Figure 1.1 shows an aerial view of the cement works and surrounding area, with the location of Kiln 6 and No.7 Cement Mill 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.

Reports of compliance assessment of the two items of plant were provided in 2005 for Kiln 6 Upgrade and in 2007 for Cement Mill No.7. Noise monitoring of environmental noise and source noise is undertaken regularly in the neighbourhood of the plant and on site. Annual reporting of compliance assessments for the two projects has been made since 2007. Annual environmental noise assessments are provided to the NSW EPA and other statutory authorities.

For the 2017 annual noise compliance assessment, measurements of sound levels at the site and in residential areas of New Berrima were obtained in September and October 2017. During this period, the Kiln was not operating for a brief period of 6 hours from 15:00 to 21:00 on 23 September, while the Raw Mills and Cement Mills had periods of non-operation over the measurement period from 19 September to 6 October. Table 1.1 shows the times of non-operation of the major plant items while Figure 1.4 shows the idle periods graphically.

Measurements of continuous sound levels over the period 19 to 30 September were taken with logging sound level meters at previously measured residential and site boundary locations of:

- 72 Taylor Avenue (near Adelaide St);
- 12 Brisbane Street;
- 4 Melbourne Street;
- Northern Boundary
- Store Yard (close)

Measurements were also taken on the operating site at the same locations as previously measured to provide comparisons with past measurements and conditions.

This report provides an assessment of compliance of the current operation of Kiln 6 Upgrade and Cement Mill 7. Results are compared to those taken in 2005, and 2006 to 2016.

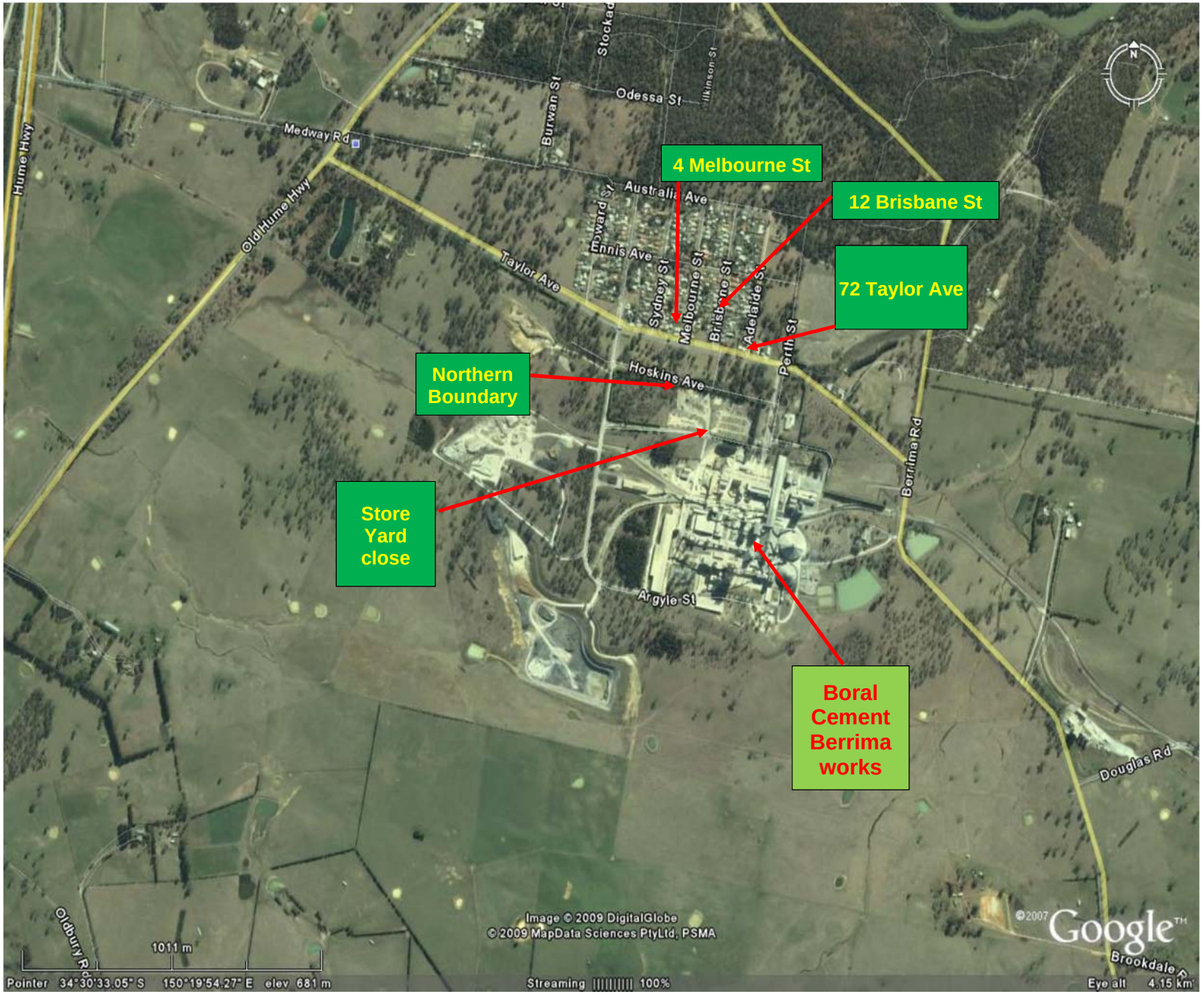


Figure 1.1: Boral Cement - Berrima Cement Works - Aerial view of locality and monitoring sites for 2017

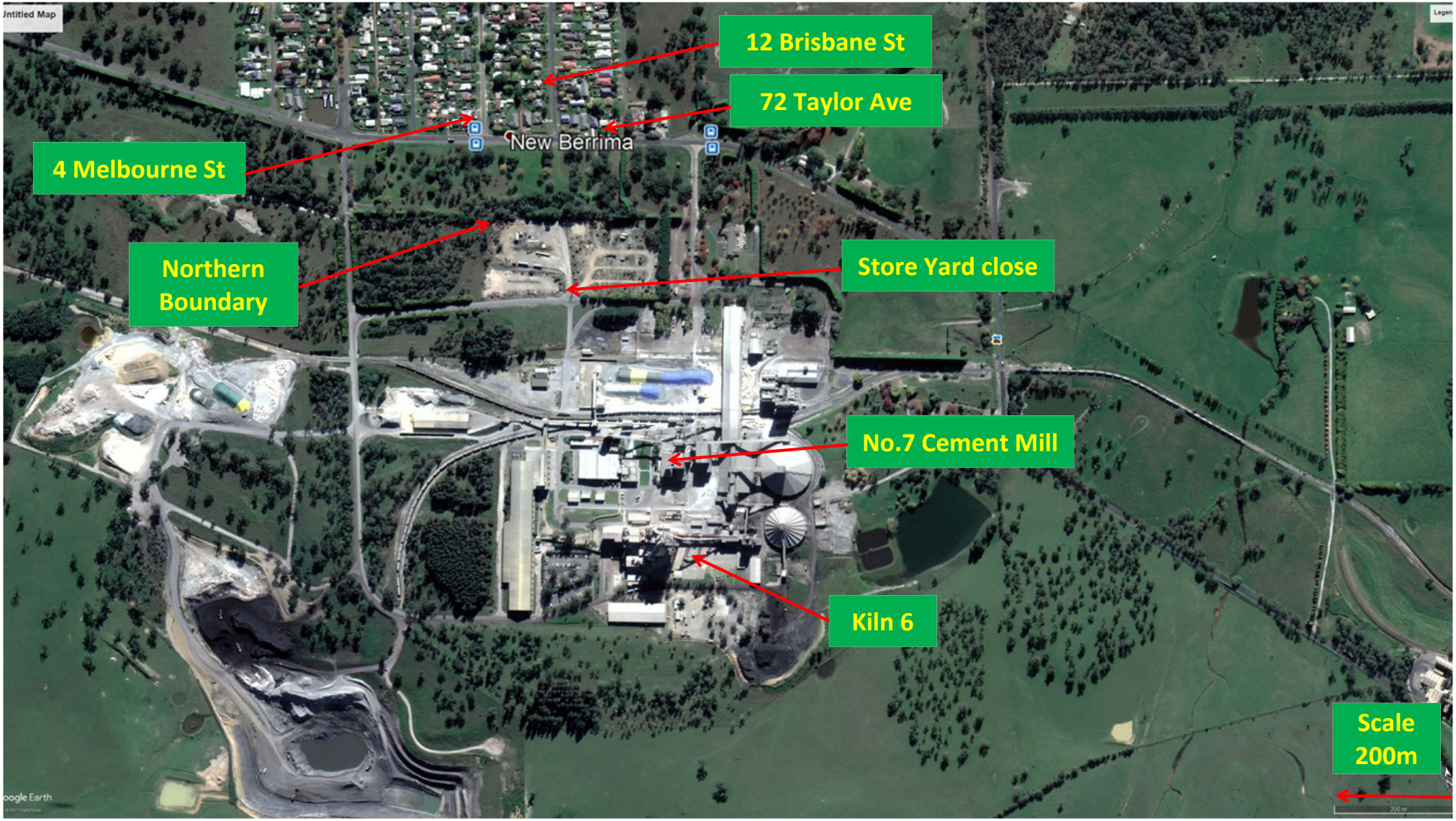


Figure 1.2: Boral Cement Berrima Annual Environmental Noise 2017 - Plant major items and Residential and boundary monitoring locations

AMBULANCE ENTRANCE

TAYLOR AVE.

WORKS MAIN ENTRANCE

SECURITY GATE 1

SECURITY GATE 2

WEIGHBRIDGE ENTRANCE

TAYLOR AVE.

N

W WARDEN AREA

S SAFE ASSEMBLY AREAS

SPEED HUMP

ARGYLE S

RAIL CROSSING

RAIL LINE

SHALE STORAGE SHED

LOCO SHED

MOTOR SHED

FETTLERS SHED

LUNCH ROOM

WEIGHBRIDGE

CAR PARK

ADMIN. OFFICE

CAR PARK

CAR PARK

POWER SUB STATION

POWER SUB STATION

CLINKER STORAGE

STOCKHOUSE

BULK DISPATCH

CLINKER GANTRY

LIMESTONE GANTRY

RAW MILLS

No 1 MIXING BASIN

No 2 MIXING BASIN

WALKWAY OVER RAIL

DUMPING STN

CO 45

CO 47

CO 48

CO 46

CO 44

CO 43

CO 23

TS1

TS2

TS3

CO 22

CO 21

No7 CEM MILL

No6 CEMENT MILL

60 000 T CLINKER STORAGE

GROUP ENG.

LAKE QUALITY

TO MOSS VALE

Cement Mill No.7

WORKSHOP & STORES COMPLEX

CONTROL CENTRE

VISITOR CAR PARK

No 5 KILN

COAL MILL

CO 18

CO 73

CO 74

COAL BLENDING PLANT

WALKWAY

FIRST AID

VISITOR CAR PARK

EXISTING RAW MATERIAL STORE

CO 61

CO 62

RAW MILL

PRECIPITATOR

BLENDING SILO

No 6 KILN

COOLING PONDS

Kiln 6 and new plant area

LAKE BREED

SETTLING PONDS

EMPLOYEES CAR PARK

PRIMARY SAFE ASSEMBLY AREA

LARGE STORE SHED BU90

SECONDARY SAFE ASSEMBLY AREA

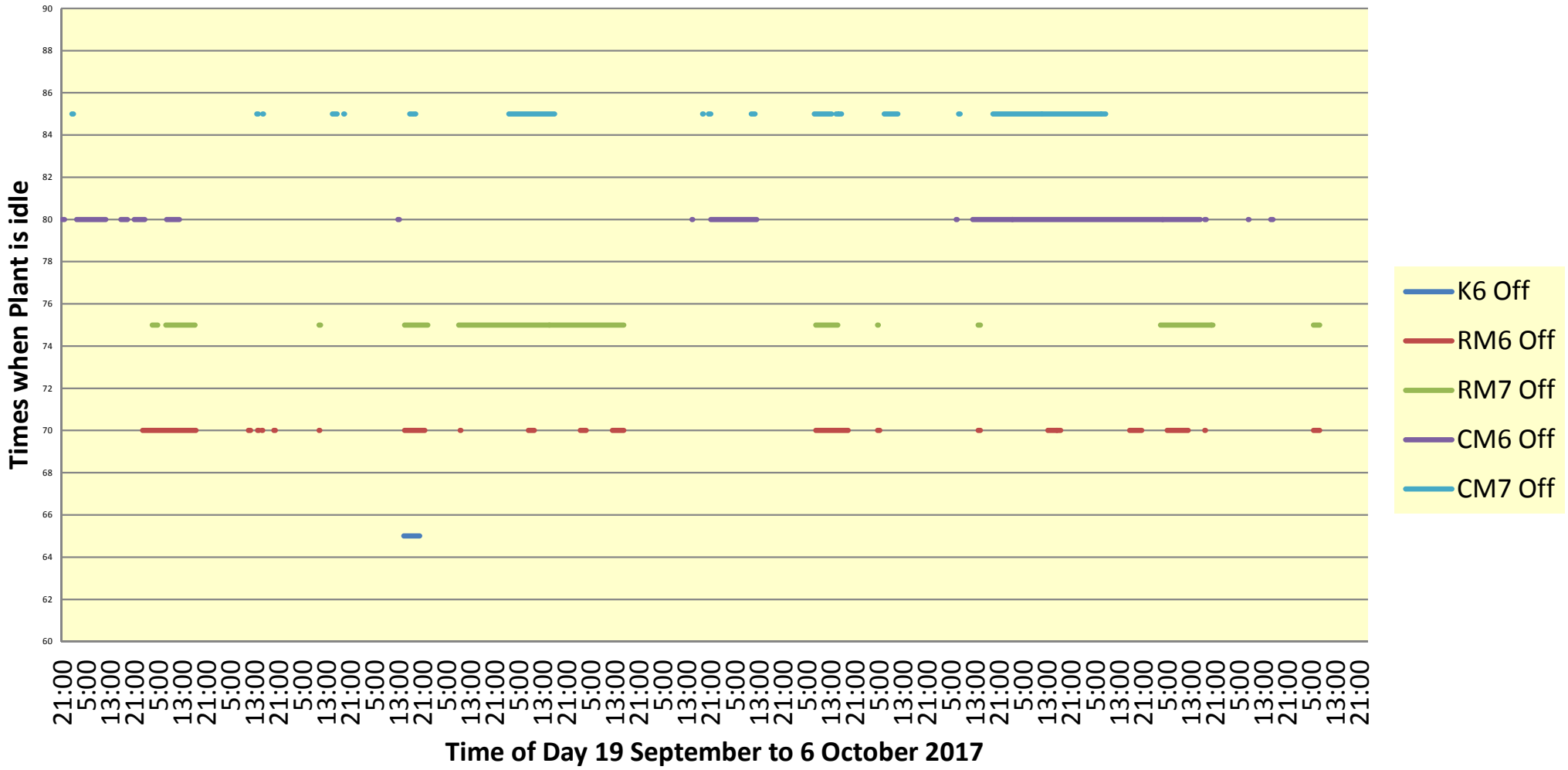
CONTRACTORS HUTS & PARKING

Figure 1.3
BERRIMA WORKS SITE PLAN

DRAWING No 40591 H

Figure 1.3:

Figure 1.4: BoralCement Berrima Annual Environmental Noise 2017 - plant times of not operating



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2 Contribution sound level objectives and method of measurement and assessment

2.1 Contribution sound level objectives

Each project was given contribution objective sound levels for the residential receiver locations. These were as follows:

Table 2.1 – Kiln 6 Upgrade Maximum Allowable Noise Contribution Limit dBA

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
Chesley Park Farm*	30	30	30
Candowie Farm*	37	37	37

Table 2.2 Cement Mill No.7 Maximum allowable noise contribution limit dBA

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	43	43	40
Argyle Street, near Taylor Avenue	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 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am on Sundays and public holidays

These levels are to be considered as the contributions from the new plant associated with Kiln 6 or Cement Mill No. 7, and do not apply to the noise emissions from the rest of the plant at Berrima.

In 2015 Chesley Park Farm was acquired by Austral Bricks for their proposed development and the residence demolished. This effectively removed the assessment location as there was no receiver and no access available to the site. Similarly, Candowie Farm access is no longer available as it is no longer apparently occupied as a residence, the land having been acquired for a future industrial development. This location has also been effectively removed from the assessment.

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2.2 Method of measurement and assessment

Kiln 6 Upgrade

The environmental impact assessment report provided allowable sound power levels for each major source in the Kiln 6 Upgrade required to ensure the contribution sound level objective was achieved. From those calculated sound power levels, allowable sound pressure levels at different locations and distances from each major source in each plant area were also calculated. The measured sound levels from the operating individual sources were then compared with the calculated allowable sound levels. If the measured sound levels were less than the allowable sound levels, then compliance was achieved. These measurements were reported in the nominated compliance reports for each plant item.

For Kiln 6 Upgrade, sound power levels and associated sound pressure levels of the new sources were identified as required in the noise impact assessment. These are given in Table 2.3 below. In the compliance assessment report for the Kiln 6 Upgrade provided in 2005, the measured sound levels were compared with the objective sound levels. These are also shown in Table 2.3.

Table 2.3: Kiln 6 Upgrade Plant Items and Objective Sound Power Levels and Sound Pressure Levels required to achieve compliance with objective sound levels

Source	Sound Power Level – dB(A)	Sound Pressure Level dB(A)		
		Objective	Measured 2005	Measured 2017
Coal Mill and Clinker cooler fans	117	100 @ 3m	93 @ 2m	Coal mill wall vent 77 @ 2m, Courtyard cooler fans 89 to 94 @ 1m
New Radicon Cooler	103	92 @ 1m	81 @ 1m West 80 @ 2m East	85 to 95 @ 1m Area Average 93 @ 1m
New Pre-heater fan FA249	97	89 @ 1m	77 @ 2m	75 to 82 @ 1m
New Baghouse fan FA250	102	94 @ 1m	82 @ 2m	79 to 85 @ 1m
Raw Mill 7 Building	117	100 @ 3m	Vents 83 to 86 @ 1m	Vents 80 to 82 @ 1m Roof 80 to 92 @1m

This comparison showed in 2005 that the noise emissions for the Kiln 6 Upgrade items were well below the objectives required to achieve compliance.

Comparison of current measured sound levels at the same or similar locations, with those measured for the compliance assessment, will be sufficient to indicate if the contribution objectives are currently being achieved. Results for 2017, some shown above, are similar to previous and lower than the objective maximum levels, for all except the Radicon cooler, indicating compliance levels are being achieved.

Increases of more than 7 dBA would be required to indicate potential non-compliance with the licence conditions. Radicon cooler sound levels vary depending on load and sometimes in the past have exceeded the objective by 4 to 5 dB. Current exceedance of the 92 dBA at 1m objective is 3 dB for an individual fan and 1 dB as an average over the area. Calculations (shown later in Table 3.4) indicate that this does not cause exceedance of receiver objectives.

Cement Mill No.7

Assessment of compliance for Cement Mill No.7 was made by measuring the noise emissions from the building and then calculating the contributions from these at the relevant residential receiver locations, using a recognised computer noise model. Three different meteorological conditions were used in the modelling. The results of these predictions are given in Table 2.4 below. The DECCW considered this approach a good example of a method to assess contributions from new noise sources in the presence of a relatively high background sound level.

Table 2.4: Cement Mill No.7 Predicted Contribution Levels at receivers for 2007 sound levels

Receiver	Source	Predicted sound level – dB(A)		
	Weather Condition	**Wind 0 m/s Lapse 0°C/100m**	**Wind 3 m/s Lapse 0°C/100m**	**Wind 2 m/s Lapse 3°C/100m**
Adelaide Street	Mill Room northern wall	23	29	29
	BE Tower northern wall	22	25	26
	Compressor room vents	15	20	21
	Total	**26**	**31**	**31**
Argyle Street	Western wall Mill room	17	28	28
	Western Roll door Mill room	14	25	26
	Western Wall vents I & J	13	19	20
	Western Wall BE Tower	10	17	17
	Western Roll door compressor room	9	16	16
	Total	**21**	**30**	**31**

The Candowie Farm calculations provided in previous years are no longer relevant as the residence is apparently no longer used and is part of an industrial zone.

As with the Kiln 6 Upgrade items measurements, comparison of current measured sound levels at the same or similar locations, with those measured for the compliance assessment, will be sufficient to indicate if the contribution objectives are currently being achieved. Increases of more than 9 dBA would be required to indicate potential non-compliance with the licence conditions.

Results from 2017 shown later in Section 3 Table 3.7 and 3.8, again indicate that compliance is being achieved by Cement Mill 7.

2017 site source measurements

Measurements were taken on 19 September and 6 October 2017 at the same locations as in previous years around each of the major noise sources associated with the upgraded or new plant items. These are compared with previously measured sound levels and described in Section 3. If the measured sound levels are more than 3 dB above the previously measured sound levels, then they are screened to assess their potential contribution and compliance with the objectives of the licence. These results are also described in Section 3.

2017 receiver and boundary monitoring

As well as the site noise source monitoring, environmental receiver sound levels are measured. The set of measurements for 2017 was done between 19 September and 6 October 2017, with attended measurements on 19 September (day and evening periods), 6 October (daytime period) and 16 October (evening and night-time periods).

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 will also indicate any trends in receiver location sound levels occurring over the monitoring period since 2002.

There appear to be no relevant residential locations east of the Cement Plant, following the demolition of Chesley Park farm-house and the use of the Candowie site as an industrial or commercial site. These locations and potential receivers will continue to be reviewed annually in case additional receivers are located east of the plant. No new locations were identified in 2017.

An additional monitoring location near the south-eastern boundary by Lake Breed was added for 2016 as a reference for later assessments if the proposed railway for Hume Coal, shown in Figure 2.1. Modifications proposed by Wingecarribee Shire Council for the intersection of Taylor Avenue and Berrima-Moss Vale Road, shown in Figure 2.2, are more likely to affect sound levels for residences on the eastern and south-eastern sides of the plant and measurements for the eastern side of the plant will be repeated when that project is completed.

2.3 PRP-7 2011

Under the 2011 Environment Protection Licence, a pollution reduction program was requested by the EPA to calculate Project Specific Noise Levels (PSNLs) for the plant, according to the NSW Industrial Noise Policy. Measurements of background sound levels were obtained in the same residential receiver locations as used in this 2013 compliance assessment, when the plant was not operating in June and July 2011. PSNLs were calculated and submitted with a report to the EPA. These were given as $L_{AEQ.15\text{-}min.}$, $L_{A90.15\text{-}min.}$ and $L_{A01.1\text{-}min.}$ contribution sound levels at the receiver locations. Values for these are shown in Table 2.5 as follows:

Figure 2.1: Extract from Hume Coal Berrima Rail Project EIS showing proposed rail route on the southern side of the Boral Cement Berrima Plant

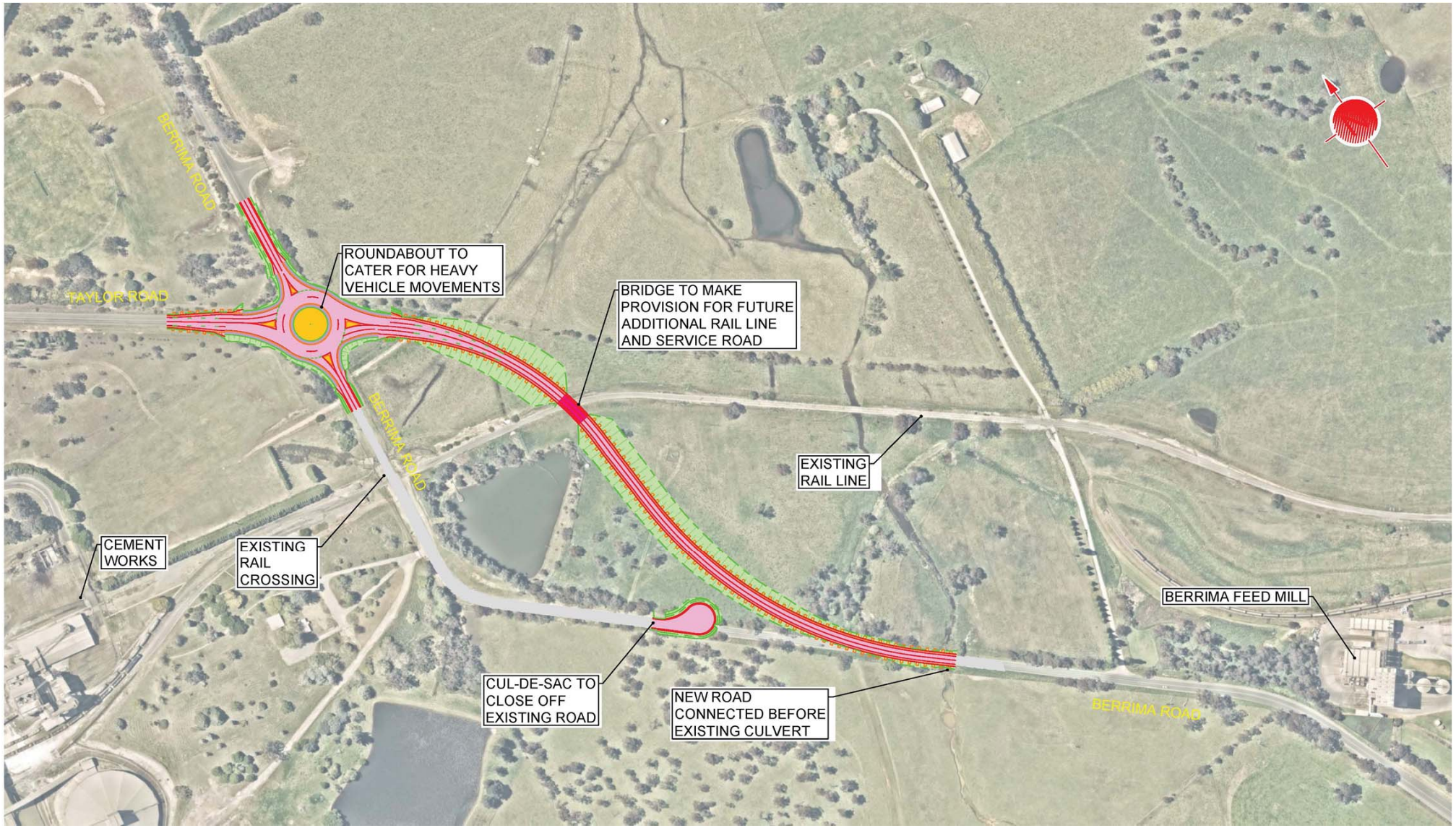

Figure 2.2: Proposed Wingecarribbee Shire Council Berrima Road deviation project layout plan

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Table 2.5: Recommended PSNLs calculated for representative receiver locations

Receiver location	Period	Recommended PSNL $L_{AEq.period}$	Inferred Recommended Average $L_{A90.period}$	Recommended PSNL for Night-time $L_{A01.1\text{-}min}$
Taylor Avenue near Adelaide St	Day Evening Night	48 44 43	43 39 38	58
4 Melbourne St	Day Evening Night	46 42 40	41 37 35	56
Chesley Park Farm	Day Evening Night	49 45 40	44 40 35	54
12 Brisbane St	Day Evening Night	51 45 40	46 40 35	56
Northern Boundary	Night			60

The PRP has yet to be finalised or included in Licence conditions. As part of the PRP response, it has been proposed that a new monitoring location be placed at the “Store Yard Close” location. This is proposed to replace all other monitoring and have an objective of $L_{A90.period}$ of 56 dBA averaged over 7 days, or $L_{A90.15\text{-}minutes}$ of 58 dBA. This objective is based on $L_{A90.15\text{-}minute}$ averages to avoid variability occurring with passing traffic outside and inside the plant which occurs with $L_{Aeq.15\text{-}minute}$ values. This objective is yet to be agreed with the NSW EPA.

The new Store Yard Close location is proposed to enable measurement of only Cement Plant noise emissions. Other residential and boundary locations receive noise immission from other sources as well, especially road traffic, which confound the measurement results if they were used to assess the Cement Plant. Results from this new location were commenced in 2015 and are included in this 2017 assessment. The location is shown in Figure 1.2.

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3 Measured sound levels in 2017 compared to previous measurements

3.1 Kiln 6 area sound levels

The plan view of the Kiln 6 area and upgrade plant items are shown in Figure 3.1. Figures 3.2 to 3.4 show measurement locations around the Kiln and upgrade items area.

Sound levels measured at locations around Kiln 6 Upgrade plant items are shown summarised in Table 3.1. Table 3.2 shows the tonality assessment of each measurement, with spectra shown in Table 3.2A and Figures given in Appendix A. Table 3.3 compares the results of sound levels measured at the same location on previous occasions from 2010 to 2016 and shows the calculated differences.

If the 2017 measured sound level exceeds the previous sound levels by more than 3dB, the cell difference in Table 3.2 is highlighted pink. A difference value of 3 dB is considered to be indicative of a potentially significant change in emission, as less than this is within measurement error or variation expected from location or source load differences.

The tables also have a column for comments, about major sources or where there is a difference which is an increase of more than 3 dB from previous measurements, and why this might have occurred.

For locations with an increase of 3 dB or more, other than for noise from passing traffic or open doors or vehicles or other non-normal noise source nearby, calculations of the effects of those increases on received sound are provided in Table 3.4. These are described below, with reference to increases shown in Table 3.3 and the effects calculated in Table 3.4. One-third octave band spectra and calculated tonality for each measurement location are shown in Figures 3.6 to 3.21. Locations where increased sound levels occurred are described below.

Starting with the PHT, a higher sound level was noted on Level 8 of the PHT near FA 263, compared to sound levels in 2012, and near the inlet vent for this fan in 2016. While the increases were 3 and 4 dB respectively, the relatively low sound level meant that the calculated resulting sound level (shown in Table 3.4) from these at residential receivers was not audible. The BE gearbox drive and the FA263 inlet vent sound spectra shown in Figure 3.6, were tonal. However these would not have caused tonal levels at receivers.

For Level 6 on top of the Raw Meal Silo near the motor for BE15, one location sound level was 7 dB above that measured in 2014, although other sound levels around the same drive were lower than in the past 3 years, so the difference is likely to be related to a minor measurement location variation. The calculated receiver sound level, without considering effects of barriers, is shown in Table 3.4 to be inaudible at 25 dBA or less. Tonal spectra occurred for the BE drive and FA260 motor, as shown in Figure 3.8, however these would not result in audible tonal sound at the receivers because of their close measurement location and the reduction occurring over distance.

In the same area on top of the RM Silo, near the discharge of the baghouse DC30 from the room below, the sound level was 4 dB above that measured in 2013. The calculated sound level at receivers, without including barrier effects, was below the contribution objective.

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Sound levels measured around Fans FA38 and FA39 were similar to those measured previously in most locations. Levels were 5 dB higher opposite the opening to the FA38 access area on the southern side of the roadway. This was calculated to have contribution sound levels more than 10 dB lower than the contribution objectives. Spectra and tonality graphs for this area are shown in Figure 3.16. Tonality occurs in the 1 kHz to 2 kHz and 4 kHz bands, caused by the noise from the VVF drives on the fan motors. This higher frequency sound emission is controlled by the barriers of the enclosure walls and switchroom.

For RM7, measurements were affected by maintenance occurring, with doors open and supplementary machinery operating. However sound level measurements on areas unaffected were similar to those measured previously and had not increased inmost locations. Internal locations for RM7 had similar sound levels to those of previous years. Sound levels measured under the switchroom ventilation fan western inlet duct were 6 dB higher than in 2016, with a relatively high band sound levels in the 125 and 250 Hz bands, shown in Figure 3.17, but were not tonal as shown in Figure 3.17. While its calculated contribution sound level was more than 10 dB below the objectives, it is recommended it be reviewed for effective operation.

Sound levels from Fans FA249 and FA250 were similar to or lower than measured in the past. FA249 had some marginally tonal sound levels near the fan casing in the 160 Hz frequency band, shown in figure 3.18, but these would not be audible at receiver locations because of the low sound levels emitted.

Sound levels on RM7 roof platform had some increases from those measured previously. Impact noise from material flow on the Magnete separator diverter plate is the main source of noise - this may be related to flowrate. A cover plate on the northern side of this separator was open slightly (10mm) at the top having not been bolted shut and this is considered to be the cause of the higher sound level on that side. Improvements to reduce the noise emission from this area have been advised in the past. Sound levels on the southern side of the upper roof platform were higher than in 2010 because the noise cladding has been removed from around the access hatch to the bucket elevator. Increases were up to 11 dB higher at the northern side of the Magnete plate on the lower platform compared to some previous years, mainly 2014. Calculations of contribution sound levels for all of these roof platform locations were below contribution objectives, without including additional attenuation that would occur from barriers. Spectra for the roof platform, shown in Figure 3.19, were not tonal.

Sound levels were higher near the RM7/FA250 baghouse area from the high-pitch sound of squeaking screw conveyors in the base of the baghouse hopper. On top of the baghouse structure at the southern side, a compressed-air leak caused increased sound levels 13 dB above those measured in 2013. However the calculated contributions were well below objectives for receivers. Spectra for the baghouse area, shown in Figure 3.20, had some tonal levels at higher frequencies caused by the squeals from the screw conveyors.

The doorway of the baghouse top had higher sound levels than 2013 by 8 dB. This sound level depends on how many reverse pulses might be measured during the measurement period. The calculated sound level at receivers is also well below contribution objectives.

Kiln 6 general emissions are checked by measurements along the northern and southern sides at approximately 13m to the sides, as well as along the Coal Road on the southern side of the kiln at a distance of approximately 80 metres to the side of the Kiln.

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While the PHT Level 6 stack test port sound level was 5 dB higher than in 2016, shown in Table 3.3, this is not considered to be a noise source as such. Other PHT level 6 sound levels were not increased from previous year's and were not tonal, as seen in Figure 3.9.

Sound levels on PHT levels 4 and 5 had not increased by more than 2 dB and most had not changed from those of previous measurements. Level 5 gas valves had slightly tonal levels at higher frequencies from gas flow noise seen in figure 3.11, but these would not be audibly significant at more than 20metres. Level 4 had no tonal sounds evident, as shown in Figure 3.12.

Sound levels on top of the northern side of the ESP were 3 dB higher than in 2016. This is most likely related to an intermittent source not observed during the measurement, such as a truck or other vehicle passing. The calculated contribution at receiver locations is less than audible. Tonality was not evident for Level 3 or ESP measurements, as seen in Figure 3.13.

In the area around DC31 and its fan on Level 2.5 of the PHT, the sound levels were up to 7 dB above those measured in the past. This area has many sources, including the fan entry duct to the stack. Calculated contribution levels at the residences were less than the contribution objectives, without considering barrier attenuation that might occur. The one-third octave band spectrum for this location, shown in Figure 3.14A, has relatively high levels at mid and high frequencies, caused by squeals from the screw conveyor SC48 on the floor below. So it is likely the sound level was influenced by sound from other sources. Similar increased sound levels occurred for the measurement of this fan discharge and a similar calculated receiver sound level not exceeding the contribution sound levels was shown in Table 3.4. Figure 3.14 shows minor tonality at 630 Hz for the SC48 drive and 2.5 kHz for the DC31 area. For the low-frequency sound levels at 63 Hz at measurement locations close to DC31, this frequency of sound is unusual for this fan and location but was observed in 2016 and may indicate either a problem with the silencer for the fan, or it may be coming from another source in the area. The potential for a standing wave in the main FA39 duct to the stack could be considered, given that the wavelength for 69.3 Hz is close to 5m and this might be available in the duct. Despite the higher sound levels at low frequencies, as noted above, the calculated contribution in Table 3.4 was well below the contribution objectives.

For level 2.25 by the eastern end of the screw conveyor SC48 Radicon gearbox, the sound level was 6 dB higher than measured in 2015. This was also influenced by high-frequency noise from the squeals of the conveyor. This was calculated to have receiver sound levels below the contribution objectives.

On Level 2 of the PHT the discharge of FA63 had a high level in the 63 Hz band, shown to be 69 Hz in Figure 3.5. This was calculated to have receiver contribution sound levels more than 6 dB lower than the contribution objectives, without considering barrier effects. A recommendation is to review this fan and its silencer for effectiveness. Figure 3.15 shows that the sound levels on Levels 2 and 1 were not tonal.

Also on level 2, sound levels adjacent to the FA39 stack entry duct were 4 dB higher than in 2016. This was calculated to have receiver sound levels well below the level of audibility.

Sound levels near FA265 were also higher than measured in 2013 to 2015 but similar to those measured in 2016. It is considered these were caused by sources other than those of the fan.

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Constancy in sound levels at these distant locations indicates no significant changes in overall emissions from the kiln and all of its multiple sources. There were only two locations where increases had occurred compared to those of previous years and at those locations there were other sources operating, such as trucks or other vehicles. Therefore it is evident the emissions from Kiln 6 in general have not changed. Increased sound levels at some close locations identified earlier or later have not resulted in increased sound levels towards residential receivers. Spectra for this area are shown in Figure 3.21 for the southern side measurements and Figure 3.22 for the Coal Mill Room area. Emissions from the Coal Mill fan discharge were marginally tonal at 630 Hz. The silencer for this fan was replaced about 10 years ago and may require servicing to improve its attenuation and reduce its tonality.

Sound levels at approximately 13m distance along the southern and northern sides had generally non-tonal sound spectra as shown in Figures 3.23 and 3.25, apart from the locations near FA38 and FA39, discussed earlier. Sound spectra on the kiln drive platform, shown in Figure 3.24, had tonal sound levels in the 315 Hz and 630 Hz bands from the gearbox, however these sound levels had not increased from previous measurements.

Sound levels in the grate cooler fan courtyard were very similar to those of previous years. One location between inlet filters for FA 205 and FA206 showed an increase of 4 dB compared to 2016 shown in Table 2.3, but was the same as measured in years prior to that. This variation may have been due to a slightly different location, especially given that adjacent measurement location results have not changed. The calculated contribution sound levels at the residential receivers given in Table 3.4, was at least 5 dB below the objective without considering barrier effects of the compressor house. Figure 3.26 shows the spectra in the courtyard were not tonal.

For the Kiln firing floor, the location on the northern side opening to the west had sound levels 4 dB higher than in 2013. This may have been caused by higher levels in the firing area or from other nearby sources such as the Radicon cooler fans. The calculated contribution for this location at the residential receivers was well below the objectives. Spectra are shown in Figure 3.27 to be non-tonal.

On the southern side opening of the Kiln Firing Floor, seal cooling fan FA210 inlet measurement location had 7 dB higher sound levels than in 2014. This may have been from the fan or from other sources in the area. The calculated contribution at the receivers was below the objectives at receivers without considering the barrier of the kiln.

Radicon cooler fan sound levels were similar to those of 2016 and 2013 to 2014, but 10 to 11 dB above those measured in 2015 and 2012. This is likely to be related to different operating speeds of the fans, which occurs at different weather conditions and process conditions. For the highest increase sound level of 14 dB, the calculated contribution was less than the objectives at the residential receivers. Tonality spectra shown in Figure 3.28 had a marginally tonal value for the measurement in front of the Level 4 Northern fan, which was not operating at the time. The Level 4 Centre fan location also had a tonal value shown at 1.25Hz. This may have been caused by fan belt squeal, which was noted in the area. The calculated receiver sound levels at this frequency would be below audibility.

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The Radicon Cooler baghouse fan FA215 had higher sound levels adjacent to the inlet box by 3 dB compared to 2013. The calculated contribution from this was less than 20dBA at any receiver. Figure 2.29 also shows this location had a marginally tonal sound level in the 4 kHz band. This would not be audible in the receiver locations and would be attenuated by the barriers of several buildings in the pathway.

Assessment of Kiln 6 Upgrade noise emission

Over all, the sound levels associated with Kiln 6 Upgrade sources were considered to not exceed the contribution objectives at the nearest residential receivers to the northern and southern sides of the plant. Some closer location measured sound levels had increased but these were calculated to not exceed the objectives at the residential locations. More distant measurements of the total emissions form the Kiln 6 area had not increased significantly from previous measurements which also indicated compliance with the objectives for the Project.

On the basis of the measurements and assessment, it is considered that the Kiln 6 Upgrade project is in compliance with its conditions of approval for sound levels.

Figure 3.1: Boral Cement Berrima Annual Environmental Noise 2017 - Kiln 6 survey area

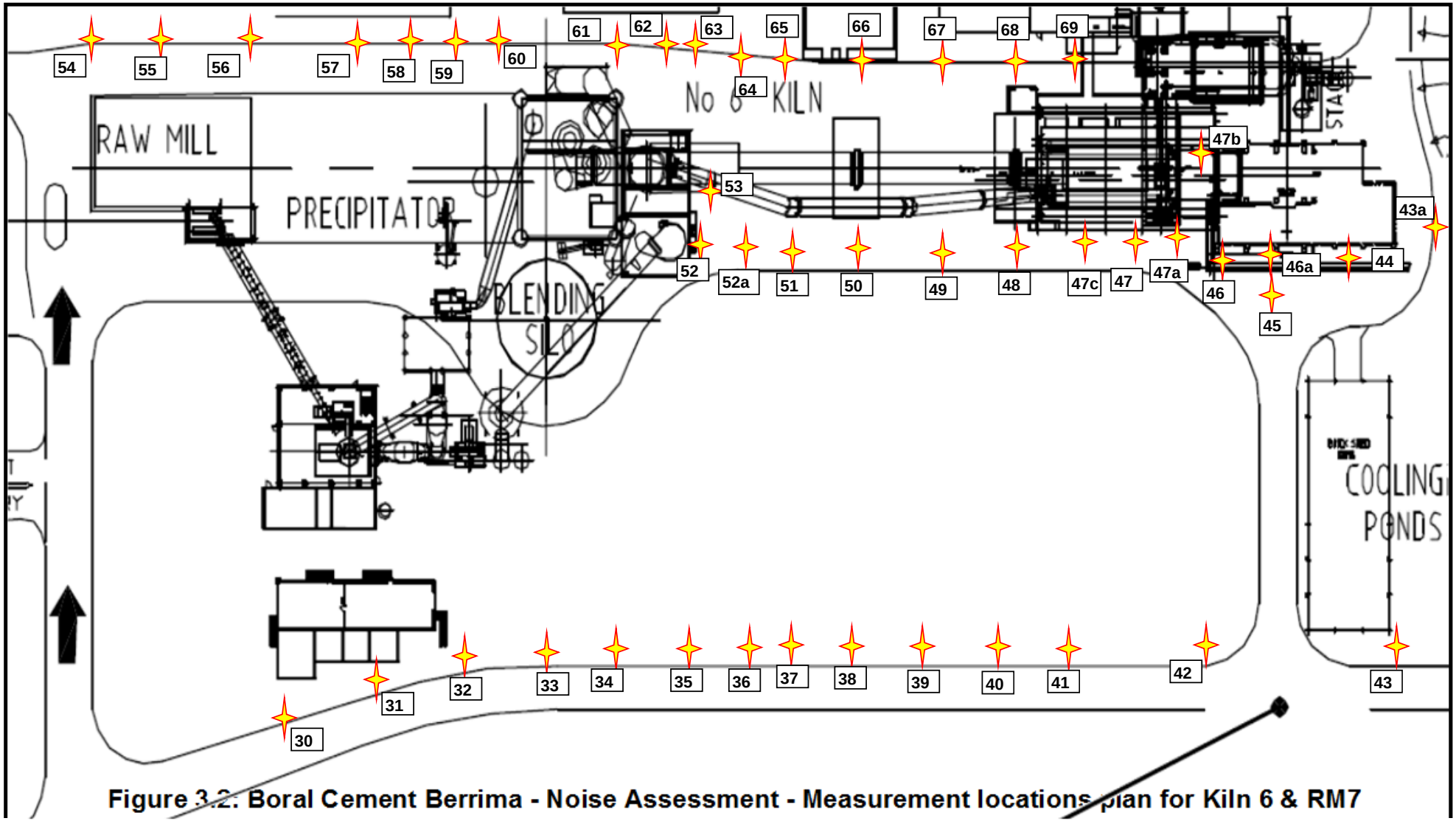

Figure 3.2: Boral Cement Berrima - Noise Assessment - Measurement locations plan for Kiln 6 & RM7

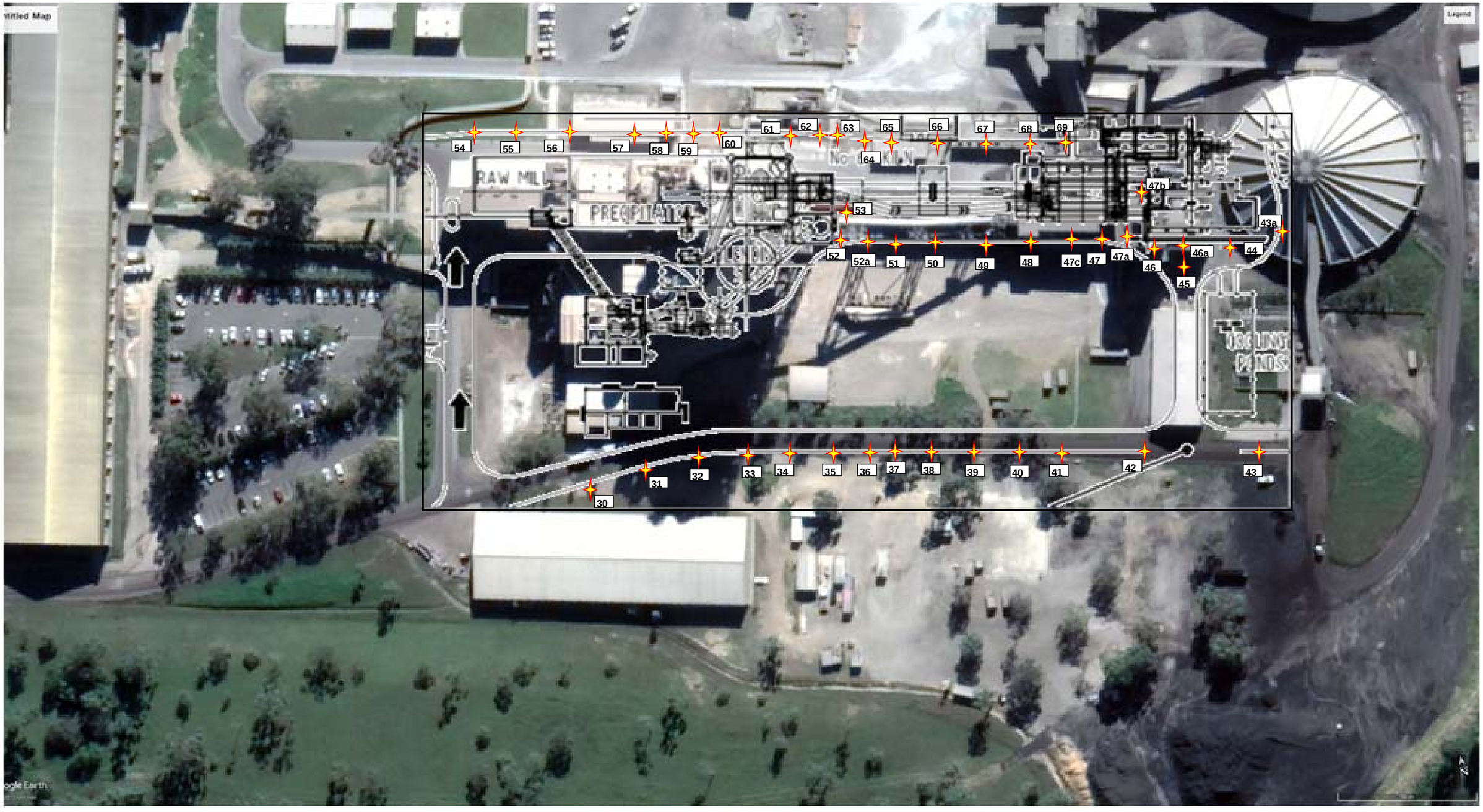

Figure 3.2A: Boral Cement Berrima - Kiln 6 Layout and measurement locations with aerial overlay

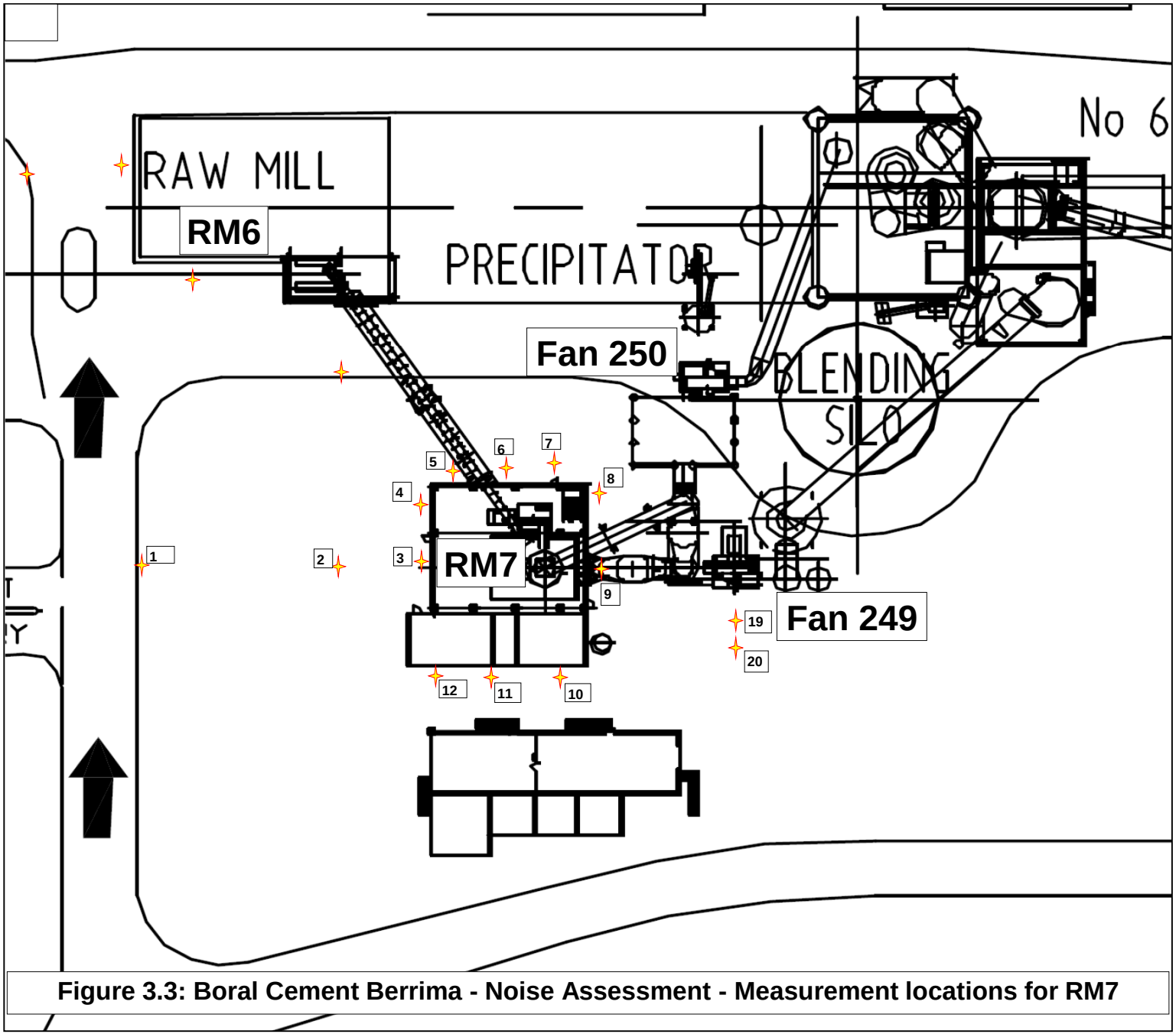

Figure 3.3: Boral Cement Berrima - Noise Assessment - Measurement locations for RM7

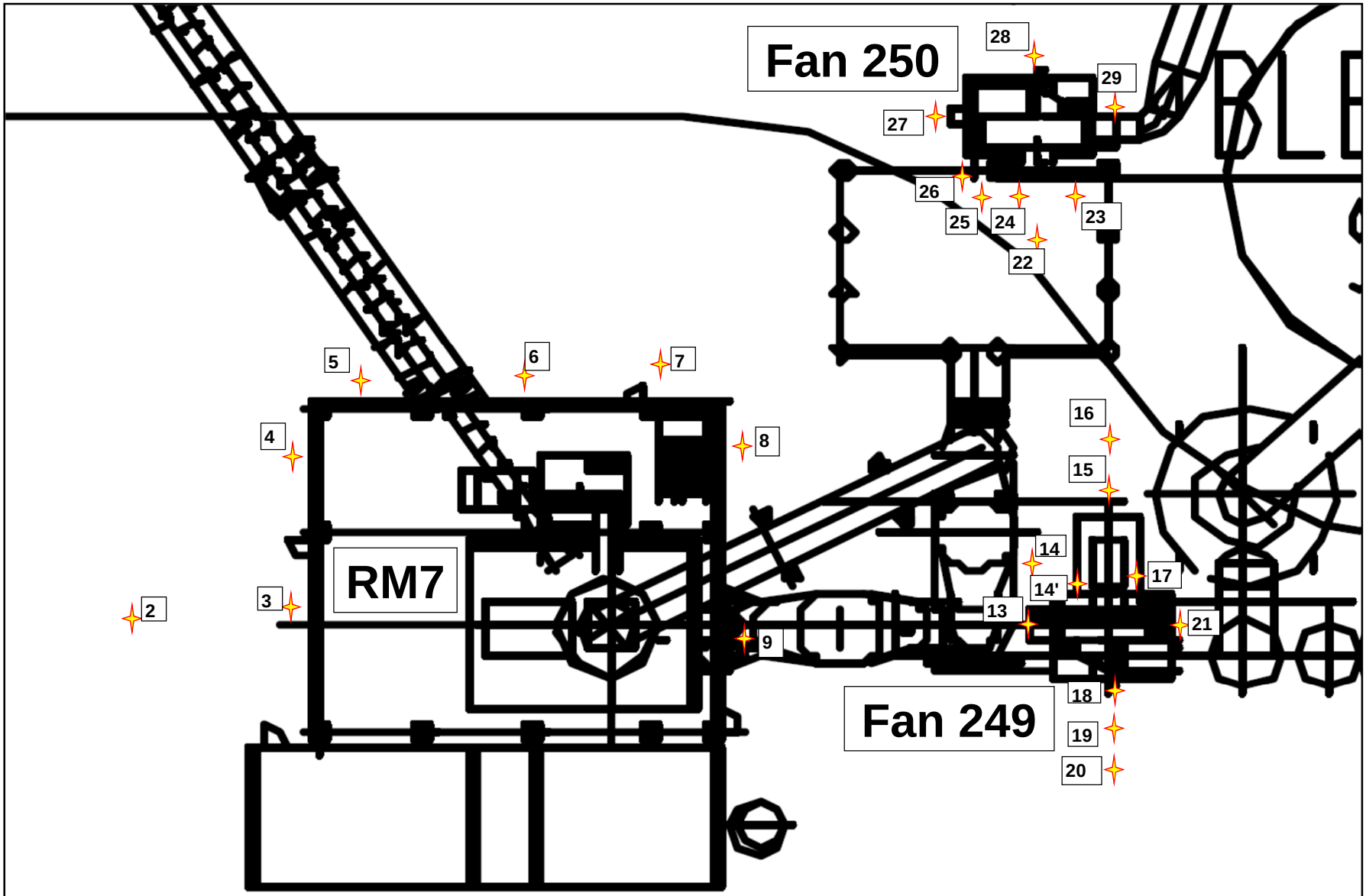

Figure 3.4: Boral Cement Berrima - Noise Assessment - Measurement locations RM7 & FA249 & FA250

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
PHT	L8+ Top NW corner Pointing to Gbox & motor @ 0.6m	337	6/10/2017	10:41 AM	00:00:48	A	80	90	81	81	81	79	10	
	L8+ Top SW side BE, 1m to motor	338	6/10/2017	10:42 AM	00:00:43	A	79	89	80	80	80	78	10	
	L8+ Top S side BE bearing @ 350mm	339	6/10/2017	10:43 AM	00:00:43	A	73	87	76	74	74	73	14	Location is shielded from Gbox, Wind 2m/s WSW
	L8+ Top NE corner Gbox @ 1m	340	6/10/2017	10:44 AM	00:00:31	A	80	91	82	81	81	80	10	
	L8+ Lower platform, pointing to stack @ 17m	341	6/10/2017	10:47 AM	00:00:36	A	76	90	79	78	77	76	14	1m below level of top of stack.
	L8+ Lower platform, pointing to Gbox & BE drive @ 3.2m	342	6/10/2017	10:48 AM	00:00:32	A	77	90	79	79	78	76	13	
	L8 FA263 @ 1m to N side	344	6/10/2017	10:54 AM	00:00:34	A	84	93	85	85	85	84	9	
	L8 Vent for inlet filter shed AS35 FA263	345	6/10/2017	10:55 AM	00:00:30	A	77	90	78	78	78	77	12	
	By L7 access door 13 @ 2m on top of PHT	346	6/10/2017	10:56 AM	00:00:30	A	78	91	80	80	79	77	13	Affected by FA263
	L8 new PHT centre	347	6/10/2017	10:57 AM	00:01:00	A	73	86	75	74	74	73	12	
	L8 new PH centre N side @ 2m to edge, facing centre	348	6/10/2017	10:58 AM	00:00:30	A	73	85	74	74	73	72	12	
	L8 new PH centre E side @ 2m to edge, facing centre	349	6/10/2017	10:59 AM	00:00:30	A	73	86	75	74	73	72	13	
	L8 new PH centre S side @ 2m to edge, facing centre	350	6/10/2017	11:00 AM	00:00:30	A	68	84	69	69	68	67	16	
	L7 new PH centre S side @ 2m to edge, facing centre	351	6/10/2017	11:02 AM	00:00:31	A	70	83	72	71	71	70	13	
	L7 new PH centre E side @ 2m to edge, facing centre	352	6/10/2017	11:02 AM	00:00:45	A	73	83	74	73	73	72	11	Noise from kiln, KSCFs & Radicon cooler
	L7 new PH centre N side @ 2m to edge, facing centre	353	6/10/2017	11:03 AM	00:00:33	A	72	85	74	73	73	71	13	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	L7 new PH centre centre facing E	354	6/10/2017	11:04 AM	00:00:30	A	73	85	75	74	74	73	12	
	L7 between PHTs centre facing W	355	6/10/2017	11:05 AM	00:00:30	A	73	87	74	74	73	72	14	
	L7 old PHT S side centre edge @ 2m face centre	356	6/10/2017	11:06 AM	00:00:30	A	74	88	77	76	75	74	14	
	L7 under BE drive platform W side facing BE @ 1m	357	6/10/2017	11:07 AM	00:00:30	A	74	88	75	75	74	73	15	Noise from below
	L7 BE drive platform E side @ 1m to Gbox coupling	358	6/10/2017	11:08 AM	00:00:30	A	80	90	81	81	80	79	10	
	L7 BE drive platform N side @ 1m to Gbox & 1m to E side of BE	359	6/10/2017	11:09 AM	00:00:30	A	77	88	78	78	78	77	11	
	L7 BE drive platform N side @ 1m to BE	360	6/10/2017	11:09 AM	00:00:30	A	76	89	78	77	77	75	13	
	L7 BE drive platform S side @ 1m to BE & 1m W side of motor	361	6/10/2017	11:10 AM	00:00:30	A	78	90	80	79	79	78	12	
	L7 BE drive platform W side @ 0.6m to BE	362	6/10/2017	11:11 AM	00:00:30	A	75	89	77	77	76	74	14	
	L7 centre between cylinders	363	6/10/2017	11:12 AM	00:00:26	A	74	90	76	76	75	74	16	
	L7 NW corner 2m to edge and stack	364	6/10/2017	11:13 AM	00:00:32	A	74	90	76	75	75	73	16	
	L7 PHT centre N side opening to platform to L7 door 17	365	6/10/2017	11:14 AM	00:00:30	A	74	91	76	75	74	73	17	
	L6 top of RM silo FA260 @ 2.5m N side	366	6/10/2017	11:16 AM	00:01:18	A	83	91	84	84	83	82	9	Affected by noise from BH vent on level below
	L6 top of RM silo FA260 @ 1m E side	367	6/10/2017	11:18 AM	00:00:31	A	87	95	88	88	88	86	8	
	L6 top of RM silo FA260 @ 1m to motor end (N side)	368	6/10/2017	11:19 AM	00:00:30	A	87	93	89	89	88	87	5	
	L6 RM silo top on BE EL15 platform NW side @ 1m	369	6/10/2017	11:20 AM	00:00:30	A	74	87	75	75	74	73	14	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	L6 RM silo top on BE EL15 platform SW side @ 0.8m	370	6/10/2017	11:20 AM	00:00:30	A	76	87	77	77	76	76	11	Gearbox noise
	L6 RM silo top on BE EL15 platform S side Gbox @ 1m	371	6/10/2017	11:21 AM	00:00:30	A	80	90	81	81	80	79	10	
	L6 RM silo top on BE EL15 platform E side Gbox @ 0.4m	372	6/10/2017	11:22 AM	00:00:30	A	82	89	83	82	82	81	8	
	L6 RM silo top, N side of platform @ 1m near discharge from baghouse below	373	6/10/2017	11:23 AM	00:00:37	A	89	97	91	90	90	88	8	
	L6 old PHT centre W side 2m to edge facing centre	374	6/10/2017	11:25 AM	00:00:32	A	75	87	77	76	75	74	12	
	L6 old PHT stack test port @ 200mm	375	6/10/2017	11:26 AM	00:00:30	A	90	98	92	91	91	90	8	Record TAS 688 100A
	L6 old PHT NW corner, stack @ 1m	377	6/10/2017	11:30 AM	00:00:30	A	77	88	79	78	78	77	11	
	L6 old PHT centre N side @ 2m to edge facing centre	378	6/10/2017	11:31 AM	00:00:31	A	73	85	75	74	73	72	12	
	L6 centre centre between PHTs facing W	379	6/10/2017	11:32 AM	00:00:31	A	74	84	75	75	75	74	10	
	L6 new PHT centre N side @ 2m to edge facing centre	380	6/10/2017	11:33 AM	00:00:30	A	73	84	76	75	74	73	11	
	L6 new PHT centre E side @ 2m to edge facing centre	381	6/10/2017	11:34 AM	00:00:42	A	73	83	78	75	73	72	11	Air cannon to 78
	L6 new PHT centre S side @ 2m to edge facing centre	382	6/10/2017	11:35 AM	00:00:30	A	72	82	84	80	72	71	10	Air cannon below 82
	L6 centre S side old PHT by elevator	383	6/10/2017	11:36 AM	00:00:37	A	73	83	74	74	74	73	10	
	L6 inside doorway to top RM silo room	384	6/10/2017	11:37 AM	00:00:30	A	83	93	86	85	84	82	9	
	L6 RM silo top room centre byt FA54 @ 1.2m	385	6/10/2017	11:39 AM	00:00:38	A	87	96	90	90	88	86	9	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	L6 RM silo top room in fully open E doorway	386	6/10/2017	11:40 AM	00:01:17	A	85	92	91	89	86	84	7	
	L6 RM silo top room inside S man door	387	6/10/2017	11:41 AM	00:00:41	A	86	93	89	88	87	85	8	
	L6 RM silo top room outside S man door	388	6/10/2017	11:43 AM	00:00:31	A	73	85	75	74	74	73	11	
	L5 old PHT centre S side by stair @ 2m to edge facing centre	389	6/10/2017	11:45 AM	00:00:48	A	75	84	80	78	75	74	9	Air cannon 80
	L5 old PHT centre W side by gas valves centre	390	6/10/2017	11:46 AM	00:00:30	A	81	86	81	81	81	80	6	Gas valve noise
	L5 old PHT NW corner @ 2m to edge, 1.2m to stack	391	6/10/2017	11:47 AM	00:00:30	A	75	87	78	76	76	75	12	Gas valve noise
	L5 old PHT centre N side @ 2m to edge by L5 Door 5	392	6/10/2017	11:48 AM	00:00:31	A	74	86	78	76	74	73	12	
	L5 centre centre between PHTs facing S	393	6/10/2017	11:49 AM	00:00:31	A	74	84	83	80	74	73	11	Air cannon No.32
	L5 new PHT centre N side 2m to edge facing centre	394	6/10/2017	11:50 AM	00:00:30	A	73	83	78	75	73	72	11	
	L5 new PHT centre E side 2m to edge facing centre	395	6/10/2017	11:51 AM	00:00:33	A	75	83	92	86	73	72	8	Air cannon 90 @ 8m
	L5 new PHT centre S side 2m to edge facing centre	396	6/10/2017	11:52 AM	00:00:40	A	71	81	80	76	71	70	10	
	L4 old PHT centre S side @ 2m to edge	397	6/10/2017	11:54 AM	00:00:33	A	76	86	79	78	77	76	9	
	L4 old PHT SW corner @ 1m to water pumps SV09	398	6/10/2017	11:55 AM	00:00:33	A	80	87	86	84	80	80	7	
	L4 old PHT centre W side @ 2m to edge facing centre	399	6/10/2017	11:56 AM	00:00:35	A	77	88	78	78	77	77	11	
	L4 old PHT NW corner 1.8m to stack	400	6/10/2017	11:57 AM	00:00:32	A	75	87	79	77	75	74	12	
	L4 old PHT centre N side on E side of cylinder	401	6/10/2017	11:58 AM	00:00:35	A	72	84	74	73	73	72	12	
	L4 centre centre between main ducts from kiln	402	6/10/2017	11:59 AM	00:00:31	A	73	84	76	75	74	73	11	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	L4 new PHT centre N side @ 2m to edge facing centre	403	6/10/2017	11:59 AM	00:00:30	A	73	83	74	74	73	73	10	
	L4 new PHT centre E side @ 2m to edge facing centre	404	6/10/2017	12:00 PM	00:00:30	A	73	84	74	74	74	73	11	
	L4 new PHT centre S side @ 2m to edge facing centre	405	6/10/2017	12:01 PM	00:00:30	A	71	82	73	72	72	71	11	
	Top of ESP E side centre platformbetween stairs facing PHT	406	6/10/2017	12:03 PM	00:00:45	A	73	86	76	75	74	73	12	
	Top of ESP S side walkway E side facing S RM7	407	6/10/2017	12:05 PM	00:00:50	A	74	84	76	75	74	73	10	Main noise is Magnete plate impacts on RM7 top
	ESP top centre E side S platform facing PHT	408	6/10/2017	12:06 PM	00:00:31	A	73	85	74	74	74	72	12	
	ESP top centre N side platform to ESP opposite stack	409	6/10/2017	12:07 PM	00:00:32	A	73	85	76	74	74	72	12	
	L3 old PHT centre S side @ 2m to edge facing centre	410	6/10/2017	12:10 PM	00:00:33	A	78	89	85	83	79	77	11	
	L3 old PHT centre W side @ 2m to edge facing centre	411	6/10/2017	12:11 PM	00:00:41	A	78	89	80	79	79	78	11	
	L3 old PHT centre N side @ 2m to edge facing centre	412	6/10/2017	12:12 PM	00:00:32	A	76	88	80	79	77	76	12	
	L3 old PHT centre E side @ 2m to edge facing centre	413	6/10/2017	12:13 PM	00:00:41	A	74	86	79	76	75	74	12	
	L2.5 PHT NW corner above motor DC31, 1.1m to stack & 1.5m to top of entry duct to stack from FA39	414	6/10/2017	12:16 PM	00:00:48	A	92	103	96	94	93	92	11	
	L2.5 PHT discharge of Fan DC31 @ 0.8m	415	6/10/2017	12:17 PM	00:00:26	A	92	107	97	95	92	91	15	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	L2.5 PHT S side centre on stair platform	416	6/10/2017	12:20 PM	00:00:38	A	83	92	87	87	85	81	8	Screw conveyor noise from below
	L2.25 PHT centre S side by E end SC48	417	6/10/2017	12:21 PM	00:00:41	A	91	95	96	94	92	88	4	Screw conveyor squeal 85 to 92
	L2.25 PHT centre W side facing fan discharge DC70 FA63 @ 4.66m, stack @ 6.35m and stack entry duct @ 6.23m	418	6/10/2017	12:22 PM	00:01:07	A	89	108	91	90	90	89	19	Very strong tonal noise @ 63 and 80 Hz bands - is 69 Hz. Repair or relace silencer with match to frequency
	L2 PHT FA63 casing @ 1m E side	420	6/10/2017	12:26 PM	00:00:31	A	87	97	89	88	87	86	10	
	L2 PHT FA63 inlet and casing @ 1m E side	421	6/10/2017	12:27 PM	00:00:30	A	86	98	89	87	87	86	12	
	L2 PHT FA63 discharge casing @ 1m W side	422	6/10/2017	12:28 PM	00:00:31	A	90	103	92	90	90	89	13	
	L2 PHT FA63 discharge @ 1m W side	423	6/10/2017	12:29 PM	00:00:20	A	92	110	93	92	92	91	18	
	L2 PHT 1m to stack entry duct S side	424	6/10/2017	12:30 PM	00:00:34	A	89	103	90	90	89	89	14	
	L2 PHT FA66 inlet filter @ 1m	425	6/10/2017	12:32 PM	00:00:38	A	88	100	90	89	89	88	12	Affected by noise from FA63
	L2 PHT FA66 motor and casing SE side @ 1m	426	6/10/2017	12:33 PM	00:00:49	A	87	100	99	92	88	86	13	
	L2 PHT centre N side edge @ 2m facing centre	427	6/10/2017	12:34 PM	00:00:31	A	84	94	90	87	85	83	11	
	L2 PHT NW corner @ 1.5m to stack	428	6/10/2017	12:36 PM	00:00:30	A	86	98	99	94	86	84	12	Air cannon 100
	L2 PHT N side of duct to stack @ 1m and W of stack @ 1m	429	6/10/2017	12:37 PM	00:00:30	A	88	101	90	89	88	87	14	80 Hz & 160/200 Hz bands
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	12:40 PM	00:00:32	A	79	92	87	83	80	79	13	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
FA 38 & FA39	FA39 E side @6.6m in line with joint	432	6/10/2017	12:41 PM	00:01:08	A	86	95	87	87	87	85	9	
	FA39 E side @2.3m in line with columns	433	6/10/2017	12:42 PM	00:00:37	A	87	97	89	89	88	86	10	
	FA39 under E side @ 0.8m to discharge duct	434	6/10/2017	12:43 PM	00:00:32	A	85	100	86	86	85	84	16	
	FA39 E side motor platform @ 0.82m to coupling cover	435	6/10/2017	12:44 PM	00:00:46	A	98	101	99	99	99	97	3	
	FA39 motor platform centre E side@ 1m	436	6/10/2017	12:45 PM	00:00:34	A	95	100	96	96	96	94	5	
	FA39 motor N end @ 1.72 to end plates	437	6/10/2017	12:46 PM	00:00:43	A	83	93	84	84	84	82	10	
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	12:47 PM	00:00:58	A	81	90	83	83	82	80	9	
	FA39 W side at metal strip @5.39m to plinth	439	6/10/2017	12:49 PM	00:00:33	A	88	94	90	89	88	87	6	
	FA39 W side at columns @2.7m to plinth	440	6/10/2017	12:50 PM	00:00:31	A	89	94	92	91	90	88	5	
	FA39 W side motor platform at 0.8m to couling cover & 1m to coupling	441	6/10/2017	12:51 PM	00:00:39	A	99	101	101	101	100	98	2	
	FA39 W side @ 1m to cladding door open, 1.33m to casing	442	6/10/2017	12:52 PM	00:00:38	A	88	98	91	90	89	87	10	
	FA39 S side @ columns 2.7m to bearing	443	6/10/2017	12:53 PM	00:00:30	A	83	96	85	85	84	82	13	
	FA39 S side platform bearing cover @ 0.8m	444	6/10/2017	12:54 PM	00:00:55	A	86	97	88	87	87	85	11	
	Centre between FA38 & FA39 @ 10.8m facing E	445	6/10/2017	12:55 PM	00:00:41	A	89	93	92	92	90	88	5	
	Centre between FA39 & FA38 @ 7m facing W	446	6/10/2017	12:56 PM	00:00:35	A	88	93	90	89	89	87	5	
	FA38 E side @ 2.66m to base	447	6/10/2017	12:57 PM	00:00:30	A	92	95	95	95	94	90	3	
	FA38 N end @ 2.7m to base	448	6/10/2017	12:58 PM	00:00:30	A	88	94	91	90	89	87	6	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	FA38 W side @ 5.13m to base at column	449	6/10/2017	12:59 PM	00:00:34	A	91	93	93	93	92	89	3	
	FA38 W side @ 10.26m to base at wall opening	450	6/10/2017	1:00 PM	00:00:32	A	87	92	88	88	88	85	5	
	FA38 motor platform W side @ 1m to couling cover, 1.9m to casing, 0.7m to motor side	451	6/10/2017	1:01 PM	00:00:44	A	100	100	102	102	101	98	1	
	FA38 at opening on S side of road facing FA38 opening	452	6/10/2017	1:03 PM	00:00:50	A	82	89	85	85	83	81	7	
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	12:40 PM	00:00:32	A	79	92	87	83	80	79	13	
Fan FA92	Drive and casing vent fan FA92 NE side @ 1m	229	19/09/2017	3:51 PM	00:00:35	A	82	90	86	84	83	82	7	
	Casing and inlet E side FA92 @ 1m	230	19/09/2017	3:52 PM	00:01:07	A	76	88	82	78	77	76	12	
	FA92 inlet filter S side @ 1m	231	19/09/2017	3:53 PM	00:00:30	A	74	87	75	75	74	74	13	
RM7 Area														
0*	RM6 Door @ 1.2m	136	19/09/2017	1:31 PM	00:00:30	A	77	87	79	79	78	76	10	Aggreko generator @ 3m. Door open 100mm
0	RM6 Door @ 13m	137	19/09/2017	1:32 PM	00:00:35	A	69	82	71	70	70	69	13	
	RM7													
1	Edge of road opposite main W door	138	19/09/2017	1:33 PM	00:00:33	A	69	81	72	72	70	69	11	Door open 500mm. Noise also from feed conveyor to RM7 from RM6
2	RM7 W door @ 20m	139	19/09/2017	1:35 PM	00:00:35	A	73	83	76	75	74	72	10	
3	RM7 W door @ 31.2	140	19/09/2017	1:36 PM	00:00:33	A	82	89	85	84	83	81	7	Open 500mm bottom
5	N side W roll door @ 1m	141	19/09/2017	1:37 PM	00:00:35	A	86	91	89	89	87	84	5	No 4 as truck being loaded there. Door fully open
6	N side vent E side of bin	142	19/09/2017	1:38 PM	00:00:31	A	81	90	85	83	82	80	9	Noise from open door
7	Man door NE corner @ 1m	143	19/09/2017	1:39 PM	00:00:31	A	79	90	81	80	80	79	11	
8	Vent E side N corner @ 1m	144	19/09/2017	1:39 PM	00:00:31	A	82	90	85	84	83	81	9	
9	E side under main duct	145	19/09/2017	1:40 PM	00:00:44	A	78	89	80	79	79	77	11	
10	S side compressor room doors, E side @ 1m	146	19/09/2017	1:41 PM	00:00:48	A	72	87	73	73	72	72	15	Fan noise from switchroom

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
11	S side compressor room - centre door @ 1m	147	19/09/2017	1:43 PM	00:00:41	A	74	88	75	74	74	73	15	Is opposite switchroom fan duct
12	Switch room fan ducts N side @ 1m	148	19/09/2017	1:44 PM	00:00:44	A	79	95	82	81	81	78	16	LF noise @ 63 & 80 Hz
12A	Under switchroom fan duct E	149	19/09/2017	1:45 PM	00:00:31	A	84	96	86	86	85	83	12	
12B	Under switchroom fan duct W	150	19/09/2017	1:46 PM	00:00:37	A	89	103	91	91	90	87	15	LF noise @ 63 & 80 Hz
4	W side N corner vent @ 1m	151	19/09/2017	1:47 PM	00:00:30	A	80	88	86	83	81	79	7	
13	Under W duct fan FA249	152	19/09/2017	1:48 PM	00:00:41	A	78	91	79	79	78	77	14	
14	2m W side W motor platform FA249	153	19/09/2017	1:49 PM	00:00:36	A	79	91	81	80	79	78	12	
14'	W side motor platform, motor drive & fan casing @ 1m	154	19/09/2017	1:51 PM	00:00:31	A	81	91	82	82	81	80	11	
15	FA249 motor end @ 1m	155	19/09/2017	1:51 PM	00:00:30	A	81	89	82	82	82	80	8	
16	FA249 motor end @ 4m at column	156	19/09/2017	1:52 PM	00:00:30	A	79	90	81	80	79	78	11	
17	FA249 motor platform E side 1m casing & motor	157	19/09/2017	1:53 PM	00:00:36	A	82	93	83	83	82	81	11	
18	FA249 platform S side @ 1m to shaft	158	19/09/2017	1:55 PM	00:00:31	A	76	89	78	77	77	75	13	
	Repeat store	159	19/09/2017	1:55 PM	00:00:31	A	76	89	78	77	77	75	13	
18'	FA249 S platform under duct inlet box	160	19/09/2017	1:57 PM	00:00:31	A	75	87	79	78	77	74	12	
19	FA249 @ 6m S side	161	19/09/2017	1:58 PM	00:00:35	A	71	84	73	73	72	71	13	
20	FA249 S side @ 10.3m to fan plinth	162	19/09/2017	2:02 PM	00:01:22	A	72	87	79	73	72	71	15	
21	FA249 under E side duct & 1m casing S side	163	19/09/2017	2:03 PM	00:00:32	A	77	92	79	79	78	76	15	
22A	FA250 S side @ 5m by columns	164	19/09/2017	2:05 PM	00:00:54	A	80	90	85	84	82	79	10	
22	FA250 motor end @ 1m	165	19/09/2017	2:06 PM	00:00:35	A	81	90	83	82	82	81	9	
23	FA250 E side shaft & casing @ 1m	166	19/09/2017	2:07 PM	00:00:32	A	85	96	86	86	85	84	11	
23'	FA250 E side motor centre	167	19/09/2017	2:08 PM	00:00:25	A	82	92	83	83	83	82	10	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
24	FA250 W side motor shaft @ casing @ 1m	168	19/09/2017	2:09 PM	00:00:32	A	85	96	87	86	85	84	11	
25	FA250 motor @ W edge of casing ~4m	169	19/09/2017	2:09 PM	00:00:31	A	82	93	84	83	83	82	10	
26	FA250W side @ 1m to casing & inlet box	170	19/09/2017	2:10 PM	00:00:34	A	82	93	83	83	82	81	11	
27	Under inlet box duct W side	171	19/09/2017	2:11 PM	00:00:30	A	79	90	83	81	80	79	11	
28	FA250 N side platform shaft bearing @ 1m	172	19/09/2017	2:12 PM	00:00:31	A	81	94	83	82	82	81	12	
29	FA250 E side ground level under discharge casing @ 1m	173	19/09/2017	2:13 PM	00:00:45	A	81	93	83	83	82	80	12	
RM7 Roof	Lower platform E side@ 1m to Magnete	174	19/09/2017	2:17 PM	00:00:47	A	89	91	92	91	90	88	2	
	Lower platform S side@ 1m to Magnete	175	19/09/2017	2:18 PM	00:00:48	A	92	93	96	94	94	91	1	Impact noise main source. Could enclose area on frame to reduce emitted noise
	Lower platform W side @ 1m to Magnete	176	19/09/2017	2:19 PM	00:00:30	A	89	91	92	91	90	88	3	
	Lower platform N side @ 1m to Magnete & 1m BE casing	177	19/09/2017	2:20 PM	00:00:31	A	90	92	94	93	92	88	2	
	Lower platform N side BE @ 1m	178	19/09/2017	2:20 PM	00:00:46	A	85	91	89	88	87	83	6	
	On adjacent platform @ 7m S side of Magnete	179	19/09/2017	2:22 PM	00:00:33	A	78	86	81	80	79	77	8	
	Upper platform NE of GB & drive shaft BE @ 1m	180	19/09/2017	2:23 PM	00:00:35	A	82	89	85	84	83	81	7	
	Upper platform N side of GB & drive @ 1m	181	19/09/2017	2:24 PM	00:00:35	A	82	93	86	84	83	81	11	Truck pneumatic loading below HF
	Upper platform W side motor end @ 1m	182	19/09/2017	2:24 PM	00:00:30	A	82	89	86	85	83	81	7	
	Upper platform W side BE @ 1m	183	19/09/2017	2:25 PM	00:00:33	A	80	88	85	83	81	79	8	
	Upper platform S side BE door @ 0.5m	184	19/09/2017	2:26 PM	00:00:31	A	87	93	93	91	89	84	6	Cladding removed from door
	Upper platform E side BE @ 1m	185	19/09/2017	2:26 PM	00:00:32	A	80	92	83	82	81	80	12	

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Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
Baghouse Tower FA250	Platform same level as RM7 top access S side	186	19/09/2017	2:28 PM	00:00:32	A	71	91	75	73	72	70	20	
	Top platform at BH top level S end	187	19/09/2017	2:29 PM	00:00:34	A	82	86	83	83	82	81	4	Compressed air leak @ 1m
	In baghouse S doorway open	188	19/09/2017	2:30 PM	00:01:01	A	80	86	96	93	78	75	6	Pulses 90 to 94, ambient 76.5 pulses in 1 min
	Inside baghouse centre	189	19/09/2017	2:32 PM	00:01:36	A	82	84	100	96	75	72	2	Pulse level depends on proximity 92 to 98 every 10 sec
SC12 platform	W end 1m to SC end	213	19/09/2017	3:04 PM	00:00:37	A	82	89	83	82	82	81	8	Truck loading may influence
	Centre SC12 under centre hopper of Baghouse	214	19/09/2017	3:04 PM	00:00:34	A	80	90	82	82	81	80	10	
	E end of platform near SC214 N end	215	19/09/2017	3:05 PM	00:00:31	A	79	89	82	82	81	78	10	Screw conveyor squeaks
Base of baghouse hopper level	SW corner by S end SC211	216	19/09/2017	3:07 PM	00:00:30	A	77	88	79	78	78	77	10	
	Centre W side, on E side SC211	217	19/09/2017	3:08 PM	00:00:31	A	78	96	84	82	79	78	18	
	Centre E side on W side SC210	218	19/09/2017	3:09 PM	00:00:35	A	79	88	80	80	79	78	9	
	N side FA252 & inlet	219	19/09/2017	3:10 PM	00:00:30	A	76	92	78	78	77	75	16	FA252 off
Hopper base level	N end	220	19/09/2017	3:11 PM	00:00:38	A	77	88	80	78	77	76	11	Truck below gone
	Centre centre of platform between hopper bottoms	221	19/09/2017	3:12 PM	00:00:28	A	76	88	77	77	77	76	12	

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Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
RM7 Inside	Top level inside E doorway	190	19/09/2017	2:35 PM	00:00:46	A	89	93	95	94	91	87	4	
	Top level N side BE @ 1m	191	19/09/2017	2:36 PM	00:00:35	A	89	93	95	93	90	88	4	
	E side BE and conveyor feed DC206	192	19/09/2017	2:37 PM	00:00:38	A	94	96	105	100	96	92	2	
	By top of RM7	193	19/09/2017	2:38 PM	00:00:33	A	92	95	100	96	93	90	3	
	Top level W side of conveyor feed chute to RM7	194	19/09/2017	2:39 PM	00:00:31	A	94	96	101	98	96	91	2	
	Top level, W side of conveyor entry to chute	195	19/09/2017	2:39 PM	00:00:31	A	93	95	99	98	94	91	2	
	Top level W side of platform	196	19/09/2017	2:40 PM	00:00:31	A	89	93	93	92	90	87	4	
	Top level N side at wall opening for conveyor	197	19/09/2017	2:41 PM	00:00:31	A	87	91	92	89	88	85	5	
	Top level - feed conveyor walkway half-way - 10m to RM7	198	19/09/2017	2:42 PM	00:00:31	A	80	92	81	81	81	79	12	Truck below still loading
	Level 3 BE N side @ 2.5m	199	19/09/2017	2:43 PM	00:00:47	A	89	94	93	92	90	87	5	
	Level 3 by duct from RM7 top @ 1m N side	200	19/09/2017	2:44 PM	00:00:37	A	95	97	104	101	97	93	2	Impact noise main source. Could enclose area on frame to reduce emitted noise
	Level 2 BE N side @ 2.5m & to N wall	201	19/09/2017	2:46 PM	00:00:41	A	89	94	92	91	90	87	6	
	Level 2 RM7 top & duct E side	202	19/09/2017	2:46 PM	00:00:32	A	91	96	96	95	93	89	5	
	Level 1 work bench BE N side @ 2.5m and N wall	203	19/09/2017	2:48 PM	00:00:47	A	89	95	94	92	91	88	6	
	Level 1 on RM7 platform W side @ 1m to body	204	19/09/2017	2:49 PM	00:00:45	A	93	99	100	99	95	90	6	Floor vibration and fan noise
	Mezzanine platform W of RM7 body @ 3m	205	19/09/2017	2:50 PM	00:00:31	A	92	96	97	95	93	90	5	Impact noise
	Ground floor E side of VF100 @ 1m and 2m to BE casing	206	19/09/2017	2:51 PM	00:00:29	A	94	99	100	99	96	92	5	Impact noise
	Ground floor N side of BE @ 2.2m	207	19/09/2017	2:52 PM	00:00:31	A	90	95	94	93	91	89	6	
	Ground floor NE corner	208	19/09/2017	2:52 PM	00:00:31	A	88	92	92	91	89	87	5	Door fully open
	Ground floor centre W side @ 4m to motor end	209	19/09/2017	2:53 PM	00:00:31	A	91	96	95	94	92	90	5	

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Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	Ground floor motor N side @ 1.5m	210	19/09/2017	2:54 PM	00:00:30	A	93	98	96	96	94	92	5	Mainly VF100
	Ground floor S side motor & RM7 body @ 2m	211	19/09/2017	2:55 PM	00:00:31	A	93	96	95	95	94	91	4	
	Ground floor S side RM7 body centre	212	19/09/2017	2:56 PM	00:00:40	A	92	96	98	95	94	90	5	
Kiln 6 North and South sides														
30	Coal Road S side in line W side RM7	3	19/09/2017	01:40 PM	32	A	65	78	69	67	66	64	13	
31	Coal Road S side in-lin E side RM7	4	19/09/2017	01:42 PM	42	A	71	81	86	82	73	64	9	truck passed
32	Coal Road S side in-line FA249	5	19/09/2017	01:44 PM	42	A	66	80	69	68	67	65	14	
33	Coal Road S side Centre Blending Silo	6	19/09/2017	01:46 PM	34	A	67	81	68	68	67	66	14	
34	Coal Road S side E side PHT	7	19/09/2017	01:47 PM	35	A	67	82	70	68	68	66	15	in line with ring
35	Coal Road S side E side new PHT	8	19/09/2017	01:49 PM	43	A	67	81	69	69	68	66	14	
36	Coal Road S side E side drive platform	9	19/09/2017	01:51 PM	37	A	67	81	72	69	68	67	14	
37	Coal Road S side centre column W support duct	10	19/09/2017	01:52 PM	33	A	68	82	71	69	69	67	14	
38	Coal Road S side centre pedestal	11	19/09/2017	01:53 PM	34	A	69	82	72	72	71	68	13	
39	Coal Road S side Between centre & E pedestal	12	19/09/2017	01:55 PM	32	A	68	80	69	69	69	68	12	
40	Coal Road S side E pedestal	13	19/09/2017	01:56 PM	39	A	68	80	70	69	69	67	12	
41	Coal Road S side W end Firing floor building	14	19/09/2017	01:57 PM	34	A	66	78	67	67	66	65	13	
42	Coal Road S side opposite grate	15	19/09/2017	01:59 PM	33	A	67	78	71	69	68	66	11	
43	Coal Road S side W side coal receival bin 25m to truck	16	19/09/2017	02:01 PM	38	A	64	81	66	66	65	63	16	
43	A Kerb E side CM opp CM fan discharge	17	19/09/2017	02:04 PM	38	A	75	83	76	76	75	74	8	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
43A	Kerb opposite CM fan discharge	472	6/10/2017	4:47 PM	00:00:58	A	78	85	81	80	79	77	7	Close to tonal @ 630 Hz. Fan room and mill drive doors open
Southern fence line														
43*	S fence Opp E end kiln	273	19/09/2017	4:44 PM	00:02:00	A	58	75	63	61	59	57	17	Gate and fence rmoved for new building. Wind 3-5m/s W, main noise K6 PHT, KSCFs and some CM fan. Air cannon 62
38*	S fence at corner post opp centre pedestal of kiln	274	19/09/2017	4:47 PM	00:01:00	A	61	76	64	63	62	60	15	KSCFs main source
34*	S fence, Opposite W side PHT	275	19/09/2017	4:49 PM	00:01:00	A	60	74	63	62	61	59	14	
Coal Mill South wall Area														
44	CM fan room door @ 2m	18	19/09/2017	02:06 PM	36	A	85	91	86	86	85	85	6	Door open; 5 paces back from building
44	CM Fan Room door open S side @ 1.5m to open door, 4m x 4m	469	6/10/2017	4:43 PM	00:00:32	A	88	94	89	89	88	87	7	
45	CM S roll door and wall vent @ 10m S side	20	19/09/2017	02:09 PM	38	A	78	85	79	79	79	78	7	5 paces back from 46a
45'	~20m S of CM open doorway and motor room	471	6/10/2017	4:46 PM	00:00:39	A	78	85	79	79	79	78	7	
46	CM room wall vent @ 2m	21	19/09/2017	02:11 PM	34	A	77	86	79	78	78	77	8	
46	Doors to CM room open S side - in doorway 4.5m x 4m	470	6/10/2017	4:45 PM	00:00:31	A	92	96	93	93	92	92	4	
47b	b Between Grate and Coal Mill Room	22	19/09/2017	02:12 PM	33	A	86	92	87	87	87	86	6	
47a	A At kerb in line East End of Grate	23	19/09/2017	02:14 PM	32	A	79	87	81	80	80	79	8	
47	Opp FA264 & Shute	24	19/09/2017	02:16 PM	35	A	81	88	83	82	82	81	6	
47c	c FA 200 S Side @ 5m	25	19/09/2017	02:18 PM	32	A	82	89	83	83	83	82	7	fan FA 200
48	Opp. E pedestal roller	26	19/09/2017	02:19 PM	42	A	83	90	84	84	83	82	8	ring
49	Half way between centre & E pedestals	27	19/09/2017	02:21 PM	33	A	83	90	84	84	84	83	6	
50	Opp. Centre pedestal	28	19/09/2017	02:22 PM	32	A	80	88	81	81	80	79	8	in line with ring
51	Half way between Centre & Western pedestals	29	19/09/2017	02:24 PM	32	A	76	86	77	77	77	76	10	trelise
52a	A Opp E end of kiln drive platform	30	19/09/2017	02:25 PM	34	A	77	86	79	78	78	76	9	in line with building
52	Opp W pedestal roller	31	19/09/2017	02:28 PM	51	A	76	86	78	77	76	75	11	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
Kiln Drive Platform	S side S motor end @ 1.5m kiln drive	222	19/09/2017	3:44 PM	00:00:31	A	84	91	85	85	84	83	8	
	S side S drive GB @ 1.5m kiln drive	223	19/09/2017	3:45 PM	00:00:33	A	88	93	90	89	88	86	5	
	S drive motor end @ 1m kiln drive	224	19/09/2017	3:45 PM	00:00:32	A	88	94	90	90	88	87	7	
	Between drive motors kiln drive	225	19/09/2017	3:46 PM	00:00:30	A	89	95	90	90	89	88	7	
	N side motor end @ 1m kiln drive	226	19/09/2017	3:47 PM	00:00:29	A	86	94	87	87	86	85	8	
	N side motor N end @ 1.5m kiln drive	227	19/09/2017	3:48 PM	00:00:31	A	84	91	85	85	85	83	8	
	N side N gearbox @ 1.5m kiln drive	228	19/09/2017	3:48 PM	00:00:39	A	86	92	88	87	87	85	6	
53	Kiln drive platform Centre E end on platform	32	19/09/2017	02:30 PM	32	A	74	88	79	76	75	73	14	
54	W end RM6	33	19/09/2017	02:36 PM	38	A	69	83	71	70	70	69	13	strong wind more exposed 100 fsd
55	Centre RM6	34	19/09/2017	02:38 PM	36	A	71	83	73	73	72	71	12	
56	E End RM6	35	19/09/2017	02:39 PM	32	A	76	86	79	78	77	75	10	18m from building
57	N side of road opposite opening to FA38	453	6/10/2017	1:04 PM	00:01:01	A	78	86	81	81	80	76	8	
57'	N side of kerb opposite FA38 roll door closed	454	6/10/2017	1:05 PM	00:01:19	A	82	89	85	84	84	80	7	
57	Door opp FA38	36	19/09/2017	02:43 PM	31	A	79	89	81	81	80	78	10	in line with door
58	Half way between FA38 & FA39	37	19/09/2017	02:45 PM	40	A	80	91	82	82	81	79	11	
58	Half way between FA38 & FA39, N side of road	455	6/10/2017	1:07 PM	00:00:30	A	81	91	84	83	82	80	10	
59	Opp FA39 end	38	19/09/2017	02:46 PM	34	A	82	91	83	83	83	81	9	Edge of building
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	12:47 PM	00:00:58	A	81	90	83	83	82	80	9	
60	Opp Conditioning Tower	39	19/09/2017	02:48 PM	37	A	81	90	83	82	82	80	9	in line with fan
60	Opposite conditioning tower N side of road	456	6/10/2017	1:08 PM	00:00:33	A	84	91	85	85	84	83	7	
60'	Opposite NW PHT column	457	6/10/2017	1:09 PM	00:00:32	A	82	91	83	83	83	81	9	
61	Opp centre PHT	40	19/09/2017	02:50 PM	33	A	77	88	80	78	77	76	11	
61	Opposite NE PHT column	458	6/10/2017	1:10 PM	00:00:39	A	78	88	80	79	79	78	10	
63	Opp E side new PHT	43	19/09/2017	02:57 PM	48	A	77	87	83	79	77	76	11	in line edge of tower

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
63	Opposite E side new PHT	459	6/10/2017	1:11 PM	00:00:36	A	77	88	78	78	78	77	11	
64	Opp. E end drive platform	42	19/09/2017	02:53 PM	31	A	78	88	80	79	78	77	10	
65	Opp column for return duct W side	44	19/09/2017	02:59 PM	32	A	80	90	81	81	81	80	10	
65	Opposite S duct support tower	460	6/10/2017	1:12 PM	00:00:32	A	80	88	81	80	80	79	9	
66	Opp centre pedestal	45	19/09/2017	03:00 PM	34	A	85	91	86	86	85	85	6	
67	Half way between centre & e pedestals	46	19/09/2017	03:02 PM	32	A	85	91	86	86	85	85	6	
68	Opp E pedestal	47	19/09/2017	03:03 PM	32	A	86	93	87	87	86	86	7	cl of ring
69	Centre courtyard	48	19/09/2017	03:05 PM	58	A	85	93	86	86	86	85	8	in front of FA205
Grate Cooler Fan Courtyard Area														
	FA201 N side coupling @ 1.5m	234	19/09/2017	3:57 PM	00:00:30	A	90	97	91	91	91	90	7	
	FA201 N side inlet & casing @ 1m	235	19/09/2017	3:58 PM	00:00:30	A	92	98	92	92	92	91	7	
	Between FA201 & FA203 & 1.5m to FA202 N side	236	19/09/2017	3:59 PM	00:00:36	A	94	100	94	94	94	93	6	
	FA203 inlet & casing @ 1m	237	19/09/2017	4:00 PM	00:00:31	A	89	97	90	89	89	89	8	
	Between FA203 & FA205 and 2m to FA204 N side	238	19/09/2017	4:00 PM	00:00:31	A	89	98	90	89	89	88	9	
	Between grate and Coal Mill Room W door	239	19/09/2017	4:02 PM	00:00:32	A	86	93	87	87	87	86	7	
	Coal Mill Room N roll door @ 1m	240	19/09/2017	4:02 PM	00:00:31	A	86	92	87	86	86	85	7	Door open 100mm bottom
Kiln Firing Floor	KFF centre opening N side	248	19/09/2017	4:16 PM	00:00:59	A	85	91	104	91	83	83	6	Air cannon @ 7m 100A but HF relatively low, new silencer
	FA209 E side inlet & filter silencer	249	19/09/2017	4:18 PM	00:00:31	A	86	94	87	87	86	85	8	KSCFs main source
	FA209 W side inlet @ 1.2m	250	19/09/2017	4:19 PM	00:00:31	A	93	98	94	94	94	93	5	KSCFs @ 3m main source
	KFF centre S side opening	251	19/09/2017	4:20 PM	00:00:45	A	83	89	93	88	83	82	6	Air cannon 93
	FA210 S side seal fan inlet E side @ 1.5m	252	19/09/2017	4:21 PM	00:00:32	A	92	95	93	93	92	92	3	
	FA210 S side seal fan inlet W side & casing @ 1m	253	19/09/2017	4:22 PM	00:00:31	A	85	91	87	87	86	85	6	

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
	FA200 inlet N side @ 1.2m	254	19/09/2017	4:23 PM	00:00:30	A	87	95	89	89	88	87	8	Other fans adding
	New replacement FA211 centre under kiln, inlet @ 1m	255	19/09/2017	4:23 PM	00:00:50	A	96	102	101	98	97	96	5	Open inlet - consider inlet silencer as opening points to village
	Centre KFF @ 2m to elevator conveyor duct S side	256	19/09/2017	4:25 PM	00:00:31	A	81	88	83	82	82	81	6	
	KFF burner air cannon N side @ 2m	257	19/09/2017	4:26 PM	00:00:39	A	90	92	112	101	85	85	2	Ambient 85, reverse pulse 112
	KFF burner air cannon N side @ 2m	258	19/09/2017	4:27 PM	00:00:56	A	90	92	114	99	86	85	2	Reverse Pulse 114 dBA
Radicon Cooler	L1 S side fan @ 0.6m	259	19/09/2017	4:29 PM	00:00:30	A	92	102	93	93	93	92	10	
	L1 centre fan @ 1m	260	19/09/2017	4:29 PM	00:00:31	A	90	99	91	91	91	90	9	
	L1 N side fan @ 1m	261	19/09/2017	4:30 PM	00:00:30	A	89	97	90	90	89	89	8	
	L2 centre fan @ 1m	262	19/09/2017	4:31 PM	00:00:32	A	94	102	95	95	94	94	8	
	L2 S fan @ 0.6m	263	19/09/2017	4:32 PM	00:00:30	A	95	104	96	95	95	94	9	
	L2 N fan @ 1m	264	19/09/2017	4:32 PM	00:00:30	A	95	102	97	96	96	95	6	
	L3 centre fan @ 1m	265	19/09/2017	4:33 PM	00:00:36	A	94	102	95	95	95	94	7	
	L3 S side fan @ 0.6m	266	19/09/2017	4:34 PM	00:00:31	A	94	103	95	95	94	93	10	
	L3 N side fan @ 1m	267	19/09/2017	4:35 PM	00:00:31	A	95	101	96	95	95	94	7	
	L4 centre fan @ 1m	268	19/09/2017	4:35 PM	00:00:30	A	95	99	96	96	96	95	3	belt squeak
	L4 S side fan 2 0.6m	269	19/09/2017	4:36 PM	00:00:31	A	93	98	95	94	94	93	5	Less belt squeak
	L4 N side fan @ 1m	270	19/09/2017	4:37 PM	00:00:30	A	90	96	92	92	91	88	6	Fan idle, other fans are source
	L5 face E	271	19/09/2017	4:38 PM	00:00:34	A	85	93	86	86	86	85	8	Reflected noise from KSCFs and other fans
	L5 face W	272	19/09/2017	4:39 PM	00:00:31	A	86	92	87	86	86	85	6	Noise from KSCFs and other fans

Table 3.1: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	10:40 AM	00:00:36	A	79	90	81	80	80	78	12	Level with top of stack directed to it, Gbox behind, 160 & 200 Hz 8-10 dB above rest
Stack Fan FA215	S side ground level @ 2m to motor end FA215	241	19/09/2017	4:03 PM	00:00:44	A	81	89	82	81	81	81	8	
	FA215 platform E side motor & casing @ 1m	242	19/09/2017	4:05 PM	00:00:30	A	84	91	85	85	85	84	7	
	FA215 platform W side motor & casing @ 1m	243	19/09/2017	4:05 PM	00:00:30	A	85	91	86	86	86	85	6	
	FA215 E side under discharge duct @ 1m	244	19/09/2017	4:06 PM	00:00:33	A	79	90	80	79	79	78	11	
	FA215 platform N side on E side of inlet box @ 0.5m and duct casing @ 0.8m	245	19/09/2017	4:07 PM	00:00:35	A	78	90	79	79	78	77	12	
	FA215 N platform centre N side inlet box @ 0.8m	246	19/09/2017	4:08 PM	00:00:33	A	77	87	78	77	77	76	11	
	FA215 N platform W side under inlet duct @ 0.8m	247	19/09/2017	4:09 PM	00:00:31	A	80	89	81	81	80	80	9	
Control Building Roof														
	SW corner	279	19/09/2017	5:19 PM	00:01:01	A	72	82	77	75	73	70	10	Wind3-4m/s W. Ambient 74. Some noise from FA502
	SE corner	280	19/09/2017	5:21 PM	00:01:00	A	72	81	75	74	73	71	9	72 to 73 dBA depends on FA502
	NE corner	281	19/09/2017	5:22 PM	00:01:01	A	72	81	74	73	73	71	9	KSCFs and FA520

Table 3.3: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for Kiln 6 Upgrade

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File No.	Date	Statistical Sound Level - LAeq dBA											Difference to 2016 = 2016 - 20XX dB								
				LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
PHT	PHT L8 Top platform level with top of stack	335	6/10/2017	91	90	91									-1								
	PHT L8 Top platform level with top of stack	336	6/10/2017	79	78	80	80	81	80	80					-1	-2	-2	-1	-1				
	PHT L8 Top platform EL16 Gbox @ 1m to coupling NW side	337	6/10/2017	80	79	81	82								-1	-2							
	PHT L8 Top platform EL16 Gbox @ 1m to coupling SW side	338	6/10/2017	79	78	82	80								-3	-1							
	PHT L8 Top platform EL16 Gbox @ 2m to motor S side	339	6/10/2017	73	73	78	81								-5	-7							
	PHT L8 Top platform EL16 Gbox @ 1m to NE side	340	6/10/2017	80	80	79	82								1	-2							
	PHT L8 Lower platform	341	6/10/2017	76	76	78	80	80	80	79	77				-1	-4	-4	-4	-3	-1			
	PHT L8 Top platform EL16 Gbox @ 3m to N side	342	6/10/2017	77	76	76									1								
		343	6/10/2017	90	89																		
	PHT L8 proper FA263 motor & casing @ 1m	344	6/10/2017	84	84	85	86	89	85	81					-1	-2	-5	-1	3				
	PHT L8 proper 1m to vent on FA263 filter room	345	6/10/2017	77	77	74	80								4	-3							
	PHT L8 centre tower W side	346	6/10/2017	78	77	76	76								2	1							
	L8 new PHT centre	347	6/10/2017	73	73																		
	PHT L8 centre tower N side	348	6/10/2017	73	72	71	75	74							2	-2	-2						
	PHT L8 centre tower E side	349	6/10/2017	73	72	71	74								2	-1							
	PHT L8 centre tower S side	350	6/10/2017	68	67	67	69								1	-1							
	PHT L7 New S side centre	351	6/10/2017	70	70	70	70								1	0							
	PHT L7 New E side centre	352	6/10/2017	73	72	72	72								1	0							
	PHT L7 New N side centre	353	6/10/2017	72	71	71	72								1	-1							
	PHT L7 New centre between towers	354	6/10/2017	73	73	75	73	75	71						-1	0	-1	2					
	L7 between PHTs centre facing W	355	6/10/2017	73	72																		
	PHT L7 Old S side centre	356	6/10/2017	74	74	75	73								0	2							
	PHT L7 under EL13 platform E side	357	6/10/2017	74	73	75	76								-1	-2							
	EL13 platform E side Gbox & coupling @ 0.5m	358	6/10/2017	80	79	81	83								-1	-3							
	EL13 platform N side GB end & side EL @ 1m	359	6/10/2017	77	77	77	79	79	79	80					0	-2	-2	-2	-2				
	L7 BE drive platform N side @ 1m to BE	360	6/10/2017	76	75																		
	EL13 platform SW side motor & EL & coupling @ 1m	361	6/10/2017	78	78	79									-1								
	EL13 platform W side 0.5m	362	6/10/2017	75	74	75									0								
	EL13 platform motor end @ 1m	0	0/01/1900	0	0	78	78																
	L7 centre between cylinders	363	6/10/2017	74	74																		
	PHT L7 old NW corner 1.5m to stack	364	6/10/2017	74	73	71	74	77	77	77	77	77			3	0	-3	-3	-4	-3	-3		
	PHT L7 old centre N side	365	6/10/2017	74	73	74	74								-1	-1							
	PHT L7 old centre N side on new platform			0	0	69																	
	PHT L6 RM silo above baghouse discharge @ 2m at base of stairs to EL	366	6/10/2017	83	82	87	90	86	87	85	85	86	85		-5	-7	-3	-4	-2	-2	-3	-2.3	
	PHT L6 RM silo Top FA260 NE side @ 1m casing & motor	367	6/10/2017	87	86	89	88		85						-3	-1		2					

Table 3.3: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for Kiln 6 Upgrade

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File No.	Date	Statistical Sound Level - LAeq dBA										Difference to 2016 = 2016 - 20XX dB								
				LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
	PHT L6 RM Silo top EL15 platform motor side 0.6m	368	6/10/2017	87	87	80									7								
	EL15 W side @ 1m	369	6/10/2017	74	73	74	74	81	81	80	80	75			-1	0	-7	-7	-7	-6	-1		
	L6 RM silo top on BE EL15 platfor	370	6/10/2017	76	76																		
	EL15 S side Gbox @ 1m	371	6/10/2017	80	79	80	77	78	80						0	2	1	0					
	EL15 E side Gbox @ 0.5m	372	6/10/2017	82	81	80	80								1	2							
	RM silo top baghouse fan DC30 discharge @ 1.5m	373	6/10/2017	89	88	88	90	87	86						1	-1	2	4					
	RM Silo top E side 12m to FA260					74																	
	PHT L6 centre W side	374	6/10/2017	75	74	72	75								2	0							
	PHT L6 stack test port 100mm diam @ 200mm	375	6/10/2017	90	90	86		90	90	90					5		1	0	0				
	PHT L6 stack test port 100mm diam @ 200mm	376	6/10/2017	98	97	95									3								
	PHT L6 NW corner 1m to stack	377	6/10/2017	77	77	75	83	90	90	90					2	-6	-12	-13	-13				
	PHT L6 centre N side by platform	378	6/10/2017	73	72	72	73								1	0							
	PHT L6 centre between towers	379	6/10/2017	74	74	73	73	74	74						2	1	1	1					
	PHT L6 new N side centre	380	6/10/2017	73	73	73	74								0	0							
	PHT L6 new E side centre	381	6/10/2017	73	72	74	74								-1	-1							
	PHT L6 new S side centre	382	6/10/2017	72	71	86	73								-14	-1							
	L6 centre S side old PHT by eleva	383	6/10/2017	73	73																		
	L6 inside doorway to top RM silo	384	6/10/2017	83	82																		
	RM Silo top inside centre	385	6/10/2017	87	86	89	89	91	87						-2	-2	-4	-1					
	RM silo top inside E doors open	386	6/10/2017	85	84	84	85	86	83	86	83	84	86		1	0	0	3	-1	2	1	-0.9	
	L6 RM silo top room inside S mar	387	6/10/2017	86	85																		
	RM silo top outside S man door	388	6/10/2017	73	73	74	74	84	82						0	-1	-10	-9					
	PHT Level 5 old centre S side by stairs	389	6/10/2017	75	74	74									1								
	PHT Level 5 old centre W side by gas valves @ 1m	390	6/10/2017	81	80	78	80	80	80						2	1	0	1					
	PHT Level 5 old NW corner @ 1m to stack	391	6/10/2017	75	75	74	76								2	0							
	PHT Level 5 old centre N side	392	6/10/2017	74	73	73	75								0	-1							
	PHT Level 5 centre between towers	393	6/10/2017	74	73	73	74	75	74	79	78	75			1	0	-2	0	-5	-4	-1		
	PHT Level 5 New centre N side	394	6/10/2017	73	72	73	74								0	-1							
	PHT Level 5 New centre E side above kiln	395	6/10/2017	75	72	75	74								1	1							
	PHT Level 5 New centre S side	396	6/10/2017	71	70	70	72								1	-1							
	PHT Level 4 old centre S side by stairs	397	6/10/2017	76	76	77									-1								
	PHT Level 4 old SW corner by water pumps SV09 @ 1m N	398	6/10/2017	80	80	79	80	80	79						1	1	1	1					
	PHT Level 4 old centre W side	399	6/10/2017	77	77	76	77								1	0							
	PHT Level 4 old NW corner @ 1.2m to stack	400	6/10/2017	75	74	75	75								0	0							
	PHT Level 4 old centre N side	401	6/10/2017	72	72	72	74								0	-1							
	PHT Level 4 centre between towers by air cannon	402	6/10/2017	73	73	77	75	75	75						-4	-2	-2	-1					
	PHT Level 4 new centre N side	403	6/10/2017	73	73	73									-1								
	PHT Level 4 new centre E side above kiln	404	6/10/2017	73	73	75									-2								
	PHT Level 4 new centre S side	405	6/10/2017	71	71	72									-1								
	ESP Centre E side top walkway looking E to PHT	406	6/10/2017	73	73	74	74								0	-1							

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	ESP top SE corner at barrier	407	6/10/2017	74	73	75	72								-1	2							
	ESP top centre E side S platform t	408	6/10/2017	73	72																		
	ESP top NE corner at barrier	409	6/10/2017	73	72	70	71								3	2							
	L3 old PHT centre S side @ 2m to	410	6/10/2017	78	77																		
	PHT Level 3 old centre W side above FA39	411	6/10/2017	78	78	78									0								
	PHT Level 3 old centre N side above FA39	412	6/10/2017	76	76	76									1								
	PHT Level 3 old centre E side above kiln	413	6/10/2017	74	74	76	77	77	77						-2	-3	-3	-3					
	PHT Level 3 old NW corner by stack @ 1.5m above FA39					78																	
	PHT Level 2.5 by DC31 drives @ 1m	414	6/10/2017	92	92	87	86	86	88						5	6	7	4					
	PHT Level 2.5 by DC31 discharge @ 1m @ 1m	415	6/10/2017	92	91	87	86		85						5	6		7					
	PHT Level 2.25 by centre by kiln entry	416	6/10/2017	83	81	86	84	82							-3	-1	2						
	PHT Level 2.25 by Radicon Gbox drive E end @ 1m	417	6/10/2017	91	88	88	84								3	6							
	L2.25 PHT centre W side facing fa	418	6/10/2017	89	89																		
	L2.25 PHT centre W side facing fa	419	6/10/2017	108	108																		
	L2 PHT FA03 casing @ 1m E side	420	6/10/2017	87	86																		
	PHT Level 2 by E side drive coupling & casing DC70 FA63	421	6/10/2017	86	86	86	84	85	85						0	2	1	1					
		422	6/10/2017	90	89																		
	PHT Level 2 FA63 discharge @ 1.5m	423	6/10/2017	92	91	89	86	85	86	88	91	89	91		2	5	7	6	4	1	3	0.8	
	PHT Level 2 @ 1m to FA39 stack entry duct	424	6/10/2017	89	89	85	91								4	-2							
	PHT Level 2 FA65 inlet filter @ 1m in front	425	6/10/2017	88	88	87	84	84	84						1	4	4	4					
	PHT Level 2 FA65 rear side 1m	426	6/10/2017	87	86	86	83	83	83						1	4	4	4					
	L2 PHT centre N side edge @ 2m	427	6/10/2017	84	83																		
	L2 PHT NW corner @ 1.5m to sta	428	6/10/2017	86	84																		
	L2 PHT N side of duct to stack @	429	6/10/2017	88	87																		
	L2 PHT N side of duct to stack @	430	6/10/2017	101	100																		
	PHT Level 1 RM silo base blower room N side man door @ 1m	431	6/10/2017	79	79	79	79								1	0							
FA39	FA39 E side at concrete line 5.4m to motor	432	6/10/2017	86	85	87									-1								
	FA39 E side @2.3m in line with columns	433	6/10/2017	87	86																		
	FA39 under discharge duct @ 1m	434	6/10/2017	85	84	85									0								
	FA39 E side motor platform @ 0.	435	6/10/2017	98	97																		
	FA39 motor platform centre E sid	436	6/10/2017	95	94																		
	FA39 motor N end @ 1.72 to end	437	6/10/2017	83	82																		
	FA 39 N side on kerb	438	6/10/2017	81	80	80	81	81	86	85					1	1	0	-5	-3				
	FA39 W side at metal strip 5.25m to motor	439	6/10/2017	88	87	88	91								0	-3							
	FA39 W side at columns @2.7m to plinth	440	6/10/2017	89	88																		
	FA39 W side motor platform at 0.8m to couling cover & 1m to coupling	441	6/10/2017	99	98																		

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	FA39 W side @ 1m to cladding door open, 1.33m to casing	442	6/10/2017	88	87																		
	FA39 S side @ columns 2.7m to bearing	443	6/10/2017	83	82																		
	FA39 S side platform bearing cover @ 0.8m	444	6/10/2017	86	85																		
	Centre between FA38 & FA39 @ 10.8m facing E	445	6/10/2017	89	88																		
	Centre between FA38 & FA39	446	6/10/2017	88	87	91									-3								
FA38	FA38 @ 3.9m to E side	447	6/10/2017	92	90	93	89								-1	2							
	FA38 @ 3m to N side	448	6/10/2017	88	87	87									1								
	FA38 @ 5m to NW side at column	449	6/10/2017	91	89	88	88								2	3							
	In centre opening of wall on S side of road	450	6/10/2017	87	85	82									5								
	FA38 motor platform W side @ 1m to couling cover, 1.9m to casing, 0.7m to motor side	451	6/10/2017	100	98																		
	FA38 at opening on S side of road facing FA38 opening	452	6/10/2017	82	81																		
	56' Road kerb N side opp. Opening to FA38	453	6/10/2017	78	76	77	79	82	84	86					2	-1	-4	-5	-8				
	57 Road N side opp FA38 doorway	454	6/10/2017	82	80	79	80	83	84	89					3	2	-1	-2	-7				
	58 Road N side between FA38 & FA39	455	6/10/2017	81	80	79									2								
FA92 RM Silo base room blower fan	PHT Level 1 RM silo base blower room N side man door @ 1m	431	6/10/2017	79	79	79	79								1	0							
	PHT Level 1 RM silo fan 92 motor @ 1m to side	229	19/09/2017	82	82	81	83								1	-1							
	PHT Level 1 RM silo fan 92 casing & inlet @ 1m to side	230	19/09/2017	76	76	76									0								
	PHT Level 1 RM Silo base inlet filter front @ 1m to S	231	19/09/2017	74	74	73	77								1	-3							
RM6	1 RM6 W door @ 1m	136	19/09/2017	77	76	78	81	87	70	70	73	72			-1	-4	-10	7	7	4	5		
	1' RM6 W door at kerb W side @ 13.3m	137	19/09/2017	69	69	70	72	76	76	80	83	82	82		-1	-3	-7	-7	-11	-14	-13	-13	
RM7	1 RM7 at roadside kerb ~32m	138	19/09/2017	69	69	69	70	69	68	70	69	69	70		0	0	0	1	0	0	0	-1	
	2 Rm7 @ 14.6m to W door	139	19/09/2017	73	72	72	72	73	73	76	75	75	74		1	1	0	0	-3	-3	-2	-1	
	3 RM7 W wall door @ 1m	140	19/09/2017	82	81	79	80	80	79	82	81	80	78		4	2	2	3	1	2	2	4	
	3 RM7 W wall door @ 1m	0	0/01/1900		0	80																	
	4 RM7 NE corner wall vents 2 1m	151	19/09/2017	80	79	81	82	83	81	83	83	82	83		0	-2	-3	-1	-3	-3	-2	-3	
	5 RM7 N side NW roll door @ 1m	141	19/09/2017	86	84	79	80	78	81	81	81	81	79		6	6	7	5	5	5	5	7	
	6 RM7 N wall vents centre next to door	142	19/09/2017	81	80	82	83	84	84	85	85	83	83		-1	-2	-3	-3	-4	-4	-2	-2	
	7 RM7 N wall man door	143	19/09/2017	79	79	83	80	79	83	82	82	81			-4	-1	0	-4	-3	-3	-2		
	8 RM7 E wall vents NE corner @ 1m	144	19/09/2017	82	81	85	84	83	84	85	82	83	84		-3	-2	-1	-2	-4	-1	-1	-2	
	9 RM7 E side under duct	145	19/09/2017	78	77	81	81	79	81	82	81	80	80		-3	-3	-1	-3	-4	-3	-2	-2	
	10 RM7 By E door Hydraulics room open	146	19/09/2017	72	72	74	73	73	72	74	74	73	74		-2	-2	-1	0	-2	-2	-1	-2	
	11 RM7 Centre Compressor room door @ 1m closed	147	19/09/2017	74	73	74	74	73	71	72	71	73			0	0	0	3	2	3	1		
		148	19/09/2017	79	78																		

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	12 RM7 Under inlet for switchroom fan	149	19/09/2017	84	83	84	87	83							0	-4	1						
	12B Under switchroom fan duct W	150	19/09/2017	89	87																		
FA249	13 FA249 under inlet duct W side	152	19/09/2017	78	77	78	78	80	80						-1	-1	-3	-3					
	14 FA249 2m W side ground level	153	19/09/2017	79	78	82	80	80	80						-3	-1	-1	-1					
	14' FA249 motor platform fan coupling & casing W side @ 1m	154	19/09/2017	81	80	82	82	80	81	82	81	79	79		-2	-2	0	-1	-1	0	2	2	
	15 FA249 1m motor end	155	19/09/2017	81	80	82	81	80	81	81					-1	0	1	0	0				
	16 FA249 end at column 4.3m N of motor plinth	156	19/09/2017	79	78	80	79	77	79	81	82	82			-2	0	1	-1	-2	-3	-4		
	17 FA249 motor platform E side coupling & casing 1m	157	19/09/2017	82	81	84	82	81	82	84	82	89	83		-3	-1	1	0	-2	-1	-7	-1	
	18 FA249 Platform S side centre @ 1m	158	19/09/2017	76	75	78	78	78	78	76	77	83	79		-2	-2	-2	-2	0	-1	-7	-3	
	18' FA249 platform S side under discharge duct E side	160	19/09/2017	75	74	74									1								
	19 FA249 S side @ 5m	161	19/09/2017	71	71	73	72	72	73	73	73	74			-1	-1	0	-2	-2	-1	-3		
	20 FA 249 S side @ 10m	162	19/09/2017	72	71	73	72	72	73	73	73				-1	-1	0	-1	-2	-2			
	21 FA249 E side of fan casing ground level @ 2m	163	19/09/2017	77	76	76	76	76	76	77	76	79			0	1	1	1	-1	1	-2		
FA250	22 FA250 S side 4m to motor end	164	19/09/2017	80	79	83	79	78							-3	1	2						
	22' FA250 Motor end S side @ 1m	165	19/09/2017	81	81	84	82	80	82	83	82	83			-3	-1	1	0	-2	-1	-2		
	23 FA250 E side platform coupling & casing	166	19/09/2017	85	84	86	84	83	83	85	84				-1	1	1	2	-1	1			
	23' FA250 E side centre motor @ 1m	167	19/09/2017	82	82	84	85	80	85	86					-2	-3	2	-2	-3				
	FA250 W side motor shaft @ casing @ 1m	168	19/09/2017	85	84																		
	25 FA250 coupling & casing W side 1m S	169	19/09/2017	82	82	86	84	80	85	86					-3	-2	2	-2	-3				
	26 FA250 W side casing @ 1m & coupling @ 3m	170	19/09/2017	82	81	83	81	79	83	83	84	85	81		-2	0	2	-1	-1	-2	-4	1	
	27 FA250 W side 1m under inlet casing expansion joint	171	19/09/2017	79	79	83	80	78	85	84					-3	-1	1	-6	-5				
	28 FA250 N side casing shaft platform 2 1m	172	19/09/2017	81	81	85	84	84	91	86	85	93	83		-3	-3	-3	-9	-5	-4	-12	-2	
	29 FA250 E side under discharge duct	173	19/09/2017	81	80	82	82								0	-1							
RM7 Roof Platform	Lower platform E side 1m to Magnete plate	174	19/09/2017	89	88	86	89	83	88	87	85	88	90		3	0	6	1	2	4	1	-1	
	Lower platform S side @ 1m to magnete plate	175	19/09/2017	92	91	89	90	82	91	91	87	91	93		3	3	11	2	1	6	1	-1	
	Lower platform W side @ 1m to magnete plate	176	19/09/2017	89	88	86	88	81	87	85					2	1	8	1	4				
	Lower platform N side @ 1m to magnete plate	177	19/09/2017	90	88	88		84	92	84	85	84	86		3		6	-1	7	5	6	4	
	Lower platform N side @ 1m to BE casing	178	19/09/2017	85	83	83	84	83	86	81					2	1	2	-1	4				
	Platform S of Magnete 2m to S side	179	19/09/2017	78	77	85	87								-7	-8							
	Upper Platform Gbox @ 1m E side & 0.5m casing	180	19/09/2017	82	81	80	81	77	80	79					2	0	4	2	3				

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	Upper Platform Gbox @ 1m N side	181	19/09/2017	82	81	81	83	81	83						1	-1	1	-1					
	Upper Platform motor end @ 1m W side	182	19/09/2017	82	81	80	81								2	1							
	Upper Platform BE casing @ 0.5m W side	183	19/09/2017	80	79	78	79	78	81	79	78	81	82		3	1	3	0	1	2	-1	-2	
	Upper Platform BE casing @ 1m S side	184	19/09/2017	87	84	84	81	83	85	83	78	80	85		3	6	4	2	4	9	7	2	
	Upper Platform BE casing @ 1m E side	185	19/09/2017	80	80	79	79								1	1							
	On tower to baghouse top S side above FA249 same level as roof RM7	186	19/09/2017	71	70	74	70	69	70	71	71				-3	2	2	1	0	0			
	On tower to baghouse top S side above FA249 top level	187	19/09/2017	82	81	70	69	71	68						12	13	11	13					
	Baghouse S doorway open	188	19/09/2017	80	75	81	80	78	72	87	96	73			-1	0	3	8	-7	-16	7		
	Inside centre baghouse top	189	19/09/2017	82	72	82	83	81							0	-1	2						
RM7 bag-house	On screw conveyor SC212 platform Level 1 W end side by fan motor @ 1m	213	19/09/2017	82	81	81																	
	Centre S side of screw in line with motor FA250	214	19/09/2017	80	80	80									1								
	E end of SC212 body @ 2m and other N-S aligned screw	215	19/09/2017	79	78	95									-16								
	Main platform of baghouse hopper screws S end chute W side between SC211 & gate valve	216	19/09/2017	77	77	85									-8								
	Centre W side	217	19/09/2017	78	78	91	80	78	79	79	80				-13	-2	1	-1	0	-1			
	Centre E side - off	218	19/09/2017	79	78	83	79	78	77	78					-5	-1	1	2	1				
	N end Sc211 but S of duct	219	19/09/2017	76	75	84									-8								
	By FA252 @ 1m shaft , casing & discharge box					83	83																
	Baghouse hopper platform level N end	220	19/09/2017	77	76	80	78	76							-3	-1	1						
	Baghouse hopper centre platform	221	19/09/2017	76	76	81	76	78	77	78					-5	0	-1	-1	-2				
Kiln 6 N & S sides																							
	30 Coal Road S side in line W side RM7	3	19/09/2017	65	64	66	67	66	65	67	65	66	65		-1	-2	-1	-1	-2	-1	-1	0	
	31 Coal Road S side in-line E side RM7	4	19/09/2017	71	64	66	66	66	66	68	66	67	68		5	6	5	5	3	5	4	3	
	32 Coal Road S side in-line FA249	5	19/09/2017	66	65	68	67	67	68	70	68	69	69		-2	-1	-1	-2	-4	-2	-3	-3	
	33 Coal Road S side Centre Blending Silo	6	19/09/2017	67	66	68	68	69	69	71	69	71	69		-1	-1	-2	-2	-4	-3	-5	-3	
	34 Coal Road S side E side PHT	7	19/09/2017	67	66	67	68	71	69	70	69	70			-1	-1	-4	-2	-3	-2	-3		
	35 Coal Road S side E side new PHT	8	19/09/2017	67	66	68	68	70	68	71	70	70	69		-1	-1	-3	-2	-4	-3	-3	-2	
	36 Coal Road S side E side drive platform	9	19/09/2017	67	67	69	68	70	69	70	70	71	70		-1	-1	-3	-2	-3	-2	-4	-3	
	37 Coal Road S side centre column W support duct	10	19/09/2017	68	67	69	69	69	69	70	70	71	71		-2	-1	-1	-1	-3	-2	-3	-3	
	38 Coal Road S side centre pedestal	11	19/09/2017	69	68	69	68	69	68	71	69	71	71		-1	1	0	1	-2	-1	-2	-2	
	39 Coal Road S side Between centre & E pedestal	12	19/09/2017	68	68	69	68	69	68	69	69	71	71		-1	0	-1	0	-1	-1	-3	-3	
	40 Coal Road S side E pedestal	13	19/09/2017	68	67	69	68	68	68	70	69	70	74		-1	0	0	0	-2	-1	-2	-6	

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	41 Coal Road S side W end Firing floor building	14	19/09/2017	66	65	68	66	67	67	70	69	69			-2	0	-1	-1	-4	-3	-3		
	42 Coal Road S side opposite grate	15	19/09/2017	67	66	69	66								-2	1							
	43 Coal Road S side W side coal receival bin 25m to truck	16	19/09/2017	64	63	67	64								-3	0							
	43A Kerb E side CM opp CM fan discharge	17	19/09/2017	75	74	80	77	78	79	78					-5	-3	-3	-4	-3				
	44 CM fan room door @ 2m	18	19/09/2017	85	85	84	84	85	83						1	1	0	2					
	44' CM S wall door opp mill motor drive is open	470	6/10/2017	92	92	83									9								
	45 CM S roll door and wall vent @ 10m S side	20	19/09/2017	78	78	78	76	79	78						1	2	-1	0					
	46 CM room wall vent @ 2m	21	19/09/2017	77	77	82	81	86	80	83	89	90			-4	-3	-9	-2	-6	-11	-13		
	Centre between Grate & CM blower room roll door	22	19/09/2017	86	86	86	89	89	92						0	-3	-3	-5					
	47A Centre between CM Room and grate	23	19/09/2017	79	79	79	78	81	82						0	1	-2	-2					
	47 Opp FA264 @ 8m	24	19/09/2017	81	81	80	80	81	81						2	1	0	0					
	47C Between FA264 & FA200					80																	
	47D FA 200 S Side @ 5m	25	19/09/2017	82	82	82	81								0	1							
	48 Opp. E pedestal roller	26	19/09/2017	83	82	81	81	81	80	83	81	83	83		2	1	1	2	0	1	-1	-1	
	49 Half way between centre & E pedestals	27	19/09/2017	83	83	81	82								2	2							
	50 Opp. Centre pedestal	28	19/09/2017	80	79	81	81	80	81	85	84	83	83		-1	-2	0	-1	-5	-5	-3	-3	
	51 Half way between Centre & Western pedestals	29	19/09/2017	76	76	77	81	80	80	83	82	81	80		-1	-4	-4	-3	-6	-6	-5	-4	
	52A Opp E end of kiln drive platform	30	19/09/2017	77	76	78	79	78	78	83	80	80	80		-1	-2	-1	-1	-6	-3	-3	-3	
	52 Opp W pedestal roller	31	19/09/2017	76	75	76	79	76	76						0	-3	-1	-1					
	53 Kiln drive platform Centre E end on platform (ground level)	32	19/09/2017	74	73	87	88	88							-14	-14	-14						
Kiln Drive platform Platform	S side S motor end @ 1.5m kiln drive	222	19/09/2017	84	83																		
	S side of S Gbox @ 1.5m	223	19/09/2017	88	86	87	88								1	0							
	E side of S drive motor @ 1.5m, 2m to Gbox	224	19/09/2017	88	87	86									2								
	53 Kiln drive platform Centre E end on platform	225	19/09/2017	89	88	87	88	88							1	1	1						
	N side motor end @ 1m kiln drive	226	19/09/2017	86	85																		
	N side motor N end @ 1.5m kiln drive	227	19/09/2017	84	83																		
	N side of N drive & Gbox @ 1.5m	228	19/09/2017	86	85	86	87	88							0	-1	-2						
Kiln 6 Northern side of road @ 13m	54 W end RM6	33	19/09/2017	69	69	70	73	76	76	80	83	82	82		-1	-4	-7	-7	-10	-13	-13	-13	
	55 Centre RM6	34	19/09/2017	71	71	72	74	73	75	74					0	-2	-2	-3	-3				
	56 E End RM6	35	19/09/2017	76	75	76	78	79	80	81					-1	-2	-3	-4	-6				
	56' Between RM6 & New wall for FA38	453	6/10/2017	78	76	82	79	82	84	86					-4	-1	-4	-5	-8				
	57 Door opp FA38	36	19/09/2017	79	78	79	80	83	84	89					0	-1	-4	-5	-10				
	58 Half way between FA38 & FA39	37	19/09/2017	80	79	79	80								1	0							
	59 Opp FA39 end	38	19/09/2017	82	81	79	81	81	86	85					3	1	1	-5	-3				
	60 Opp Conditioning Tower	39	19/09/2017	81	80	80	84	80	82	81	84	83	83		1	-3	1	-1	0	-3	-2	-2	
	60' Opp. Stack	457	6/10/2017	82	81	78	80								4	2							
	61 Opp centre PHT	40	19/09/2017	77	76	77									0								
	61' Opp E side of old PHT	458	6/10/2017	78	78	76	78	78	78	79	79	79			2	0	0	0	-1	-1	-1		

Table 3.3: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for Kiln 6 Upgrade

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File No.	Date	Statistical Sound Level - LAeq dBA											Difference to 2016 = 2016 - 20XX dB								
				LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
	63 Opp E side new PHT	43	19/09/2017	77	76	77	80	77	78	79	81	80			-1	-4	-1	-2	-3	-4	-4		
	64 E end drive platform	42	19/09/2017	78	77	79	82	78	80	82	82				-2	-4	0	-3	-5	-5			
	65 Opp column for return duct W side	44	19/09/2017	80	80	81	85	81	86	85	85	82	83		-1	-4	0	-6	-5	-4	-2	-3	
	66 Opp centre pedestal	45	19/09/2017	85	85	85	87	84	83	88	88	85	85		0	-2	1	2	-3	-3	0	0	
	67 Half way between centre & e pedestals	46	19/09/2017	85	85	85	87	87	87	87	88	89	88		1	-2	-2	-2	-2	-3	-4	-3	
	68 Opp E pedestal	47	19/09/2017	86	86	86	86	86	87	88	88	88	88		0	0	0	-1	-2	-2	-2	-2	
Grate Cooler Fan Courtyard	69 Centre courtyard	48	19/09/2017	85	85	89	89	88	88	88	89	87	88		-3	-4	-3	-2	-2	-4	-2	-3	
	69 Centre courtyard	233	19/09/2017	89	88	89	89	88	88	88	89	87	88		0	-1	1	1	1	0	2	1	
	FA201 @ 2m	234	19/09/2017	90	90	90	91								1	0							
	FA201 N side inlet & casing @ 1m	235	19/09/2017	92	91																		
	Between FA201 & 203 & 202	236	19/09/2017	94	93	93	93	93	87	88	89	87	88		0	1	1	6	5	5	7	6	
	FA203 inlet & casing @ 2m	237	19/09/2017	89	89	89	90								0	-1							
	Between inlet filters 205 & 206	238	19/09/2017	89	88	85	89	89							4	0	0						
	Centre between Grate & CM blower room roll door	239	19/09/2017	86	86	86	89	89	92						0	-3	-3	-5					
	Coal Mill Building N roll door @ 2m	240	19/09/2017	86	85	84	84	90	88						2	2	-4	-2					
Kiln Firing Floor	Centre N side opening	248	19/09/2017	85	83	82	83	83	81		86	83			3	2	1	4		-2	2		
	FA209 E side inlet & filter silencer	249	19/09/2017	86	85																		
	FA209 Kiln Discharge Seal Fan N inlet	250	19/09/2017	93	93	92	93	92	90		94	92			1	0	1	3		-1	1		
	Centre S side opening	251	19/09/2017	83	82	82	84	82	81		81	81			1	-1	1	2		2	2		
	FA210 Kiln Discharge Seal Fan S inlet	252	19/09/2017	92	92	94	95	85	96	94	96	92			-2	-3	7	-4	-2	-4	0		
	FA210 S side seal fan inlet W side & casing @ 1m	253	19/09/2017	85	85																		
	FA200 inlet side @ 1m	254	19/09/2017	87	87	85	87								2	0							
	New replacement FA211 centre under kiln, inlet @ 1m	255	19/09/2017	96	96			96									0						
	Kiln floor centre E S of duct/clinker elevator	256	19/09/2017	81	81	79	81	82	85	82	84				2	1	-1	-3	-1	-3			
	KFF burner air cannon N side @ 2m	257	19/09/2017	90	85																		
	KFF burner air cannon N side @ 2m	258	19/09/2017	90	85																		
Radicon Cooler	RC L1 centre fan @ 1m	259	19/09/2017	92	92	91	84	93	93	83	93	85	84		2	8	-1	-1	9	-1	7	8	
	RC L1 S fan @ 0.5m	260	19/09/2017	90	90	92	84		95						-2	6		-4					
	RC L1 N fan @ 1m	261	19/09/2017	89	89	90	85	94	97						-1	4	-5	-8					
	RC L2 centre fan @ 1m	262	19/09/2017	94	94	94	85	96	96	84	95	86	85		0	9	-2	-3	10	-1	8		
	RC L2 S fan @ 0.7m	263	19/09/2017	95	94	95	84		95						0	10		0					
	RC L2 N fan @ 1m	264	19/09/2017	95	95	95	86	96	97						0	10	0	-2					
	RC L3 Centre fan @ 1m	265	19/09/2017	94	94	95	85	95	96	83	94	86	83		0	9	0	-2	11	0	8	11	
	RC L3 S fan @ 0.7m	266	19/09/2017	94	93	93	83		93						1	11		1					
	RC L3 N fan @ 1m	267	19/09/2017	95	94	94	91	97	97						0	4	-3	-3					
	RC L4 Centre fan @ 1m	268	19/09/2017	95	95	92	92	92	88	82	88	85	84		3	3	3	7	14	7	10	11	
	RC L4 S fan @ 0.7m	269	19/09/2017	93	93	91	90	86	89						2	3	8	5					
	RC L4 N fan @ 1m	270	19/09/2017	90	88	93	91	97	97						-3	-1	-8	-8					
	RC L5 face E	271	19/09/2017	85	85	84	86	84							1	-1	1						
	RC L5 face W	272	19/09/2017	86	85	85	87								1	-1							

Table 3.3: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for Kiln 6 Upgrade

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File	Date	Statistical Sound Level - LAeq dBA											Difference to 2016 = 2016 - 20XX dB								
		No.		LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
FA215	Motor S end @ 2.5m	241	19/09/2017	81	81	80	81	87	85	85	86	85	84		0	0	-6	-4	-4	-5	-4	-3	
	Platform E side drive coupling @ casing @ 1m	242	19/09/2017	84	84	85	85	85	85						-1	-1	0	-1					
	W side platform @ 1m to coupling & casing	243	19/09/2017	85	85	85	86	87	85	86	87				0	-1	-2	1	-1	-1			
	Under expansion joint discharge duct to stack @ 1m	244	19/09/2017	79	78	79	80	81	78	81	80	78	79		0	-1	-2	0	-2	-2	1	0	
	N side inlet box platform @ 1m to discharge duct & inlet box	245	19/09/2017	78	77	77	79	79	75						1	-2	-1	3					
	Platform centre N side inlet box	246	19/09/2017	77	76	76	79	79	74	78	78	78	74		1	-2	-2	2	-2	-1	-1	3	
	Under Inlet box W side entry duct	247	19/09/2017	80	80	79	81	83							1	-1	-3						
	Inlet box N side ground level 2 1m					75	78	77															
Control Building Roof	Roof SW corner opp E end RM6	279	19/09/2017	72	70	69									2								
	SE corner opp FA38	280	19/09/2017	72	71	71									2								
	Admin Building Roof NE corner opp FA502 & CM7	281	19/09/2017	72	71	68	69								4	3							

Table 3.4: Boral Cement Berrima Works
2017 Annual Environmental Noise Assessment for Kiln 6 Upgrade -
Measurement locations with increase in sound level > 3 dB and calculated contribution sound level at receivers

Location	Year	Time	Period d:h:m:s	Sound Level dB(A) $L_{AEQ.t}$	Comments	Distance measured	Distance to Receivers				
							Distance Attenuation to receiver				
							Calculated LAEQ level at receiver distance only				
							Adelaide	Brisbane	Melbourne	Argyle	Sth
Kiln 6 Upgrade						**Objective**	**37**	**37**	**37**	**37**	**37**
PHT Level 8 FA263 motor & casing F231	**2017**	10:54 AM	00d 00:00:34	84	Distance	**1**	666	754	745	890	1506
	2012			**81**	Source after directivity		**75**	**75**	**78**	**78**	**80**
Difference 2017 - 2012			*Difference*	**3**	Distance reduction		-56	-58	-57	-59	-64
					Calculated SPL without barriers		***19***	***18***	***20***	***19***	***17***
PHT L8 proper 1m to vent on FA263 filter room	**2017**	10:55 AM	00d 00:00:30	77	Distance	**1**	666	754	745	890	1506
Difference 2017 - 2016	**2016**			**73.7**	Source after directivity		**77**	**77**	**77**	**77**	**57**
			Difference	**4**	Distance reduction		-56	-58	-57	-59	-64
					Calculated SPL without barriers		***21***	***20***	***20***	***18***	***-7***
PHT L6 RM Silo top EL15 platform motor side 0.6m	**2017**	11:19 AM	00d 00:00:30	**87**	Distance	0.6	666	754	745	890	1506
	2014			80	Source after directivity		**87**	**87**	**87**	**87**	**63**
Difference 2017 - 2014			*Difference*	**7**	Distance reduction		-61	-62	-62	-63	-68
					Calculated SPL without barriers		***26***	***25***	***25***	***24***	***-5***
RM silo top baghouse fan DC30 discharge @ 1.5m	**2017**	11:23 AM	00d 00:00:37	89	Distance	1.5	692	782	765	905	1473
	2013			86	Source after directivity		**89**	**89**	**89**	**89**	**68**
Difference 2017 - 2013			*Difference*	**4**	Distance reduction		-53	-54	-54	-56	-60
					Calculated SPL without barriers		***36***	***35***	***35***	***33***	***8***
ESP top NE corner at barrier	**2017**	12:07 PM	00d 00:00:32	73	Distance	1	642	730	711	850	1485
	2016			70	Source after directivity		**58**	**55**	**53**	**51**	**53**
Difference 2017 - 2016			*Difference*	**3**	Distance reduction		-56	-57	-57	-59	-63
					Calculated SPL without barriers		***2***	***-2***	***-4***	***-8***	***-10***
PHT Level 2.5 by DC31 drives @ 1m	**2017**	12:16 PM	00d 00:00:48	92	Distance	1	666	754	745	890	1506
	2014			86	Source after directivity		**92**	**92**	**92**	**92**	**73**
Difference 2017 - 2014			*Difference*	**7**	Distance reduction		-56	-58	-57	-59	-64
					Calculated SPL without barriers		***36***	***35***	***35***	***33***	***9***
PHT Level 2.25 by Radicon Gbox drive E end @ 1m	**2017**	12:21 PM	00d 00:00:41	91	Distance	1	692	782	765	905	1473
	2015			84	Source after directivity		**90**	**90**	**90**	**90**	**90**
Difference 2017 - 2015			*Difference*	**6**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***34***	***33***	***33***	***31***	***27***
PHT Level 2 FA63 discharge @ 1.5m	**2017**	**12:29 PM**	**0d 00:00:20**	92	Distance	1.5	692	778	758	886	1459
	2014			85	Source after directivity		**82**	**83**	**84**	**85**	**89**
Difference 2017 - 2014			*Difference*	**7**	Distance reduction		-53	-54	-54	-55	-60
					Calculated SPL without barriers		***29***	***28***	***30***	***29***	***29***
PHT Level 2 @ 1m to FA39 stack entry duct	**2017**	**12:30 PM**	**0d 00:00:34**	89	Distance	1	692	778	758	886	1459
	2016			85	Source after directivity		**69**	**71**	**71**	**72**	**89**
Difference 2017 - 2016			*Difference*	**4**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***13***	***13***	***13***	***13***	***26***
PHT Level 2 FA65 inlet filter @ 1m in front	425	6/10/2017	Not included as affected by noise from other sources, not the fan			88					
57 Road N side opp FA38 doorway	**2017**	**1:05 PM**	**0d 00:01:19**	82	Distance	1	645	730	713	847	1505
	2016			79	Source after directivity		**82**	**82**	**82**	**82**	**49**
Difference 2017 - 2016			*Difference*	**3**	Distance reduction		-56	-57	-57	-59	-64
					Calculated SPL without barriers		***26***	***24***	***25***	***23***	***-15***
11 RM7 Centre Compressor room door @ 1m closed	147	########	Noise is from switchroom duct behind so do that, not the compressor room door			74					
12B Under switchroom fan duct W	**2017**	**1:46 PM**	**0d 00:00:37**	89	Distance	0.8	715	809	786	912	1422
	2014			83	Source after directivity		**83**	**83**	**83**	**83**	**83**
Difference 2017 - 2014			*Difference*	**6**	Distance reduction		-59	-60	-60	-61	-65
					Calculated SPL without barriers		***24***	***23***	***23***	***22***	***18***
RM7 roof Lower platform E side 1m to Magnete plate	**2017**	2:17 PM	0d 00:00:47	89	Distance	1	692	778	758	886	1459
	2014			83	Source after directivity		**74**	**69**	**67**	**64**	**69**
Difference 2017 - 2014			*Difference*	**6**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***17***	***12***	***10***	***6***	***6***
RM7 roof Lower platform S side @ 1m to magnete plate	**2017**	2:18 PM	0d 00:00:48	92	Distance	1	692	778	758	886	1459
	2014			82	Source after directivity		**59**	**62**	**62**	**64**	**75**
Difference 2017 - 2014			*Difference*	**11**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***3***	***4***	***4***	***5***	***12***

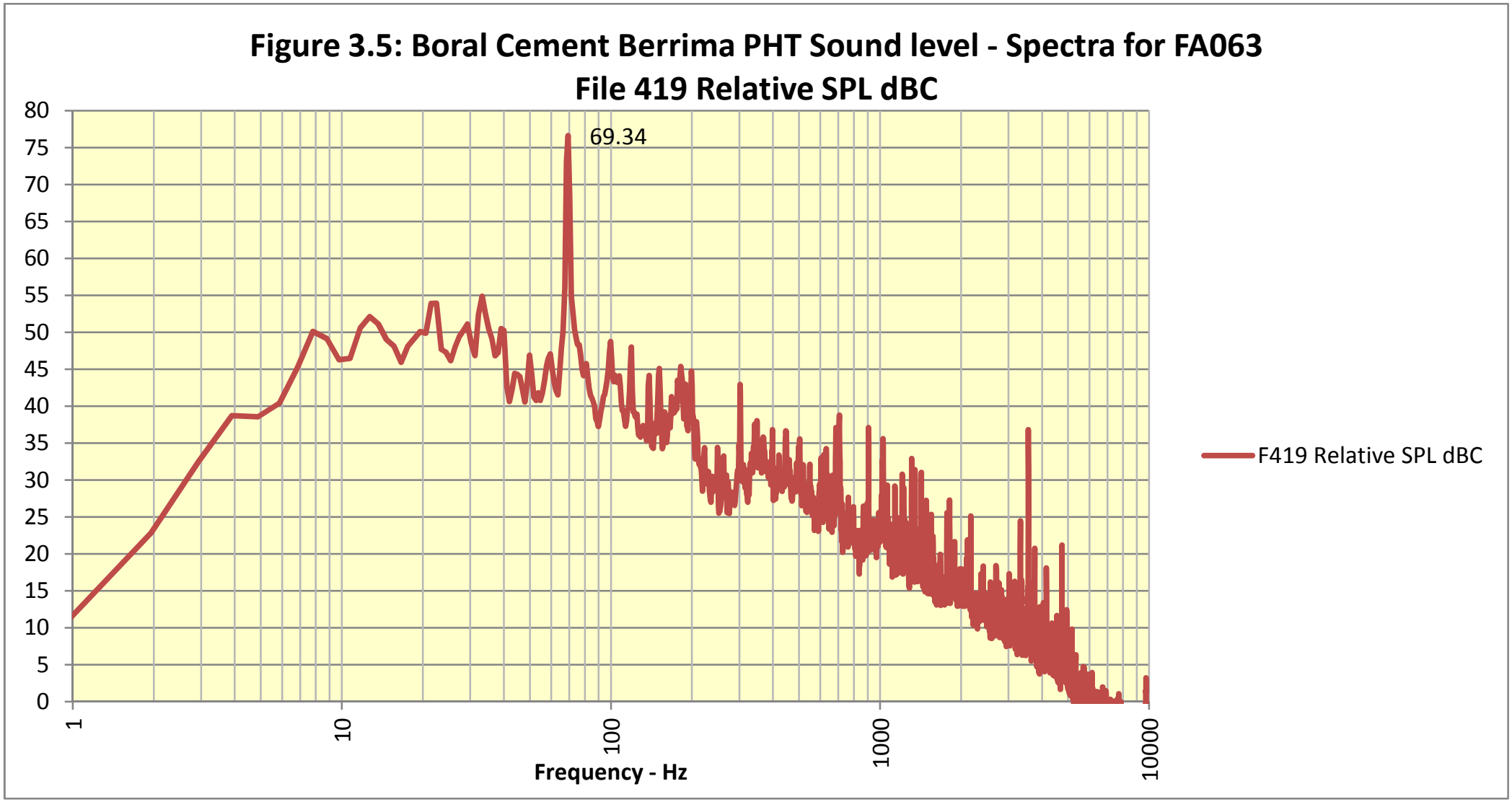
Pink shaded cells and red text indicates exceeds contribution objective by 3dB+

Increase table 2017: Increases from previous for2017

Table 3.4: Boral Cement Berrima Works
2017 Annual Environmental Noise Assessment for Kiln 6 Upgrade -
Measurement locations with increase in sound level > 3 dB and calculated contribution sound level at receivers

Location	Year	Time	Period d:h:m:s	Sound Level dB(A) $L_{AEQ.t}$	Comments	Distance measured	Distance to Receivers				
							Distance Attenuation to receiver				
							Calculated LAEQ level at receiver distance only				
							Adelaide	Brisbane	Melbourne	Argyle	Sth
Kiln 6 Upgrade						Objective	**37**	**37**	**37**	**37**	**37**
RM7 Roof Lower platform W side @ 1m to magnete plate	**2017**	2:19 PM	00d 00:00:30	**89**	Distance	1	692	778	758	886	1459
	2014			81	Source after directivity		**74**	**74**	**78**	**81**	**78**
Difference 2017 - 2014			*Difference*	**8**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***17***	***16***	***20***	***22***	***14***
RM7 Roof Lower platform N side @ 1m to magnete plate	**2017**	2:20 PM	00d 00:00:31	90	Distance	1	692	778	758	886	1459
	2012			84	Source after directivity		**90**	**90**	**90**	**90**	**58**
Difference 2017 - 2012			*Difference*	**6**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***34***	***33***	***33***	***31***	***-5***
Next item for 1m N of BE is 5 dB lower so asssume results for it are 5 dB lower than for this one											
RM7 Roof Upper Platform Gbox @ 1m E side & 0.5m casing	**2017**	2:23 PM	00d 00:00:35	82	Distance	0.5	692	778	758	886	1459
	2014			77	Source after directivity		**69**	**69**	**66**	**64**	**64**
Difference 2017 - 2014			*Difference*	**4**	Distance reduction		-63	-64	-64	-65	-69
					Calculated SPL without barriers		***6***	***5***	***2***	***-1***	***-5***
RM7 Roof Upper Platform BE casing @ 1m S side	**2017**	2:26 PM	00d 00:00:31	87	Distance	1	692	778	758	886	1459
	2011			78	Source after directivity		**62**	**61**	**62**	**63**	**87**
Difference 2017 - 2011			*Difference*	**9**	Distance reduction		-57	-58	-58	-59	-63
					Calculated SPL without barriers		***5***	***3***	***4***	***4***	***23***
RM7 Baghouse tower Top platform at BH top level S end	**2017**	2:29 PM	00d 00:00:34	82	Distance	1	703	792	772	907	1455
	2013			**68.4**	Source after directivity		**52**	**52**	**53**	**54**	**82**
Difference 2017 - 2013			*Difference*	**13**	Distance reduction		-57	-58	-58	-59	-63
Is compressed air leak					*Calculated SPL without barriers*		***-5***	***-6***	***-5***	***-5***	***19***
RM7 Baghouse S doorway open	**2017**	3:28 PM	00d 00:00:47	80	Distance	1	671	772	775	937	1557
	2013			72	Source after directivity		**54**	**54**	**56**	**57**	**80**
Difference 2017 - 2013			*Difference*	**8**	Distance reduction		-57	-58	-58	-59	-64
					Calculated SPL without barriers		***-2***	***-4***	***-2***	***-2***	***16***
					Significant barriers in place for all village receivers						
K6 Opposite NW PHT column	**2017**	1:09 PM	00d 00:00:32	82	Distance	7	656	748	725	875	1508
	2016			78	Source after directivity		**72**	**73**	**75**	**78**	**46**
Difference 2017 - 2016			*Difference*	**4**	Distance reduction		-39	-41	-40	-42	-47
Could be affected by truck loading behind conditioning tower.					*Calculated SPL without barriers*		***32***	***33***	***35***	***36***	***-1***
Kiln firing floor Centre N side opening	**2017**	4:16 PM	00d 00:00:59	85	Distance	2	674	773	775	936	1544
	2013			81	Source after directivity		**66**	**69**	**73**	**84**	**69**
Difference 2017 - 2013			*Difference*	**4**	Distance reduction		-51	-52	-52	-53	-58
					Calculated SPL without barriers		***15***	***18***	***21***	***31***	***12***
FA210 Kiln Discharge Seal Fan S inlet F518	**2017**	3:52 PM	00d 00:00:21	92	Distance	1	684	782	783	942	1534
	2014			85	Source after directivity		**73**	**77**	**81**	**92**	**77**
Difference 2017 - 2014			*Difference*	**7**	Distance reduction		-57	-58	-58	-59	-64
					Calculated SPL without barriers		***16***	***19***	***23***	***33***	***13***
Radicon Cooler L4 Centre fan @ 1m	**2017**	4:35 PM	00d 00:00:30	95	Distance	1	672	773	778	942	1562
	2012			82	Source after directivity		**75**	**79**	**83**	**95**	**79**
Difference 2017 - 2012			*Difference*	**14**	Distance reduction		-57	-58	-58	-59	-64
Highest increase for 2017 - for same fan other year increases ranged down to 3 dB					*Calculated SPL without barriers*		***19***	***21***	***25***	***36***	***15***
FA215 platform N side on E side of inlet box @ 0.5m and duct casing @ 0.8m	**2017**	4:07 PM	00d 00:00:35	78	Distance	0.8	680	785	793	962	1575
	2013			75	Source after directivity		**78**	**78**	**78**	**78**	**55**
Difference 2017 - 2013			*Difference*	**3**	Distance reduction		-59	-60	-60	-62	-66
					Calculated SPL without barriers		***19***	***18***	***18***	***16***	***-11***
Between inlet filters 205 & 206, F238	**2017**	4:00 PM	00d 00:00:31	89	Distance	**1**	**671**	**772**	**775**	**937**	**1557**
	2016			85	Source after directivity		**84**	**84**	**84**	**84**	**62**
Difference 2017 - 2016			*Difference*	**4**	Distance reduction		-57	-58	-58	-59	-64
					Calculated SPL without barriers		***28***	***27***	***27***	***25***	***-2***

Figure 3.5: Boral Cement Berrima PHT Sound level - Spectra for FA063
File 419 Relative SPL dBC



spectrum 419

3.2 No.7 Cement Mill Project sound levels

Figure 3.31 shows an aerial view of the area around the No. 7 Cement Mill and Cement Mill No.6. Figure 3.32 shows a plan view of the buildings and measurement locations used. Figure 3.33 shows these locations on an aerial view.

Results of sound levels measured around Cement Mill No.7 are shown in Table 3.5. Measurements were taken with CM7 mill operating, along with the rest of the cement plant on 19 September 2017. At some locations, especially on the northern, southern and western sides of CM7, other sources are the main source of noise at the location – for example the kiln shell cooling fans, PHT fans and fan emissions from CM5 and CM6 buildings. Measurements of Cement Mill No.6 were obtained on both 19 September and 6 October, and are also shown in Table 3.5. One-third octave band frequency sound levels are shown in Table 3.6A and calculation of the tonality of the measured sound levels is shown in Table 3.6. Graphs of the spectra and tonality for the areas of No.7 Cement Mill and surrounds and CM6 are shown in Figures 3.34 to 3.44.

The difference between the 2017 operating sound levels and 2009 to 2016 operating sound levels of CM7 for external locations are shown in Table 3.7. If the differences in sound levels between 2017 and those of previous years are greater than 3 dB, the difference is highlighted (as was done for the Kiln 6 Upgrade assessment shown in Table 3.3).

Differences in sound level from previous measurements show they were mostly the same or less than previous measurements results or within measurement variation error (+/- 2 to 3 dB).

Sound levels around the outside of No.7 Cement Mill were similar to those of previous years and had not increased significantly. Western side locations were not significantly higher than previous and in most cases were similar or lower than previous. Figure 3.34 shows the spectra and tonality and they are all acceptable.

For the northern side locations, location D was the same or lower an all measurements back to 2012, but was 4 dB higher than in 2010. Despite this it was a similar sound level to others measured in the same area and so it is likely that the measurement is related to another source. Table 3.8 calculates the potential contribution at residential receivers assuming the wall of the cement mill is the source and based on its distance, the calculated contribution is above 40 dBA at all village receivers. Sound levels at this location are a combination of sounds from the cement mill, kiln and other site sources, which means that the actual contribution from the cement mill will be much lower than shown in the simplified calculation of the table. The tonality spectra for the measurement locations north of the No.7 Cement Mill are shown in Figure 3.35 and all are below the tonality criterion.

A similar situation occurs for locations G, K and O on the northern side of the compressor house. The sound levels are 4 to 6 dB higher than measured in 2012 or 2011, as shown in Table 3.7. The calculated contribution sound levels assuming all the sound at these points is from the Cement Mill sources, are 40 dB or close to it. As for location D, the sound levels at these locations are a combination of many sources and the actual contribution from No.7 Cement Mill at these locations would not exceed the objectives.

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Sound levels immediately outside the main western roller door, location H, were similar to recent years but 5 dB higher than in 2011. The calculated contribution from this at the residential receivers was less than 15 dB and would not be audible. The slight increase at this location would have been caused by the bottom of the door being open at the bottom with a gap of 200 mm off the ground, which would cause noise leakage and increased sound levels.

Location N by the western side wall vents on the northern side of the compressor house inlet filter house had sound levels lower than the past 4 years but 5dB higher than in 2011. Table 3.8 shows that the contribution sound level from this at the residential receivers would be inaudible at less than 17 dBA.

Sound levels immediately outside the main northern roll door were the same or lower than for the past 5 years but 4dB higher than in 2011. The sound spectrum was non-tonal and the calculated contribution was 26 dBA or less in the residential locations and would be inaudible. A minor gap at the bottom of the door of 50mm could cause this slight increase in sound level.

Sound level spectra for the southern side locations around No.7 Cement Mill were the same or lower than previous measurements. Spectra shown in Figure 3.36 were non-tonal except for the measurement at Location R to the south-west corner of the mill area where there was minor tonality in the 315 Hz band. The peak in the 315 Hz band shown in Figure 3.36A was different to other spectra along the southern side of the mill area. Sound levels at this location are a contribution from many other source areas at the plant, including the kiln, cement mill and other sources. 315 Hz is one of the spectral peaks for the kiln drive gearbox, seen in Figure 3.24A and this may have been a factor at this measurement location. However it is unlikely to be audible or significant at the nearest residential receivers.

Internal sound levels were measured and are shown in Tables 3.5 and 3.6 but are not used in the comparison with previous measurements because they are controlled by the building shell and assessed through the external sound levels. Spectra for the internal locations are shown to be non-tonal in figures 3.37 to 3.40.

Assessment of Compliance for No.7 Cement Mill Project

The comparison of measured sound levels in 2017 with those of previous measurements was found to not be significantly different to those measured in the initial assessment of 2008. Predicted contribution sound levels from measurement locations with higher sound levels were calculated to not cause sound levels above the residential receiver objectives. Based on these results it is the consideration of this assessment that the No.7 Cement Mill Project is incompliance with the sound level objectives of its conditions of approval.

No.6 Cement Mill

Sound levels were also measured around Cement Mill No.6 for comparison with previous measurements and the results are also shown in Tables 3.5 to 3.7, for locations shown in Figures 3.32 and 3.33. Spectra are shown in Figures 3.42 to 3.44.

Sound levels at location 17 by one of the central roll doors along the eastern side of CM6 were 5 dB higher than in 2015. As this is on the eastern side, the reduction in sound levels to residential locations is significant and the calculated contribution sound levels shown in Table3.8 are insignificant at 2 dB or less. Spectra for the adjacent location 18 are shown to be tonal in Figure 3.43 at 800 Hz

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and 1.25 kHz. These would not be audible at the residential receiver locations as the total sound level is 1 dB less than at location 17.

Sound levels of the western wall fans of CM6 measured on the conveyor gantry platform (CO 24?) were similar to recent years but 5 dB higher than in 2010. The calculated contribution at residential receivers without considering the barrier effect of the conveyor gantry or TS3, is shown in Table 3.8 to be up to 45 dBA at 4 Melbourne St. While it is expected that the barrier effect would reduce these contribution levels to less than 40 dB, it is recommended that the silencer for this fan discharge be reviewed for condition and cleaned if required.

It is considered that sound levels from Cement Mill No. 6 have not increased significantly such that increased total sound levels from the plant are received at residential locations. Sound level spectra are also considered to be acceptable at residential receiver locations.

Control Building roof sound levels

Sound levels on the Control Building roof are measured in three locations to provide an annual comparison. This location receives sound levels mostly from No.6 Kiln sources, but also receives noise from the discharge of FA502 in the western wall of the No.5 Cement Mill building

Results are shown in Tables 3.1 and 3.3. Sound levels are typically in the range 69 to 72 dBA. Sound levels at the north-eastern corner of the roof showed 4 dB higher sound levels than in 2016. Sound levels at this location are affected by emissions from western wall fans in FA502 and CM6. These may have been not operating in2016. A review of the condition of these fans and their silencers (FA502 does not appear to have a silencer) is recommended.

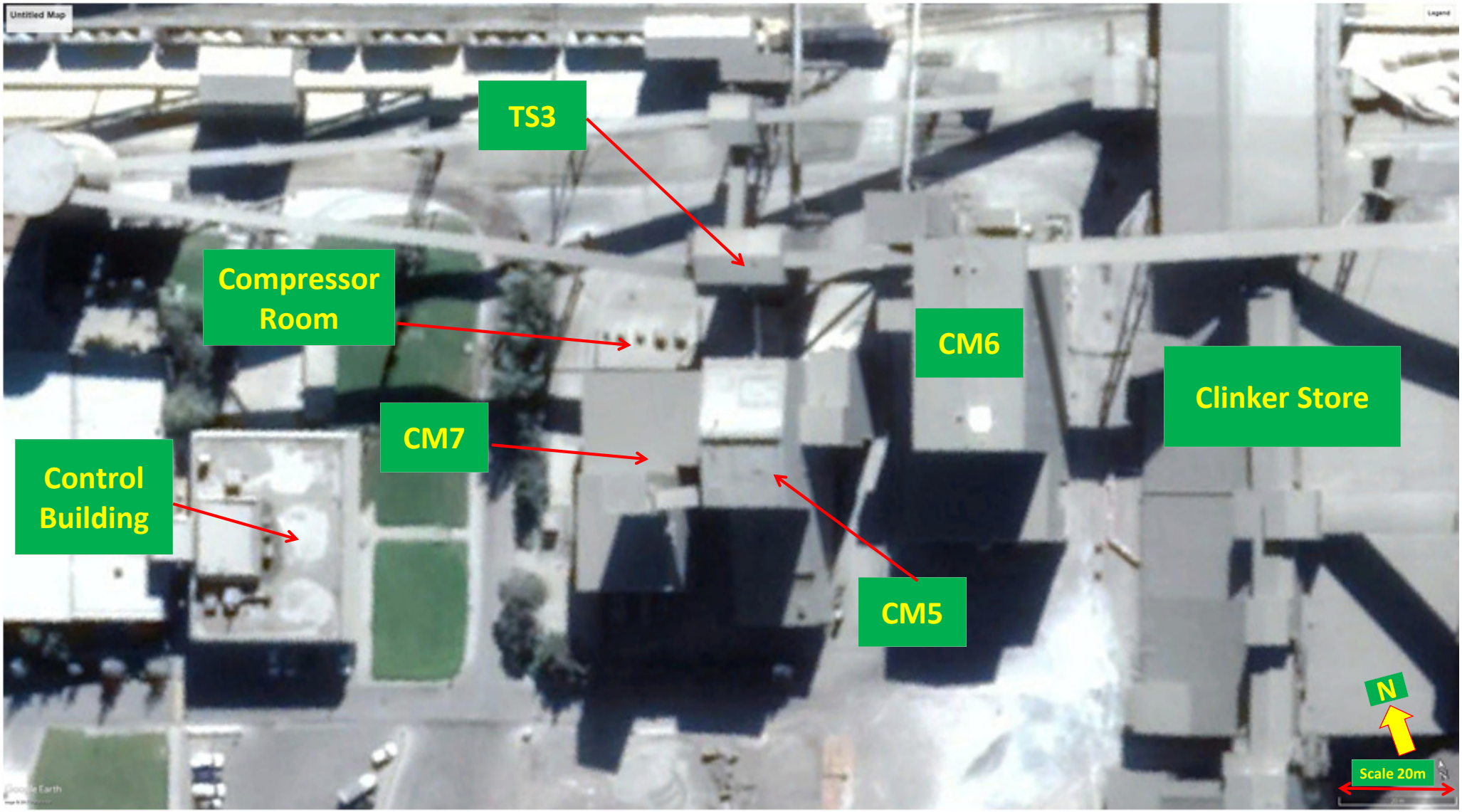

Figure 3.31: Boral Cement Berrima - Aerial view of layout of No.7 Cement Mill area

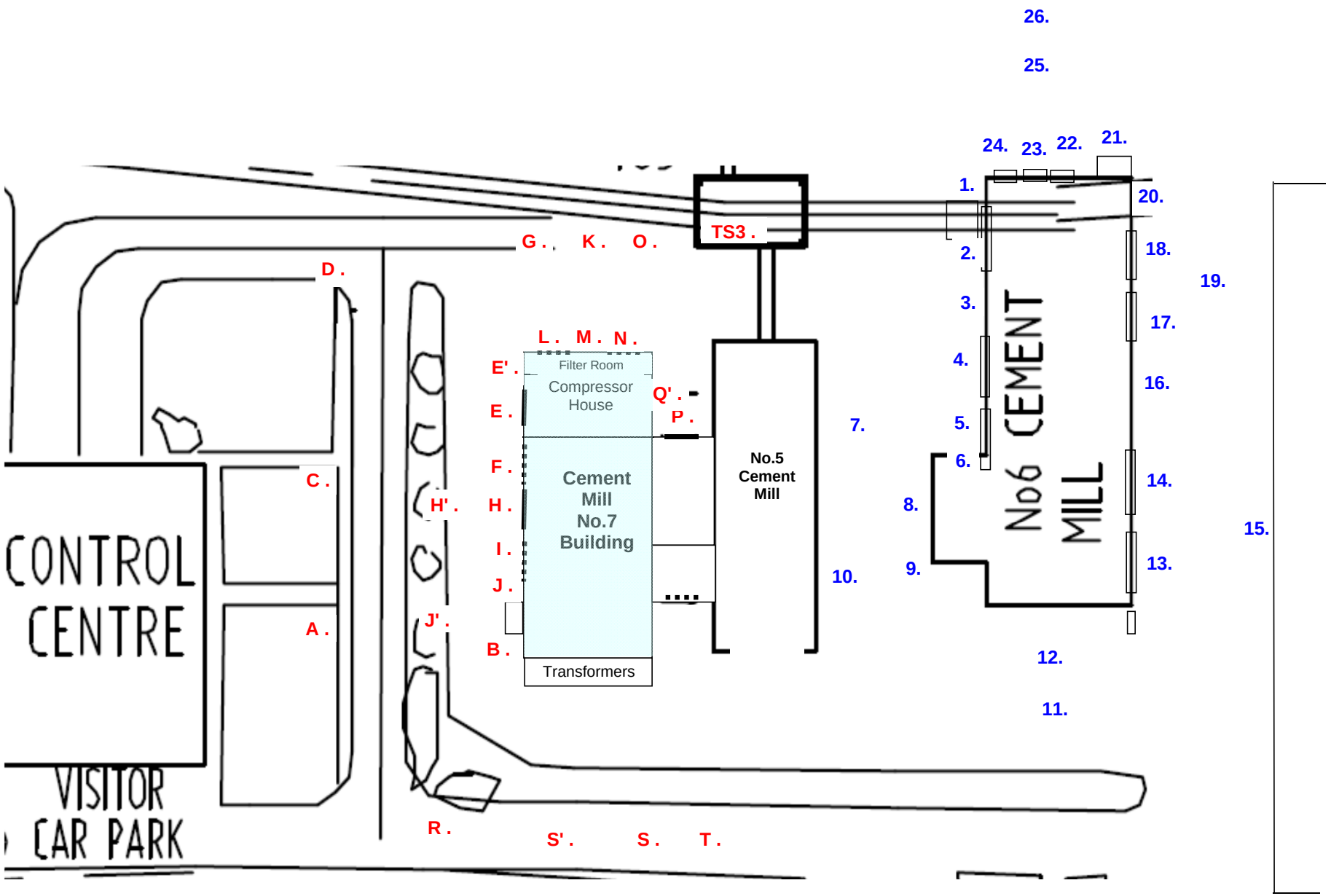

Figure 3.32: Boral Cement Berrima 2017 Annual Noise Assessment - Plan view of external measurement locations for No.7 Cement Mill and CM6

Figure 3.33: Aerial view of No.7 Cement Mill, CM6 and sound level measurement locations

Table 3.5: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017 - Measurements of CM 7 Outside and Inside and CM6 Outside

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
A	Top of stairs	49	19/09/2017	03:38 PM	37	A	72	85	73	73	72	71	13	
C	Top of stairs S	50	19/09/2017	03:40 PM	32	A	72	84	75	74	73	72	12	
J'	Edge of concrete opp, J.	51	19/09/2017	03:42 PM	32	A	73	85	74	74	74	73	11	
J	Vents N of baghouse	52	19/09/2017	03:44 PM	32	A	77	89	78	78	78	77	12	.7m from wall
J"	under baghouse & 1m to wall vent	53	19/09/2017	03:46 PM	45	A	79	90	80	80	80	79	11	under box
J	Vents N of baghouse	54	19/09/2017	03:48 PM	31	A	78	89	79	79	78	77	12	2 m from corner; large rattle from above
I	Vent S of door @ 1m	55	19/09/2017	03:51 PM	32	A	77	87	78	78	78	77	10	
H	W roller door @ 1m	56	19/09/2017	03:52 PM	38	A	82	92	83	83	83	82	10	door is 200mm open
F	Wall vents N on W side @ 1m	57	19/09/2017	03:54 PM	32	A	76	86	77	77	77	76	10	
E'	Man door to compressor filter room@ 1m	59	19/09/2017	03:56 PM	32	A	69	83	70	70	70	69	13	
E	Compressor room door @ 1m	59	19/09/2017	03:56 PM	32	A	69	83	70	70	70	69	13	
L	N wall vent W side @ 1m	60	19/09/2017	03:58 PM	32	A	71	82	73	72	72	71	11	outside filter room
M	Between wall vents @ 1m to wall	61	19/09/2017	03:59 PM	38	A	70	80	73	72	71	69	10	outside filter room
N	Wall vents N wall E side @ 1m	62	19/09/2017	04:01 PM	36	A	71	81	74	73	72	70	11	outside filter room
O	Line E side of Comp House 13.5m to control point	63	19/09/2017	04:03 PM	31	A	72	83	74	74	73	71	11	
K	Line level with G centre of compressor house	64	19/09/2017	04:05 PM	32	A	74	82	76	76	75	72	9	
G	Line N side of transfer house 13.5m to it, in-line W edge CM7	65	19/09/2017	04:06 PM	33	A	73	82	76	75	74	72	9	influence from exhaust vent above
D	At corner N of Admin	66	19/09/2017	04:08 PM	42	A	71	81	74	73	72	70	10	
P	1m N roll door CM7	68	19/09/2017	04:13 PM	31	A	81	88	81	81	81	80	8	
T	Kerb Opp W wall CM5	102	19/09/2017	05:35 PM	34	A	74	85	75	75	74	73	11	
S	Kerb opp E side CM7 tower	103	19/09/2017	05:36 PM	32	A	75	88	76	76	75	74	13	
S'	Kerb Opp W wall CM7	104	19/09/2017	05:38 PM	32	A	74	88	76	75	75	74	13	
R	corner SW of CM7	106	19/09/2017	05:40 PM	32	A	77	89	78	78	78	76	12	
TS3	TS3 L3 11.7m to FA34 discharge	217	19/09/2017	3:08 PM	00:00:31	A	84	109	82	78	78	0	25	Noise is from CM6 W wall fans and rest of CM7
	TS3 N side L1 opening to N	276	19/09/2017	5:04 PM	00:00:30	A	73	81	74	73	73	72	8	
	TS3 Platform L3 facing CM5 fan	277	19/09/2017	5:06 PM	00:00:47	A	74	84	75	74	74	73	10	Fan just audible. Other sources higher

Table 3.5: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017 - Measurements of CM 7 Outside and Inside and CM6 Outside

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
(CM6)	Platform opposite CM6 W wall fans	278	19/09/2017	5:09 PM	00:00:31	A	72	83	77	76	73	71	11	CM6 wall Fans off
CM7 Inside	Inside centre Compressor room	282	19/09/2017	5:33 PM	00:00:31	A	89	90	90	90	90	89	1	No purge
	Inside W roll door Compressor room	283	19/09/2017	5:35 PM	00:00:31	A	93	93	94	94	94	93	0	
	H* Inside main W roll door @ 1m	284	19/09/2017	5:36 PM	00:00:30	A	95	100	96	96	96	95	5	
	F* Inside NW corner	285	19/09/2017	5:37 PM	00:00:31	A	92	98	94	93	93	92	5	
	I* W side by hydraulics bench	286	19/09/2017	5:38 PM	00:00:30	A	95	100	96	95	95	94	5	
	J* inside vents	287	19/09/2017	5:38 PM	00:00:31	A	92	98	93	92	92	91	7	
	J'* SW corner by vents at baghouse	288	19/09/2017	5:39 PM	00:00:31	A	89	96	90	89	89	88	7	
	N side centre mill 2m to wall	289	19/09/2017	5:40 PM	00:00:41	A	94	99	96	95	95	93	5	
	P* inside main N roll door	290	19/09/2017	5:41 PM	00:00:31	A	94	99	95	95	95	94	4	
	Centre E side of mill at column line	291	19/09/2017	5:42 PM	00:00:31	A	101	103	102	102	102	101	2	
	Platform N end mill centre	292	19/09/2017	5:43 PM	00:00:30	A	95	99	96	96	95	95	4	
	Platform top of mill level by N wall & conveyor 701A	293	19/09/2017	5:44 PM	00:00:35	A	92	97	93	92	92	91	5	
	Top of mill centre platform	294	19/09/2017	5:45 PM	00:00:31	A	93	99	94	94	93	93	6	
	Bucket elevator S side on platform at mill top level	295	19/09/2017	5:46 PM	00:00:30	A	89	96	90	90	90	89	7	
	BE stairway at roof level	296	19/09/2017	5:47 PM	00:00:31	A	91	96	92	91	91	90	5	
	1st platform above roof level in BE tower W side	297	19/09/2017	5:48 PM	00:00:35	A	86	93	87	86	86	85	8	
	2nd platform in BE tower by fans FA703 & FA720, W side wall @ 1m	298	19/09/2017	5:49 PM	00:00:30	A	83	92	83	83	83	82	9	
	Between Fans FA703 on & FA720 off	299	19/09/2017	5:50 PM	00:00:30	A	84	92	84	84	84	83	9	
	At crossway to CM5 level, N side at transfer to conveyor	300	19/09/2017	5:51 PM	00:00:30	A	82	91	83	82	82	81	9	
	At crossway to CM5 level, W side by wall @ 1m, BE @ 1.8m	301	19/09/2017	5:52 PM	00:00:30	A	82	90	83	83	83	82	8	

Table 3.5: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017 - Measurements of CM 7 Outside and Inside and CM6 Outside

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
	At W end crossway to CM5 by vent in S wall	302	19/09/2017	5:53 PM	00:00:31	A	77	88	78	78	77	76	12	
	Top level BE tower W side NW corner	303	19/09/2017	5:54 PM	00:00:35	A	82	90	84	83	83	82	8	
	Top level BE tower S side BE @ 0.8m	304	19/09/2017	5:55 PM	00:00:31	A	81	91	83	82	82	81	9	
	Top level BE tower E side by drive motor end @ 0.8m	305	19/09/2017	5:55 PM	00:00:35	A	84	92	85	85	85	83	8	
	Crossway to CM5 E end by opening in floor	306	19/09/2017	5:57 PM	00:00:41	A	77	89	78	78	77	76	13	
	Main baghouse SE corner top, 4m to E wall	307	19/09/2017	6:01 PM	00:00:36	A	86	94	91	89	87	86	8	
	Base of main baghouse SW corner	308	19/09/2017	6:02 PM	00:00:30	A	86	94	87	87	87	86	8	
	Main mill motor fan platform NE side, motor & casing @ 1m	309	19/09/2017	6:03 PM	00:00:34	A	89	96	90	90	90	89	7	
	SW side of mill motor fan @ 2m to casing inlet & discharge ducts	310	19/09/2017	6:04 PM	00:00:30	A	86	96	87	87	87	86	10	
	Mill drive motor fan motor drive end @ 1.5m	311	19/09/2017	6:05 PM	00:00:30	A	93	99	95	95	94	93	6	
CM5 area	L1 Larox Valve @ 1.2m	465	6/10/2017	2:28 PM	00:01:11	A	89	90	98	96	95	76	1	95 then drops to 76
	DC702 by duct through N wall, @ 1m to motor & casing	466	6/10/2017	2:31 PM	00:00:40	A	75	87	80	78	77	74	12	Affected by nosie from Larox below. Ambient is 74 from fan
	FA34 motor & casing S side @ 1m	467	6/10/2017	2:36 PM	00:00:36	A	80	92	82	81	81	80	12	Noise is from rest of the building
	FA502 @ 1m to motor & casing & discharge	468	6/10/2017	2:38 PM	00:00:34	A	82	92	84	83	83	82	9	
CM6	W wall fan from far platform @ 7.3m to splitters, 5.8m to wall	461	6/10/2017	2:10 PM	00:01:45	A	86	98	89	88	87	84	12	
	W wall fan from close platform 2.9m to centre bottom of silencer at wall	462	6/10/2017	2:13 PM	00:01:04	A	92	103	94	93	93	91	11	
11	9.8m from S wall	84	19/09/2017	04:46 PM	32	A	75	85	76	76	75	74	10	9.74 from building
13	E side S roll door @ 1m	85	19/09/2017	04:49 PM	43	A	72	82	75	74	73	71	10	1.3m from door / 1m from wall

Table 3.5: Boral Cement Berrima Annual Noise Survey 2017

Site measurements September and October 2017 - Measurements of CM 7 Outside and Inside and CM6 Outside

Location		File	Date	Time	Period	Weighting	Statistical Sound Level s- dBA							Comment
Number	Description				Hr:Mn:Sec		LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
14	CM6 E side centre door @ 1m	86	19/09/2017	04:50 PM	31	A	73	82	79	78	75	71	9	
15	2m from Clinker Building opp 13 & 14	87	19/09/2017	04:51 PM	34	A	72	82	74	73	73	72	10	
18	Door opp Comp Room @ 1m	88	19/09/2017	04:54 PM	32	A	71	81	73	72	72	71	10	
19	Clinker Building @ 2m opp 18	89	19/09/2017	04:56 PM	39	A	73	81	75	75	74	71	8	
20	Man door - open 100mm	90	19/09/2017	04:58 PM	52	A	71	80	72	72	72	70	9	
21	1m Outside vent fan filter	92	19/09/2017	05:04 PM	33	A	69	79	70	70	70	69	10	
22	E side N wall vent @ 1m	93	19/09/2017	05:05 PM	48	A	70	79	74	73	71	70	9	
23	Centre N wall vent @ 1m	94	19/09/2017	05:07 PM	32	A	70	78	70	70	70	69	9	
24	W side N wall vent @ 1m	95	19/09/2017	05:09 PM	32	A	68	79	70	69	68	67	11	2m from wall
17	E roll door opp Mill	96	19/09/2017	05:11 PM	34	A	81	84	81	81	81	80	4	door open
16	E wall centre @ 2m	97	19/09/2017	05:13 PM	31	A	73	85	74	74	73	72	13	
25	11m N of CM6	98	19/09/2017	05:16 PM	46	A	69	80	70	70	70	69	10	14m out
26	22.6m N of CM6	99	19/09/2017	05:20 PM	35	A	69	78	70	70	69	68	10	20m out ; under conveyor
11	9.8m from S wall	123	6/10/2017	10:55 AM	31	A	77	85	78	78	78	76	8	9.8 from building
13	E side S roll door @ 1m	124	6/10/2017	10:58 AM	34	A	73	82	74	74	74	73	9	1.3m from door / 1m from wall
14	CM6 E side centre door @ 1m	125	6/10/2017	10:59 AM	33	A	75	84	76	76	75	75	9	
16	E wall centre @ 2m	126	6/10/2017	11:00 AM	32	A	72	82	74	73	73	72	10	1.79m from wall due to rubbish in front of wall
16	E wall centre @ 2m	127	6/10/2017	11:02 AM	32	A	72	83	73	73	73	72	11	.97m from wall
17	E roll door opp Mill	128	6/10/2017	11:05 AM	32	A	80	86	82	81	80	79	6	1.3m from door; high pitch noise
18	Door opp Comp Room @ 1m	129	6/10/2017	11:06 AM	31	A	79	83	80	79	79	78	5	1.3m from door; high pitch noise
20	Man door - open 100mm	130	6/10/2017	11:08 AM	31	A	75	85	77	76	75	74	10	CM6 Not working
19	Clinker Building @ 2m opp 18	131	6/10/2017	11:10 AM	32	A	74	82	74	74	74	73	8	CM6 Not working
15	2m from Clinker Building opp 13 & 14	132	6/10/2017	11:11 AM	31	A	72	82	73	73	73	71	10	
21	1m Outside vent fan filter	134	6/10/2017	11:16 AM	31	A	72	85	75	75	74	71	13	1m vent
22	E side N wall vent @ 1m	135	6/10/2017	11:17 AM	34	A	75	87	76	76	76	75	12	1.74m
23	Centre N wall vent @ 1m	136	6/10/2017	11:19 AM	31	A	80	88	81	81	81	80	8	
24	W side N wall vent @ 1m	137	6/10/2017	11:20 AM	31	A	78	86	79	78	78	77	9	
25	11m N of CM6	138	6/10/2017	11:22 AM	31	A	70	80	71	71	70	69	10	14.4m out; door above vent open
26	22.6m N of CM6	139	6/10/2017	11:25 AM	32	A	69	80	70	69	69	68	11	20.6m out ; under conveyor

Table 3.7: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for CM7 Project and CM6

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File	Date	Statistical Sound Level - LAeq dBA											Difference to 2016 = 2016 - 20XX dB								
		No.		LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
CM7	A Top of stairs	49	19/09/2017	72	71	72	73	73	72	71	73	69	70	70	0	-1	-1	0	1	-1	3	2	2
	C Top of stairs S	50	19/09/2017	72	72	72	73	71	71	71	71	70	72	72	0	0	1	1	2	1	2	0	0
	D At corner N of Admin	66	19/09/2017	71	0	72	72	72	70	69	68	67	73	73	-2	-2	-1	0	1	2	4	-2	-2
	E Compressor room door @ 1m	59	19/09/2017	69	69	71	72	74	73	74	75	76	76	75	-2	-3	-5	-4	-5	-6	-7	-7	-6
	E' Man door to compressor filter room@ 1m	59	19/09/2017	69	69	69	71	70	69	71	71	69	74	73	0	-1	-1	0	-2	-2	0	-5	-4
	F Wall vents N on W side @ 1m	57	19/09/2017	76	76	76	76	77	77	77	75	76	77	78	0	0	-1	-1	-1	1	0	-1	-2
	G - Line N side of transfer house 13.5m to it, in-line W edge CM7	65	19/09/2017	73	72	75	75	74	72	70	68	69	78	81	-2	-1	-1	1	4	6	4	-5	-8
	H W roller door @ 1m	56	19/09/2017	82	82	81	80	80	81	80	77	78	78	77	1	3	2	2	2	5	4	4	5
	I Vent S of door @ 1m	55	19/09/2017	77	77	77	78	78	79	79	87	78	78	85	0	-1	-1	-2	-2	-10	-1	-1	-8
	J Vents N of baghouse	52	19/09/2017	77	77	78	77	79	80	86	89	83	83	86	0	0	-2	-2	-9	-12	-6	-6	-9
		54	19/09/2017	78	77																		
	J' Edge of concrete opp, J.	51	19/09/2017	73	73	74	75	74	75	78	84	77	80	74	0	-1	-1	-2	-5	-11	-4	-7	-1
	J" under baghouse & 1m to wall vent	53	19/09/2017	79	79	80	81	82	81						-1	-2	-3	-2					
	K Line level with G centre of compressor house	64	19/09/2017	74	72	72	74	72	71	72	68	69	78		1	0	1	3	1	6	5	-5	
	L N wall vent W side @ 1m	60	19/09/2017	71	71																		
	M Between wall vents @ 1m to wall	61	19/09/2017	70	69	73	74	73	72	70	79	71	76	76	-3	-4	-3	-2	0	-9	-1	-6	-6
	N Wall vents N wall E side @ 1m	62	19/09/2017	71	70	71	71	71	69	69	67	70	76	75	-1	0	0	2	2	4	1	-5	-4
	O Line E side of Comp House 13.5m to control point	63	19/09/2017	72	71	73	75	73	72	70	67	67	78		-2	-3	-1	0	2	5	5	-6	
	P 1m N roll door CM7	68	19/09/2017	81	80	81	81	80	81	81	76	79	87		-1	-1	1	-1	-1	4	2	-7	
	Transfer Station #TS3 Level 1 N side opening	276	19/09/2017	73	72	71	71								2	1							
	TS3 Platform opp fan discharge	277	19/09/2017	74	73	75	75	77	75	77	75	74			-1	-2	-3	-1	-3	-1	0		
	TS3 Platform opp fan discharge	464	6/10/2017	75	74	75	75	77	75	77	75	74			0	-1	-2	0	-2	0	1		
	R corner SW of CM7	106	19/09/2017	77	76	76	75								1	2							
	S' Kerb Opp W wall CM7	104	19/09/2017	74	74	74	74								0	0							
	S Kerb opp E side CM7 tower	103	19/09/2017	75	74	75	76								0	-2							
	T Kerb Opp W wall CM5	102	19/09/2017	74	73	75	76								-1	-2							
CM6	11 9.8m from S wall	123	6/10/2017	77	76	78	76	78	77	79		77			-1	1	-1	0	-2		0		
	13 E side S roll door @ 1m	124	6/10/2017	73	73	75	80	81	82	82		83			-2	-7	-8	-9	-9		-10		
	14 CM6 E side centre door @ 1m	125	6/10/2017	75	75	76	74	75	77	74		74			-1	1	0	-3	1		1		
	15 2m from Clinker Building opp 13 & 14	132	6/10/2017	72	71	73	78	78	89	79					-1	-6	-7	-17	-7				
	16 E wall centre @ 2m	126	6/10/2017	72	72	73	74	75	80	74		77			-1	-1	-2	-7	-2		-5		
		127	6/10/2017	72	72							72											
	17 E roll door opp Mill	128	6/10/2017	80	79	82	74	75	78	77		75			-3	5	4	2	3		5		
	18 Door opp Comp Room @ 1m	129	6/10/2017	79	78	76	82	83	85	82		85			2	-4	-5	-7	-4		-6		
	19 Clinker Building @ 2m opp 18	131	6/10/2017	74	73	72	77	77	75	77		76			1	-3	-4	-1	-3		-2		
	20 Man door - open 100mm	130	6/10/2017	75	74	73	75	75	78	73		72			2	0	0	-4	2		3		
	21 1m Outside vent fan filter	134	6/10/2017	72	71	72	73	75	72	74		74			1	-1	-2	0	-2		-2		
	22 E side N wall vent @ 1m	135	6/10/2017	75	75	82	82	84	81	83		85			-7	-7	-9	-6	-8		-9		
	23 Centre N wall vent @ 1m	136	6/10/2017	80	80	83	84	86	84	85		86			-3	-3	-5	-3	-4		-5		
	24 W side N wall vent @ 1m	137	6/10/2017	78	77	80	78	81	81	81		83			-2	-1	-4	-3	-4		-6		
	25 11m N of CM6	138	6/10/2017	70	69	74	74	75	74						-4	-4	-6	-4					
	26 22.6m N of CM6	139	6/10/2017	69	68	80	71	72	74	75		77			-11	-3	-3	-5	-6		-9		
	Door platform near CM6 W wall fan @ 5.7m	461	6/10/2017	86	84	87	85	84	88			81			-1	0	2	-2			5		

Table 3.8: Boral Cement Berrima Works
2017 Annual Environmental Noise Assessment for CM7 Project -
Measurement locations with increase in sound level > 3 dB and calculated contribution sound level at receivers

Location	Year	Time	Period d:h:m:s	Sound Level dB(A) $L_{AEQ,t}$	Comments	Distance measured metres	Distance to Receivers — Distance Attenuation to receiver — Calculated LAEQ level at receiver distance only				
							Adelaide	Brisbane	Melbourne	Argyle	South
CM7						Objective Night	40	40	40	40	37
CM7 D At corner N of Admin, F 66	**2017**	04:08 PM	42	71	Distance	25	**517**	**611**	**610**	**773**	**541**
	2010			67	Source after DIR		**71**	**71**	**71**	**71**	**36**
Difference 2017 - 2010			*Difference*	**4**	Distance reduction		-26	-28	-28	-30	-27
					Calculated SPL without barriers		***44***	***43***	***43***	***41***	***9***
					Noise is from other sources, not just CM7						
G - Line N side of transfer house 13.5m to it, in-line W edge CM7, F65	**2017**	04:06 PM	33	**73**	Distance	13.5	**517**	**611**	**610**	**773**	**1647**
	2011			68	Source after DIR		**73**	**73**	**73**	**73**	**38**
Difference 2017 - 2011			*Difference*	**6**	Distance reduction		-32	-33	-33	-35	-42
					Calculated SPL without barriers		***42***	***40***	***40***	***38***	***-4***
					Noise is from other sources, not just CM7						
CM7 H W roller door @ 1m F56	**2017**	03:52 PM	38	82	Distance	1	**546**	**636**	**628**	**791**	**1615**
	2011			77	Source after DIR		**68**	**70**	**71**	**73**	**71**
Difference 2017 - 2011			*Difference*	**5**	Distance reduction		-55	-56	-56	-58	-64
					Calculated SPL without barriers		***13***	***13***	***15***	***15***	***7***
K Line level with G 13.5m to building, centre of compressor house, F64	**2017**	04:05 PM	32	**74**	Distance	13.5	**517**	**611**	**610**	**773**	**1647**
	2011			68	Source after DIR		**73**	**73**	**73**	**73**	**38**
Difference 2017 - 2011			*Difference*	**6**	Distance reduction		-32	-33	-33	-35	-42
					Calculated SPL without barriers		***42***	***40***	***40***	***38***	***-4***
					Noise is from other sources, not just CM7						
N Wall vents N wall E side @ 1m, F62	**2017**	04:01 PM	36	71	Distance	1	**517**	**611**	**610**	**773**	**1647**
	2011			67	Source after DIR		**71**	**71**	**71**	**71**	**38**
Difference 2017 - 2011			*Difference*	**4**	Distance reduction		-54	-56	-56	-58	-64
					Calculated SPL without barriers		***17***	***15***	***15***	***13***	***-26***
					No change since 2012 but influenced by FA502 and dependent on other sources e.g. K6						
CM7 O Line level with G 13.5m to centre of compressor house F63	**2017**	04:03 PM	31	**72**	Distance	13.5	**517**	**611**	**610**	**773**	**1647**
	2011			67	Source after DIR		**72**	**72**	**72**	**72**	**38**
Difference 2017 - 2011			*Difference*	**5**	Distance reduction		-32	-33	-33	-35	-42
					Calculated SPL without barriers		***40***	***39***	***39***	***37***	***-4***
P 1m N roll door CM7	**2017**	04:13 PM	31	**81**	Distance	1	**528**	**625**	**620**	**783**	**1637**
	2011			76	Source after DIR		**80**	**80**	**80**	**80**	**45**
Difference 2017 - 2011			*Difference*	**4**	Distance reduction		-54	-56	-56	-58	-64
					Calculated SPL without barriers		***26***	***25***	***25***	***23***	***-19***
Non-Upgrade areas or items with increased sound levels											
CM6 17 E roll door opp Mill	**2017**	11:05 AM	32	**80**	Distance	1	**541**	**653**	**658**	**833**	**1660**
	2015			74	Source after DIR		**56**	**54**	**50**	**44**	**55**
Difference 2016 - 2015			*Difference*	**5**	Distance reduction		-55	-56	-56	-58	-64
					Calculated SPL without barriers		***2***	***-3***	***-7***	***-14***	***-9***
					Significant barriers also to each receiver						
CM6 Door platform near CM6 W wall fan @ 5.7m	**2017**	2:10 PM	00d 00:01:45	86	Distance	5.7	**532**	**633**	**639**	**813**	**1665**
	2010			81	Source after DIR		**77**	**78**	**86**	**86**	**78**
Difference 2016 - 2015			*Difference*	**5**	Distance reduction		-39	-41	-41	-43	-49
					Calculated SPL without barriers		***37***	***37***	***45***	***43***	***29***
					Barrier of conveyor gantry to village receivers						

Pink shaded cells and red text indicates exceeds contribution objective by 3dB+

Increase table 2017: Increases from previous for2017

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4. Residential receiver sound levels - review for 2017

Environmental sound levels are measured at residential receiver locations in New Berrima. The same three locations are used each year to provide an on-going comparison from year to year. Measurements are also made at the central section of the northern boundary of the Berrima Cement Mill and a location in the south eastern corner of the Stores Yard near the cross-road north of the Fettlers Shed.

Measurements are made by a combination of attended and unattended measurements. Attended measurements were made at four residential receiver locations during daytime, evening and night-time periods on 19 September and 6 and 16 October 2017. Unattended measurements were made at three residential receiver locations between 19 September and 2 October. Site boundary measurements covered the same period.

4.1 Unattended measurement results

Unattended measurements were made using logging sound level meters at 5 locations, shown in Figure 1.2:

- Residential:
  - 4 Melbourne Street, New Berrima (full results provided in Appendix B) for the period 19 to 30 September.
  - 72 Taylor Avenue (near Adelaide Street), New Berrima (full results provided in Appendix C). Data for this logger had some missing periods for the period 19 September to 2 October.
  - 12 Brisbane Street, New Berrima (full results provided in Appendix D) for the period 19 to 29 September.
- Boral Cement industrial site:
  - Northern Boundary at the north-western corner of the Stores Yard (full results provided in Appendix E) for the period 19 to 30 September and the evening and night of 16 October.
  - South-western corner of the Stores Yard, north of the internal cross road north of the Fettler's Shed (full results provided in Appendix F) for the period 19 September to 2 October.

Monitoring instruments measured the sound levels continuously and stored the statistical results every 15-minutes. The logger at the Northern Boundary also stored all of the sound levels to allow processing of other parameters, such as $L_{A01.1\text{-minute}}$.

The main plant noise sources operated over most of this period – the stoppages are shown in Figure 1.4. Kiln 6 operated continuously except for a period of 6 hours on 23 September between 15:00 and 21:15. Other plant items had stoppage periods, with longer stoppages as follows:

- RM7 was off for 2.5 days (55 hours) from 24 to 26 September and 17 hours on 4 October;
- RM6 was off for 18 hours on 19 to 20 September, 11 hours on 29 September, 4.5 hours on 2 and 3 October and 7 hours on 4 October;
- No.7 Cement Mill was off for 15.5 hours on 25 September and 8 hours on 29 September, 4 hours on 30 September and 31 hours from 1 to 3 October;
- No.6 Cement Mill 16 hours from 19 to 20 September, 4.75 hours on 20 September, 15 hours from 27 to 28 September and 76 hours from 1 to 4 October.

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 period of 10 to 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

Weather conditions

Weather is measured at the site meteorology station to the south of the Raw Materials Store. A summary of the weather conditions relevant to noise propagation and measurement (wind speed, wind direction and rainfall) is shown in Figure 4.1. Wind direction is shown alone on Figure 4.2, wind speed and rainfall in Figure 4.3. Weather conditions for the evening and night of 16 October (wind speed and direction only as it did not rain) are shown in Figure 4.4.

Wind direction was mainly westerly with some north-westerly and northerly at times. Southerly winds, which assist propagation from the Cement plant towards the residential receivers in the village, occurred on evenings and nights of 19 to 23 September and 1 and 6 October, however during these periods the wind speeds were very low, which also assist in enhancing sound levels from the plant to the village.

Wind speeds were moderate for the days of the first week 19 to 25 September at 3 to 6m/s mainly during daytime, almost calm in night-times, higher to 8m/s on 25, 28 and 30 September. Rain only occurred in three periods from 4 to 8am on 28 September. A comparison was made between statistical results for data including and excluding rain for the 4 Melbourne St location. The difference was found to be less than 0.1 dB for the overall long-term averages and is therefore considered to not be significant. This means data for all sites could be analysed without removing data for periods with wind or rain, however the rain periods were removed from all data for this assessment.

Table 4.1 provides a summary of the statistical data for all sites over the full period of the monitoring. Tables 4.1A and 4.1B show the comparison for 4 Melbourne Street location with differences for including and excluding rain period data.

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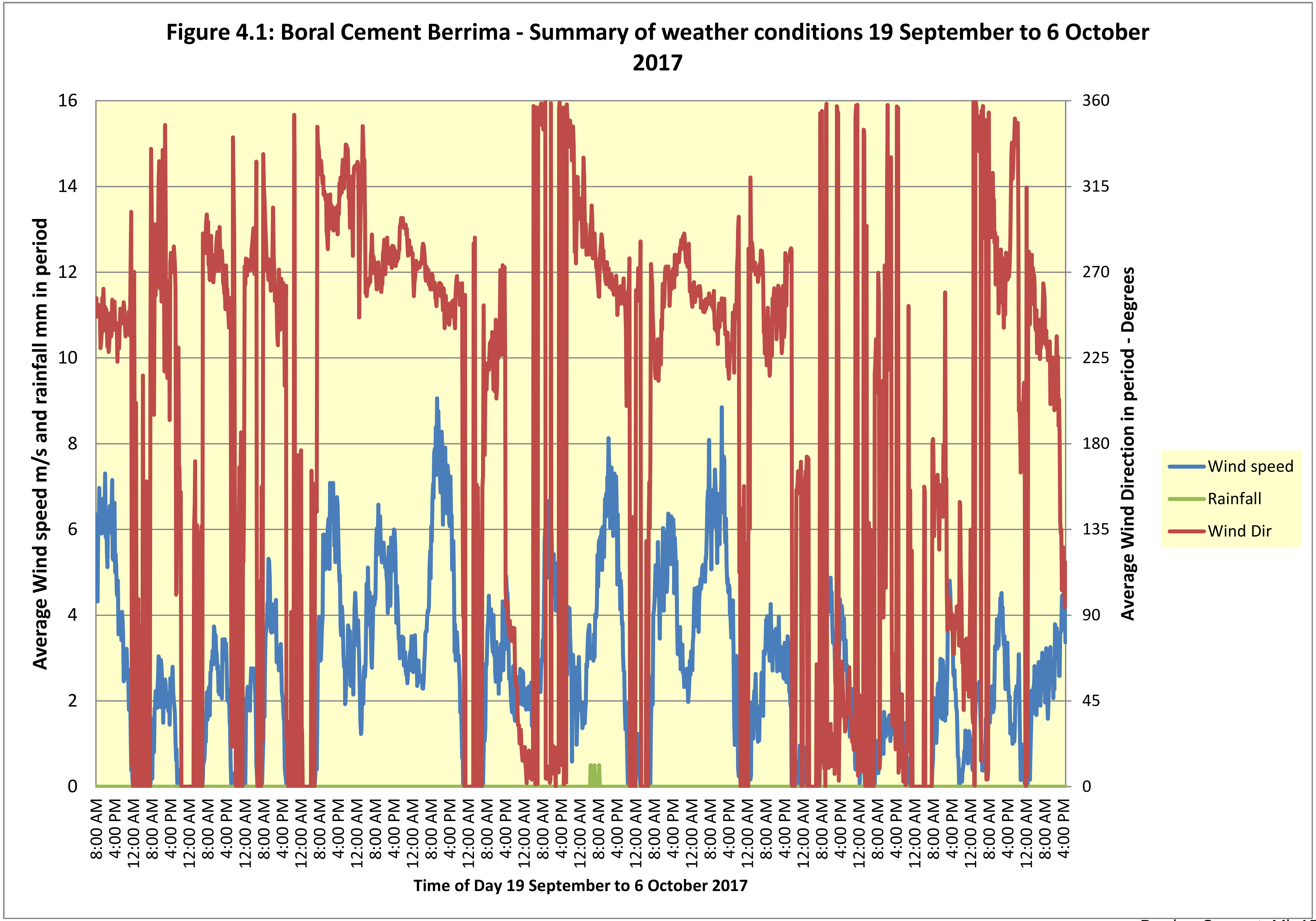
ACN: 153 946 064

The results show that 12 Brisbane Street was the quietest of the residential locations in each period of the day for all parameters calculated, although 4 Melbourne St had the same average L_{A90} values. For long-term average L_{Aeq} results, the Northern Boundary location had similar sound levels to that of 4 Melbourne Street but below those of 72 Taylor Avenue for all periods, including night-time. For Average L_{A90} values the residential receiver locations had lower sound levels than either of the Northern Boundary or Stock Yard locations. Together these results continue to demonstrate that road traffic noise has a more significant effect on receiver L_{Aeq} sound levels than the Cement Plant.

Table 4.2 compares the long-term average results for 2017 with those measured since 2002. For all residential and boundary locations, the results for all parameters were lower than or the same as the average over all years monitored and tended to be lower than in 2016. For the Store Yard Close location the results were slightly higher or the same than in previous years.

Figure 4.15 to 4.19 shows graphs of the long-term average results as a type of time history comparison for each site. These graphs also indicate there have been no significant increases in long-term sound levels from 2016 to 2017 or since measurements commenced in 2002. This further indicates that the projects Kiln 6 Upgrade and No.7 Cement Mill are achieving compliance with their objectives.



BerrimaCement_Min15(1)

Figure 4.2: Boral Cement Berrima - Summary of weather conditions 19 September to 6 October 2017

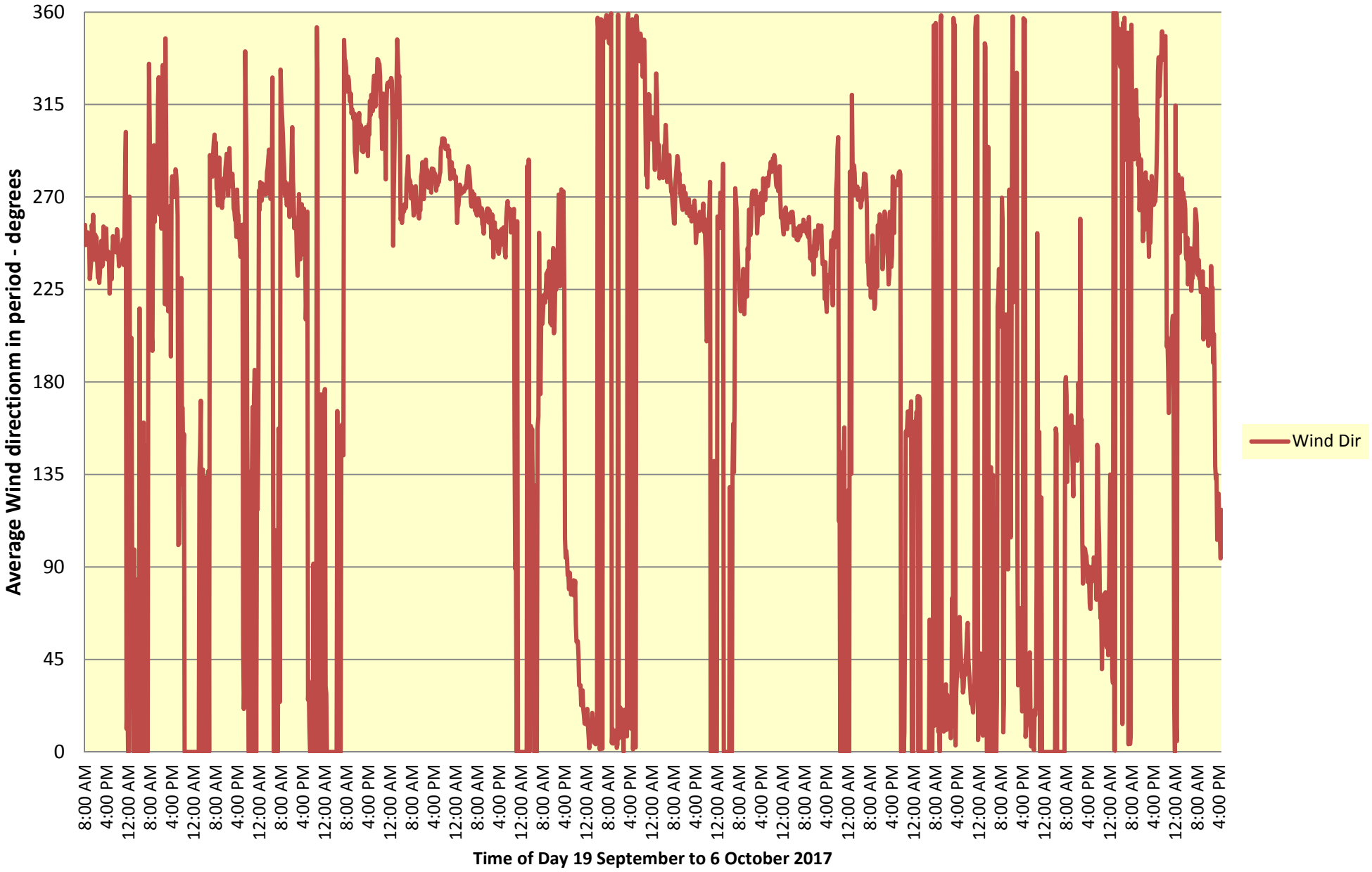


Figure 4.3: Boral Cement Berrima - Summary of weather conditions 19 September to 6 October 2017 - wind speed and rainfall

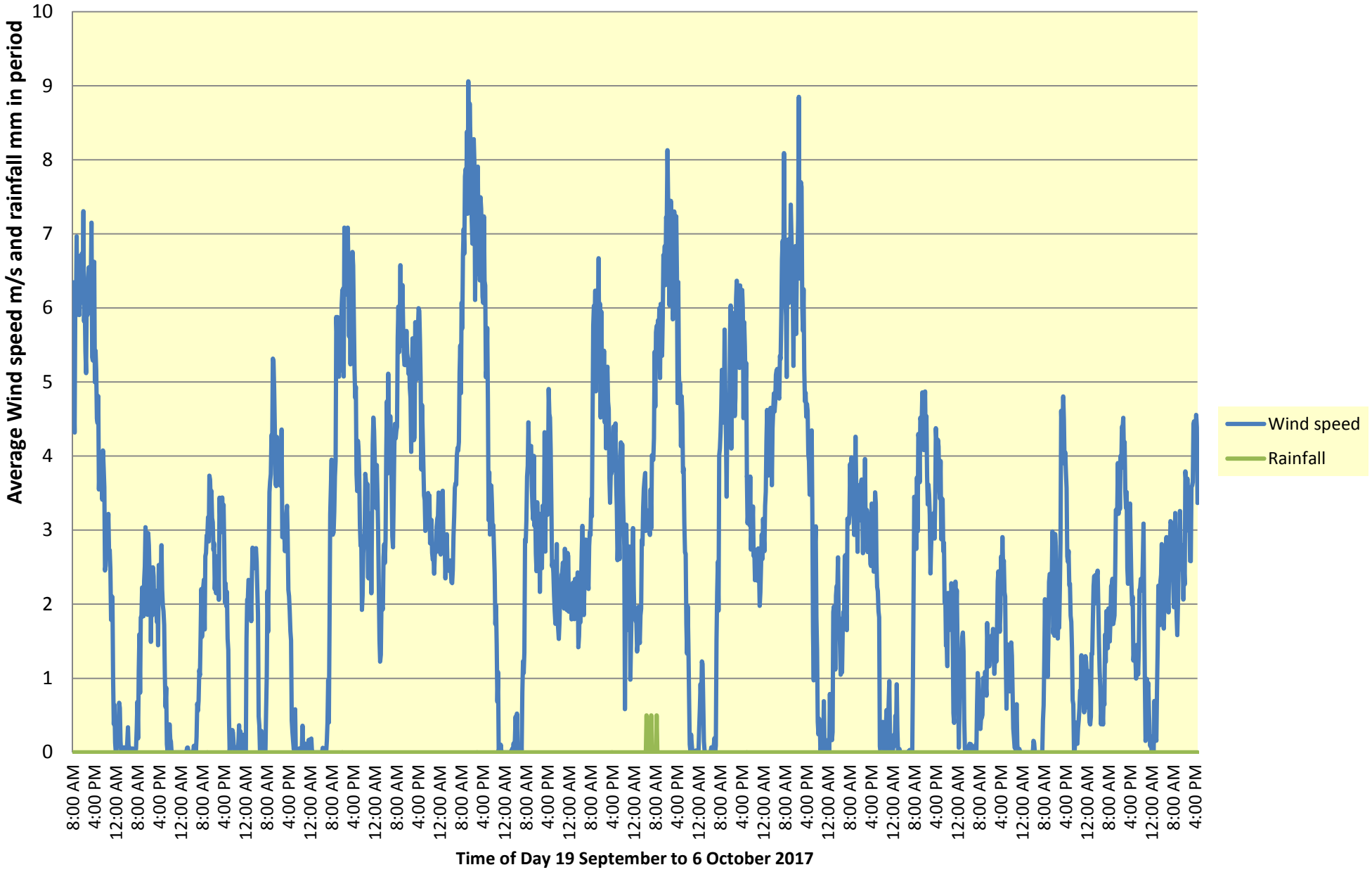


Figure 4.4: Boral Cement Berrima - Weather Data for evening and night of 16 October 2017

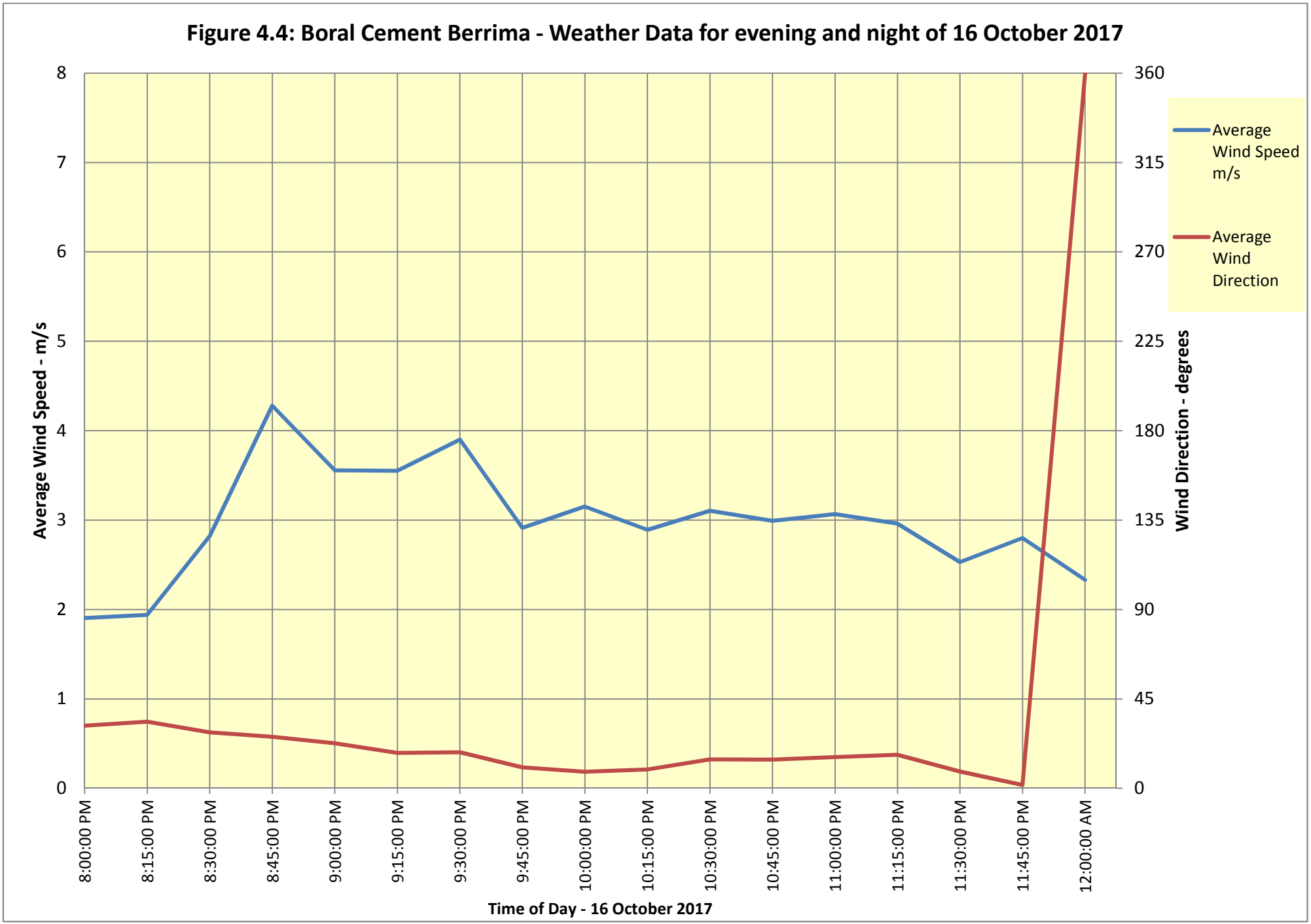


Figure 4.5: Boral Cement Berrima - Summary of weather conditions 19 to 21 September 2017

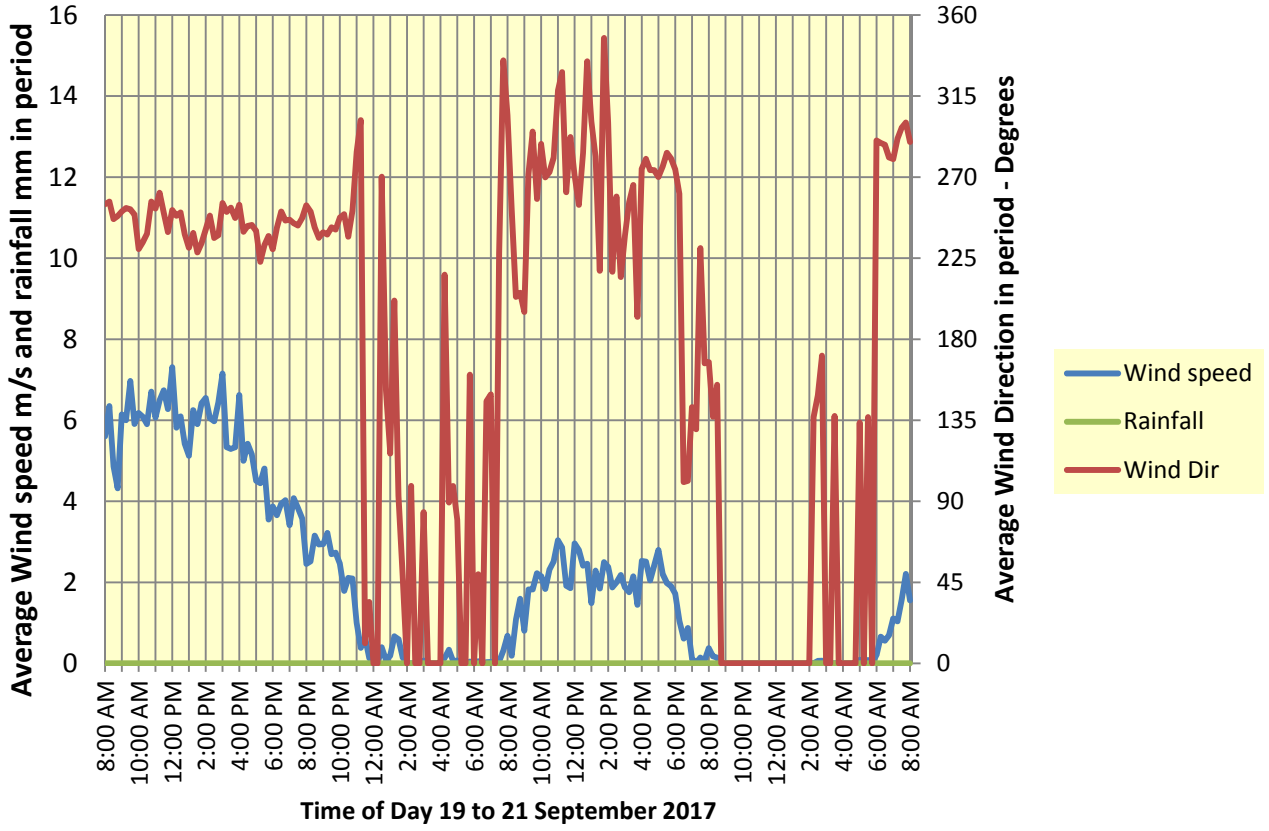


Figure 4.6: Boral Cement Berrima - Summary of weather conditions 21 to 23 September 2017

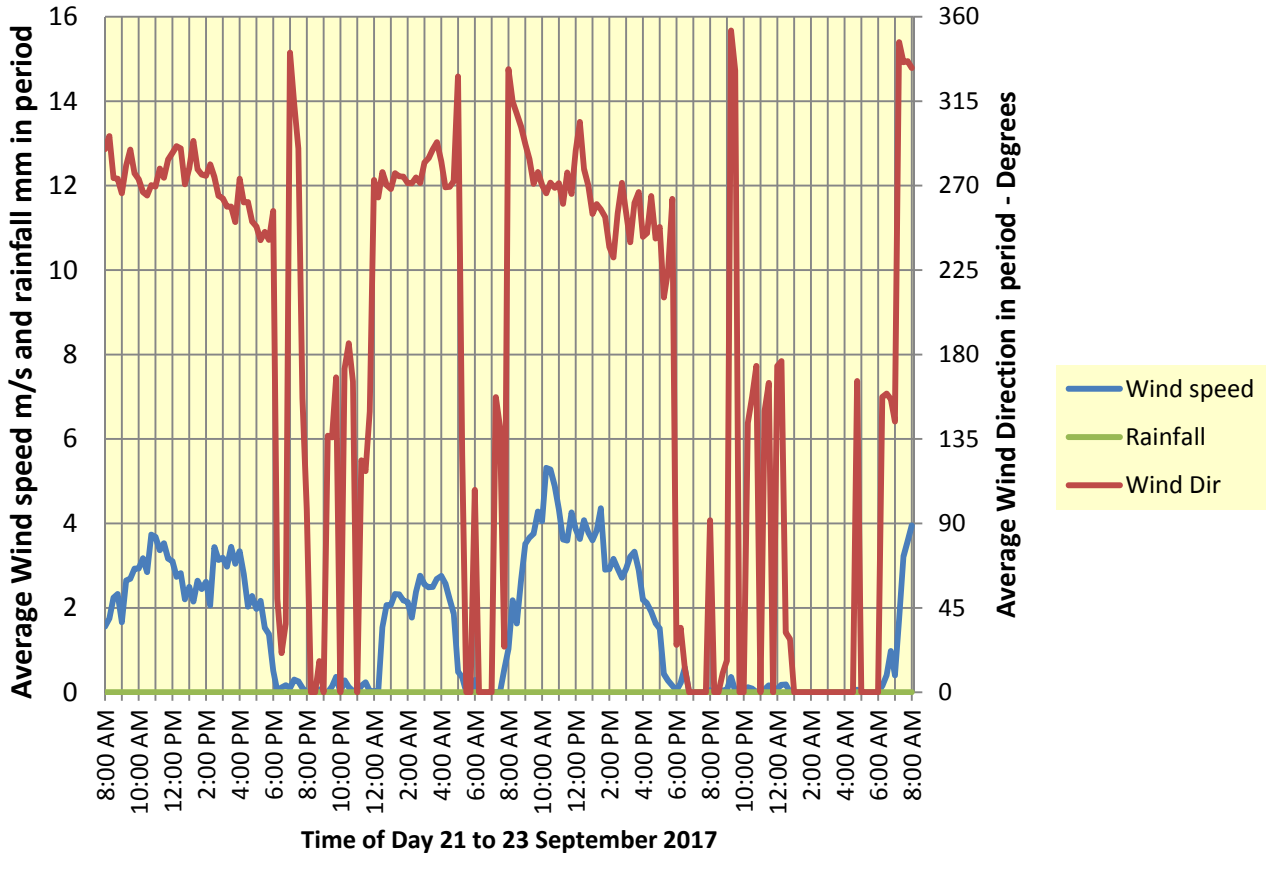


Figure 4.7: Boral Cement Berrima - Summary of weather conditions 23 to 25 September 2017

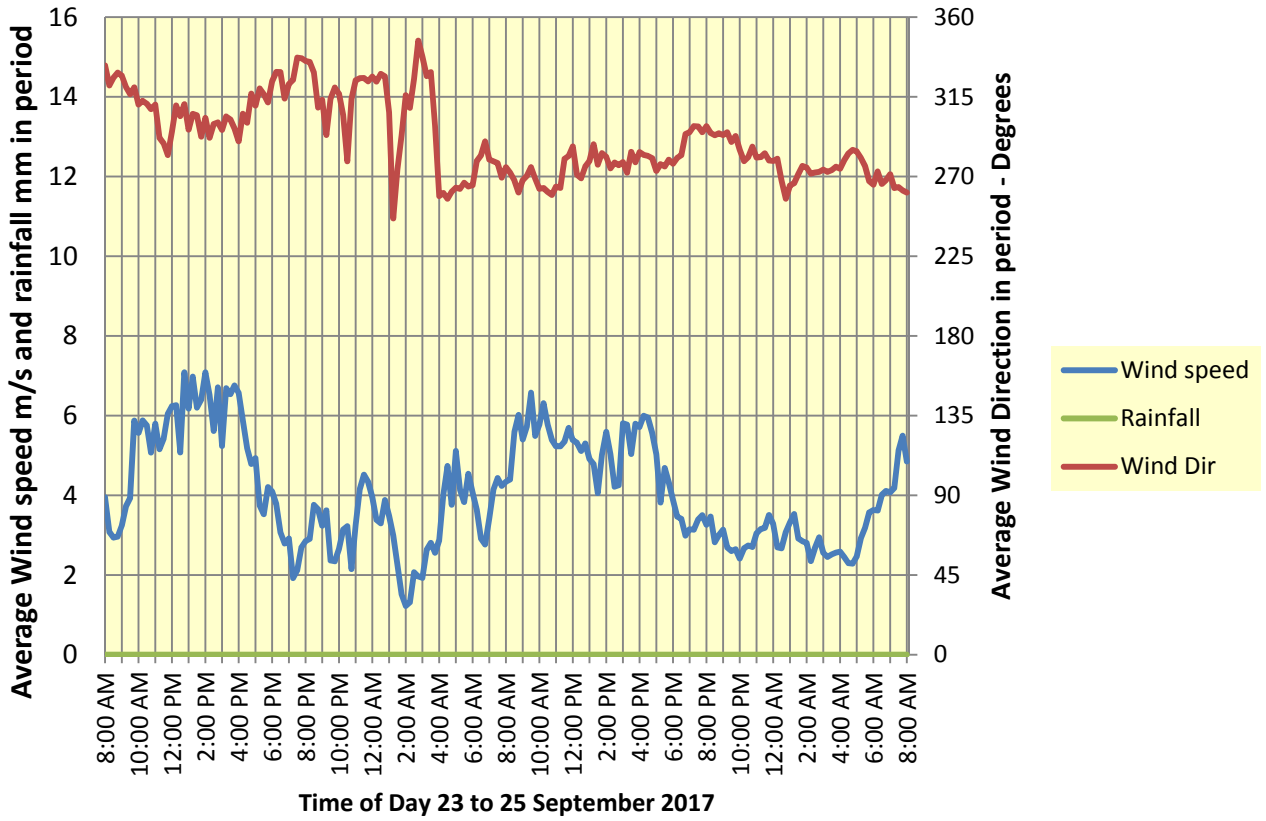


Figure 4.8: Boral Cement Berrima - Summary of weather conditions 25 to 27 September 2017

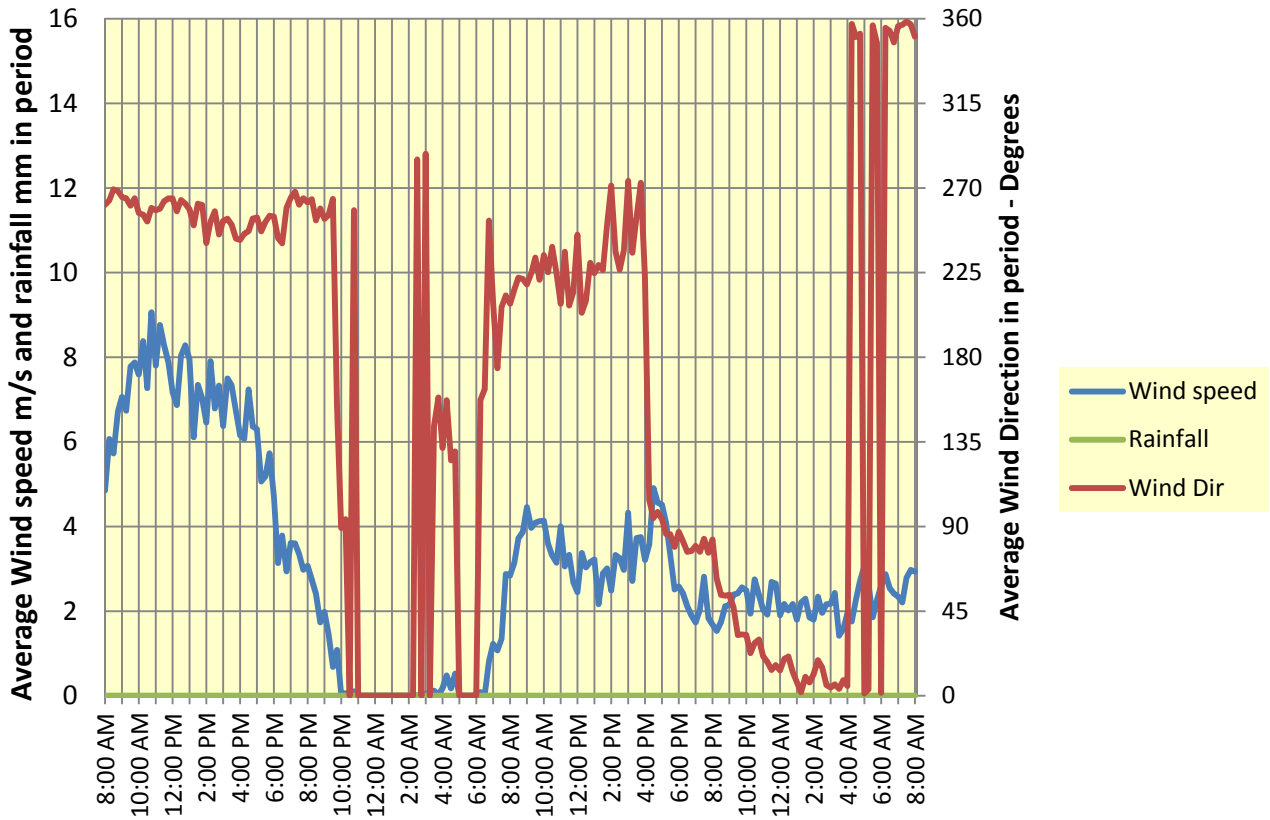


Figure 4.9: Boral Cement Berrima - Summary of weather conditions 27 to 29 September 2017

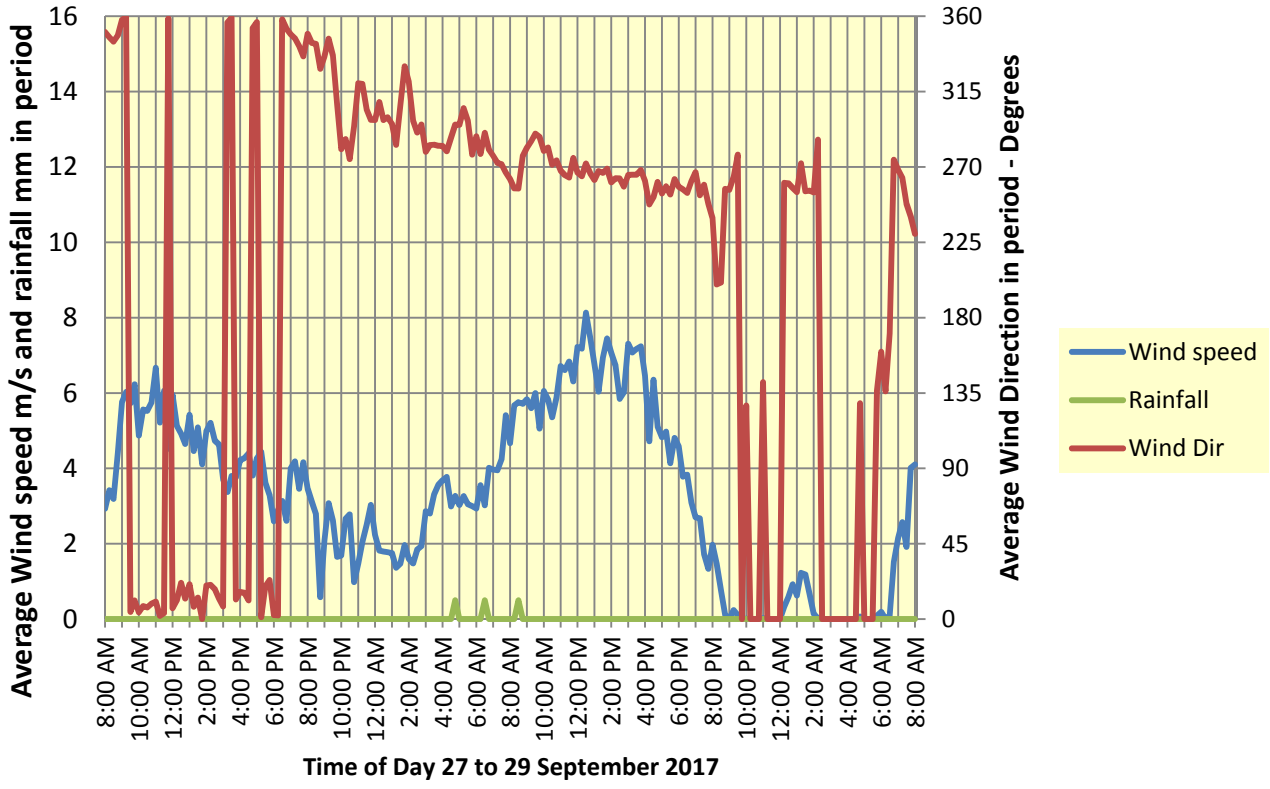


Figure 4.10: Boral Cement Berrima - Summary of weather conditions 29 September to 1 October 2017

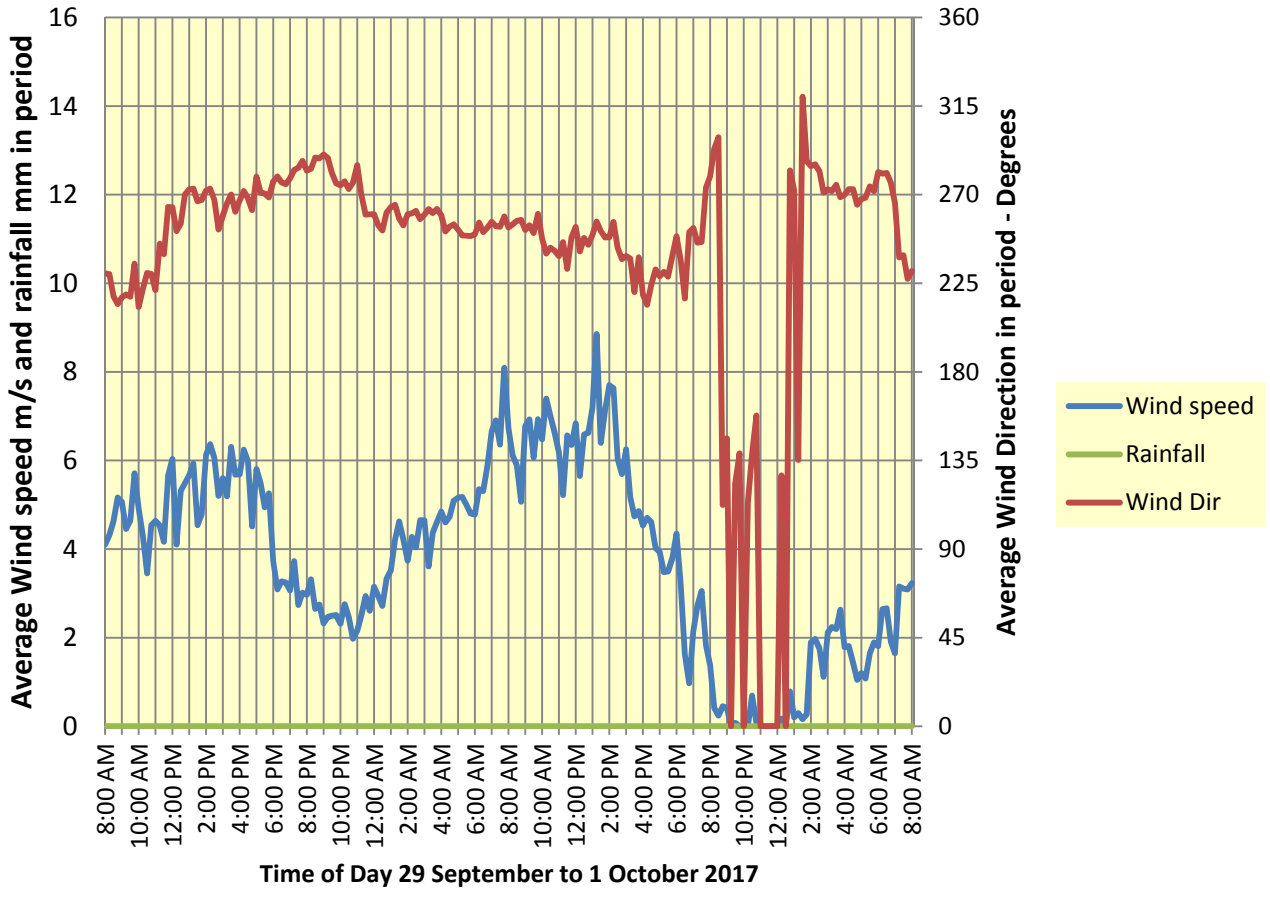


Figure 4.11: Boral Cement Berrima - Summary of weather conditions 1 to 3 October 2017

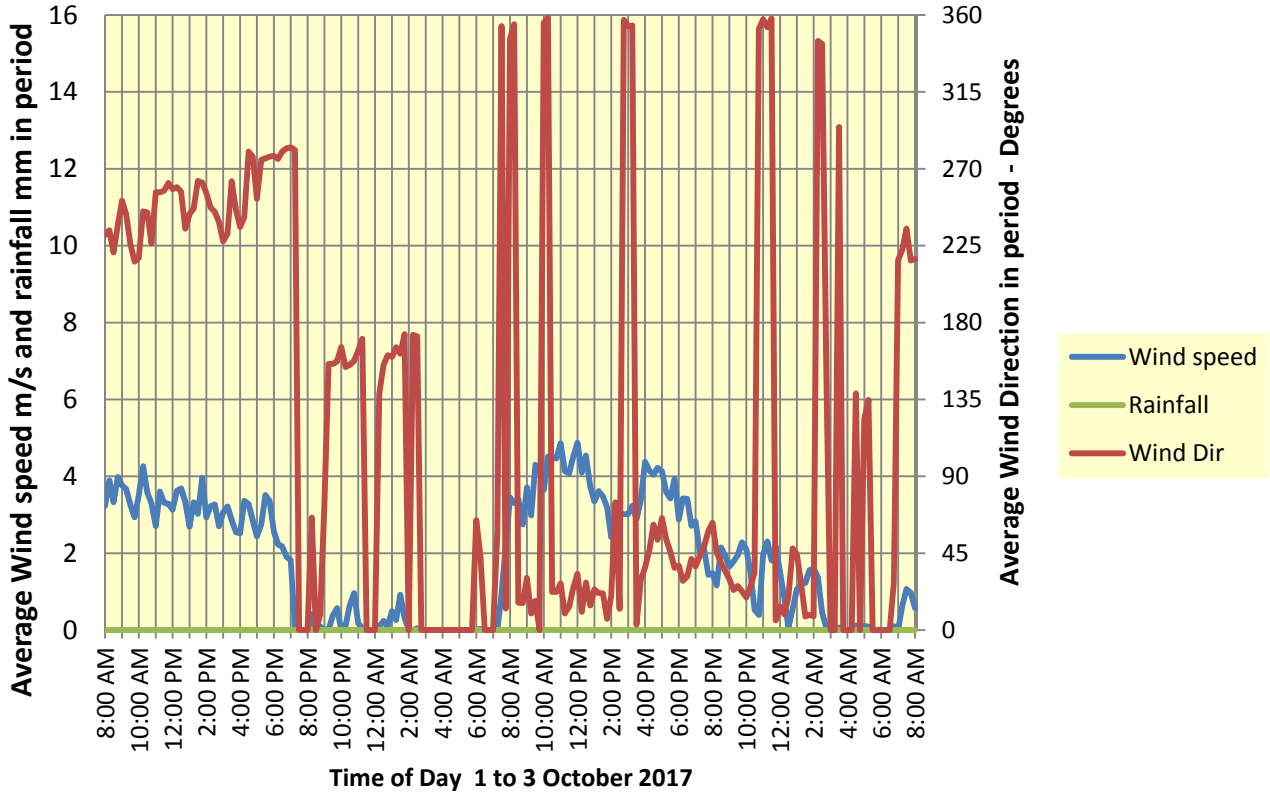


Figure 4.12: Boral Cement Berrima - Summary of weather conditions 3 to 5 October 2017

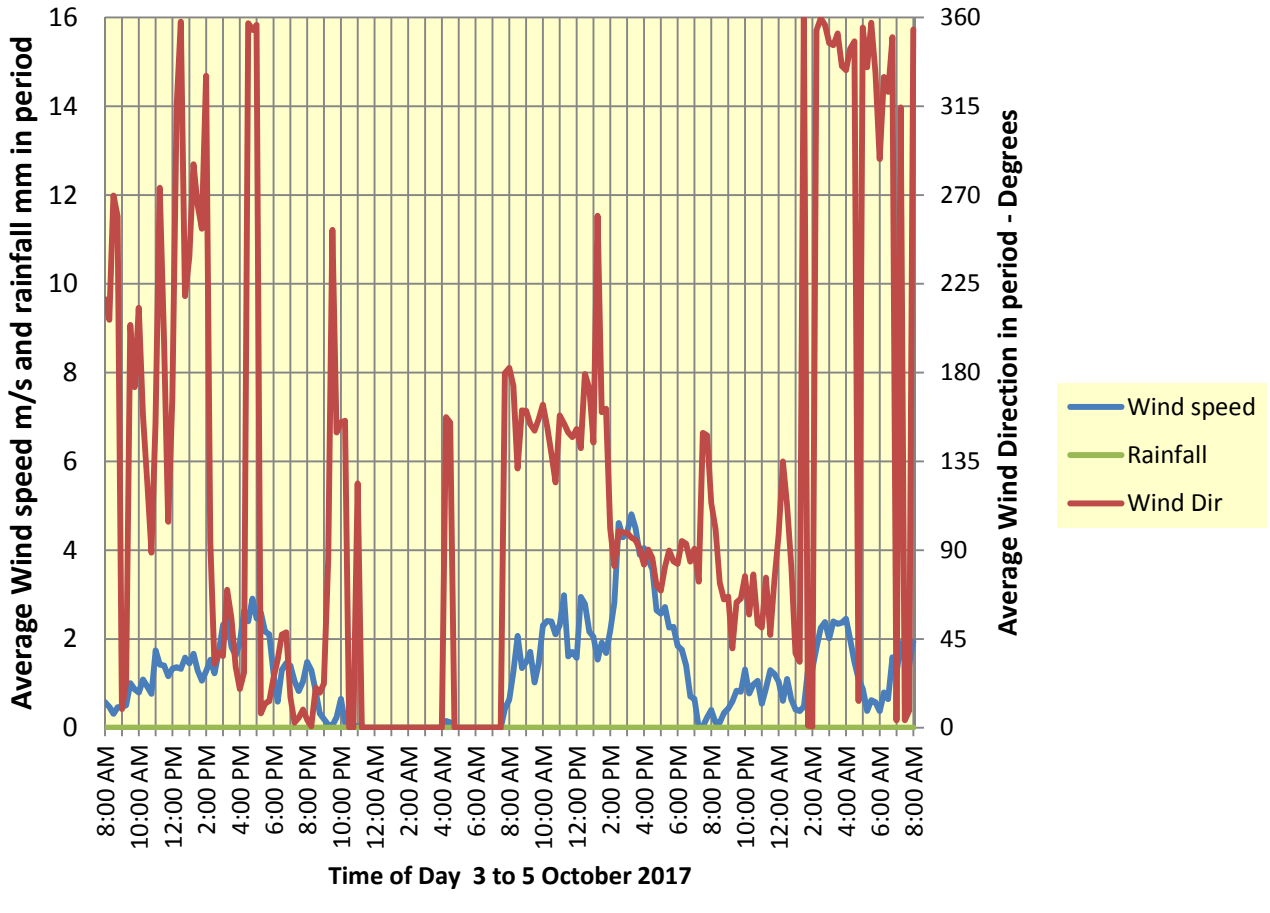


Figure 4.13: Boral Cement Berrima - Summary of weather conditions 5 to 6 October 2017

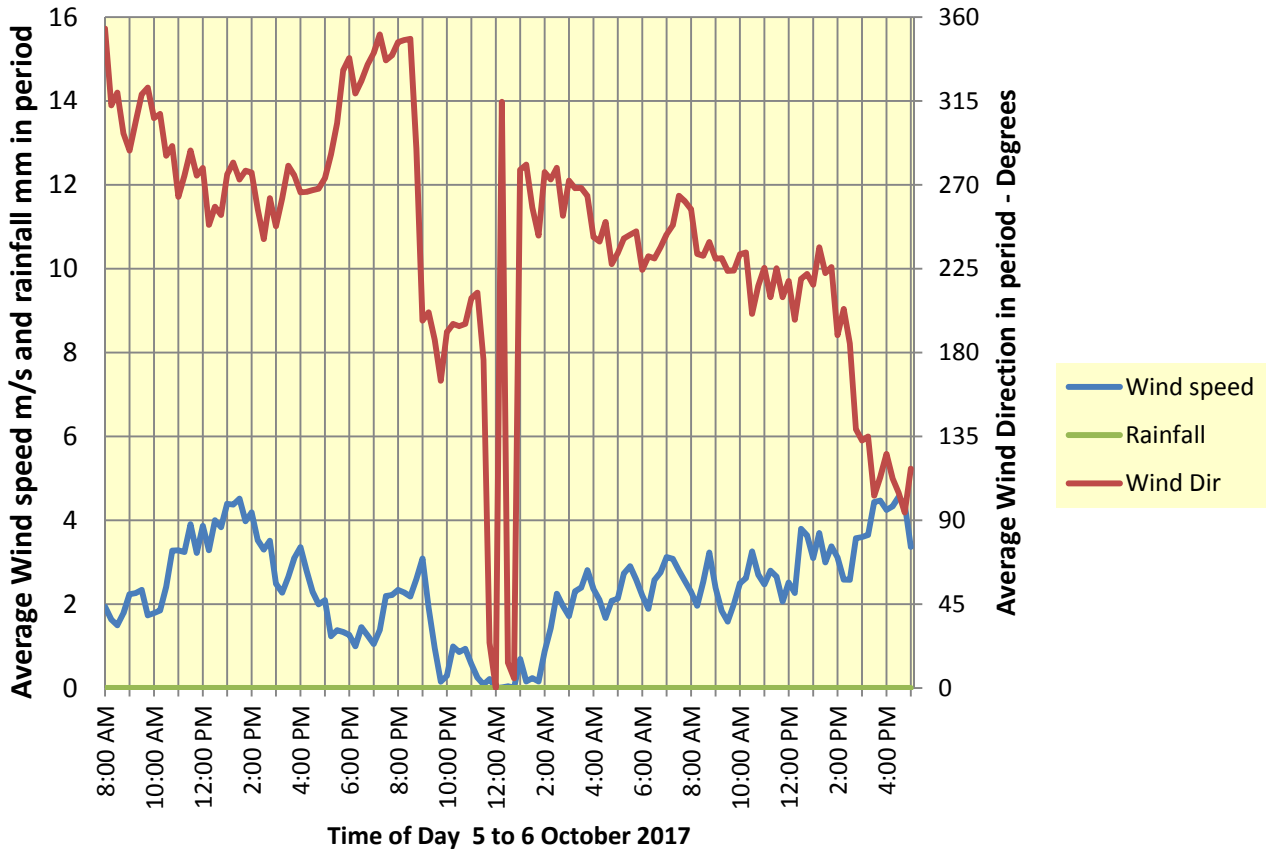


Figure 4.14: Boral Cement Berrima - Summary of weather conditions 3 to 6 October 2017

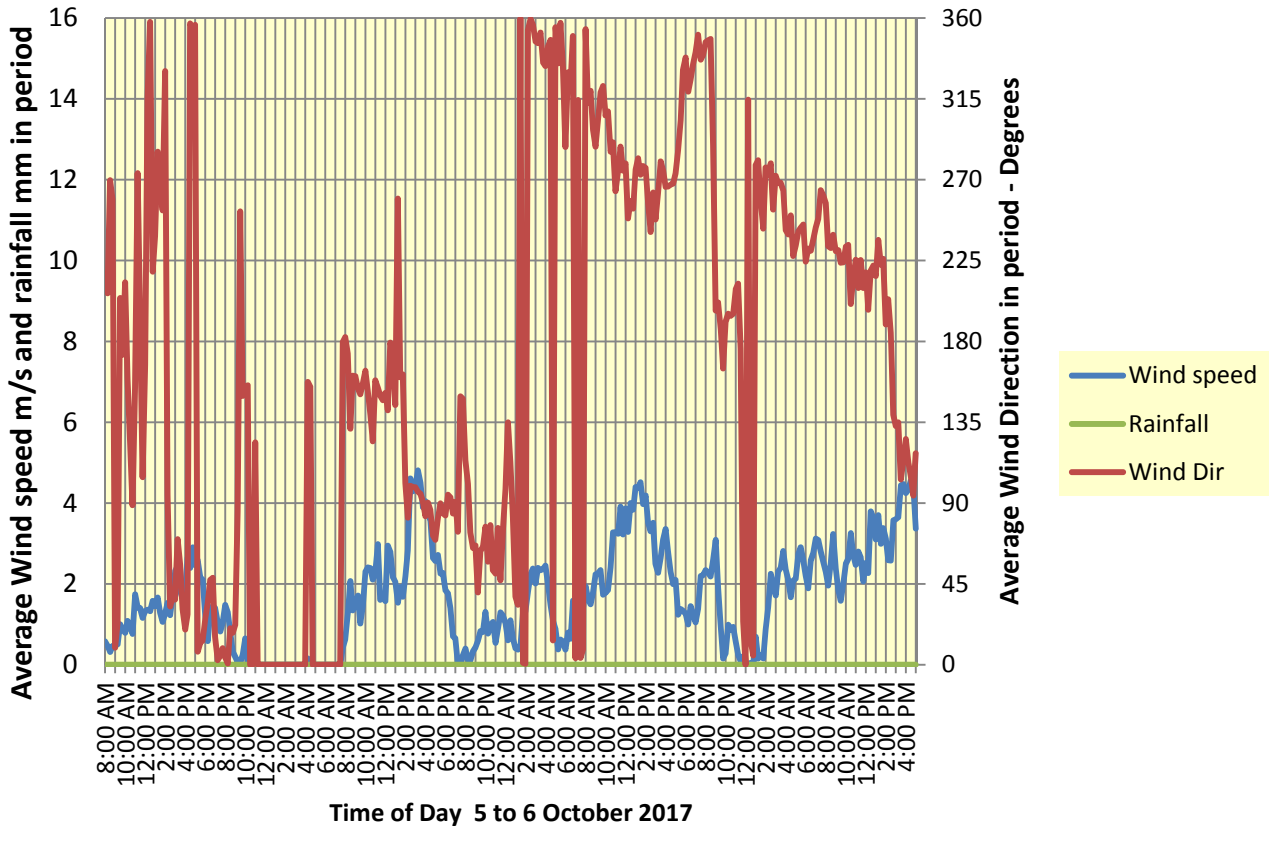


Table 4.1 : Boral Cement Berrima - Annual Environmental Noise Compliance - residential and boundary receiver locations
Comparison of Period LAEQ, Period Average LA90 and Period 90% LA90 Results
Summary of Statistical Data

$L_{AEQ.15min}$	Day			Evening			Night			24 hour		
	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. $L_{AEQ.24hr}$
4 Melbourne St, New Berrima NSW	55	49	53	51	45	49	51	43	48	58	42	51
12 Brisbane St. New Berrima NSW	54	49	51	49	44	47	49	43	46	55	41	49
72 Taylor Ave, New Berrima NSW	60	53	58	55	49	54	56	45	53	59	45	54
Northern Fence, New Berrima NSW	56	48	51	51	44	49	52	46	49	55	46	50
Stock Yard	62	56	59	57	52	55	59	54	57	63	53	58

L90.15-min 10%	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	46	39	42	42	44	36	41	41	43	36	39.9	40.4
12 Brisbane St. New Berrima NSW	47	39	43	42	45	36	41	41	44	35	40	40
72 Taylor Ave, New Berrima NSW	51	41	44	44	47	38	43	43	46	38	43	44
Northern Fence, New Berrima NSW	49	41	45	45	48	41	45	45	49	41	45	45
Stock Yard	54	48	52	52	54	48	52	53	54	49	53	53

L90.15-min	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	47	41	44	44	44	37	42	42	44	38	41.5	42.1
12 Brisbane St. New Berrima NSW	47	39	43	42	45	36	41	41	44	35	40	40
72 Taylor Ave, New Berrima NSW	52	41	46	45	48	39	44	45	47	39	44	44
Northern Fence, New Berrima NSW	51	44	47	47	49	42	47	47	50	43	47	47
Stock Yard	55	51	53	54	55	50	53	53	56	50	54	54

Table 4.1A : Boral Cement Berrima - Annual Environmental Noise Compliance - residential and boundary receiver locations
Comparison of Period LAEQ, Period Average LA90 and Period 90% LA90 Results - rain period data included
Summary of Statistical Data

$L_{AEQ.15min}$	Day			Evening			Night			24 hour		
	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. $L_{AEQ.24hr}$
4 Melbourne St, New Berrima NSW	55	49	53	51	45	49	51	43	48	58	42	51

L90.15-min 10%	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	46	39	42	42	44	36	41	41	43	36	39.9	40.4

L90.15-min	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	47	41	44	44	44	37	42	42	44	38	41.5	42.1

Table 4.1B: Boral Cement Berrima - Annual Environmental Noise Compliance - residential and boundary receiver locations
Comparison of Period LAEQ, Period Average LA90 and Period 90% LA90 Results - difference between results for rain period data removed and not removed
Summary of Statistical Data

$L_{AEQ.15min}$	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. $L_{AEQ.24hr}$
4 Melbourne St, New Berrima NSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L90.15-min 10%	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L90.15-min	Day				Evening				Night			
	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 $L_{A90.Night}$
4 Melbourne St, New Berrima NSW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06

Table 4.2: Boral Cement Berrima - Annual Environmental Noise Review 2017:
Comparison of statistical sound levels 2002 to 2017

Receiver Location 4 Melbourne Street

Parameter	Period	Survey Dates																
		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
LAEQ.ave	Day	57	50	54	55	54	56	54	54	56	56	58	56	55	57	56	52	56
	Evening	53	48	54	54	65	53	51	50	60	57	53	52	54	59	53	52	51
	Night	53	44	49	47	49	50	51	49	51	51	51	52	51	56	52	50	50
LA90.ave	Day	46	40	43	43	44	45	45	44	44	45	47	46	47	50	47	45	46
	Evening	44	39	42	42	42	44	45	43	45	46	47	46	46	49	46	39	39
	Night	44	37	41	39	40	44	45	43	42	46	46	46	45	50	46	38	38
10%LA90.med	Day	44	38	41	39	41	43	43	42	43	43	45	45	45	43	45	42	44
	Evening	42	37	40	40	39	42	44	42	43	43	45	44	45	46	43	38	41
	Night	42	35	39	37	37	42	43	41	42	43	44	44	44	44	44	38	40

		INP Acceptable*	Kiln 6 Contribution	CM7 Contribution	NL Rec PRP7 20
LAEQ	Day	60	43	43	46
	Evening	50	43	43	42
	Night	45	40	40	40

Most OffMost on

Ave L90 from attended for Jun & Dec 2008

* Based on Suburban/Industrial Interface from NSW INP Table 2.1

Receiver Location 72 Taylor Ave near Adelaide St

Parameter	Period	Survey Dates																
		Sep-02	Jan-03	Feb-03	Feb-04	Mar-04	Apr-04	May-04	Jan-06	Feb-06	Feb-06	Jun-06	Apr-07	Jun-08	Dec-08	Sep-10	Jun-11	Jul-11
LAEQ.ave	Day								61	62	54	63	62	63	63	60	57	60
	Evening								57	58	50	59	57	59	59	56	57	53
	Night								56	56	49	58	56	59	58	56	55	56
LA90.ave	Day								47	45	41	48	48	49	49	47	46	47
	Evening								46	44	40	47	46	46	47	45	37	42
	Night								45	42	40	47	46	45	48	46	36	42
10%LA90.ave	Day								45	43	39	47	46	47	45	45	43	43
	Evening								45	42	40	46	45	46	44	44	39	44
	Night								44	41	39	46	45	46	43	43	38	42

		INP Acceptable*	Kiln 6 Contribution	CM7 Contribution	NL Rec PRP7 20
LAEQ	Day	60	43	43	48
	Evening	50	43	43	44
	Night	45	40	40	43

Most OffMost on

Ave L90 from attended for Jun & Dec 2008

Receiver Location 12 Brisbane Street

Parameter	Period	Survey Dates																
		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
LAEQ.ave	Day														51	50	52	52
	Evening														46	46	48	47
	Night														48	47	45	46
LA90.ave	Day														44	44	43	45
	Evening														42	43	41	42
	Night														44	42	38	42
10%LA90.ave	Day														42	42	40	42
	Evening														41	41	37	41
	Night														39	41	35	40

Most OffMost on

Receiver Location 4 Northern Boundary

Parameter	Period	Survey Dates																
		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
LAEQ.ave	Day	52												63	53	50	52	55
	Evening	52												54	51	49	49	51
	Night	53												54	51	50	47	52
LA90.ave	Day	48												53	49	47	47	51
	Evening	50												53	48	47	45	49
	Night	50												53	49	47	43	49
10%LA90.ave	Day	46												51	48	46	44	49
	Evening	48												51	47	46	42	49
	Night	48												51	47	47	42	48

Most OffMost on

Receiver Location Store Yard Close from 2015

Parameter	Period	Survey Dates																
LAEQ.ave	Day																	
	Evening																	
	Night																	
LA90.ave	Day																	
	Evening																	
	Night																	
10%LA90.ave	Day																	
	Evening																	
	Night																	

Table 4.2: Boral CTable 4.2: Boral Cement Berrima - Annual Environmental Noise Review 2017:
Comparison of stComparison of statistical sound levels 2002 to 2017 continued

Receiver Location 4 Receiver Location 4 Melbourne Street

Parameter	Period											Statistics			
		Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Max	Min	Ave	SD
LAEQ.ave	Day	56	55	56	53	56	57			56	53	58	50	55	1.8
	Evening	51	50	52	50	53	52			53	49	65	48	53	3.7
	Night	51	49	51	51	52	52			52	48	56	44	50	2.3
LA90.ave	Day	46	43	45	43	48	48			48	44	50	40	45	2.2
	Evening	45	40	39	42	47	46			46	42	49	39	44	2.9
	Night	44	36	40	42	47	45			46	42	50	36	43	3.5
10%LA90.med	Day	43	40	43	41	45	46			45	42	46	38	43	2.0
	Evening	42	33	34	41	45	44			45	41	46	33	42	3.3
	Night	41	29	34	40	44	43			43	40	44	29	41	3.8
LAEQ	Day		Most Of	Most on											
	Evening														
	Night														

* Based on

Receiver Location 72 Receiver Location 72 Taylor Ave near Adelaide St

Parameter	Period											Statistics			
		Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Max	Min	Ave	SD
LAEQ.ave	Day	60	60	59	61	61	52			63	58	63	52	60	3.1
	Evening	55	54	48	57	55	47			58	54	59	47	55	3.6
	Night	55	52	48	60	55	50			58	53	60	48	55	3.5
LA90.ave	Day	49	45	48	50	47	49			50	46	50	41	47	2.2
	Evening	48	40	41	49	47	46			48	44	49	37	45	3.3
	Night	47	38	41	47	47	46			48	44	48	36	44	3.5
10%LA90.ave	Day	46	42	46	48	46	47			47	44	48	39	45	2.2
	Evening	46	39	40	49	46	44			46	43	49	39	44	2.8
	Night	46	35	39	45	46	45			45	44	46	35	43	3.2
LAEQ	Day		Most Of	Most on											
	Evening														
	Night														

Receiver Location 12 Receiver Location 12 Brisbane Street

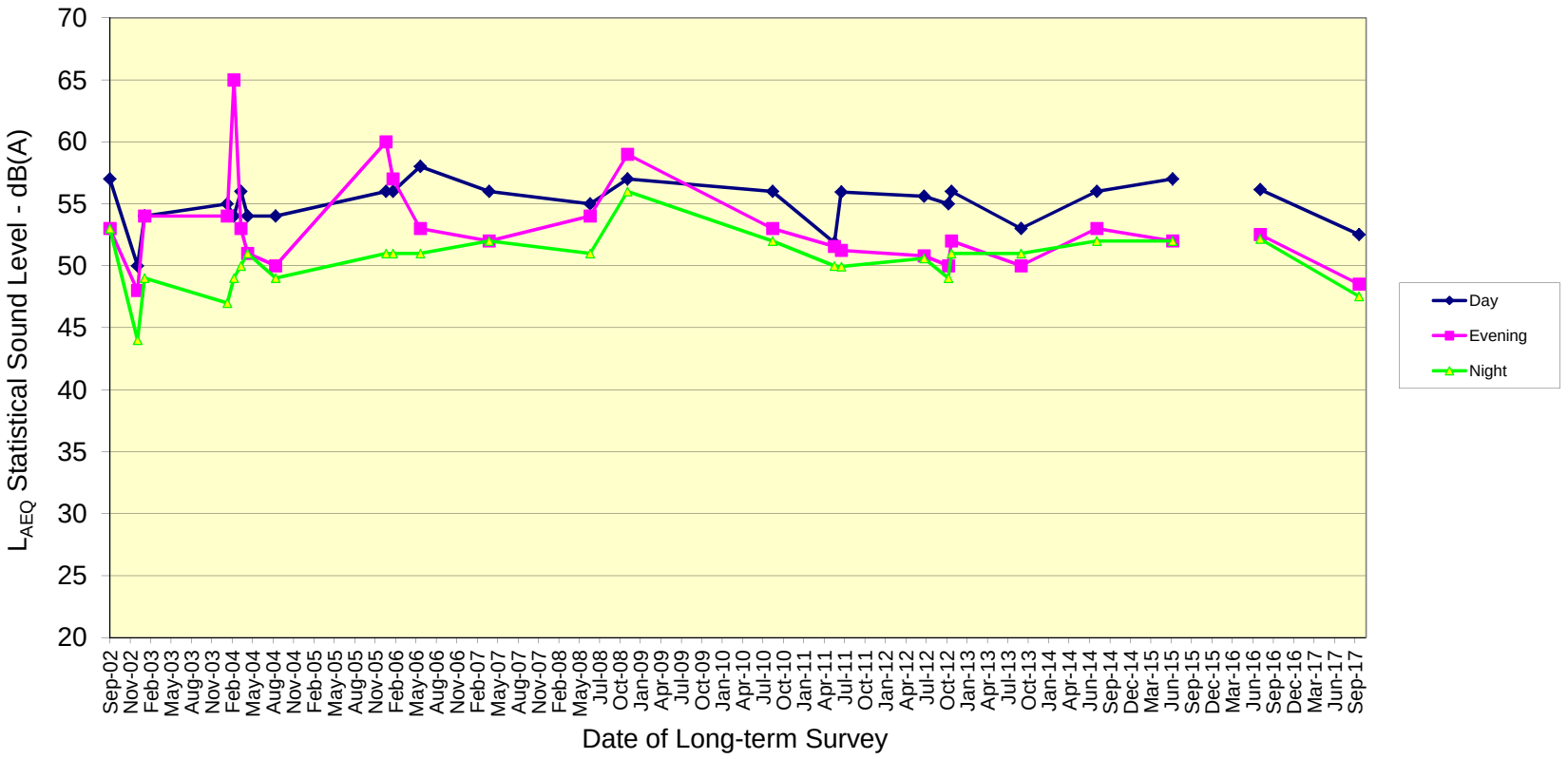
Parameter	Period											Statistics			
					Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Max	Min	Ave	SD
LAEQ.ave	Day				50	52	56			53	51	56	50	52	1.8
	Evening				47	48	49			49	47	49	46	47	1.1
	Night				48	48	48			48	46	48	45	47	1.1
LA90.ave	Day				41	45	47			47	43	47	41	44	2.0
	Evening				43	41	45			45	41	45	41	43	1.6
	Night				42	41	45			44	40	45	38	42	2.1
10%LA90.ave	Day				42	42	46			44	42	46	40	42	1.7
	Evening				42	42	43			43	41	43	37	41	1.8
	Night				39	42	44			41	40	44	35	40	2.4

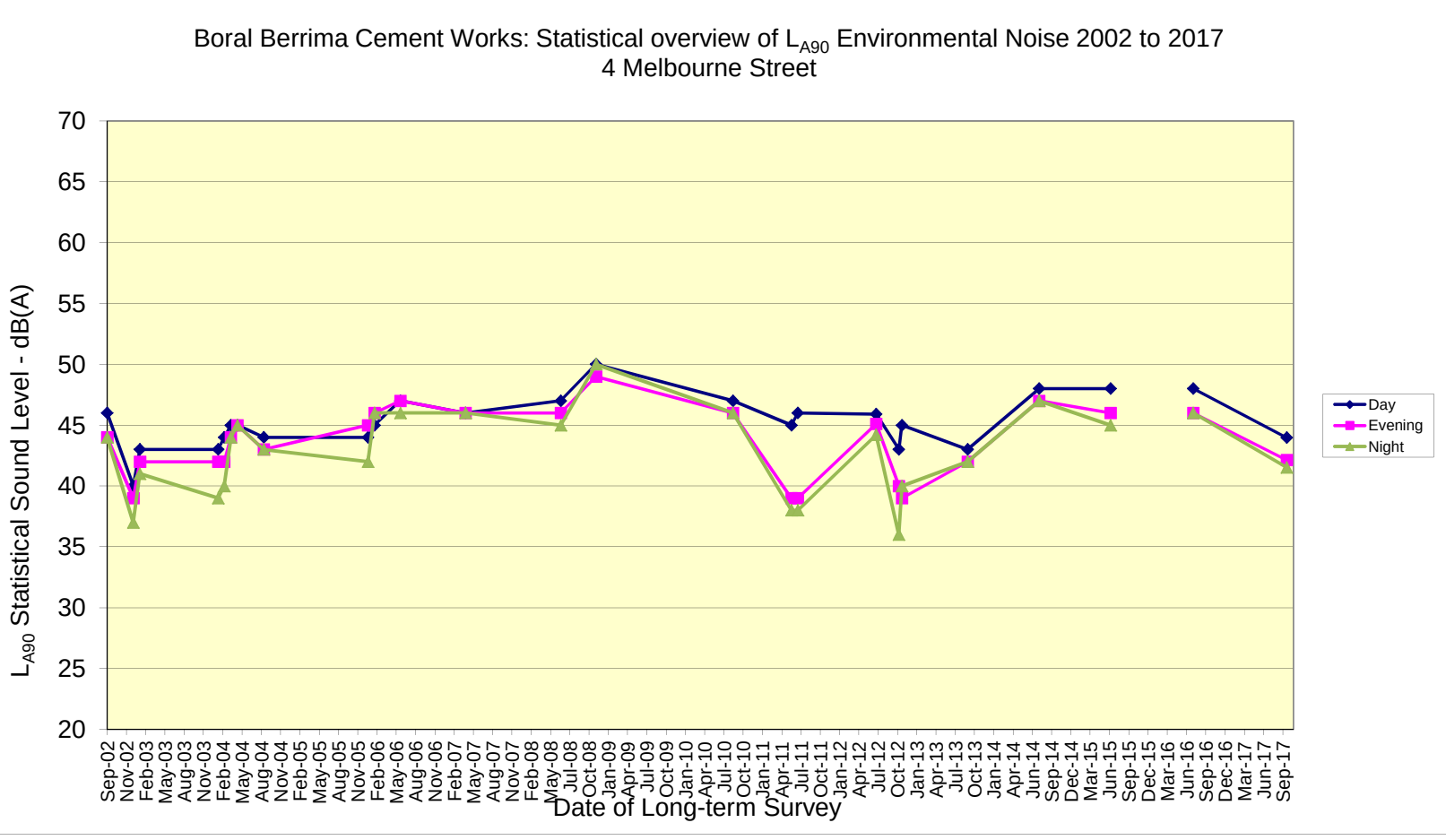
Receiver Location 4 Receiver Location 4 Northern Boundary

Parameter	Period											Statistics			
		Jul-12	Oct-12	Oct-12	Sep-13	Aug-14	Jul-15	Apr-16	May-16	Jul-16	Sep-17	Max	Min	Ave	SD
LAEQ.ave	Day	52	49	50	51	51	52	51	54	53	51	63	49	52	3.2
	Evening	50	45	49	50	50	51	50	51	53	49	54	45	50	2.0
	Night	51	44	50	49	51	52	51	52	52	49	54	44	50	2.4
LA90.ave	Day	48	43	46	44	47	49	49	51	49	47	53	43	48	2.5
	Evening	48	41	47	47	48	48	48	50	49	47	53	41	48	2.5
	Night	48	39	47	46	48	48	46	50	49	47	53	39	47	3.2
10%LA90.ave	Day	46	41	45	46	46	47	47	49	47	45	51	41	46	2.3
	Evening	46	40	46	45	47	47	46	49	47	45	51	40	46	2.6
	Night	46	37	45	44	47	48	48	49	47	45	51	37	46	3.2
			Most Of	Most on											

Receiver Location S Receiver Location Store Yard Close from 2015

Parameter	Period											Statistics			
							Jul-15	Apr-16	May-16	Jul-16	Sep-17	Max	Min	Ave	SD
LAEQ.ave	Day						58		58	58	59	59	58	58	0.5
	Evening						56		56	53	55	56	53	55	1.5
	Night						57		56	53	57	57	53	56	1.8
LA90.ave	Day						54		53	53	53	54	53	53	0.5
	Evening						54		53	50	53	54	50	53	1.7
	Night						54		53	50	54	54	50	53	1.8
10%LA90.ave	Day						52		52	52	52	52	52	52	0.2
	Evening						53		52	51	53	53	51	52	0.7
	Night						51		52	51	53	53	51	52	0.8





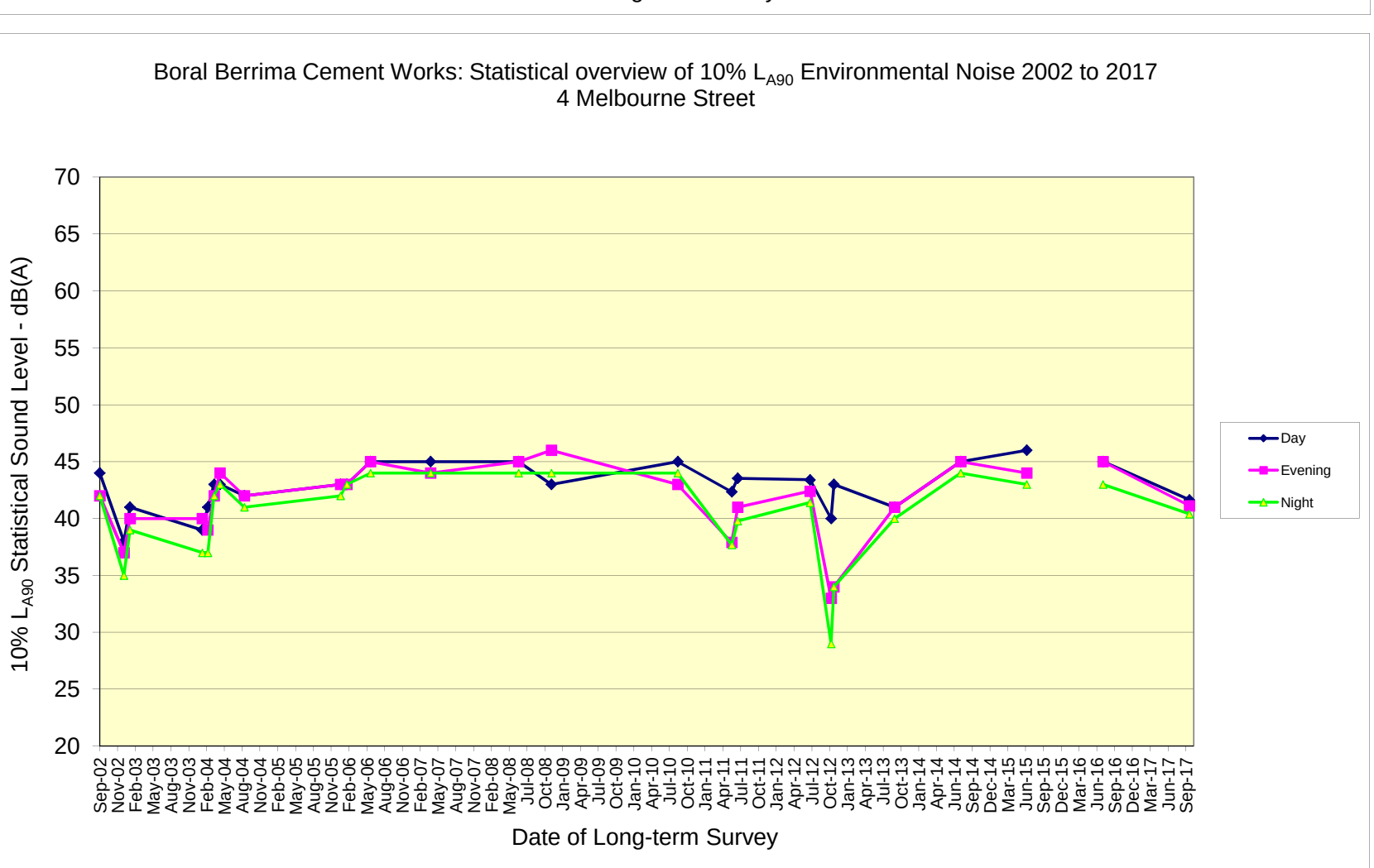
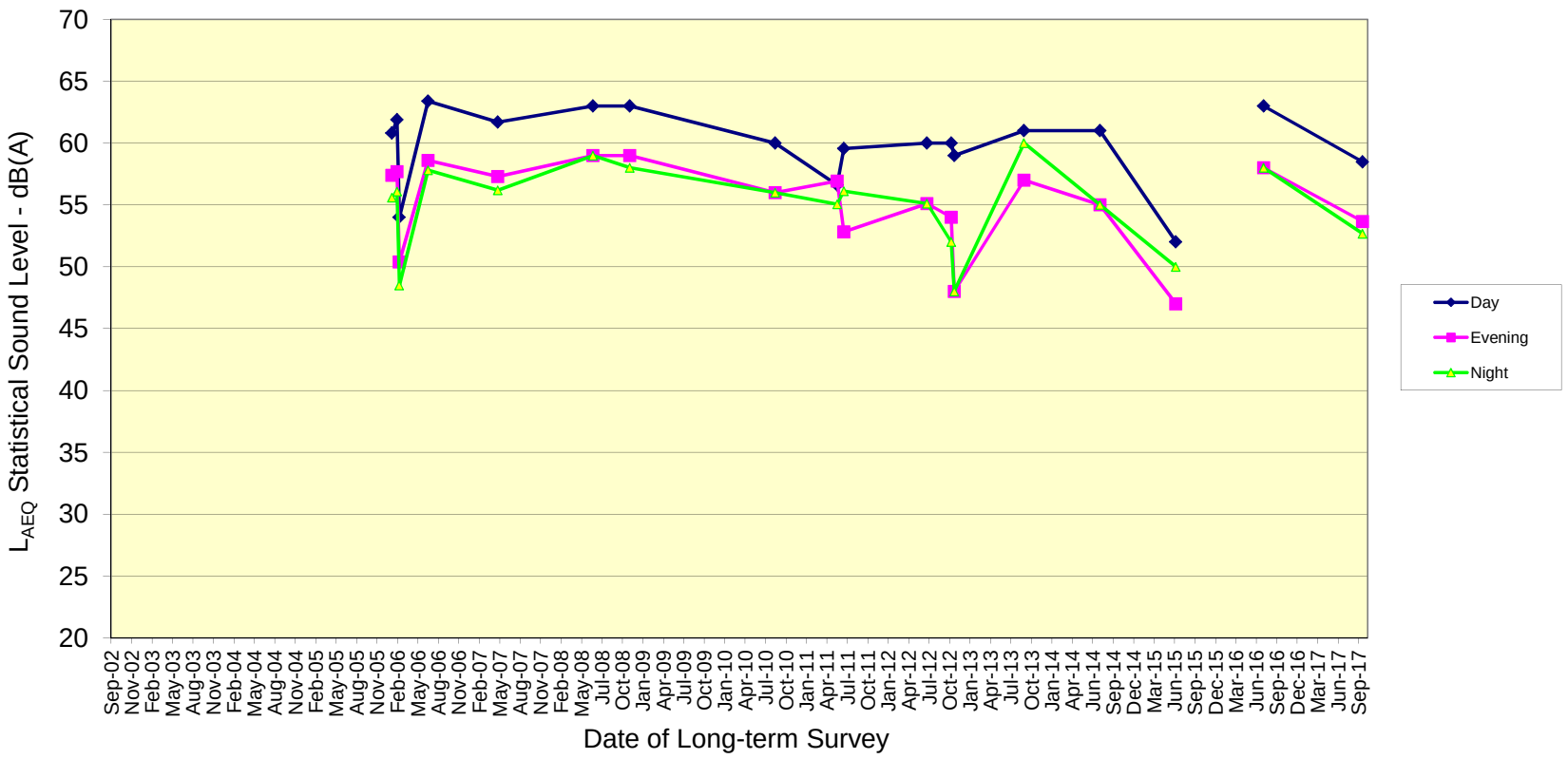
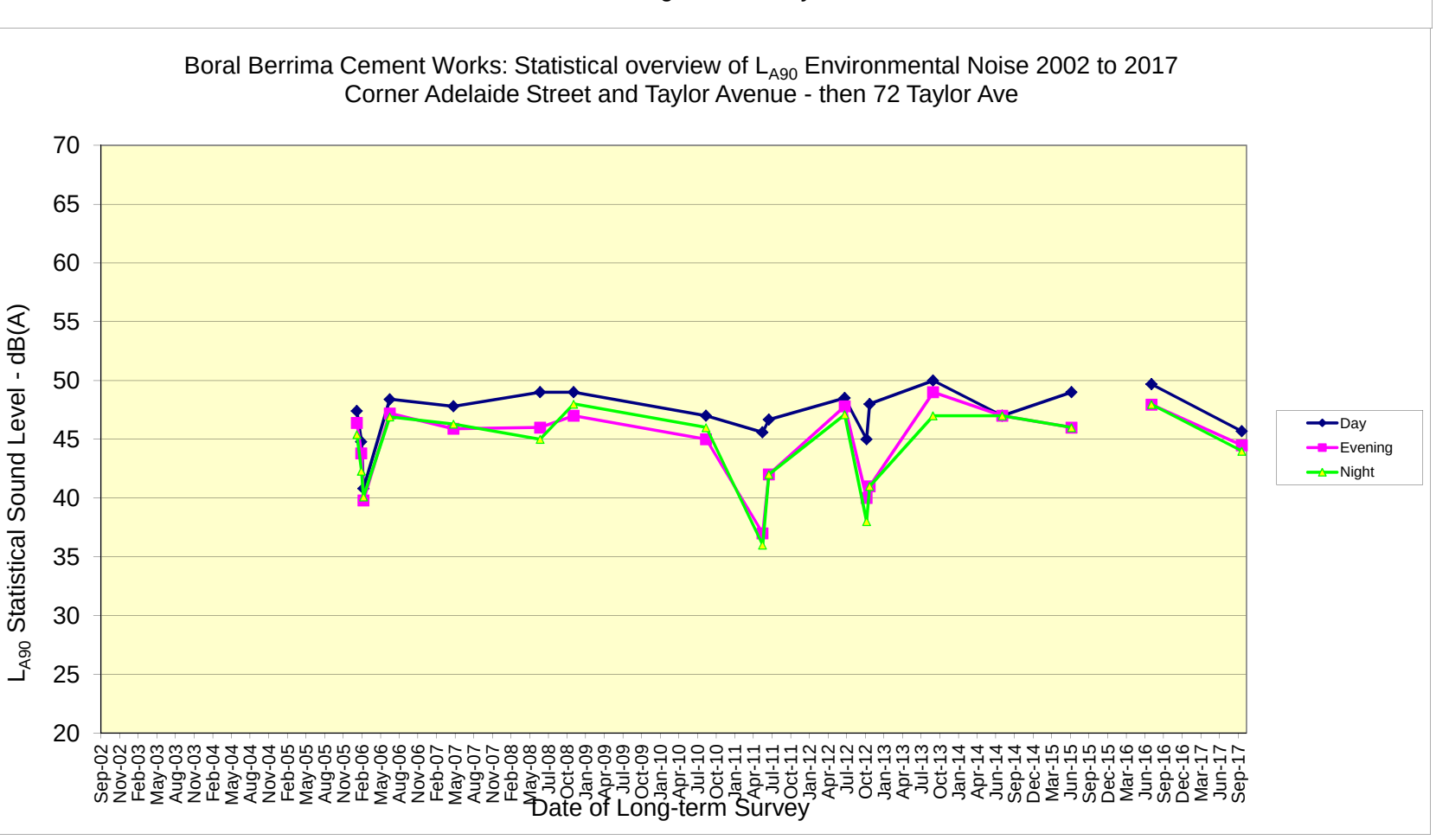


Figure 4.15: Comparison of statistical sound levels for 4 Melbourne Street location





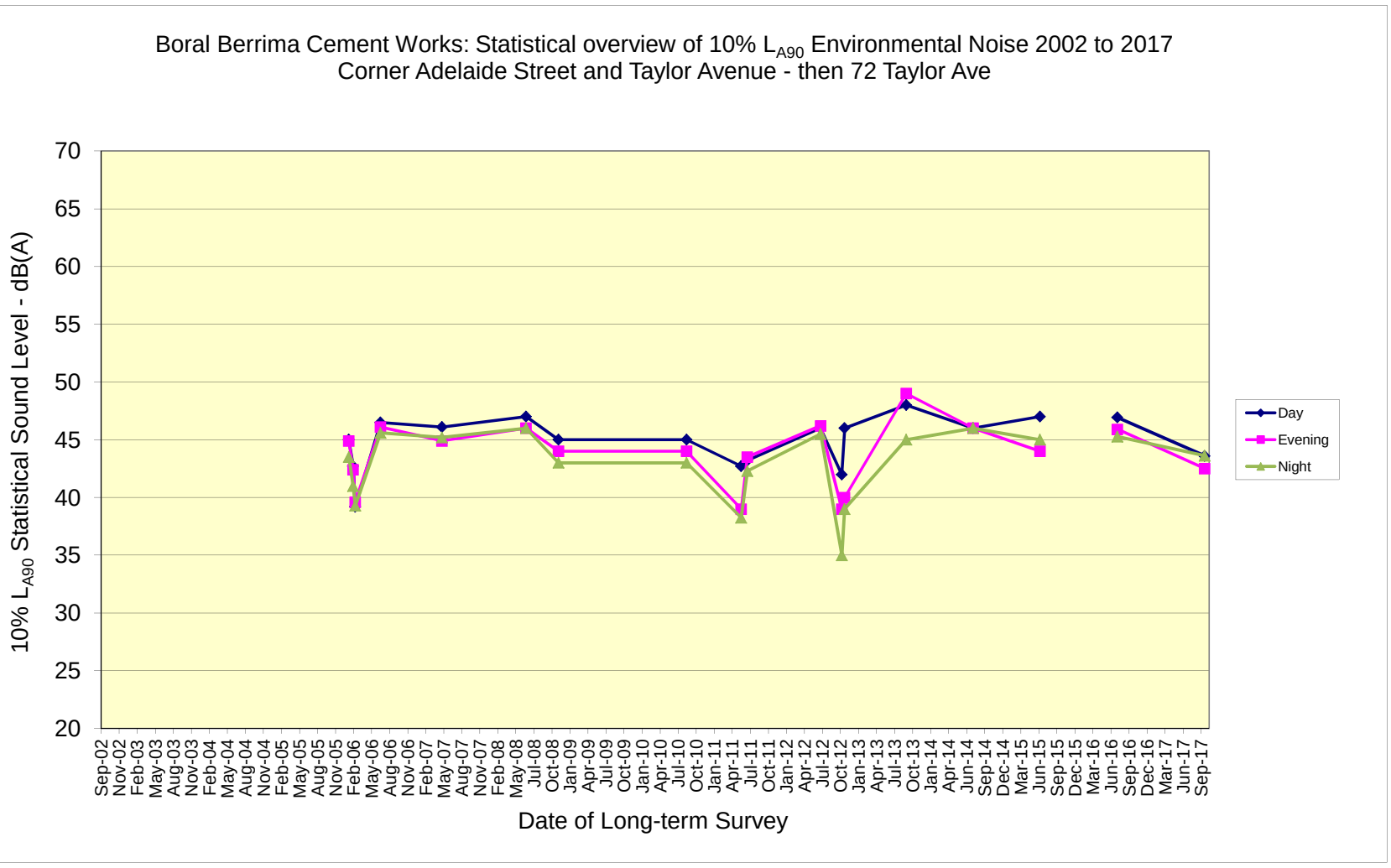
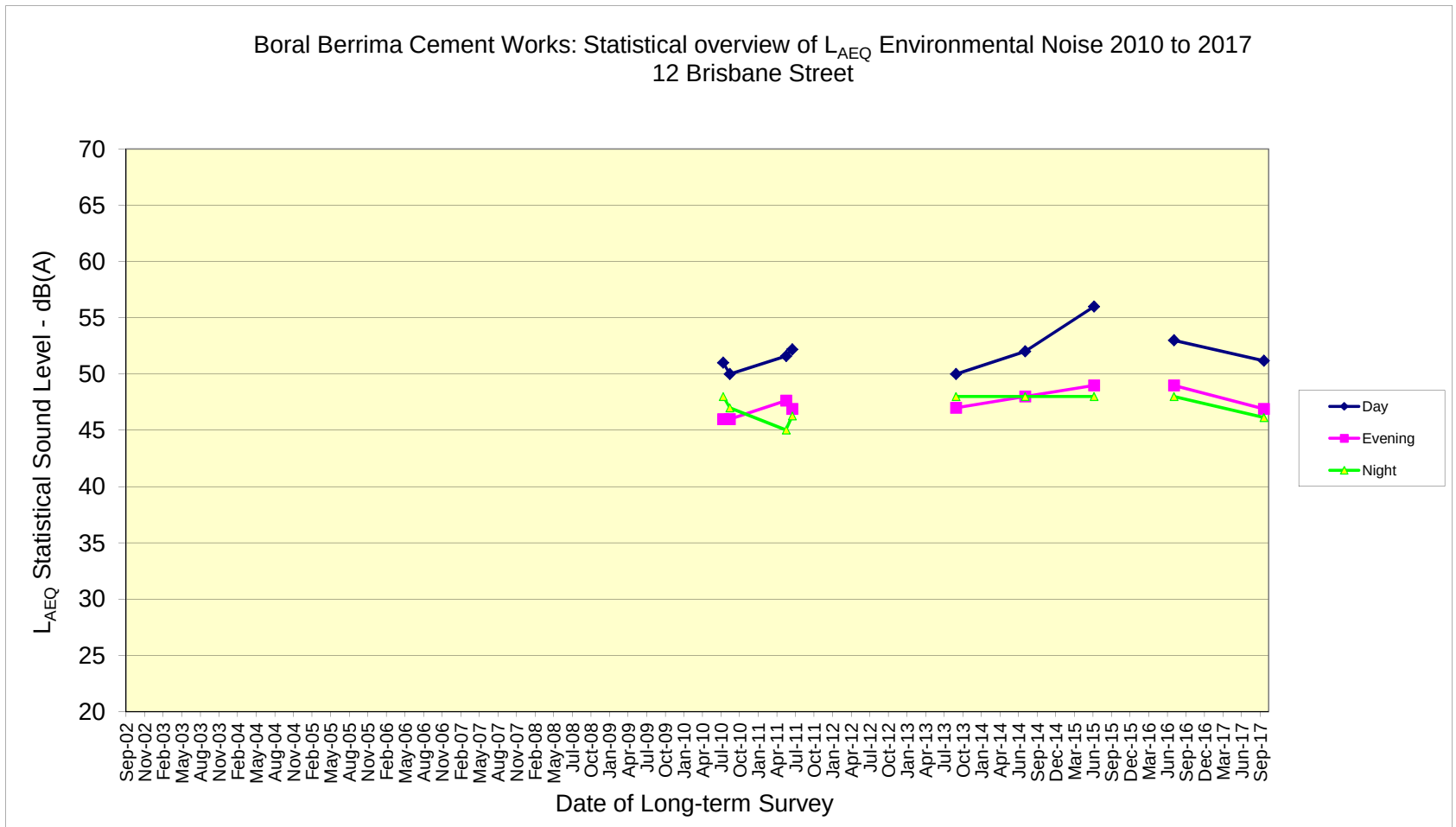
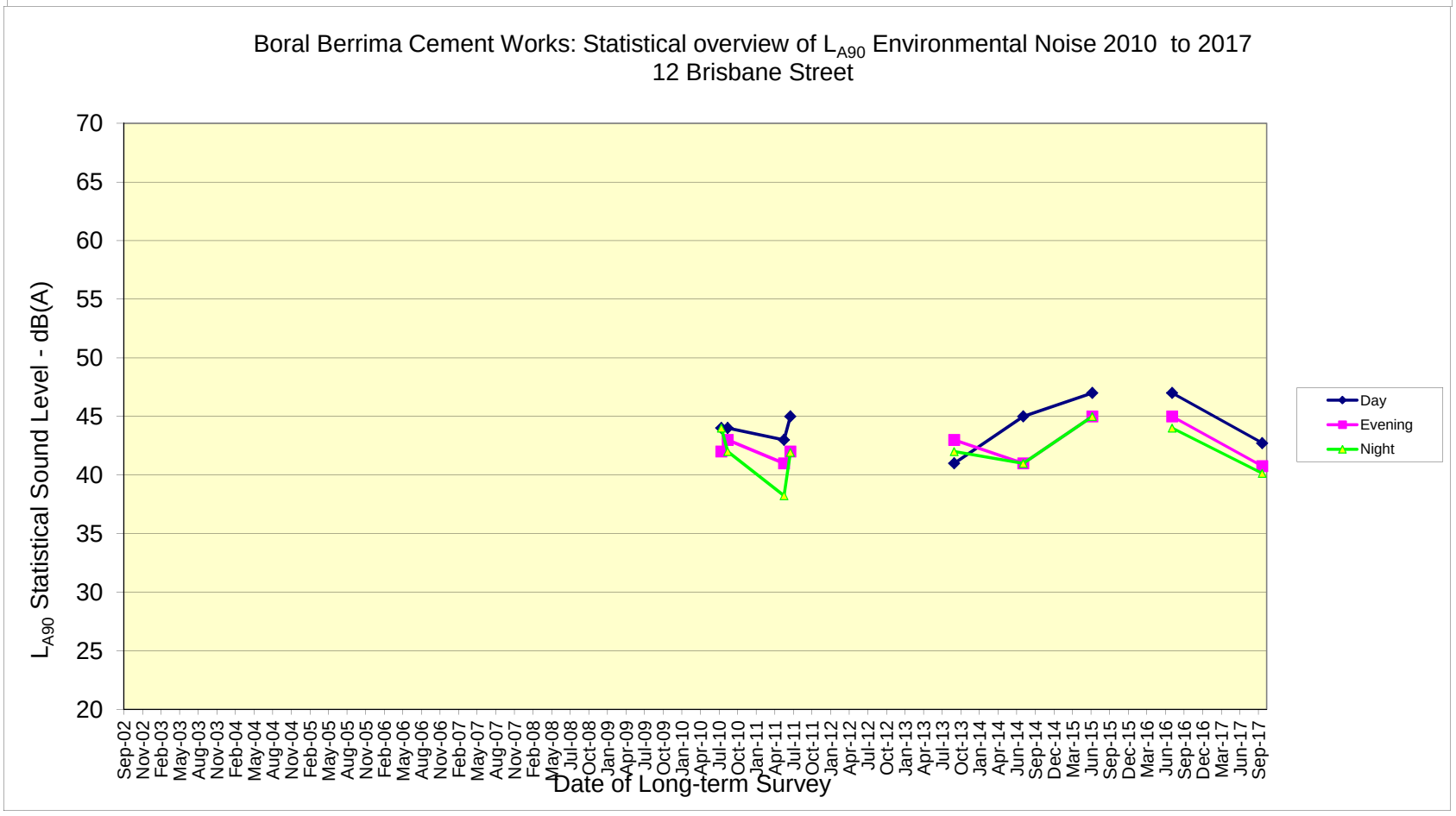


Figure 4.16: Comparison of statistical sound levels for 72 Taylor Ave location





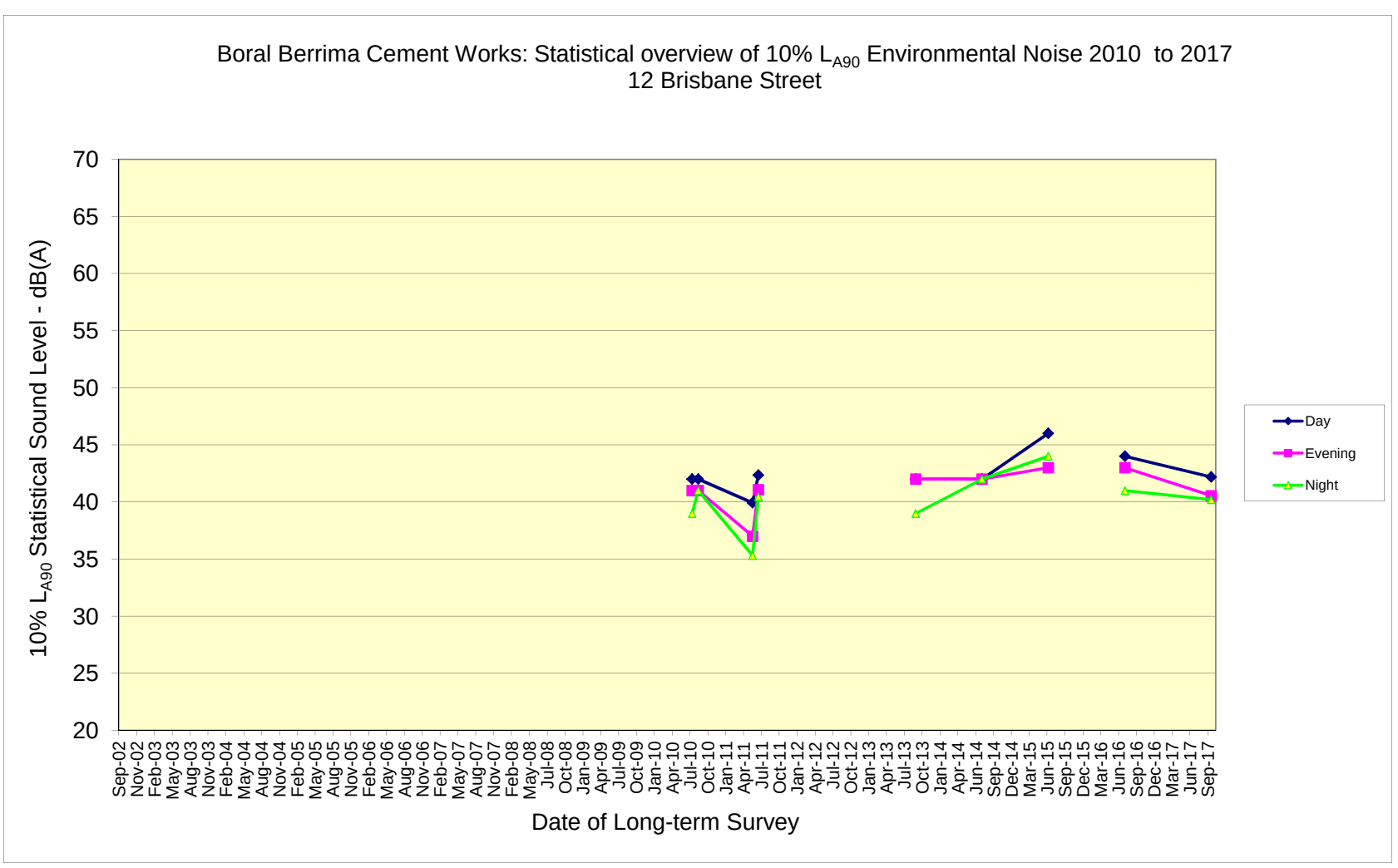
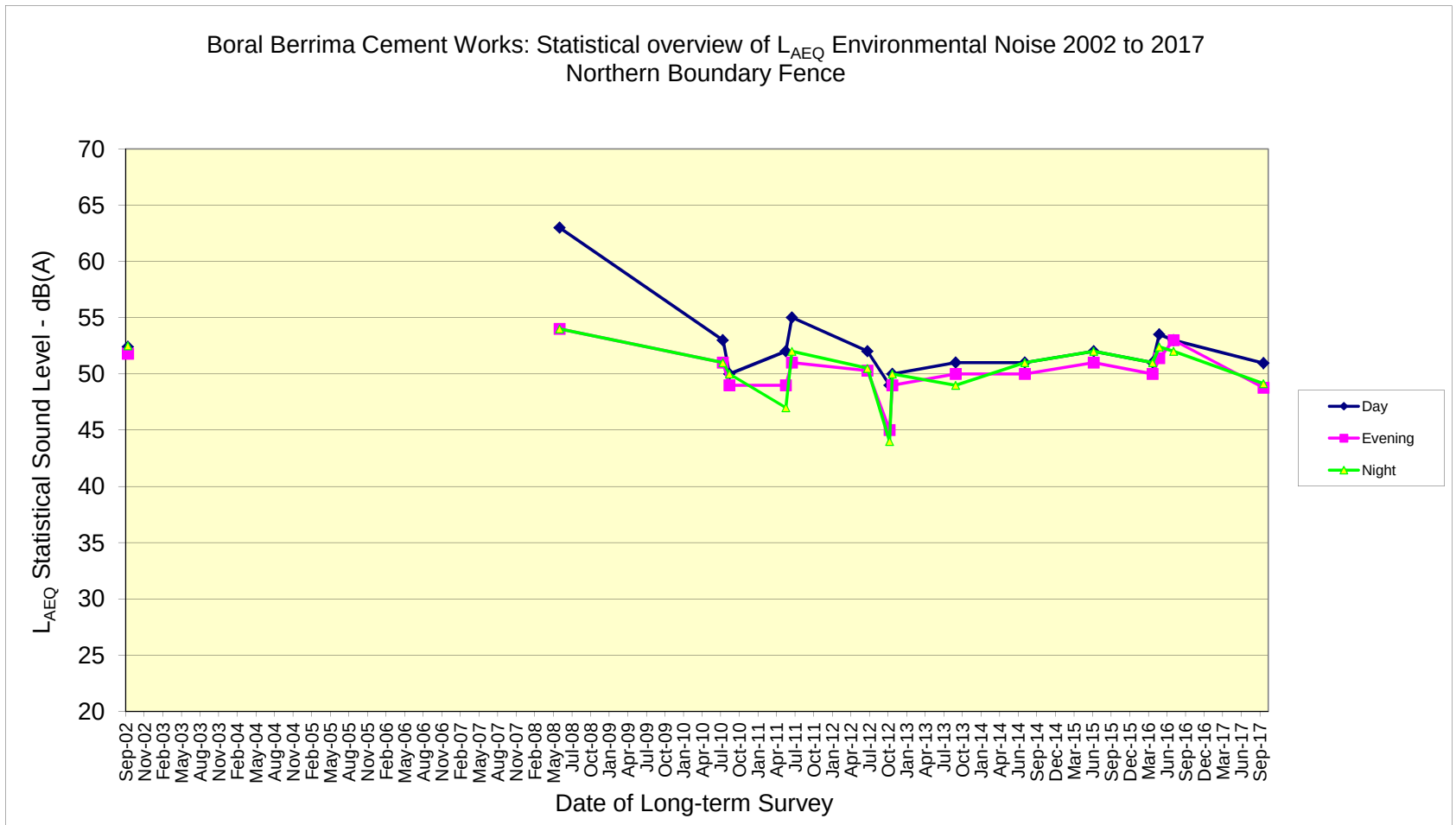
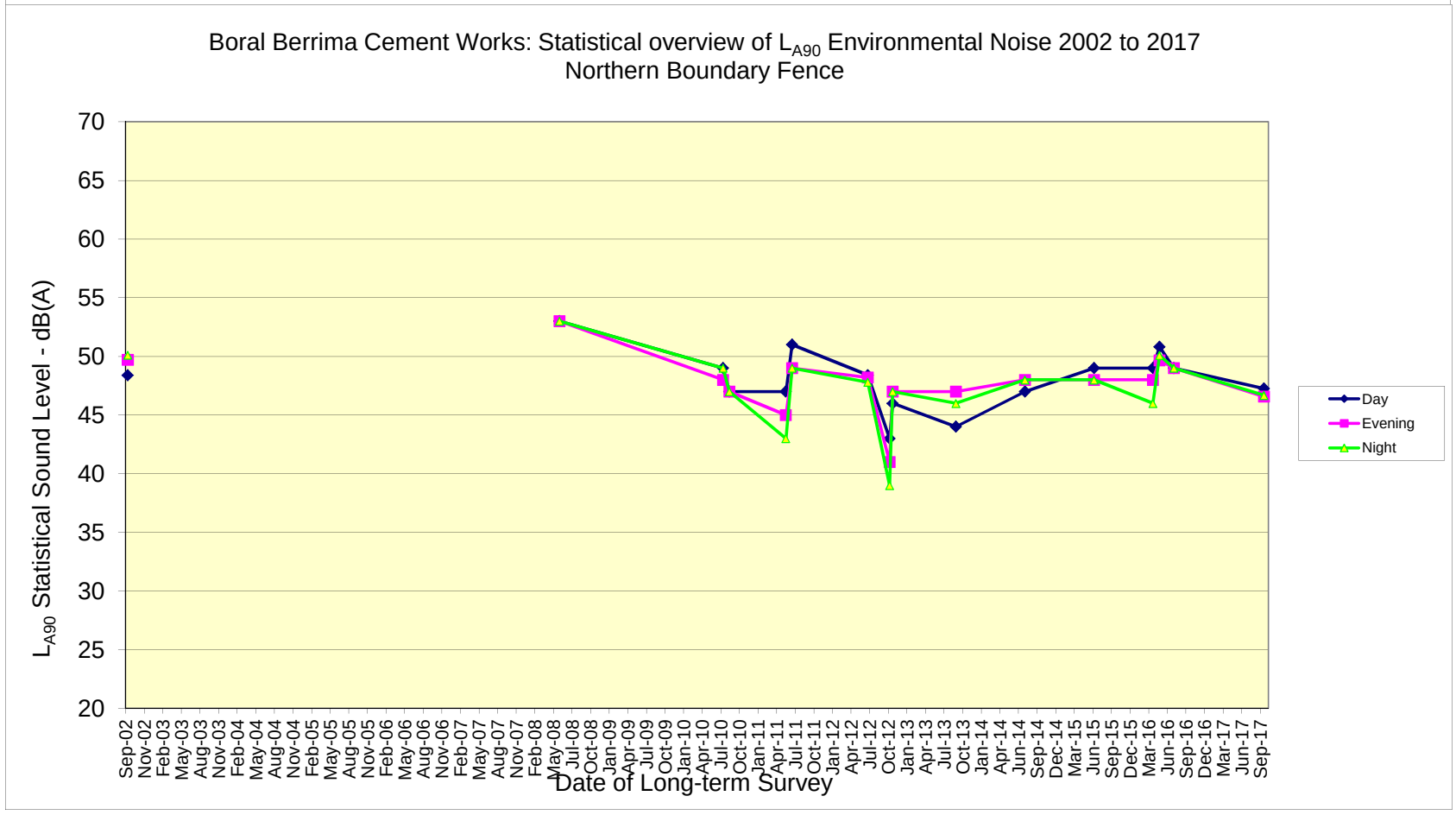


Figure 4.17: Comparison of statistical sound levels for 12 Brisbane Street location





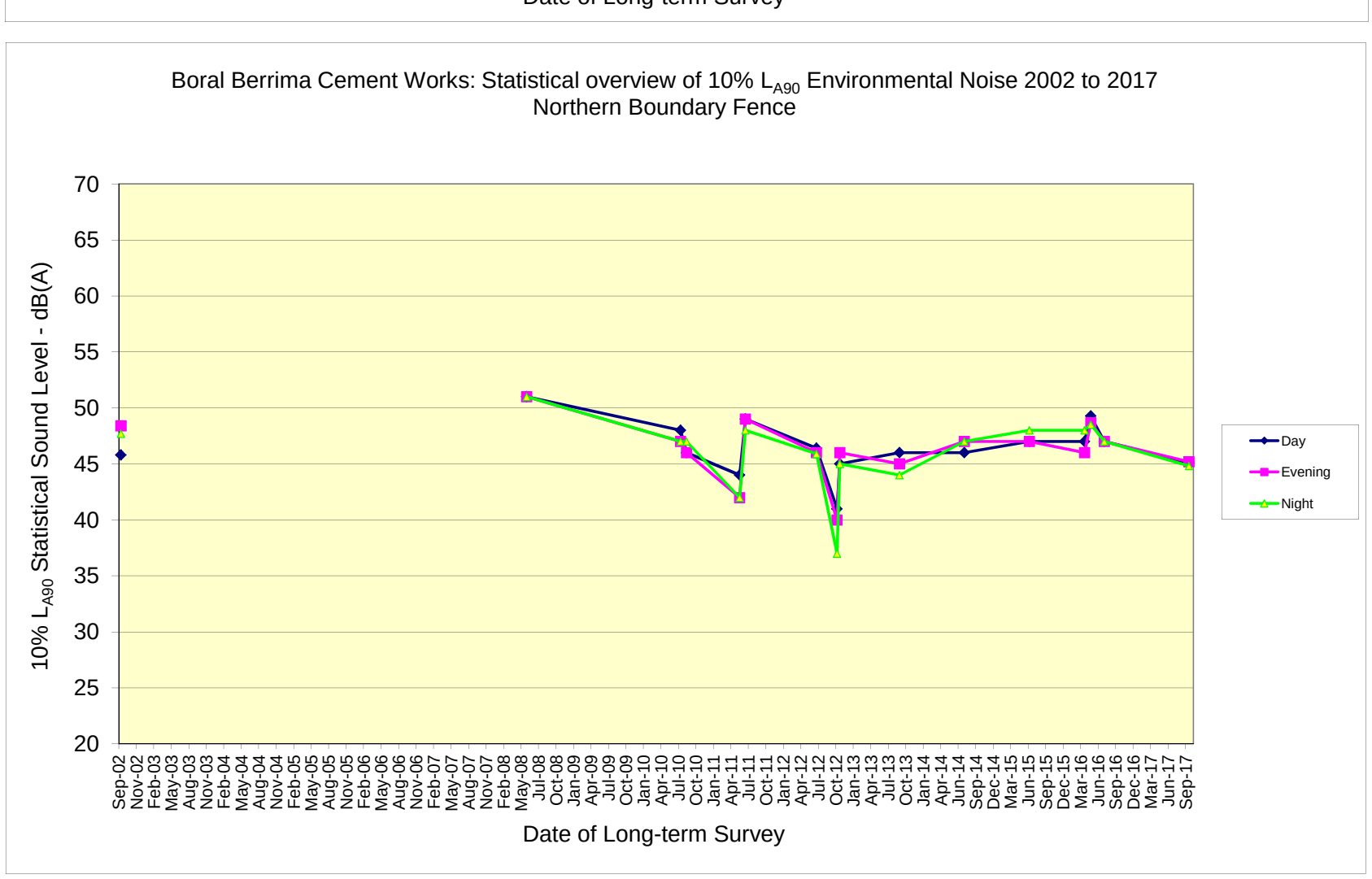
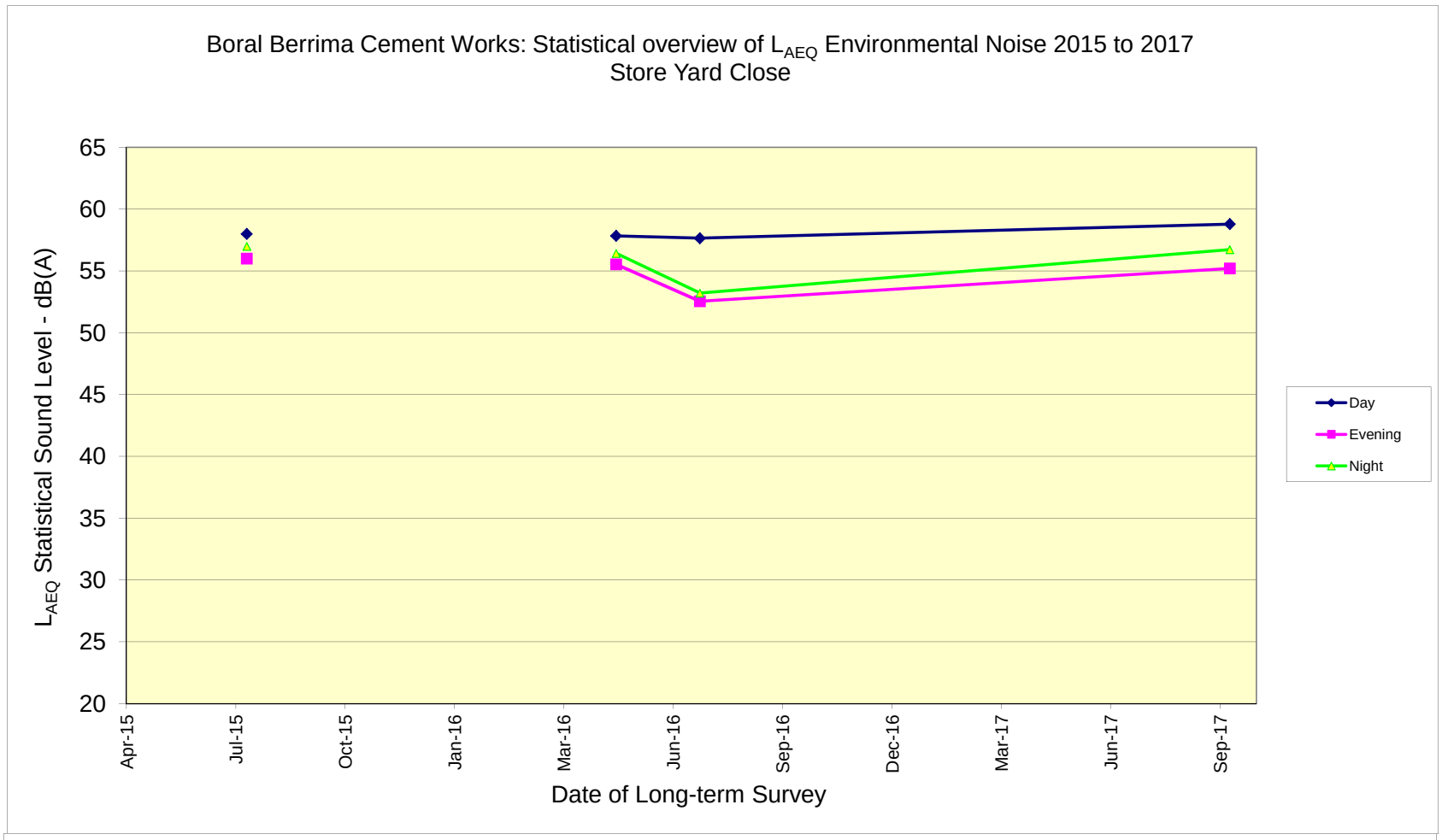


Figure 4.18: Comparison of statistical sound levels for Northern Boundary Fence location



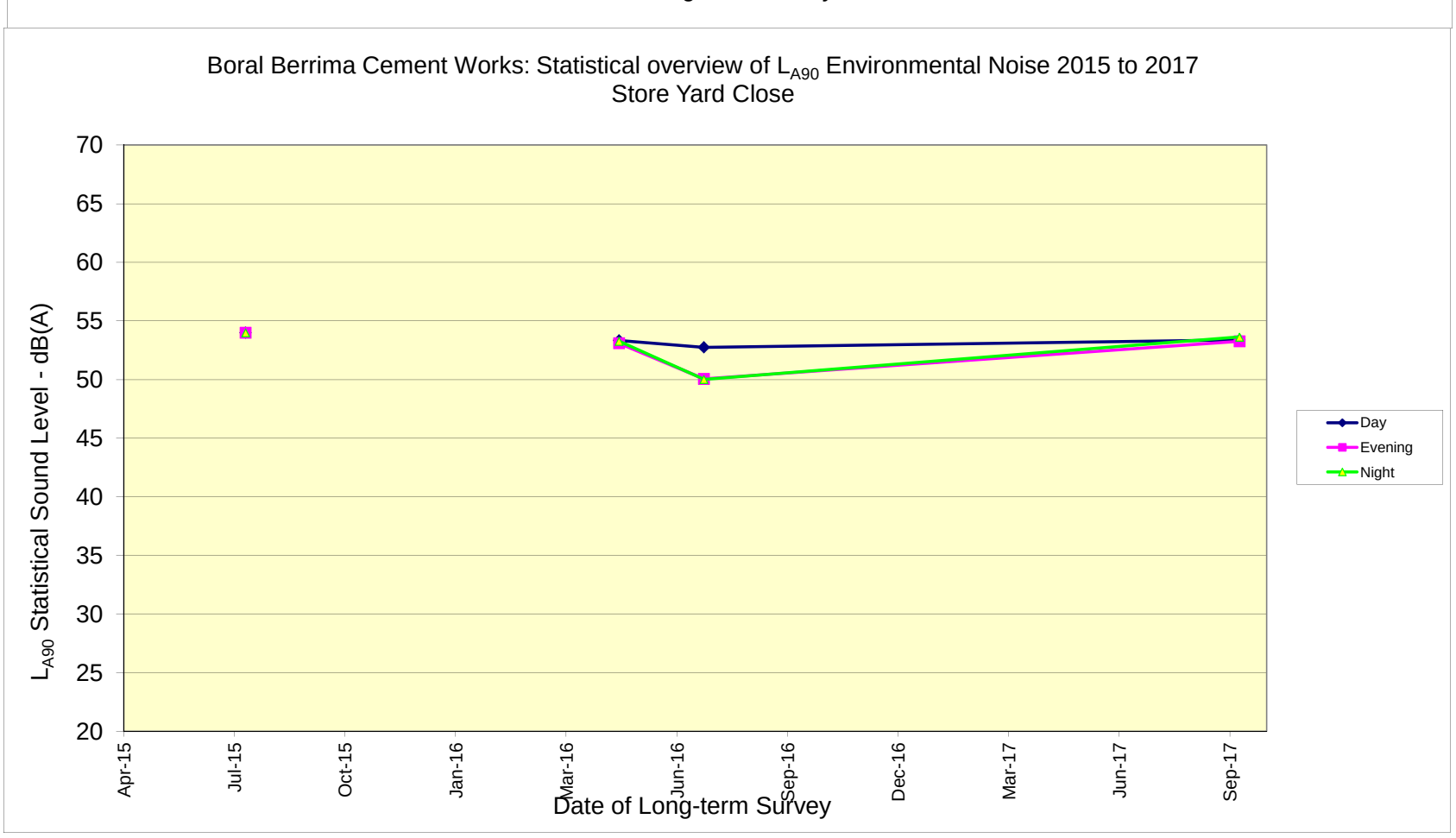


Figure 4.19: Comparison of statistical sound levels for Store Yard Close location

ABN: 25 153 946 064
ACN: 153 946 064

4.2 Store Yard Close location results compared to recommendations

In terms of the recommended PRP objectives for the Store Yard Close location of long-term average $L_{A90.period}$ not greater than 56 dBA or 58 dBA for any period, the average $L_{A90.period}$ was 53 dBA. The maximum 15-minute period sound level was 60 dBA. Table 4.3 below shows the statistics for the $L_{A90.15minute}$ period values and Figure 4.20 to 4.25 show graphs of these results.

Five of 1176 periods, or 0.4% of the total number of periods had $L_{A90.15\text{-}minute}$ sound levels greater than the recommended maximum for any period of 58 dBA. Listening to the results for the Northern Boundary for the same periods when 58 dBA was exceeded at the Store Yard Close location indicated that mobile equipment operating either within the Store Yard or stockpiling area close to it were responsible for the high sound levels. Attended monitoring which occurred at the same time as the mobile equipment operations on 6 October confirmed this.

Table 4.3: Boral Cement Berrima - Store Yard Close Location Statistics for individual $L_{A90.15\text{-}minute}$ data periods

Statistic	Decibels	Number greater than		
		dBA	Number	% of Total
Max	60	60.0	0	0%
99%	58	59.0	2	0.2%
95%	57	58.0	5	0.4%
90%	56	57.0	25	2.1%
80%	55	56.0	75	6.4%
70%	55	55.0	194	16.5%
60%	54	54.0	376	32.0%
50%	54	53.0	633	53.8%
40%	53	52.0	898	76.4%
30%	53	51.0	1043	88.7%
20%	52	50.0	1126	95.7%
10%	51	49.0	1152	98.0%
5%	51	48.0	1165	99.1%
1%	49	47.0	1173	99.7%
Min	47	46.0	1176	100.0%

Figure 4.20: Boral Cement Berrima - Annual Environmental Noise Assessment - Statistical data for Store Yard Close location $L_{A90.15\text{-minute}}$ sound levels over whole period

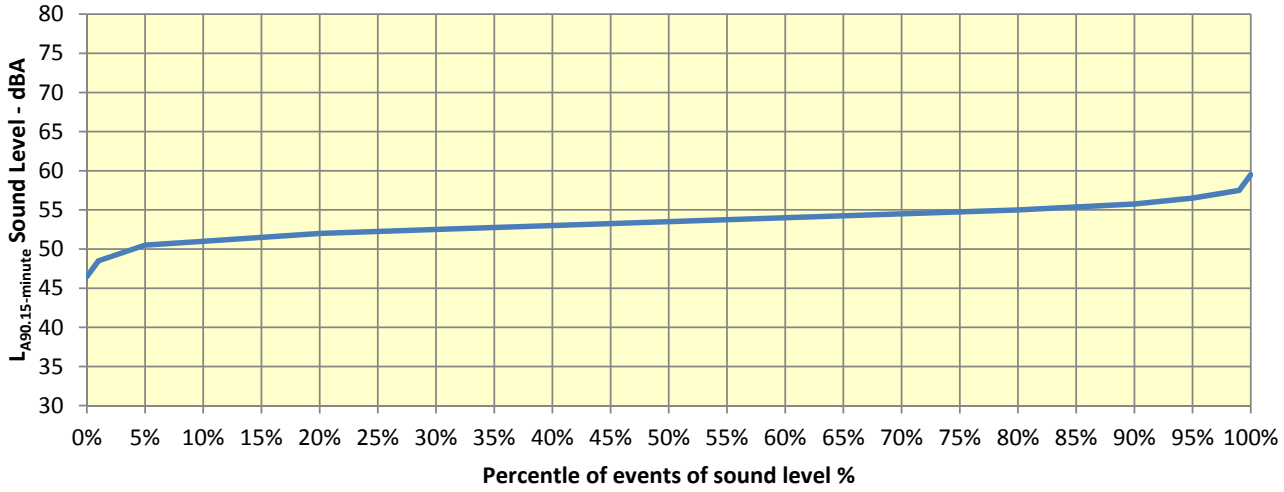


Figure 4.21: Boral Cement Berrima - Annual Environmental Noise Assessment - Statistical data for Store Yard Close location $L_{A90.15\text{-minute}}$ sound levels over whole period

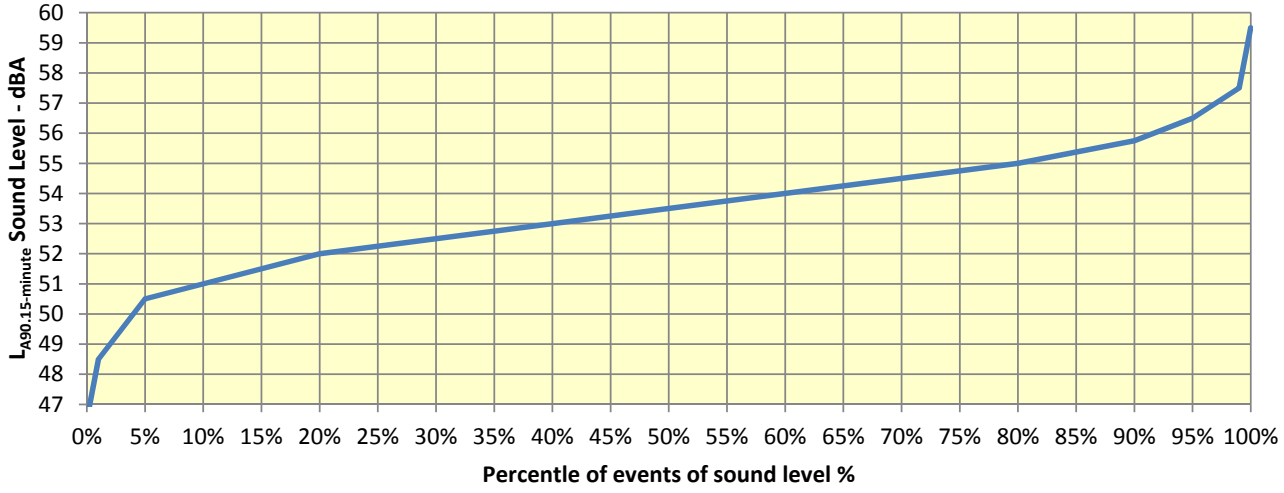


Figure 4.22: Boral Cement Berrima - Annual Environmental Noise Assessment 2017- Statistical data for Store Yard Close location $L_{A90.15\text{-minute}}$ sound levels over whole 13 day period

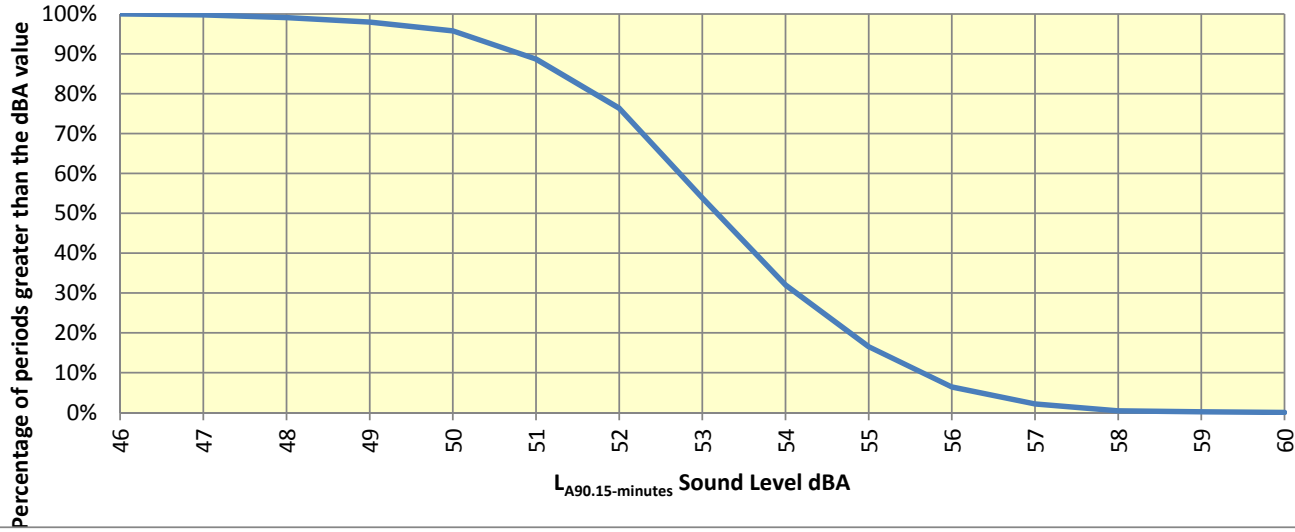


Figure 4.23: Boral Cement Berrima - Annual Environmental Noise Assessment 2017- Statistical data for Store Yard Close location $L_{A90.15\text{-}minute}$ sound levels over whole 13 day period

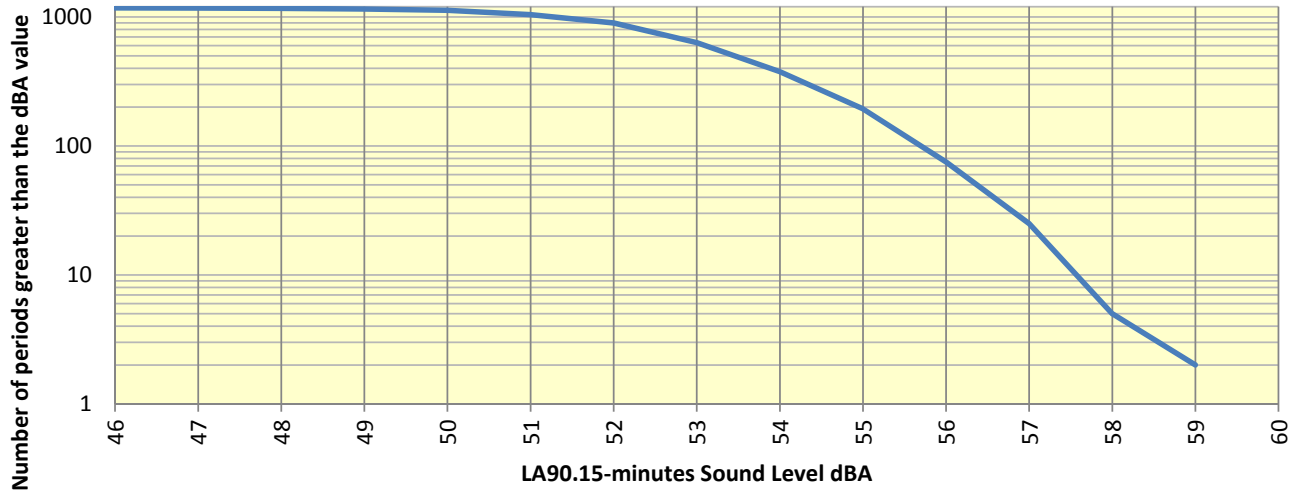


Figure 4.24: Boral Cement Berrima - Annual Environmental Noise Assessment 2017- Statistical data for Store Yard Close location $L_{A90.15\text{-}minute}$ sound levels over whole 13 day period

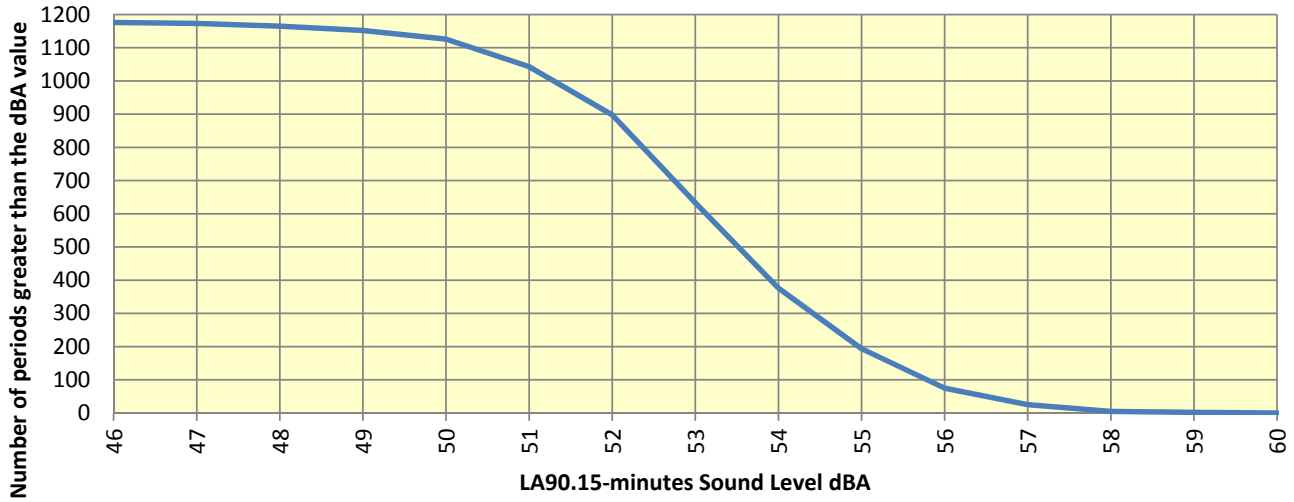
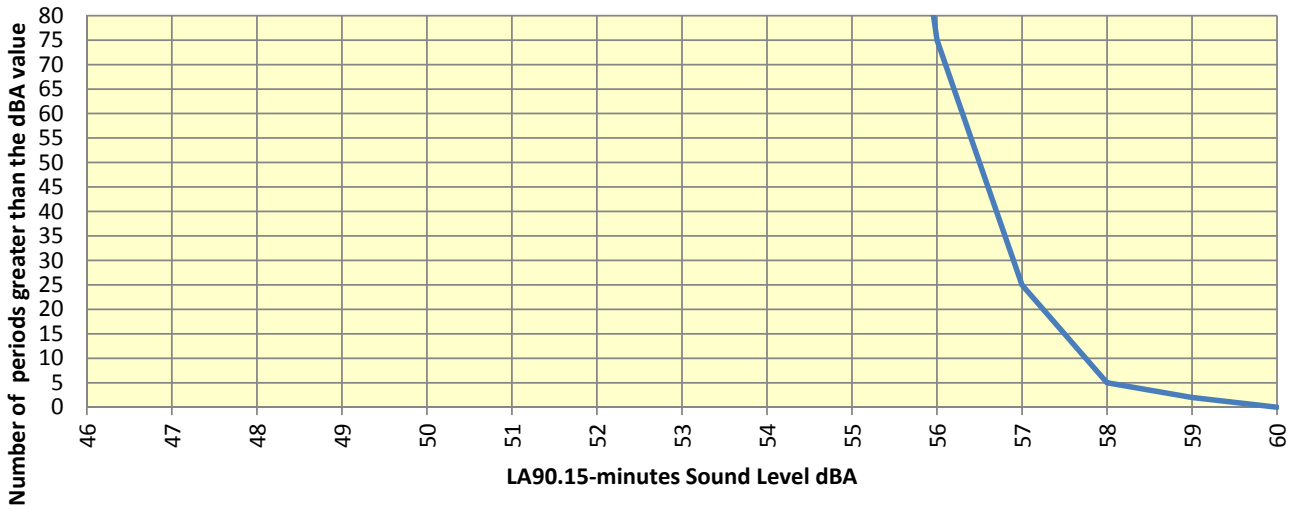


Figure 4.25: Boral Cement Berrima - Annual Environmental Noise Assessment 2017- Statistical data for Store Yard Close location $L_{A90.15\text{-}minute}$ sound levels over whole 13 day period



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

Sound levels measured at the Northern Boundary location included $L_{A01.1\text{-minute}}$ and $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ calculations to provide comparisons with recommended maximum values for night-time to indicate exceedance of the recommended $L_{A01.1\text{-minute}}$ objective for the Northern Boundary location in the PRP of 60 dBA, and sleep disturbance potential of $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ of greater than 15 dB. Periods with $\mathbf{L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}}$ difference results greater than 15 dB were listened to, to determine sources of noise occurring in the period. Figures 4.26 to 4.31 include identification of the apparent source of the events shown on the figures.

There were 65 one-minute periods when the difference is greater than 15 dB; the highest was a difference of 27.5 dB. Many of the '*event*' periods are in pairs and many in the period 5am to 7am, which are probably birds waking up. There were some isolated periods much earlier in the "night". There was one group of about 8 periods on 24/9 from 6:17am. When there was a group together one or two of the periods were listened to to confirm what it the source might be. That made about 65 listening groups altogether. Of the 65 events listened to, the following numbers of sources occurred – sometimes different sources occurred in the same period and these were noted:

- Birds 36 events, mostly between 5am and 7am
- Rail wheel squeal 10 events
- Site vehicle 9 events
- Train horn alone 4 events
- Rain 2 events
- Rail shunting 2 events
- Train horn plus rail squeal 2 events
- Rail airbrakes 1 event
- Aircraft 1 event

The total number of rail related events was 19 events out of 67 total events identified over the 11 night periods measured. Site vehicles were 9 events although these occur relatively close to the meter and most likely would not cause a difference of greater than 15 dB at the residential receivers.

For the $L_{A01.1\text{-minute}}$ values measured, there were 5940 periods assessed. Of these, 144 periods had $L_{A01.1\text{-minute}}$ greater than 60 dBA. The statistics were as follows:

- No. greater than 60.0 144
- No. greater than 62.0 69
- No. greater than 64.0 41
- No. greater than 66.0 23
- No. greater than 68.0 8
- No. greater than 70.0 5
- No. greater than 72.0 1
- No. greater than 74.0 1
- No. greater than 76.0 1

These numbers of events greater than 62 dBA are similar to those of the number of $L_{A01.1\text{-minute}} - L_{A90.15\text{-minute}}$ values greater than 15 dB. In general the same comparative ratio of sources could be considered to have caused them.

Figure 4.26: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$

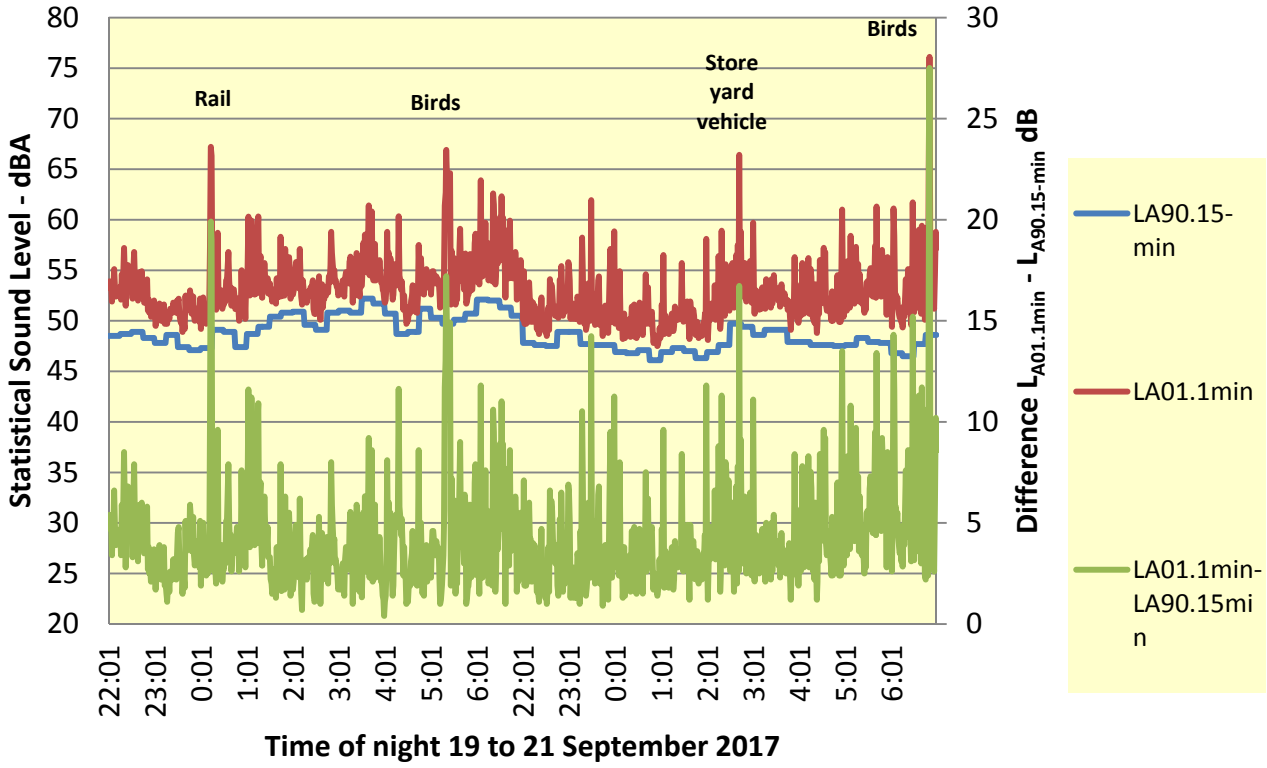


Figure 4.27: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$

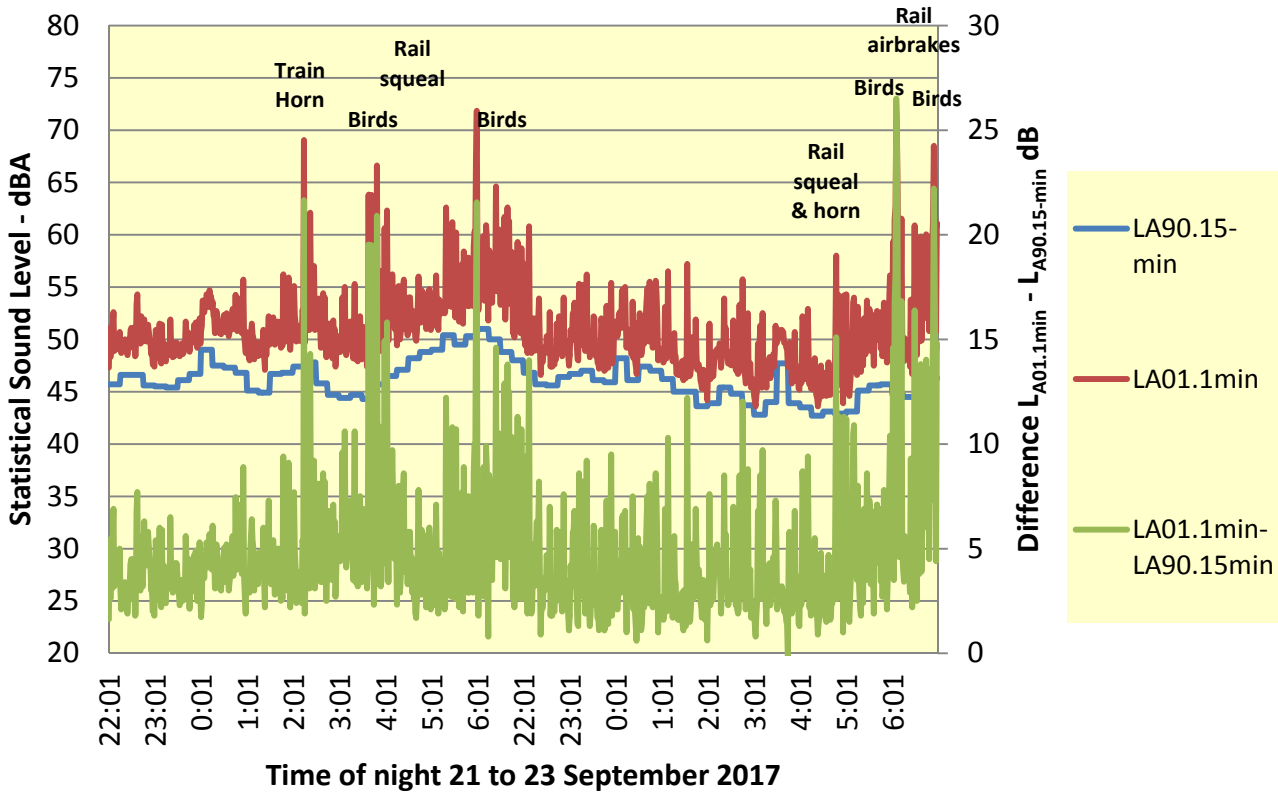


Figure 4.28: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$

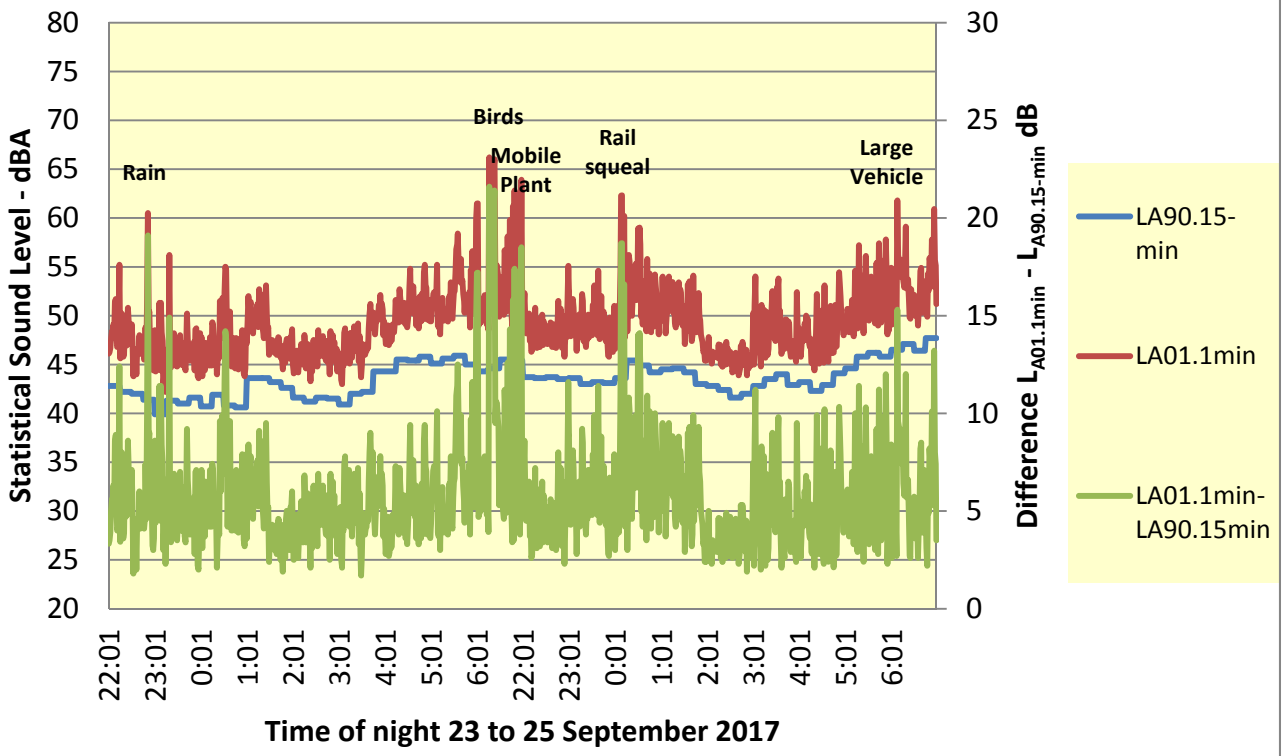


Figure 4.29: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$

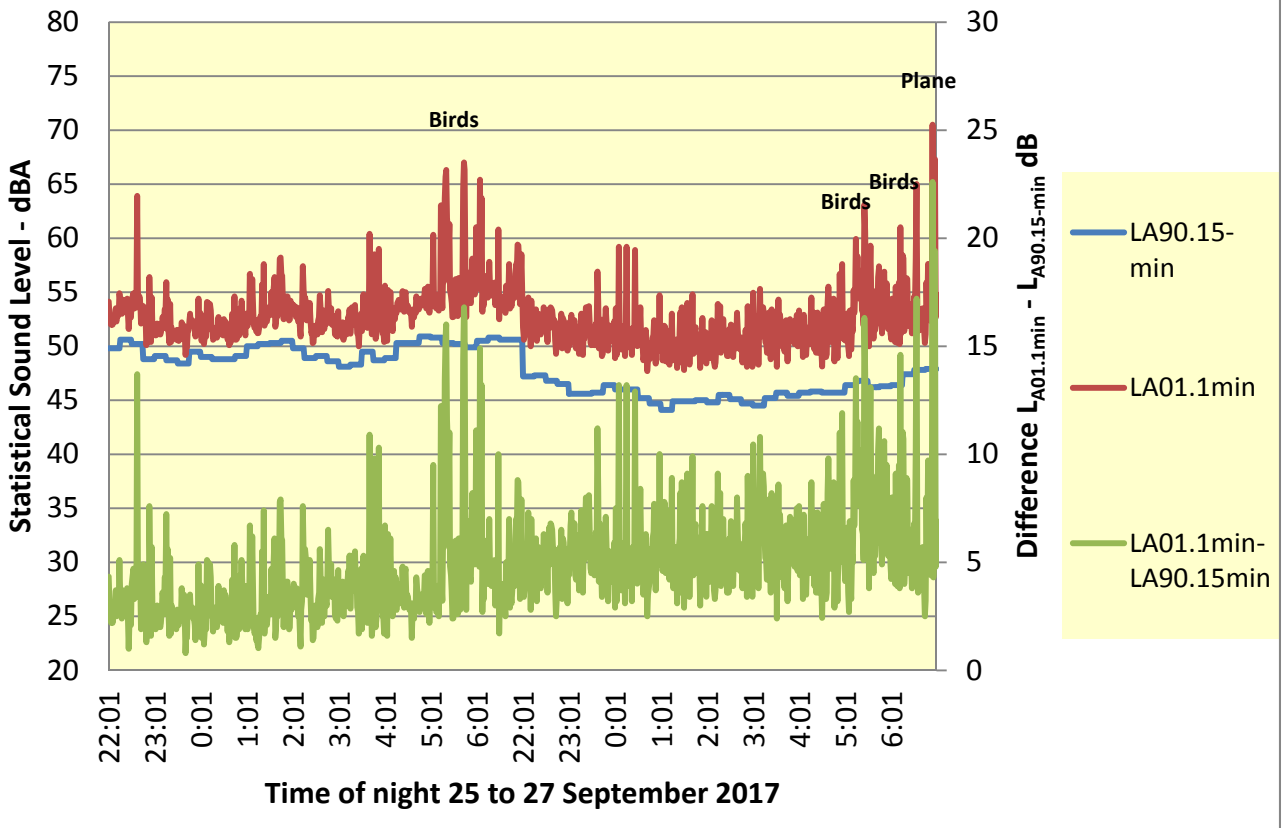


Figure 4.30: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$

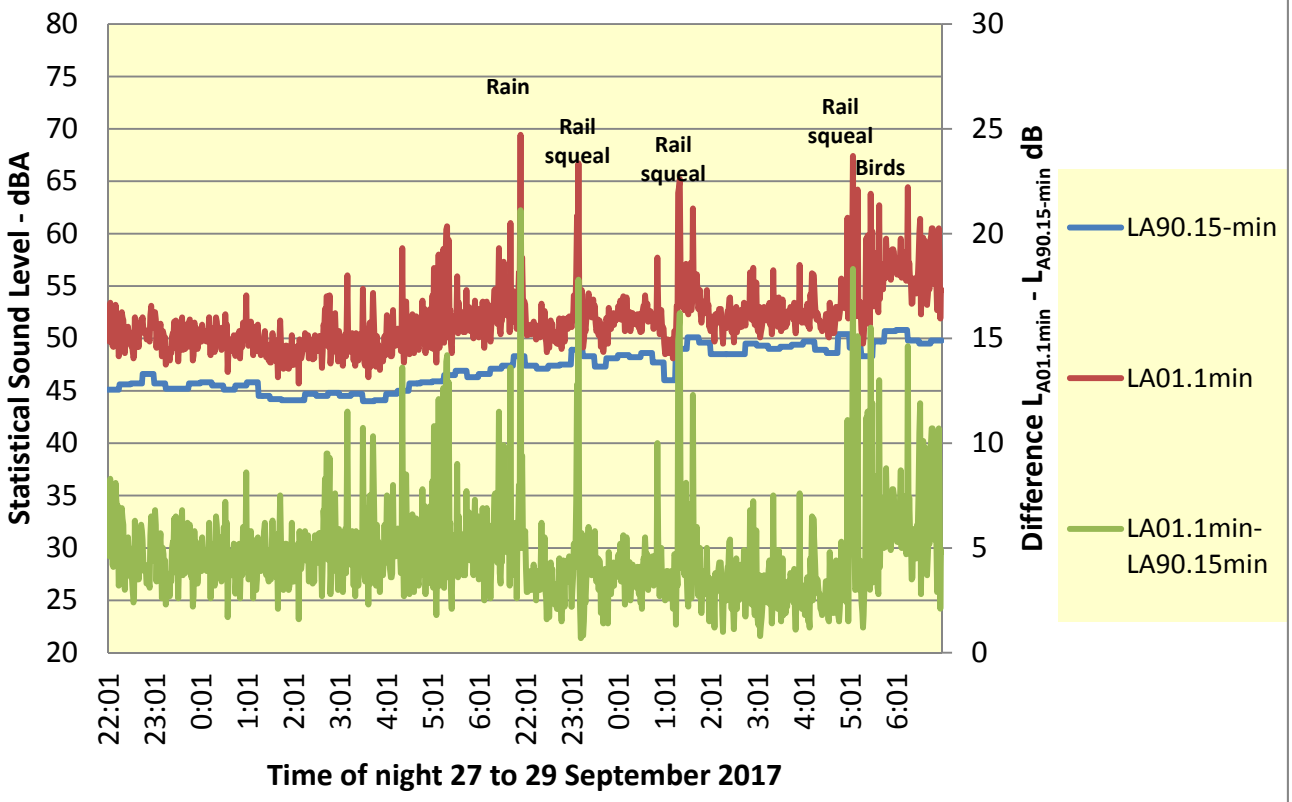
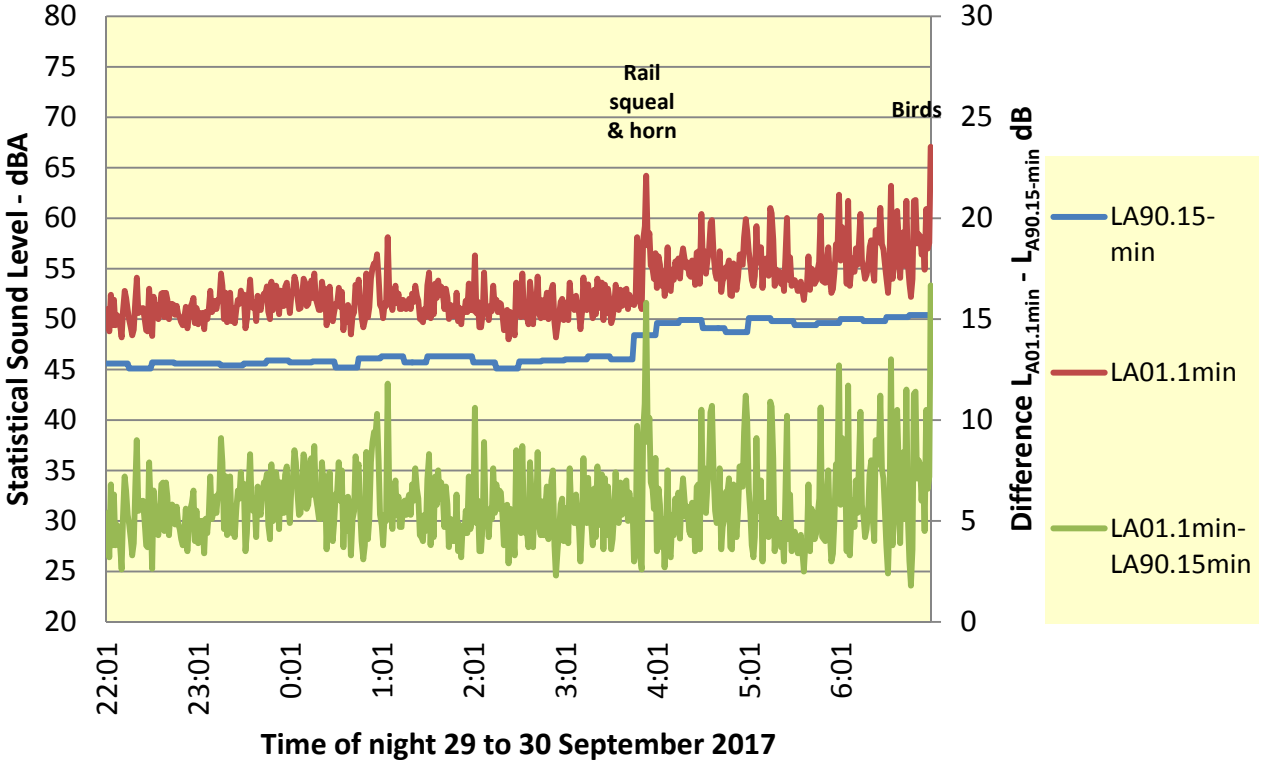


Figure 4.31: Boral Cement Berrima Annual Noise Assessment 2017 - $L_{A01.1\text{-}min}$ - $L_{A90.15\text{-}min}$



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4.4 Attended measurement results

Attended measurements were taken at the same locations as the unattended measurements to identify the sources of noise occurring that were audible at the time, as well as other conditions. Attended measurements were also taken in Argyle Street on the western side, 30m north of Taylor Avenue, and the same distance as the front of the first house on the eastern side of Argyle Street not facing Taylor Avenue. Table 4.4 shows the collated results and comments for the attended measurements.

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

Results for 4 Melbourne St attended measurements are shown in Table 4.4, with unattended measurements shown in Appendix B and Table 4.1, long-term unattended results in Table 4.2 and Figure 4.15. Results have been collected for this location since 2002. Attended measurements were obtained for daytime on 19 September and 6 October, evening on 19 September and 16 October and night-time on 16 October.

Sound levels continue to be mainly caused by road traffic noise, either 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 fans, vehicles and trains on occasions. Tonal noise was not evident on most occasions or for 15-minute sample periods.

One-third octave band sound levels are shown in Appendix A Tables 4.5 and 4.6 and Figures 4.32 to 4.36 with tonality graphs combined and shown in Figure 4.37. The spectra are very broad-band with very little tonality evident in either L_{Aeq} or L_{A90} results. Long-term average statistical sound levels were lower than in 2016.

Unattended sound levels shown on the two-day graphs of Appendix B show sound levels vary mainly diurnally with slightly higher night-time sound levels related to wind speed on some occasions but not others, and wind direction between south and west having little apparent effect. For example, night-time on the early morning of 25 September had $L_{A90.15\text{-minute}}$ sound levels of less than 40 dBA with wind speeds of 2 to 3m/s westerly, while a similar period on the following night had $L_{A90.15\text{-minute}}$ sound levels of 43 dBA with calm winds. There did not appear to be any correlation between major plant items being on or off. Average night-time $L_{A90.15\text{-minute}}$ sound levels were mostly less than 40 dBA but some nights had a night-time average of 43 dBA.

The long-term average unattended night-time sound levels over the whole measurement period of 48 dBA $L_{Aeq.night}$ and 42 dBA $L_{A90.night}$ are above the PRP recommended PSNLs of 40 and 35 dBA respectively, however the measured sound levels include sound from all sources, not just the Cement Plant.

Narrow band analyses of the attended monitoring recordings are provided in Appendix G Figures 4.62 to 4.66. Graphs are presented in linear and logarithmic scales. They show spectral peaks at 175 to 178 Hz, depending on the time of the day (related to the speed variation of the main PHT ESP fan. Occasionally there are low-level peaks visible in the 1300 to 1450 Hz frequency range, which may be related to either insects or VVF drives on the main PHT stack fan (FA39). These peaks are not seen as tonal in the one-third octave band analyses.

4.4.2 72 Taylor Avenue

The location used for the attended measurements this year was directly in front of the residence on the footpath, 5 metres from the edge of the vehicle path on Taylor Avenue. This resulted in higher

Table 4.4: Boral Cement Berrima Annual Noise Survey 2017
Attended residential measurements September and October 2017
Summary of statistical results and comments

Location	File	Date	Time	Period	Statistical Sound Levels- dBA							Comment
				Hr:Mn:Sec	LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
4 Melbourne Street	133	19/09/2017	11:15 AM	d 00:15:00	58	75	78	69	59	50	18	Wind NW to WNW 2 to 4 m/s. Trucks passing, WITN, birds, wind in wires. Quiet is 50. Plant is a distant low level fan noise with no tones prominent
4 Melbourne St	312	19/09/2017	6:27 PM	d 00:15:00	55	67	74	67	57	47	12	Wind 1-3m/s W, clear sky, 10C. Passing traffic 60 to 70, plant fan noise varying on wind, sometimes tonal near 200 Hz. Plane 47 to 50
4 Melbourne St	329	6/10/2017	8:29 AM	d 00:15:00	56	67	73	68	60	48	11	Overcast, high cloud, wind W 2-3m/s, 13.0C. Passing traffic, plant 46 to 51, train on site slight wheel-squeal, dozer tracks at times. Vehicles at site western storage area audible.
4 Melbourne St	143	16/10/2017	21:21	15:00	52	66	76	63	53	44	13	Factory Noise 48-50 dBA, Truck 73,67 dBA, Car - Taylor Ave 64,65,63,61,61 dBA, Car - Melbourne St. 62, 63dBA
4 Melbourne St	147	16/10/2017	22:44	15:00	49	67	69	63	48	41	18	Slight wind from north, Factory Noise 41-42 dBA, surge to 47 - 50; recorded about 1min mark on wav 0014 ; in the 160 - 200 hz possibly
12 Brisbane St	134	19/09/2017	11:35 AM	d 00:15:00	52	69	69	60	54	48	17	Distant traffic, WITN is main noise, occasional truck on Taylor Ave, low frequency fan noise in background when quiet, ambient 47 to 50
12 Brisbane St	108	19/09/2017	18:41	15:00	53	64	77	64	53	45	10	Wind slight SW, Works Noise audible, people talking 44, 45 dBA, truck 58, 62 (thumping), Car: 78,75, idling 45, door slamming 47dBA, Dogs barking 58, 62 dBA, Highway traffic heard
12 Brisbane St	332	6/10/2017	8:57 AM	d 00:15:00	51	64	71	62	52	44	13	Distant and passing traffic on Taylor, locos on site, distant birds & dogs. Quiet is 43
12 Brisbane St	146	16/10/2017	22:24	15:00	49	61	73	62	46	37	13	Calm conditions, Factory Noise 39 - 40 dBA, Truck 63 dBA(rattle), Car - Taylor Ave 63dBA, Car - Brisbane St 71 dBA,works trucks 45 - 46dBA, Resident spoke - noise has improved since they did some work. Scraping metal/bowls from street.
72 Taylor Ave	2	19/09/2017	12:10PM	15:00	65	75	83	78	67	52	10	Wind gusty SW, Factory Noise, Trucks 83, 81 dBA, Car 65, 69, 71,72 dBA, Nb Cpeak 100 dB
72 Taylor Ave	107	19/09/2017	18:18PM	15:00	64	72	81	78	66	49	8	Wind slight SW, Factory Noise - 50 dBA, Trucks: 81,78, 78, 79dBA (thumping tone), Car: 73,74,74dBA, reversing beacons in works audible
72 Taylor Ave	109	6/10/2017	9:05AM	15:00	66	85	76	78	69	48	19	Wind slight SW, Works Noise audible 47-48 without traffic, gate beacon (east) heard, Truck:82, 79, 78 , 78 (air brakes) Cement truck 80 dBA, 63 Hz 60 dB, Car: 61,65,74 (2Cars) 63dBA, little truck 67, 71 dBA, Truck rattle 76
72 Taylor Ave	144	16/10/2017	21:41	15:00	58	67	84	70	50	42	9	Factory Noise 42-43 dBA, roar tone 48 dBA, Truck 83 dBA, Car - Taylor Ave 70,71,71,65 dBA, works trucks 45 dBA
72 Taylor Ave	145	16/10/2017	22:00	15:00	58	67	81	71	50	42	9	Calm conditions, Factory Noise 41-43 dBA, roar tone 48 dBA, Truck 81,78 dBA(rattle), Car - Taylor Ave 65,73,75 dBA, works trucks 45 - 46dBA - recorded first 10 sec on wav 0012 fileGate alarm 45 dBA
Argyle St	315	19/09/2017	6:54 PM	d 00:15:00	55	67	76	69	56	45	13	Passing traffic, tyre noise, freeway to West. Plant is bottom, LF noise ~ 200Hz. Passibg trucks 70, cars 60 to 65, quiet is 45 with freeway noise. Location is level with front of house West and 1 block N of nearest on W side Argyle
Argyle St	148	16/10/2017	23:05	d 00:15:00	51	62	71	66	47	39	11	Slight wind from north, Factory Noise 38-39 dBA, surge recorded; recorded about 1:15min mark on wav 0015 ; in the 160 - 200 hz possibly, (also occurred 23:17pm-23:18pm), Truck 71 dBA, Car - Argyle St 57 dBA, Car - Taylor Ave 47 dBA,

Table 4.4: Boral Cement Berrima Annual Noise Survey 2017
Attended residential measurements September and October 2017
Summary of statistical results and comments

Location	File	Date	Time	Period	Statistical Sound Levels- dBA							Comment
				Hr:Mn:Sec	LAeq	LCeq	LAMax	LA01	LA10	LA90	LCeq-LAeq	
Outside Northern Fence location	127	19/09/2017	8:19 AM	d 00:15:00	53	67	65	59	55	50	15	Clear, 1/8 high cloud, wind W to SW 2-3 m/s. General Industrrial noise. Passing traffic inside and outside plant. Birds to 60, WITN, ambient 50
Northern Boundary (inside)	1	19/09/2017	11:15AM	15:00	55	70	68	61	57	52	15	Wind gusty SW < 3m/s, Factory Noise, Trucks Talyor 55 dBA, 63 Hz - 57dBA, crane in Store Yard - 60 dBA, Wind in trees 61 dBA
Northern Boundary (inside)	140	6/10/2017	12:03	15:00	51	67	72	57	53	49	15	Wind very slight SW, Works Noise 48 -49 dBA, Taylor Ave. traffic audible, works Truck:55, 53 dBA, Birds 53dBA, Aircraft
Outside Northern Fence location	142	16/10/2017	20:54	15:00	50	67	65	53	51	48	17	Calm Conditions, Factory Noise 48-50 dBA, Reversing alarm 50 dBA, Little traffic on Taylor Ave
Outside Northern Fence location	149	16/10/2017	23:46	15:00	46	65	54	49	48	44		Slight wind from north, Factory Noise 46-47 dBA, internal traffic 56dBA, Note: Laeq at loggers 46.9 dBA/ LA90 44.9
Store Yard Close	130	19/09/2017	10:48 AM	d 00:06:40	60	81	76	71	62	55	22	Ambient 55 to 60, depending on wind carry. Clear, 13C, wind W to WNW 4 to 6 m/s
Store Yard Close	141	6/10/2017	12:29 PM	15	59	73	76	70	61	54	14	Wind still to very slight SW, - Stock pile truck on road 68,67 dBA, - Stock pile truck on stock pile 58,58 dBA, - FE loader on stock pile 55 dBA, - cleanaway 65 dBA, - Bulldozer in lime pit 65 dBA

maximum and L_{Aeq} sound levels measured than in the past when the measurements were made in Adelaide Street at approximately 20m from the vehicle path in Taylor Avenue, level with the front of the residences in Taylor Avenue. The unattended measurements were made at the same location as in the past at 1m in front of the house.

Results for attended measurements are shown in Table 4.4, with unattended measurements shown in Appendix B and Table 4.1, long-term unattended results in Table 4.2 and Figure 4.16.

L_{Aeq} results are controlled by motor vehicle noise passing on Taylor Avenue. Attended L_{A90} sound levels were 50 dBA during daytime and 42 dBA in evening and night-time. Unattended measurements show L_{A90} values were mainly between 40 and 45 dBA. There was a period on 23 September when the night-time L_{A90} values were 38 to 39 dBA in a period when Kiln No. 6 was off and associated plant was also idle, but there are too many drop-outs in the data to be definitive of this. Other plant items being off did not appear to have a correlation in lower sound levels at the location.

Cement Plant site sources identified included internal truck movements and the alarm from the eastern (Truck) access gate opening and closing. Plant sound levels varied on some occasions over 20 to 30 seconds with atmospheric wind variations.

Measured one-third octave band spectra are shown in Appendix A Tables 4.5 and 4.6 and Figures 4.38 to 4.42 and the summary tonality assessment graph is shown in Figure 4.43. The spectra are broad-band and there are no tonal elements identified.

Narrow-band spectra are shown in Appendix G figures 4.67 to 4.72. As with 4 Melbourne Street analyses, the main peaks visible are 176 to 178 Hz and 1300 to 1450 Hz, with the latter peaks slightly higher than at 4 Melbourne St.

The long-term average unattended night-time sound levels over the whole measurement period of 53 dBA $L_{Aeq.night}$ and 44 dBA $L_{A90.night}$ are above the PRP recommended PSNLs of 43 and 38 dBA respectively, however the measured sound levels include sound from all sources, not just the Cement Plant.

4.4.3 12 Brisbane Street

Monitoring locations used for 12 Brisbane Street were the same as in the previous measurements. L_{Aeq} results are affected by road traffic noise from Taylor Avenue and Brisbane Street as well as the Hume Freeway at times of westerly winds. Cement Plant noise emissions also contribute at this location.

Results for attended measurements are shown in Table 4.4, with unattended measurements shown in Appendix B and Table 4.1, long-term unattended results in Table 4.2 and Figure 4.17.

Attended daytime and evening L_{Aeq} results were 51 to 53 dBA while night-times had 48 dBA. L_{A90} results for the same periods were 44 to 48 dBA daytime and evening and 37 dBA at night. Long-term average night-time sound levels from unattended monitoring were 46 dBA L_{Aeq} and 40 dBA L_{A90}, compared to the PRP recommended objectives of 40 and 35 dBA respectively. As with the other measurements the total sound levels include sources other than the Cement Plant.

Site sources of noise identified included rail operations and some general fan noise.

One-third octave band graphs of the attended measurements are shown in Appendix A Tables 4.5 and 4.6 and figures 4.44 to 4.48, with the tonality assessment for all shown in Figure 4.49. The spectra are broad-band and non-tonal, as occurred for the other residential measurements.

Narrow-band spectra from attended measurements are shown in Appendix G figures 4.73 to 4.76. The peak at 176 to 178 Hz is again visible, with sometimes a first harmonic of that at 352 Hz and some minor peaks in the range 1300 to 1450 Hz. A peak at 194 Hz was also observed. None of the measurements had tonal aspects.

4.4.4 Argyle St

Attended sound levels are measured at the western side of Argyle Street 30m north of Taylor Avenue. Measurements have been done in the evening and night-time as daytime measurements are affected by noise form the adjacent shop and road traffic noise.

The main noise sources at this location are traffic along Taylor Avenue and its extension to the Hume Highway to the west, and Hume Freeway noise. Cement Plant noise is audible at times as a general industrial noise, but is lower than in other monitored locations because of the additional distance. Results of the monitoring are shown in Table 4.4.

One-third octave band spectra from the measurements are shown in Appendix A Tables 4.5 and 4.6 and figures 4.50 and 4.51. The tonality assessment is shown in Figure 4.52. Spectra are broad-band and non-tonal.

Narrow-band spectra are shown in Appendix G figures 4.77 to 4.79. They show that the frequency peak at 176 Hz was visible and low level peaks at its first harmonic of 352 Hz and some lower peaks near 1450 Hz.

The Cement plant is considered to not be a significant source at this location.

4.4.5 Northern Boundary

Attended sound levels at the Northern Boundary are measured both outside the fence on the northern side of the boundary, and inside the fence near the power pole where the unattended meter was located, depending on the time of day. Both measurement locations are within 30m of each other and this difference would not significantly affect the measured sound levels or frequency analyses.

Results for attended measurements are shown in Table 4.4, with unattended measurements shown in Appendix B and Table 4.1, long-term unattended results in Table 4.2 and Figure 4.18.

Taylor Avenue vehicle movements are lower at this location than for the residential locations but are still an influence. Site sources identified in the attended monitoring included vehicle movements and general industrial noise.

Measured attended L_{Aeq} sound levels were 50 to 55 dBA daytime, 51 dBA evening and 46 dBA night-time. L_{A90} sound levels 49 to 52 dBA in daytime, 48 dBA evening and 44 dBA night-time. Long-term average night-time sound levels from unattended monitoring were L_{Aeq} 49 dBA and L_{A90} 47 dBA.

One-third octave band spectra of attended measurements are shown in Appendix A Tables 4.5 and 4.6 and Figures 4.53 to 4.57. The tonality assessment for all measurements is shown in Figure 4.58. Spectra were broad-band and non-tonal. The result for 8:19am on 19 September showed a minor tonality with increase sound levels in the 6.3 kHz band. This was considered to be caused by insect noise (crickets) and is not related to Cement Plant emissions.

Narrow-band spectra are shown in Appendix G Figures 4.80 to 4.85. As with other measurements they show a peak at 176 to 178 Hz related to the FA39, as well as the first harmonic of this and some peaks in the area of 1450 Hz.

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4.4.6 Store Yard Close location

While this location is not a residential receiver or boundary location, it is proposed to be a monitoring location to replace the monitoring at the other locations to indicate achievement of continuously acceptable sound levels from the Cement Plant site, without significant intrusion from other sources (traffic) outside the plant boundary. Objectives of a long-term $L_{A90.period}$ over 7 days of 56 dBA and 58 dBA for any 15-minute period without transient noise sources have been proposed. Earlier discussion of the results of this monitoring was provided in Section 4.2.

Results discussed in this section are for attended monitoring and one-third octave band and narrow-band analyses. Results of the attended monitoring are given in Table 4.4. Main sources were industrial noise of fans from the main parts of the plant and internal traffic movements. Mobile equipment loading and stockpile operations on the southern side of the rail line were noted during measurements on 6 October to cause sound levels of 56 to 58 dBA. These are considered to be the source of the high $L_{A90.15\text{-}minute}$ sound levels measured by the unattended monitor, reported in Section 4.2.

Appendix A Tables 4.5 and 4.6 show one-third octave band and tonality assessments, with figures 4.59 and 4.60 showing the spectra. The tonality assessment is shown in Figure 4.61. While the spectra are relatively broad-band and non-tonal, a relatively higher sound level occurred in the 100 Hz band, caused by the mobile equipment exhaust.

Narrow-band spectra are sown in Appendix G figures 4.86 and 4.87. They show similar peaks in the spectrum to other measurements – 176 to 178 Hz from the PHT fan and 1300 to 1450 Hz minor peaks, potentially from the FA39 fan motor VVF drives. However none of these peaks were identified as tonal in the one-third octave band assessment.

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5 Summary and Conclusions

The Boral Cement Berrima works has noise limit conditions on two major projects – No.6 Kiln Upgrade and No.7 Cement mill. Sound levels at the plant and in the residential community affected by the noise emissions from the site have been measured regularly since 2002 and since the completion of each of these projects. Monitoring on these occasions has confirmed that the Projects are in compliance with the noise limit conditions. Discussions with the NSW EPA over the past 5 years have sought to include noise limit conditions for the whole site but these have yet to be finalised. A recommended noise objective for a nominated monitoring site inside but close to the plant boundary has been proposed where noise emissions from sources other than the Cement Plant are not significant, whereas residential receiver locations are affected by such other noise sources as road traffic.

The annual environmental noise assessment evaluates noise emission from the Cement Plant by the following:

- comparative measurements at the same locations around major plant sources of noise which have been assessed previously as in compliance with the limit conditions;
- calculation of the contribution sound levels at residential receiver locations from those source emission locations which are higher than in the past and comparison with a contribution objective.

The findings of this 2017 annual environmental noise assessment are that the two projects are in considered to be compliance with their noise limit conditions at the nearest residential receiver locations.

Monitoring of residential receiver location and plant boundary locations are made using attended and unattended monitoring methods over typically two-week periods each year to assess variations of long-term statistical sound levels.

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

From the measurements at the proposed in-plant annual environmental noise monitoring location in the Store Yard, it is also considered that the plant is achieving its proposed objectives of 56 dBA for long-term $L_{A90.period}$ and 58 dBA $L_{A90.15\text{-}minutes}$ (unaffected by transient noise sources).

Some sources of noise at the Cement Plant had increased sound levels from previous measurements. These included:

For No.6 Kiln

- Radicon cooler fans on most levels of the cooler.
- RM7 Roof magnete impact plate cover and bucket elevator upper platform door acoustic cladding
- RM7 switchroom ventilation fan western duct
- FA210 inlet silencer
- FA211 inlet – no silencer is currently in place
- Raw meal silo baghouse DC30 discharge
- DC70 FA63 discharge tone at 63 Hz
- Coal Mill fan discharge silencer

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For the No.7 Cement Mill and Cement Mill No.6:

- Cement Mill No.6 western wall fans discharge silencer
- Cement Mill No.5 building FA502 fan discharge
- Openings at the bottom of all main roller doors be able to seal to ground, not left open 50 to 100mm

It is recommended that these items be reviewed for condition and silencers cleaned, replaced or installed if appropriate.

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

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	Description			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
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	36	43	45	45	51	52	57	61	72	72	63	67	72	63	62	66	63	65	64	60	60	56	54	57	52	46	41
	L8+ Top NW corner Pointing to Gbox & motor @ 0.6m	337	6/10/2017	35	43	45	44	51	54	57	59	68	71	65	67	74	66	66	69	66	69	68	65	64	62	60	67	63	56	52
	L8+ Top SW side BE, 1m to motor	338	6/10/2017	35	43	48	48	51	54	55	60	66	68	63	66	71	65	66	69	66	68	69	65	64	62	60	66	62	55	51
	L8+ Top S side BE bearing @ 350mm	339	6/10/2017	38	39	46	48	47	51	56	59	62	65	60	59	66	58	57	58	57	58	61	61	58	60	60	57	54	52	47
	L8+ Top NE corner Gbox @ 1m	340	6/10/2017	36	40	48	50	51	49	57	66	71	71	64	66	76	62	63	68	64	67	68	67	61	62	59	56	53	48	44
	L8+ Lower platform, pointing to stack @ 17m	341	6/10/2017	36	42	48	47	50	55	59	62	70	69	63	65	68	62	61	62	60	61	61	58	57	55	55	55	51	46	41
	L8+ Lower platform, pointing to Gbox & BE drive @ 3.2m	342	6/10/2017	34	41	48	47	49	52	57	62	71	70	63	63	70	63	62	63	61	61	61	58	57	55	54	55	52	47	43
	L8 FA263 @ 1m to N side	344	6/10/2017	39	47	46	46	49	49	51	59	74	76	68	65	67	71	71	78	69	70	75	71	72	68	65	63	59	56	51
	L8 Vent for inlet filter shed AS35 FA263	345	6/10/2017	35	45	47	48	48	52	57	60	62	70	66	65	64	63	65	72	61	62	66	62	60	57	55	52	49	46	41
	By L7 access door 13 @ 2m on top of PHT	346	6/10/2017	39	45	41	43	46	53	59	62	71	73	64	63	63	63	63	66	63	64	63	61	61	58	57	54	51	48	43
	L8 new PHT centre	347	6/10/2017	31	35	39	42	43	48	54	59	64	66	61	62	62	62	61	62	60	59	59	57	56	54	51	47	45	40	35
	L8 new PH centre N side @ 2m to edge, facing centre	348	6/10/2017	37	37	40	41	44	49	54	58	61	63	58	61	62	63	63	62	61	61	60	58	56	54	50	46	42	39	34
	L8 new PH centre E side @ 2m to edge, facing centre	349	6/10/2017	37	38	36	40	44	49	52	58	64	65	60	61	62	62	62	62	60	60	59	57	56	54	50	45	43	37	32
	L8 new PH centre S side @ 2m to edge, facing centre	350	6/10/2017	37	40	42	42	45	46	47	53	58	60	56	55	57	57	56	57	56	55	54	54	53	53	49	46	45	39	34
	L7 new PH centre S side @ 2m to edge, facing centre	351	6/10/2017	32	39	40	38	43	43	48	54	59	59	57	60	61	60	59	60	59	59	58	55	54	52	50	48	44	41	37
	L7 new PH centre E side @ 2m to edge, facing centre	352	6/10/2017	29	35	35	41	44	44	48	57	61	63	59	61	62	63	62	62	61	62	60	57	57	55	52	49	47	42	38
	L7 new PH centre N side @ 2m to edge, facing centre	353	6/10/2017	32	44	40	44	45	46	50	57	63	63	58	60	61	62	62	61	60	60	58	56	54	52	49	44	40	35	29
	L7 new PH centre centre facing E	354	6/10/2017	29	35	41	43	43	45	52	59	64	65	60	62	63	63	62	63	61	61	60	57	56	55	52	49	45	40	34
	L7 between PHTs centre facing W	355	6/10/2017	35	42	41	41	44	47	51	60	65	64	60	60	61	61	61	63	60	59	59	56	56	55	54	52	48	44	39
	L7 old PHT S side centre edge @ 2m face centre	356	6/10/2017	36	44	45	48	46	49	51	58	67	68	62	63	63	61	61	64	60	60	62	57	56	55	53	51	48	44	40
	L7 under BE drive platform W side facing BE @ 1m	357	6/10/2017	38	44	45	49	55	53	52	52	65	68	61	62	61	60	61	63	62	61	60	58	57	56	57	56	52	47	41
	L7 BE drive platform E side @ 1m to Gbox coupling	358	6/10/2017	35	41	44	47	48	50	56	57	70	72	64	66	67	67	67	67	72	70	65	65	65	62	59	56	53	51	47
	L7 BE drive platform N side @ 1m to Gbox & 1m to E side of BE	359	6/10/2017	35	41	46	50	51	52	54	58	66	68	62	66	65	63	70	66	66	66	64	64	63	60	57	53	49	45	40
	L7 BE drive platform N side @ 1m to BE	360	6/10/2017	35	41	45	48	49	52	54	59	71	71	62	61	62	60	63	62	59	61	59	57	58	54	51	47	43	39	34

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																									
Number	Description			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
	L7 BE drive platform S side @ 1m to BE & 1m W side of motor	361	6/10/2017	36	41	44	47	51	51	55	66	70	71	65	63	65	69	66	65	67	65	64	62	63	60	59	57	53	50	47
	L7 BE drive platform W side @ 0.6m to BE	362	6/10/2017	34	40	42	47	50	55	54	60	71	70	60	60	61	60	59	59	59	58	58	55	53	51	49	45	41	37	32
	L7 centre between cylinders	363	6/10/2017	42	47	43	47	44	49	53	58	68	68	61	62	63	61	61	61	60	60	61	58	57	57	55	54	51	48	43
	L7 NW corner 2m to edge and stack	364	6/10/2017	37	44	49	50	44	48	52	60	68	67	63	62	64	61	58	57	56	57	56	53	52	51	49	47	44	41	36
	L7 PHT centre N side opening to platform to L7 door 17	365	6/10/2017	40	45	45	44	45	53	57	62	67	67	62	60	63	61	58	58	57	56	56	54	53	52	51	49	47	44	38
	L6 top of RM silo FA260 @ 2.5m N side	366	6/10/2017	32	40	42	49	59	54	58	62	70	72	70	71	70	71	73	73	71	70	75	67	66	64	65	65	62	60	54
	L6 top of RM silo FA260 @ 1m E side	367	6/10/2017	35	42	43	51	62	59	61	66	73	75	76	75	72	74	78	78	78	76	77	71	69	66	66	65	62	58	52
	L6 top of RM silo FA260 @ 1m to motor end (N side)	368	6/10/2017	33	40	41	45	57	55	58	63	70	73	72	77	74	75	77	77	74	76	83	72	71	67	66	65	65	61	55
	L6 RM silo top on BE EL15 platform NW side @ 1m	369	6/10/2017	32	38	43	48	57	56	58	60	62	62	62	63	63	60	63	63	61	62	63	58	58	57	56	54	51	48	44
	L6 RM silo top on BE EL15 platform SW side @ 0.8m	370	6/10/2017	34	39	43	45	54	54	55	54	58	59	57	61	74	58	59	62	59	59	58	56	56	56	54	48	44	40	35
	L6 RM silo top on BE EL15 platform S side Gbox @ 1m	371	6/10/2017	39	43	46	49	55	55	56	58	66	66	60	63	76	61	62	72	66	64	62	64	63	65	63	51	47	44	38
	L6 RM silo top on BE EL15 platform E side Gbox @ 0.4m	372	6/10/2017	31	38	42	48	57	56	58	59	62	63	62	69	79	69	67	72	68	68	66	65	66	67	65	57	53	50	45
	L6 RM silo top, N side of platform @ 1m near discharge from baghouse below	373	6/10/2017	36	46	48	54	63	62	64	68	76	79	74	82	78	71	75	74	74	74	73	70	72	75	78	79	77	73	69
	L6 old PHT centre W side 2m to edge facing centre	374	6/10/2017	35	38	41	49	45	47	51	60	66	67	61	64	64	63	63	63	64	61	60	58	58	56	58	54	50	46	42
	L6 old PHT stack test port @ 200mm	375	6/10/2017	42	46	48	52	55	63	64	71	77	81	78	83	78	81	77	76	81	81	76	75	73	70	68	64	61	60	55
	L6 old PHT stack test port @ 200mm	376	6/10/2017	81	82	79	78	77	84	82	85	89	92	87	89	83	84	79	76	81	80	75	74	72	68	67	62	59	57	52
	L6 old PHT NW corner, stack @ 1m	377	6/10/2017	37	42	43	45	47	48	52	58	64	70	64	69	68	65	65	66	65	63	63	61	62	59	59	59	52	48	43
	L6 old PHT centre N side @ 2m to edge facing centre	378	6/10/2017	31	39	39	45	45	45	49	57	62	63	59	62	63	62	62	62	61	61	60	59	58	56	55	51	47	42	37
	L6 centre centre between PHTs facing W	379	6/10/2017	29	36	36	40	46	47	47	57	60	62	59	62	62	63	63	62	62	62	64	65	64	60	59	56	54	50	44
	L6 new PHT centre N side @ 2m to edge facing centre	380	6/10/2017	35	38	37	42	46	46	48	57	59	60	60	62	63	64	64	63	62	62	61	59	57	56	53	49	45	40	35
	L6 new PHT centre E side @ 2m to edge facing centre	381	6/10/2017	31	32	33	40	46	46	50	56	58	61	59	62	63	64	63	63	62	61	60	58	57	55	52	48	44	38	32
	L6 new PHT centre S side @ 2m to edge facing centre	382	6/10/2017	30	34	34	41	44	47	52	56	59	59	59	61	62	62	61	62	63	61	60	59	59	58	56	53	50	47	44
	L6 centre S side old PHT by elevator	383	6/10/2017	31	36	39	43	45	47	53	54	61	62	59	62	62	64	63	63	64	61	61	58	58	56	58	55	50	46	41

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																									
Number	Description			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
	L6 inside doorway to top RM silo room	384	6/10/2017	37	46	47	59	57	57	61	61	65	66	67	69	71	78	74	77	75	71	65	63	60	59	57	53	48	45	39
	L6 RM silo top room centre byt FA54 @ 1.2m	385	6/10/2017	30	43	49	63	57	57	67	66	68	69	70	77	74	76	72	79	83	71	71	72	67	66	63	60	57	55	49
	L6 RM silo top room in fully open E doorway	386	6/10/2017	32	40	47	56	59	57	62	64	68	69	68	73	70	74	70	81	80	68	69	69	64	62	59	55	51	49	44
	L6 RM silo top room inside S man door	387	6/10/2017	35	43	48	57	59	55	63	64	67	68	68	79	75	74	71	80	79	69	70	68	64	62	58	55	53	53	48
	L6 RM silo top room outside S man door	388	6/10/2017	31	36	41	47	49	49	55	57	61	61	63	63	62	60	63	65	64	62	61	58	56	55	53	51	47	49	46
	L5 old PHT centre S side by stair @ 2m to edge facing centre	389	6/10/2017	32	36	39	43	48	48	51	56	61	62	59	64	62	62	63	63	64	65	63	61	62	62	64	60	58	52	49
	L5 old PHT centre W side by gas valves centre	390	6/10/2017	37	40	40	42	44	45	50	59	63	65	61	63	63	61	62	62	63	67	65	63	72	69	75	71	71	64	65
	L5 old PHT NW corner @ 2m to edge, 1.2m to stack	391	6/10/2017	39	39	43	44	48	46	49	62	65	67	62	66	63	62	62	62	64	65	62	59	60	58	62	57	55	48	46
	L5 old PHT centre N side @ 2m to edge by L5 Door 5	392	6/10/2017	37	37	40	42	45	49	51	59	62	62	60	62	62	63	62	62	62	63	62	60	60	59	61	57	54	49	46
	L5 centre centre between PHTs facing S	393	6/10/2017	33	35	37	41	45	45	49	56	60	61	59	62	62	62	62	62	62	62	62	61	62	61	62	59	56	52	48
	L5 new PHT centre N side 2m to edge facing centre	394	6/10/2017	33	35	36	41	48	49	51	57	59	59	59	62	62	63	63	62	62	62	61	59	58	57	56	52	49	45	41
	L5 new PHT centre E side 2m to edge facing centre	395	6/10/2017	31	34	35	41	44	46	50	59	59	59	60	62	63	64	63	63	62	63	63	63	63	64	64	62	61	58	54
	L5 new PHT centre S side 2m to edge facing centre	396	6/10/2017	30	33	36	39	45	46	50	54	57	59	57	60	60	64	61	61	60	59	58	57	57	56	55	53	50	47	44
	L4 old PHT centre S side @ 2m to edge	397	6/10/2017	34	36	41	43	55	51	51	56	59	62	59	63	63	63	68	65	66	66	65	65	64	63	61	58	54	50	43
	L4 old PHT SW corner @ 1m to water pumps SV09	398	6/10/2017	35	37	41	45	53	50	52	58	62	61	61	69	65	64	69	70	70	72	71	69	68	67	65	63	60	57	52
	L4 old PHT centre W side @ 2m to edge facing centre	399	6/10/2017	39	41	42	42	54	52	52	59	64	67	62	65	64	63	64	65	66	67	67	64	65	64	63	59	57	53	50
	L4 old PHT NW corner 1.8m to stack	400	6/10/2017	38	39	43	44	53	51	49	61	65	65	62	64	64	62	63	63	63	65	62	59	58	57	56	52	48	43	40
	L4 old PHT centre N side on E side of cylinder	401	6/10/2017	32	39	40	42	49	48	49	58	61	60	59	62	62	62	62	62	61	62	60	58	57	55	53	52	49	48	44
	L4 centre centre between main ducts from kiln	402	6/10/2017	36	37	36	40	46	46	53	57	60	59	60	63	63	63	64	62	62	62	61	60	59	57	54	51	48	43	38
	L4 new PHT centre N side @ 2m to edge facing centre	403	6/10/2017	32	34	35	41	45	49	52	58	59	60	59	62	63	64	64	63	62	62	60	58	57	55	52	49	45	41	36
	L4 new PHT centre E side @ 2m to edge facing centre	404	6/10/2017	33	35	34	40	48	48	51	58	59	60	60	64	63	63	64	63	62	61	60	58	56	54	50	46	41	36	30
	L4 new PHT centre S side @ 2m to edge facing centre	405	6/10/2017	31	34	36	41	49	48	50	56	57	59	58	61	61	61	62	61	61	60	59	57	56	54	52	48	43	39	33
	Top of ESP E side centre platformbetween stairs facing PHT	406	6/10/2017	35	40	40	41	46	46	50	57	63	63	57	60	63	62	63	62	62	64	63	59	57	55	54	50	45	40	35
	Top of ESP S side walkway E side facing S RM7	407	6/10/2017	33	35	40	42	52	50	53	54	61	61	58	60	63	62	63	62	63	64	64	61	60	60	57	53	49	44	38
	ESP top centre E side S platform facing PHT	408	6/10/2017	35	37	40	42	50	49	51	56	59	61	58	59	62	62	63	62	62	64	63	59	57	56	55	51	46	42	36

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	Description			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
	ESP top centre N side platform to ESP opposite stack	409	6/10/2017	35	38	40	41	53	50	52	59	61	64	58	62	63	61	62	61	61	63	62	58	57	55	56	52	48	43	38
	L3 old PHT centre S side @ 2m to edge facing centre	410	6/10/2017	35	40	46	48	59	55	54	57	63	64	61	68	65	66	69	66	71	66	65	64	62	62	60	58	55	51	46
	L3 old PHT centre W side @ 2m to edge facing centre	411	6/10/2017	35	41	48	46	53	53	56	60	64	67	65	69	67	66	67	66	69	70	68	64	61	61	59	54	50	46	43
	L3 old PHT centre N side @ 2m to edge facing centre	412	6/10/2017	37	44	45	44	54	52	53	59	63	67	64	67	65	64	65	64	66	67	64	61	59	58	54	51	47	42	38
	L3 old PHT centre E side @ 2m to edge facing centre	413	6/10/2017	33	38	46	44	48	50	54	58	62	64	61	65	63	63	64	63	64	63	62	60	59	57	54	50	45	42	37
	L2.5 PHT NW corner above motor DC31, 1.1m to stack & 1.5m to top of entry duct to stack from FA39	414	6/10/2017	50	49	57	59	74	69	67	71	76	78	74	82	81	79	83	79	80	83	81	84	76	81	76	69	66	64	60
	L2.5 PHT discharge of Fan DC31 @ 0.8m	415	6/10/2017	55	51	55	62	79	75	73	73	76	76	76	83	83	79	82	80	79	81	80	78	77	79	75	71	67	65	61
	L2.5 PHT S side centre on stair platform	416	6/10/2017	35	43	47	49	61	59	60	61	66	67	63	66	69	74	79	74	75	71	68	68	65	65	63	60	53	48	42
	L2.25 PHT centre S side by E end SC48	417	6/10/2017	40	43	47	51	62	61	60	64	68	68	66	70	73	77	86	83	81	79	75	78	74	74	73	70	66	62	58
	L2.25 PHT centre W side facing fan discharge DC70 FA63 @ 4.66m, stack @ 6.35m and stack entry duct @ 6.23m	418	6/10/2017	42	52	52	58	83	77	68	69	72	75	68	75	76	77	79	77	78	77	74	74	71	73	72	66	61	58	54
	L2.25 PHT centre W side facing fan discharge DC70 FA63 @ 4.66m, stack @ 6.35m and stack entry duct @ 6.23m	419	6/10/2017	82	87	85	84	107	101	87	85	85	86	77	81	81	81	81	77	79	76	73	72	70	71	70	64	59	56	52
	L2 PHT FA63 casing @ 1m E side	420	6/10/2017	43	49	55	53	64	61	65	67	72	74	70	77	76	79	78	75	78	75	73	72	70	71	67	64	63	62	61
	L2 PHT FA63 inlet and casing @ 1m E side	421	6/10/2017	44	50	54	55	68	63	64	67	72	73	70	74	75	77	77	74	76	75	74	74	70	72	68	64	61	60	57
	L2 PHT FA63 discharge casing @ 1m W side	422	6/10/2017	48	55	58	57	75	70	71	73	73	74	74	79	79	79	80	78	79	79	77	77	75	75	73	71	68	66	63
	L2 PHT FA63 discharge @ 1m W side	423	6/10/2017	48	55	56	62	84	79	75	76	75	76	75	78	79	80	83	78	79	81	79	76	76	77	76	74	72	69	66
	L2 PHT 1m to stack entry duct S side	424	6/10/2017	50	55	57	57	76	70	63	70	75	79	72	74	77	76	79	79	79	81	77	75	73	72	69	63	59	56	52
	L2 PHT FA66 inlet filter @ 1m	425	6/10/2017	45	53	56	57	72	66	63	72	71	75	72	76	78	79	79	77	79	78	75	75	72	73	71	66	62	58	54
	L2 PHT FA66 motor and casing SE side @ 1m	426	6/10/2017	41	51	52	57	73	67	63	70	72	74	71	75	77	78	77	75	77	76	75	76	73	74	71	69	66	64	60
	L2 PHT centre N side edge @ 2m facing centre	427	6/10/2017	41	47	49	49	65	61	60	65	69	69	67	71	73	74	75	73	74	74	72	69	68	67	65	63	59	56	54
	L2 PHT NW corner @ 1.5m to stack	428	6/10/2017	47	51	54	54	69	64	62	66	72	74	68	73	79	76	74	73	74	77	74	73	72	72	70	68	67	65	62
	L2 PHT N side of duct to stack @ 1m and W of stack @ 1m	429	6/10/2017	51	54	56	54	72	67	64	70	78	81	71	74	75	74	74	77	78	78	75	73	71	69	66	62	58	54	50

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	**Description**			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
	L2 PHT N side of duct to stack @ 1m and W of stack @ 1m	430	6/10/2017	90	90	89	83	96	90	83	85	90	93	79	80	81	77	76	78	78	77	74	71	69	67	64	61	57	53	49
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	41	42	47	49	62	57	59	68	64	65	62	65	67	67	69	65	68	68	66	69	67	65	66	66	65	63	60
FA 38 & FA39	FA39 E side @6.6m in line with joint	432	6/10/2017	41	48	52	54	64	60	60	63	70	72	66	71	77	71	70	70	73	82	78	70	69	68	69	61	55	52	45
	FA39 E side @2.3m in line with columns	433	6/10/2017	44	51	57	54	64	59	59	63	70	77	68	71	77	70	70	70	74	84	77	71	71	69	71	63	58	54	46
	FA39 under E side @ 0.8m to discharge duct	434	6/10/2017	49	55	61	60	63	60	63	67	69	72	69	70	72	70	70	70	74	80	77	68	67	65	66	60	53	49	42
	FA39 E side motor platform @ 0.82m to coupling cover	435	6/10/2017	47	50	59	55	62	61	62	64	72	80	75	74	82	77	78	74	79	97	87	75	80	73	79	69	64	62	54
	FA39 motor platform centre E side@ 1m	436	6/10/2017	44	48	54	54	61	60	64	66	77	85	75	75	82	77	76	74	81	93	83	75	79	75	81	71	65	66	59
	FA39 motor N end @ 1.72 to end plates	437	6/10/2017	42	46	53	50	61	57	56	59	67	70	66	67	75	68	68	67	69	79	74	66	67	63	66	57	51	49	40
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	39	43	50	50	55	54	57	59	67	67	65	66	69	67	68	67	69	77	73	65	64	62	61	55	49	45	38
	FA39 W side at metal strip @5.39m to plinth	439	6/10/2017	42	45	50	50	59	57	56	62	72	69	65	68	76	71	71	69	74	81	84	73	70	69	73	64	58	57	48
	FA39 W side at columns @2.7m to plinth	440	6/10/2017	43	46	52	51	57	55	55	61	68	70	67	68	76	71	72	70	73	87	83	73	73	69	70	64	59	58	50
	FA39 W side motor platform at 0.8m to couling cover & 1m to coupling	441	6/10/2017	46	53	60	55	61	61	63	65	71	80	73	77	83	76	77	75	80	99	89	76	76	73	82	71	66	63	56
	FA39 W side @ 1m to cladding door open, 1.33m to casing	442	6/10/2017	45	52	58	57	63	59	59	67	78	77	66	69	73	70	71	70	72	83	82	70	68	66	67	63	60	59	54
	FA39 S side @ columns 2.7m to bearing	443	6/10/2017	44	47	55	55	62	59	58	61	69	70	66	69	71	70	70	69	70	78	77	68	66	65	64	60	54	50	46
	FA39 S side platform bearing cover @ 0.8m	444	6/10/2017	43	50	56	57	66	64	62	63	69	71	69	74	76	73	72	71	72	79	79	70	69	68	66	64	60	56	52
	Centre between FA38 & FA39 @ 10.8m facing E	445	6/10/2017	43	44	48	54	54	54	56	62	72	68	67	70	72	72	72	71	72	86	83	70	70	67	68	62	57	53	47
	Centre between FA39 & FA38 @ 7m facing W	446	6/10/2017	42	45	48	54	55	54	57	62	72	68	65	69	72	72	72	71	72	85	82	69	69	66	65	62	57	54	49
	FA38 E side @ 2.66m to base	447	6/10/2017	45	47	49	51	57	55	56	62	68	69	69	71	73	73	73	73	74	87	89	71	71	69	66	64	60	56	51
	FA38 N end @ 2.7m to base	448	6/10/2017	42	48	49	52	55	54	57	61	71	74	72	71	73	76	75	75	74	82	83	71	70	68	67	65	61	56	51
	FA38 W side @ 5.13m to base at column	449	6/10/2017	37	44	49	53	56	56	57	61	67	68	67	70	72	72	73	72	72	86	88	70	72	67	65	63	60	57	51
	FA38 W side @ 10.26m to base at wall opening	450	6/10/2017	39	43	50	49	59	57	58	60	66	67	65	67	69	70	71	69	69	82	83	67	66	64	62	61	57	53	47
	FA38 motor platform W side @ 1m to couling cover, 1.9m to casing, 0.7m to motor side	451	6/10/2017	42	46	50	57	60	58	60	64	72	75	76	76	77	79	82	80	80	95	97	79	79	78	74	72	69	64	60
	FA38 at opening on S side of road facing FA38 opening	452	6/10/2017	38	40	45	48	53	53	55	58	65	64	61	63	68	67	68	66	67	77	78	63	62	61	57	55	51	47	41

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	**Description**			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
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	41	42	47	49	62	57	59	68	64	65	62	65	67	67	69	65	68	68	66	69	67	65	66	66	65	63	60
Fan FA92	Drive and casing vent fan FA92 NE side @ 1m	229	19/09/2017	42	40	44	46	54	54	59	60	62	63	65	68	76	70	75	73	72	71	71	67	66	65	64	62	58	58	54
	Casing and inlet E side FA92 @ 1m	230	19/09/2017	42	41	45	46	50	56	57	59	60	61	63	64	70	66	69	65	65	63	62	62	60	58	58	54	56	50	45
	FA92 inlet filter S side @ 1m	231	19/09/2017	41	37	41	47	52	57	57	59	59	61	61	64	65	65	64	63	62	62	61	61	59	56	52	49	46	44	39
RM7 Area																														
0*	RM6 Door @ 1.2m	136	19/09/2017	36	37	40	45	47	55	57	61	64	66	68	72	73	71	71	70	69	69	67	65	62	57	53	50	44	38	34
0	RM6 Door @ 13m	137	19/09/2017	34	37	41	48	48	52	52	57	62	65	65	69	70	69	69	67	65	64	62	59	56	52	49	45	41	36	33
	RM7	0																												
1	Edge of road opposite main W door	138	19/09/2017	29	33	38	40	47	48	48	49	56	58	54	57	60	58	60	58	58	59	59	56	55	53	50	47	43	37	30
2	RM7 W door @ 20m	139	19/09/2017	30	35	39	42	47	51	50	54	59	60	57	60	63	61	63	62	63	63	63	61	58	56	53	50	45	40	34
3	RM7 W door @ 31.2	140	19/09/2017	34	39	43	47	50	54	58	58	65	67	67	68	72	72	74	72	71	71	70	71	69	67	65	61	57	52	46
5	N side W roll door @ 1m	141	19/09/2017	36	39	44	47	53	55	61	61	68	69	69	71	75	76	76	75	75	75	75	75	73	71	69	66	62	57	51
6	N side vent E side of bin	142	19/09/2017	37	44	48	52	52	56	54	60	66	67	64	66	71	70	71	70	69	72	72	70	68	66	64	60	55	51	46
7	Man door NE corner @ 1m	143	19/09/2017	36	41	45	50	53	56	65	63	65	66	63	65	68	67	70	68	67	69	70	67	65	63	61	57	53	48	43
8	Vent E side N corner @ 1m	144	19/09/2017	37	41	46	50	58	56	56	60	67	68	64	66	69	70	73	71	71	72	72	71	69	67	64	60	56	51	45
9	E side under main duct	145	19/09/2017	37	42	44	49	53	54	55	62	67	65	62	64	66	67	69	68	66	67	67	66	64	61	59	55	51	46	40
10	S side compressor room doors, E side @ 1m	146	19/09/2017	34	37	42	46	57	57	49	56	59	58	57	60	59	60	61	61	62	62	60	59	57	55	52	49	45	41	35
11	S side compressor room - centre door @ 1m	147	19/09/2017	33	35	41	46	60	59	48	58	63	61	61	61	62	62	64	63	63	62	61	60	58	56	54	52	49	46	41
12	Switch room fan ducts N side @ 1m	148	19/09/2017	31	36	41	45	66	66	54	70	73	68	66	69	65	65	67	64	64	65	64	62	61	60	58	56	54	51	46
12A	Under switchroom fan duct E	149	19/09/2017	35	36	43	46	64	65	64	71	73	69	76	79	68	69	70	69	68	69	67	67	66	64	65	61	60	55	51
12B	Under switchroom fan duct W	150	19/09/2017	37	39	43	50	73	72	64	82	82	72	79	81	70	68	71	68	69	70	68	67	67	65	64	63	60	57	52
4	W side N corner vent @ 1m	151	19/09/2017	33	38	42	46	52	52	54	61	64	66	64	66	70	70	72	69	70	70	70	69	67	64	62	58	53	47	41
13	Under W duct fan FA249	152	19/09/2017	39	44	50	53	57	56	55	60	72	67	61	64	64	63	66	67	64	65	65	63	61	59	57	54	50	46	41
14	2m W side W motor platform FA249	153	19/09/2017	38	39	46	49	60	57	56	61	70	69	63	64	66	66	68	69	66	67	67	66	64	61	59	57	52	48	44
14'	W side motor platform, motor drive & fan casing @ 1m	154	19/09/2017	37	40	50	54	53	59	60	62	71	69	64	68	68	68	69	71	70	70	69	69	68	64	64	62	59	56	53
15	FA249 motor end @ 1m	155	19/09/2017	33	40	47	52	54	57	58	61	66	66	64	65	67	70	72	71	70	72	70	69	69	69	64	62	58	56	52
16	FA249 motor end @ 4m at column	156	19/09/2017	36	39	46	53	59	56	57	62	65	66	61	63	66	66	69	71	66	68	69	66	65	64	61	59	53	49	45
17	FA249 motor platform E side 1m casing & motor	157	19/09/2017	37	40	53	57	56	57	59	62	73	72	67	67	68	69	70	72	70	71	70	68	69	66	66	64	61	59	56
18	FA249 platform S side @ 1m to shaft	158	19/09/2017	36	41	49	51	52	52	53	57	69	63	58	59	62	62	63	62	63	65	62	62	61	62	63	63	64	63	63
	Repeat store	159	19/09/2017	36	41	49	51	52	52	53	57	69	63	58	59	62	62	63	62	63	65	62	62	61	62	63	63	64	63	63
18'	FA249 S platform under duct inlet box	160	19/09/2017	35	39	45	50	49	50	53	58	63	62	58	59	62	63	66	67	63	65	68	62	62	59	58	57	54	52	50
19	FA249 @ 6m S side	161	19/09/2017	34	39	43	45	50	51	52	55	61	59	58	59	59	60	62	61	60	60	60	60	57	55	53	51	49	47	45
20	FA249 S side @ 10.3m to fan plinth	162	19/09/2017	37	41	44	47	51	52	54	58	61	60	58	59	61	61	61	61	60	60	60	60	58	55	52	50	48	45	42

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																									
Number	**Description**			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
21	FA249 under E side duct & 1m casing S side	163	19/09/2017	42	49	52	51	53	54	55	57	73	66	59	63	60	61	62	63	61	63	63	64	63	60	61	61	59	60	57
22A	FA250 S side @ 5m by columns	164	19/09/2017	37	41	49	51	59	56	57	61	65	66	61	65	68	67	71	72	72	70	70	67	65	63	61	61	55	51	48
22	FA250 motor end @ 1m	165	19/09/2017	35	38	46	51	53	57	58	64	70	70	64	65	69	71	71	71	70	70	71	69	68	66	64	62	59	56	53
23	FA250 E side shaft & casing @ 1m	166	19/09/2017	38	43	52	59	57	62	63	66	76	77	68	69	72	72	73	74	72	73	71	69	70	68	67	67	63	60	57
23'	FA250 E side motor centre	167	19/09/2017	36	40	47	54	55	59	62	65	71	74	66	68	70	72	72	72	70	71	71	68	69	66	66	64	59	57	54
24	FA250 W side motor shaft @ casing @ 1m	168	19/09/2017	40	44	53	62	61	61	61	67	73	75	65	69	72	74	73	75	73	75	73	72	72	70	70	67	64	63	57
25	FA250 motor @ W edge of casing ~4m	169	19/09/2017	40	41	48	54	55	60	60	63	72	75	66	68	71	72	71	71	70	70	71	68	68	66	66	63	60	57	53
26	FA250W side @ 1m to casing & inlet box	170	19/09/2017	40	43	49	54	55	57	57	60	73	74	65	66	70	69	70	69	68	70	71	67	66	66	65	62	60	57	54
27	Under inlet box duct W side	171	19/09/2017	38	43	48	52	53	57	58	61	67	69	65	64	67	67	69	68	67	70	70	67	64	63	62	59	55	52	48
28	FA250 N side platform shaft bearing @ 1m	172	19/09/2017	41	44	54	56	59	58	60	62	71	72	66	66	70	70	71	69	69	71	72	68	65	65	64	64	62	60	58
29	FA250 E side ground level under discharge casing @ 1m	173	19/09/2017	38	43	49	53	57	59	60	68	72	73	67	67	70	69	71	71	67	69	70	66	64	64	60	57	53	50	46
RM7 Roof	Lower platform E side@ 1m to Magnete	174	19/09/2017	35	39	43	51	52	53	59	59	64	66	65	65	69	71	73	75	77	78	80	79	81	81	79	76	73	70	66
	Lower platform S side@ 1m to Magnete	175	19/09/2017	35	40	43	48	51	54	60	64	64	65	70	67	69	76	75	78	80	81	83	83	83	83	82	82	81	78	71
	Lower platform W side @ 1m to Magnete	176	19/09/2017	37	40	45	48	51	54	61	61	65	66	67	68	68	70	72	75	77	78	80	81	81	80	78	75	72	69	63
	Lower platform N side @ 1m to Magnete & 1m BE casing	177	19/09/2017	36	41	47	52	55	56	62	63	66	67	65	65	68	72	73	75	76	77	79	80	82	86	80	76	72	68	63
	Lower platform N side BE @ 1m	178	19/09/2017	39	41	46	53	55	54	60	60	66	68	62	65	66	69	70	70	71	74	73	74	76	79	77	74	70	65	61
	On adjacent platform @ 7m S side of Magnete	179	19/09/2017	36	39	42	46	48	50	53	56	61	61	59	59	61	64	65	65	67	67	68	69	70	69	67	64	62	59	56
	Upper platform NE of GB & drive shaft BE @ 1m	180	19/09/2017	32	36	44	53	56	56	59	61	62	64	62	62	65	67	69	68	70	71	71	71	73	74	71	67	64	60	55
	Upper platform N side of GB & drive @ 1m	181	19/09/2017	41	46	51	56	56	58	62	66	67	66	62	63	65	68	69	70	71	71	72	71	73	73	71	67	64	59	54
	Upper platform W side motor end @ 1m	182	19/09/2017	34	38	44	52	54	53	61	62	65	66	62	62	64	66	69	68	69	71	72	72	74	74	70	67	65	61	57
	Upper platform W side BE @ 1m	183	19/09/2017	37	40	43	49	54	54	61	59	63	64	60	61	64	66	67	66	68	69	70	70	72	72	69	65	62	59	53
	Upper platform S side BE door @ 0.5m	184	19/09/2017	40	43	48	57	60	57	61	62	64	63	62	62	67	70	73	74	72	75	75	77	78	79	78	75	73	70	65
	Upper platform E side BE @ 1m	185	19/09/2017	41	45	49	52	56	57	59	60	63	65	61	62	65	67	69	67	69	70	70	70	71	72	69	65	61	57	52
Baghouse Tower FA250	Platform same level as RM7 top access S side	186	19/09/2017	42	47	49	51	54	53	53	54	66	61	55	56	56	58	59	59	58	58	57	56	56	53	51	47	43	41	37
	Top platform at BH top level S end	187	19/09/2017	35	40	43	45	48	49	50	54	57	58	57	57	58	61	61	61	62	62	62	63	69	73	70	73	76	75	71
	In baghouse S doorway open	188	19/09/2017	34	38	42	45	47	49	54	58	62	64	59	60	61	68	65	64	65	66	67	69	71	71	71	71	68	68	65
	Inside baghouse centre	189	19/09/2017	32	34	41	44	47	45	49	53	59	60	59	60	62	65	65	65	66	68	69	71	73	74	75	73	71	69	65
SC12 platform	W end 1m to SC end	213	19/09/2017	43	44	48	52	52	54	60	62	62	63	66	67	67	69	70	69	66	69	65	63	60	58	60	53	55	53	44

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																									
Number	**Description**			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
	Centre SC12 under centre hopper of Baghouse	214	19/09/2017	40	40	45	51	58	56	59	63	67	68	64	69	76	87	85	81	81	95	83	87	90	89	87	84	93	87	89
	E end of platform near SC214 N end	215	19/09/2017	46	44	46	57	59	59	59	63	64	67	64	69	74	76	72	71	69	70	68	69	68	63	60	57	54	50	45
Base of baghouse hopper level	SW corner by S end SC211	216	19/09/2017	39	43	45	57	68	63	64	71	73	77	72	71	73	71	69	69	69	68	68	68	65	66	71	63	55	51	47
	Centre W side, on E side SC211	217	19/09/2017	41	45	51	60	62	61	66	68	72	76	74	73	78	76	73	72	72	72	75	70	68	69	66	66	59	54	48
	Centre E side on W side SC210	218	19/09/2017	46	56	55	54	54	58	65	68	74	76	78	83	81	81	82	80	78	77	76	75	72	71	68	69	64	62	61
	N side FA252 & inlet	219	19/09/2017	45	50	50	57	57	62	67	69	74	77	79	82	83	84	86	84	82	83	83	83	81	80	78	75	72	67	61
Hopper base level	N end	220	19/09/2017	36	45	44	47	54	53	58	61	65	67	69	69	70	72	73	68	71	69	69	69	67	66	64	61	57	51	45
	Centre centre of platform between hopper bottoms	221	19/09/2017	43	46	46	54	51	51	58	58	61	65	65	70	70	71	78	72	73	70	67	66	66	65	59	63	69	69	61
RM7 Inside	Top level inside E doorway	190	19/09/2017	38	42	46	49	51	56	59	66	66	69	69	71	75	77	79	78	79	79	79	80	79	78	76	73	69	64	58
	Top level N side BE @ 1m	191	19/09/2017	40	43	44	53	53	53	59	66	68	71	71	71	75	76	78	78	79	79	79	80	79	78	76	73	70	65	60
	E side BE and conveyor feed DC206	192	19/09/2017	40	46	47	52	53	54	59	67	68	72	73	73	77	79	81	81	82	83	84	86	85	85	84	81	78	74	70
	By top of RM7	193	19/09/2017	39	45	46	48	51	53	59	63	69	72	75	74	78	79	81	80	81	82	82	83	81	81	79	77	73	69	65
	Top level W side of conveyor feed chute to RM7	194	19/09/2017	37	44	46	52	53	57	59	65	68	72	74	74	77	81	82	81	82	82	84	85	84	84	83	81	78	75	70
	Top level, W side of conveyor entry to chute	195	19/09/2017	36	43	45	49	52	55	60	66	69	71	72	73	76	79	80	80	81	82	83	84	83	83	81	79	76	73	69
	Top level W side of platform	196	19/09/2017	35	40	44	49	52	54	57	64	68	71	72	72	76	78	80	78	79	78	79	80	78	77	75	72	69	64	59
	Top level N side at wall opening for conveyor	197	19/09/2017	37	41	44	50	52	55	58	61	68	70	69	69	72	75	76	75	76	77	77	78	77	76	73	71	67	63	58
	Top level - feed conveyor walkway half-way - 10m to RM7	198	19/09/2017	43	46	50	53	56	56	58	60	64	65	62	63	67	71	72	68	70	70	69	68	69	66	66	61	56	51	45
	Level 3 BE N side @ 2.5m	199	19/09/2017	44	44	45	49	50	56	59	65	69	72	72	72	77	78	80	78	78	79	79	79	78	76	74	71	67	62	56
	Level 3 by duct from RM7 top @ 1m N side	200	19/09/2017	41	47	49	51	52	57	63	67	69	75	75	76	79	80	82	82	83	84	87	88	86	84	83	82	78	74	69
	Level 2 BE N side @ 2.5m & to N wall	201	19/09/2017	43	46	47	49	51	55	63	64	70	71	72	73	77	79	80	78	79	78	78	78	77	75	72	69	64	59	53
	Level 2 RM7 top & duct E side	202	19/09/2017	41	46	50	55	55	58	61	68	70	73	74	75	78	80	81	80	81	81	81	82	80	79	77	76	72	69	65
	Level 1 work bench BE N side @ 2.5m and N wall	203	19/09/2017	42	42	44	51	53	56	66	70	70	72	73	74	79	79	81	79	80	79	78	79	77	75	72	69	65	60	54
	Level 1 on RM7 platform W side @ 1m to body	204	19/09/2017	44	48	50	54	55	68	67	77	72	73	73	75	81	84	84	83	83	82	82	82	81	79	77	75	72	68	63
	Mezzanine platform W of RM7 body @ 3m	205	19/09/2017	36	45	47	50	53	58	68	72	70	74	75	76	80	82	84	81	81	80	80	81	80	78	75	73	70	66	63
	Ground floor E side of VF100 @ 1m and 2m to BE casing	206	19/09/2017	40	47	49	54	57	67	72	76	73	76	74	75	78	81	83	83	83	84	85	85	84	84	81	78	74	70	64
	Ground floor N side of BE @ 2.2m	207	19/09/2017	38	44	43	50	54	65	67	66	71	75	73	72	75	78	80	79	79	80	80	80	79	78	77	73	69	64	58
	Ground floor NE corner	208	19/09/2017	39	41	44	47	52	54	61	62	68	71	71	71	75	78	79	77	78	77	77	78	76	74	72	69	64	60	54
	Ground floor centre W side @ 4m to motor end	209	19/09/2017	38	43	45	53	54	59	65	72	71	74	75	76	82	82	82	80	80	80	80	81	79	77	75	72	68	64	59
	Ground floor motor N side @ 1.5m	210	19/09/2017	42	48	50	54	56	57	69	72	73	75	76	76	80	82	83	83	84	83	83	84	82	80	79	77	73	69	64

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	**Description**			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
	Ground floor S side motor & RM7 body @ 2m	211	19/09/2017	38	44	49	50	55	57	64	68	71	74	74	75	79	81	83	81	82	82	82	85	81	79	78	76	72	69	62
	Ground floor S side RM7 body centre	212	19/09/2017	44	49	49	49	51	52	62	68	71	75	73	74	78	81	83	81	82	81	81	83	81	79	77	75	71	68	62
Kiln 6 North and South sides																														
30	Coal Road S side in line W side RM7	3	19/09/2017	25	31	31	35	39	43	48	50	57	57	52	52	53	52	52	52	54	52	52	49	48	46	43	41	37	32	27
31	Coal Road S side in-lin E side RM7	4	19/09/2017	27	31	39	41	42	48	48	53	58	58	54	60	60	59	60	62	63	60	59	59	57	57	53	51	48	45	40
32	Coal Road S side in-line FA249	5	19/09/2017	28	32	35	39	45	49	49	53	56	54	52	54	55	54	55	55	55	55	54	52	51	49	46	44	41	36	31
33	Coal Road S side Centre Blending Silo	6	19/09/2017	30	33	38	40	44	48	49	54	54	53	52	55	56	55	56	56	56	56	55	53	52	49	47	45	42	38	33
34	Coal Road S side E side PHT	7	19/09/2017	32	35	38	41	45	47	49	54	55	55	52	55	55	55	57	57	56	56	55	54	53	50	48	45	43	41	36
35	Coal Road S side E side new PHT	8	19/09/2017	30	32	35	39	48	47	49	55	56	57	51	53	54	56	56	57	57	56	55	54	52	49	46	43	40	36	32
36	Coal Road S side E side drive platform	9	19/09/2017	29	33	36	40	47	47	48	58	57	57	52	55	55	55	57	57	57	56	55	54	52	50	48	45	42	38	35
37	Coal Road S side centre column W support duct	10	19/09/2017	31	36	38	41	44	46	48	57	57	56	56	56	56	56	57	57	57	57	56	54	52	50	47	44	41	38	33
38	Coal Road S side centre pedestal	11	19/09/2017	31	35	37	39	44	47	49	56	56	55	58	59	57	56	59	58	58	58	57	56	52	49	46	42	41	36	34
39	Coal Road S side Between centre & E pedestal	12	19/09/2017	25	32	34	38	44	47	49	56	57	55	55	57	55	56	57	58	58	58	56	54	52	49	45	40	35	30	25
40	Coal Road S side E pedestal	13	19/09/2017	27	32	33	36	44	46	48	56	58	53	57	58	55	55	58	57	58	57	55	53	51	48	44	40	36	33	28
41	Coal Road S side W end Firing floor building	14	19/09/2017	25	32	32	36	45	45	47	52	53	53	53	57	54	55	56	55	56	55	54	52	49	46	42	38	33	29	24
42	Coal Road S side opposite grate	15	19/09/2017	27	32	34	37	40	45	47	52	52	50	55	58	56	55	57	56	57	56	56	54	52	50	46	41	36	32	27
43	Coal Road S side W side coal receival bin 25m to truck	16	19/09/2017	32	35	38	40	42	42	44	47	50	50	48	56	56	54	54	53	53	52	51	49	47	44	41	37	33	29	24
43	A Kerb E side CM opp CM fan discharge	17	19/09/2017	28	34	36	43	44	45	50	54	57	59	59	71	66	64	64	62	61	60	60	59	57	55	51	46	41	36	30
43A	Kerb opposite CM fan discharge	472	6/10/2017	29	39	41	48	45	47	52	54	57	61	61	66	66	68	75	69	64	62	62	61	60	57	54	51	48	45	39
Southern fence line																														
43*	S fence Opp E end kiln	273	19/09/2017	25	30	31	34	43	41	41	46	44	45	41	47	47	47	49	48	47	47	45	43	41	39	36	33	30	26	22
38*	S fence at corner post opp centre pedestal of kiln	274	19/09/2017	24	29	31	34	42	41	43	49	50	49	48	50	51	52	51	50	50	50	49	46	44	41	37	32	28	23	18
34*	S fence, Opposite W side PHT	275	19/09/2017	22	27	30	33	39	39	41	45	48	51	50	52	50	47	48	48	47	47	46	43	42	39	37	33	30	29	24
Coal Mill South wall Area																														
44	CM fan room door @ 2m	18	19/09/2017	38	41	42	46	48	50	57	59	67	69	68	78	74	74	75	75	75	73	74	73	71	70	66	63	59	53	47
44	CM Fan Room door open S side @ 1.5m to open door, 4m x 4m	469	6/10/2017	40	49	50	50	50	53	60	64	70	73	75	80	78	78	80	78	76	75	74	73	71	69	67	67	61	58	56
45	CM S roll door and wall vent @ 10m S side	20	19/09/2017	33	37	40	44	48	50	54	56	59	61	62	69	68	68	68	67	67	67	67	67	65	64	60	57	53	47	40
45'	~20m S of CM open doorway and motor room	471	6/10/2017	29	37	37	42	51	49	54	58	60	63	66	66	67	69	70	66	69	68	67	66	65	64	61	59	54	49	43
46	CM room wall vent @ 2m	21	19/09/2017	33	39	40	46	50	52	56	56	59	61	65	66	66	67	68	68	67	67	67	66	64	61	57	54	50	44	37

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	**Description**			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
46	Doors to CM room open S side - in doorway 4.5m x 4m	470	6/10/2017	38	45	44	51	52	57	63	66	70	73	76	79	81	81	84	82	81	81	81	81	80	78	76	73	70	65	60
47b	b Between Grate and Coal Mill Room	22	19/09/2017	38	42	44	47	52	58	61	62	67	69	73	73	76	75	80	77	74	75	76	73	70	67	64	60	56	50	43
47a	A At kerb in line East End of Grate	23	19/09/2017	35	36	41	47	49	53	57	58	62	62	65	66	68	69	71	71	69	69	68	67	65	62	59	56	53	48	43
47	Opp FA264 & Shute	24	19/09/2017	35	37	42	46	48	54	58	59	62	62	68	68	69	72	72	72	71	72	71	70	68	66	64	62	60	57	54
47c	c FA 200 S Side @ 5m	25	19/09/2017	34	37	42	46	51	56	58	63	66	67	71	71	72	75	71	73	73	70	69	68	67	64	61	59	57	54	48
48	Opp. E pedestal roller	26	19/09/2017	33	37	41	46	50	56	59	65	66	66	75	73	71	72	71	72	72	71	70	68	67	64	61	58	55	51	46
49	Half way between centre & E pedestals	27	19/09/2017	30	35	39	45	51	58	60	64	66	65	70	72	73	73	74	74	74	73	72	71	69	67	64	60	57	52	46
50	Opp. Centre pedestal	28	19/09/2017	30	36	38	43	51	55	58	63	64	61	67	71	70	70	70	70	69	69	68	66	65	62	59	55	51	46	41
51	Half way between Centre & Western pedestals	29	19/09/2017	31	37	38	43	50	53	56	62	64	60	63	65	65	65	68	66	66	65	65	63	61	59	57	53	49	44	38
52a	A Opp E end of kiln drive platform	30	19/09/2017	32	38	40	43	46	51	55	61	62	60	63	67	64	65	72	66	66	64	63	62	60	57	56	52	46	43	35
52	Opp W pedestal roller	31	19/09/2017	36	38	42	43	52	52	54	59	60	59	60	63	65	64	68	66	67	64	63	62	60	57	55	52	47	44	38
Kiln Drive Platform	S side S motor end @ 1.5m kiln drive	222	19/09/2017	35	41	43	48	60	57	59	63	66	68	67	74	68	72	78	71	70	70	70	70	72	68	73	69	61	59	50
	S side S drive GB @ 1.5m kiln drive	223	19/09/2017	35	42	43	46	60	59	59	63	64	70	68	78	69	74	85	76	73	72	71	71	69	68	73	69	63	61	53
	S drive motor end @ 1m kiln drive	224	19/09/2017	41	44	47	51	60	59	61	63	65	70	67	74	69	75	85	74	72	72	73	72	77	73	74	71	63	60	53
	Between drive motors kiln drive	225	19/09/2017	39	44	46	45	58	60	64	65	67	68	72	83	71	77	84	75	74	74	76	76	73	70	75	72	63	61	54
	N side motor end @ 1m kiln drive	226	19/09/2017	42	45	48	51	60	59	63	65	66	70	67	72	70	74	81	74	72	73	74	72	72	70	71	70	65	62	56
	N side motor N end @ 1.5m kiln drive	227	19/09/2017	34	40	44	48	56	56	62	65	64	68	67	76	70	71	78	72	71	72	72	71	69	66	67	68	61	56	52
	N side N gearbox @ 1.5m kiln drive	228	19/09/2017	35	43	45	47	57	57	62	62	65	68	67	75	72	72	83	76	72	73	75	73	71	68	69	68	64	59	56
53	Kiln drive platform Centre E end on platform	32	19/09/2017	37	40	40	44	48	49	52	55	60	62	60	65	63	63	64	62	63	63	63	62	61	58	54	50	43	38	33
54	W end RM6	33	19/09/2017	31	37	39	42	45	47	49	54	59	60	54	57	60	58	59	57	56	59	60	52	50	49	43	39	36	34	32
55	Centre RM6	34	19/09/2017	31	36	39	42	48	49	51	54	60	60	55	58	60	59	61	58	58	64	64	55	53	52	46	41	37	35	30
56	E End RM6	35	19/09/2017	35	38	43	44	48	49	52	56	64	63	58	60	63	62	64	62	62	69	71	59	58	56	51	48	45	40	35
57	N side of road opposite opening to FA38	453	6/10/2017	37	39	45	45	51	50	53	56	61	63	59	61	65	65	66	63	63	72	74	60	59	58	54	51	47	42	37
57'	N side of kerb opposite FA38 roll door closed	454	6/10/2017	37	42	43	48	56	54	55	58	64	65	63	67	68	67	70	66	67	77	78	63	61	59	57	53	47	41	34
57	Door opp FA38	36	19/09/2017	35	44	45	48	55	54	54	58	66	65	62	65	66	65	67	65	66	73	74	63	61	58	54	49	44	38	32
58	Half way between FA38 & FA39	37	19/09/2017	37	46	49	48	60	57	56	59	66	66	62	66	67	66	67	66	68	76	73	65	62	59	55	51	44	39	32
58	Half way between FA38 & FA39, N side of road	455	6/10/2017	39	44	46	49	62	58	56	59	65	68	64	66	69	66	69	66	69	75	75	65	64	61	60	53	47	41	33
59	Opp FA39 end	38	19/09/2017	37	43	50	50	58	56	56	59	64	66	63	69	71	67	68	67	70	78	74	66	64	61	58	53	48	43	36
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	39	43	50	50	55	54	57	59	67	67	65	66	69	67	68	67	69	77	73	65	64	62	61	55	49	45	38
60	Opp Conditioning Tower	39	19/09/2017	38	44	50	49	54	53	56	59	67	67	63	67	68	66	67	66	69	76	73	65	63	61	58	53	47	42	36
60	Opposite conditioning tower N side of road	456	6/10/2017	38	45	48	51	57	55	58	60	66	67	64	67	69	67	70	67	69	81	75	67	66	64	62	57	50	46	38
60'	Opposite NW PHT column	457	6/10/2017	41	44	46	49	59	56	58	61	65	65	64	67	67	66	67	66	71	80	71	64	63	61	62	54	49	44	36
61	Opp centre PHT	40	19/09/2017	39	45	42	44	51	54	57	61	64	64	61	66	66	65	67	64	65	70	66	63	60	58	53	49	43	37	32
61	Opposite NE PHT column	458	6/10/2017	38	43	43	44	54	54	57	62	64	65	63	66	67	66	67	65	66	73	68	63	62	59	56	51	46	40	34
63	Opp E side new PHT	43	19/09/2017	34	41	42	42	52	54	57	62	63	62	61	65	66	66	68	66	65	66	66	63	62	59	55	52	47	43	38
63	Opposite E side new PHT	459	6/10/2017	35	41	46	50	51	52	54	58	66	68	62	66	65	63	70	66	66	66	64	64	63	60	57	53	49	45	40

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Site measurement LAeq Spectral data

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64	Opp. E end drive platform	42	19/09/2017	32	42	42	43	52	55	59	64	63	62	63	66	66	67	70	68	67	67	66	65	63	60	57	54	50	45	41
65	Opp column for return duct W side	44	19/09/2017	37	42	44	44	53	58	60	64	64	63	66	69	70	71	71	70	69	69	69	68	66	64	61	58	54	50	44
65	Opposite S duct support tower	460	6/10/2017	30	41	42	44	53	56	60	63	63	63	66	71	69	69	71	69	68	68	68	67	65	63	61	58	54	49	43
66	Opp centre pedestal	45	19/09/2017	31	36	37	42	52	58	60	65	66	68	71	74	75	75	75	75	75	75	74	72	71	69	65	62	58	53	47
67	Half way between centre & e pedestals	46	19/09/2017	31	36	41	47	51	57	60	65	68	69	70	73	75	75	75	75	75	75	74	73	71	69	66	63	59	55	49
68	Opp E pedestal	47	19/09/2017	33	40	43	45	57	63	64	68	68	69	73	76	76	76	77	76	76	75	75	73	71	69	66	63	59	55	48
69	Centre courtyard	48	19/09/2017	40	43	47	50	56	60	63	67	69	68	74	75	75	76	76	75	75	74	74	72	70	68	65	64	59	56	51
Grate Cooler Fan Courtyard Area		0																												
	FA201 N side coupling @ 1.5m	234	19/09/2017	39	42	46	53	61	65	67	71	72	73	76	78	80	82	83	81	80	79	78	76	75	72	70	68	63	61	57
	FA201 N side inlet & casing @ 1m	235	19/09/2017	38	43	51	57	62	68	70	72	73	74	76	80	82	82	84	83	82	80	79	78	76	73	71	69	65	62	57
	Between FA201 & FA203 & 1.5m to FA202 N side	236	19/09/2017	40	47	52	62	64	68	70	72	72	73	80	81	83	84	85	85	83	83	83	81	79	77	75	75	72	68	62
	FA203 inlet & casing @ 1m	237	19/09/2017	43	46	53	56	61	66	67	69	72	74	78	78	79	80	80	80	78	78	76	74	72	71	68	70	62	58	54
	Between FA203 & FA205 and 2m to FA204 N side	238	19/09/2017	45	44	53	59	62	68	69	69	72	73	76	78	79	80	79	79	78	78	76	74	73	71	69	71	64	60	57
	Between grate and Coal Mill Room W door	239	19/09/2017	39	43	44	51	56	60	59	64	68	69	75	75	76	77	78	76	75	76	75	73	71	68	65	62	57	51	45
	Coal Mill Room N roll door @ 1m	240	19/09/2017	36	43	45	51	56	59	61	61	68	68	72	76	75	76	79	77	74	73	73	71	69	70	67	63	59	53	46
Kiln Firing Floor	KFF centre opening N side	248	19/09/2017	32	37	43	51	52	56	64	66	67	65	68	70	69	71	72	72	72	74	75	74	74	75	74	71	70	67	63
	FA209 E side inlet & filter silencer	249	19/09/2017	32	38	44	50	56	62	68	70	73	72	72	73	74	75	76	76	76	75	75	73	71	69	67	65	61	57	52
	FA209 W side inlet @ 1.2m	250	19/09/2017	32	39	45	53	58	64	67	72	74	74	76	80	80	82	85	84	84	83	82	82	80	78	75	72	69	65	61
	KFF centre S side opening	251	19/09/2017	37	40	43	47	51	53	58	60	63	63	65	70	67	69	72	73	72	74	74	72	71	69	67	66	66	62	55
	FA210 S side seal fan inlet E side @ 1.5m	252	19/09/2017	32	37	43	49	55	57	64	66	70	70	69	73	76	82	84	86	83	82	81	80	79	77	74	71	68	67	62
	FA210 S side seal fan inlet W side & casing @ 1m	253	19/09/2017	31	36	43	51	54	58	62	66	67	69	70	70	72	74	77	79	77	75	74	72	70	68	65	62	58	56	50
	FA200 inlet N side @ 1.2m	254	19/09/2017	37	42	47	51	58	65	66	70	72	72	77	76	76	78	77	77	77	77	75	73	72	70	68	65	61	58	54
	New replacement FA211 centre under kiln, inlet @ 1m	255	19/09/2017	38	42	49	59	60	63	69	77	78	79	83	83	88	87	88	85	85	84	85	85	83	82	81	79	77	74	69
	Centre KFF @ 2m to elevator conveyor duct S side	256	19/09/2017	32	38	43	46	51	55	58	61	63	64	66	68	66	69	70	70	71	74	72	71	70	68	66	64	63	59	52
	KFF burner air cannon N side @ 2m	257	19/09/2017	34	38	45	49	53	58	62	65	65	65	68	69	69	71	73	74	73	77	79	78	77	79	80	82	81	80	78
	KFF burner air cannon N side @ 2m	258	19/09/2017	34	39	45	50	53	58	63	65	65	65	68	69	69	71	73	74	74	77	80	78	79	80	82	80	80	80	78
Radicon Cooler	L1 S side fan @ 0.6m	259	19/09/2017	36	43	48	57	69	73	74	77	78	81	81	82	83	84	83	81	78	78	76	75	74	76	72	69	64	60	56
	L1 centre fan @ 1m	260	19/09/2017	34	41	47	59	65	67	69	73	75	77	80	80	81	83	81	80	77	76	74	72	71	73	69	66	61	57	53
	L1 N side fan @ 1m	261	19/09/2017	35	42	48	54	64	65	66	70	72	74	78	79	78	83	80	80	76	75	73	72	70	70	67	63	58	54	49
	L2 centre fan @ 1m	262	19/09/2017	34	42	48	56	68	70	70	77	79	80	82	83	83	87	86	86	81	80	78	76	75	75	72	69	65	62	58
	L2 S fan @ 0.6m	263	19/09/2017	38	45	50	58	73	73	73	78	79	80	83	83	84	87	85	87	84	82	78	76	75	75	72	68	64	61	57
	L2 N fan @ 1m	264	19/09/2017	37	42	48	56	69	70	69	75	76	78	82	84	83	89	87	90	84	82	79	77	75	74	72	69	66	63	58
	L3 centre fan @ 1m	265	19/09/2017	37	43	48	55	68	71	71	76	78	80	81	82	84	86	85	86	81	83	81	79	80	79	76	71	68	64	61
	L3 S side fan @ 0.6m	266	19/09/2017	38	46	51	58	73	73	74	77	79	81	83	83	84	85	85	86	82	81	78	77	77	77	73	69	65	61	57
	L3 N side fan @ 1m	267	19/09/2017	36	43	48	55	69	69	69	76	77	78	82	82	84	87	87	87	81	83	80	78	78	77	74	71	68	64	60
	L4 centre fan @ 1m	268	19/09/2017	35	43	50	56	64	64	65	71	72	75	79	79	79	82	79	80	80	90	87	86	84	83	82	77	72	69	64

Table 3.2A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																										
Number	**Description**			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
	L4 S side fan 2 0.6m	269	19/09/2017	39	50	55	56	64	65	64	70	71	73	76	78	77	78	77	82	88	85	79	83	81	84	79	75	70	63	56
	L4 N side fan @ 1m	270	19/09/2017	36	43	48	52	61	62	63	69	71	73	77	79	77	80	78	78	75	83	79	76	77	76	75	68	63	59	54
	L5 face E	271	19/09/2017	35	43	48	52	60	60	61	68	69	68	73	75	72	74	71	71	73	78	75	73	72	73	69	64	59	54	48
	L5 face W	272	19/09/2017	34	41	46	50	58	58	62	66	66	69	72	74	74	75	72	73	76	78	76	74	72	72	70	65	60	55	50
Stack Fan FA215	S side ground level @ 2m to motor end FA215	241	19/09/2017	33	45	45	48	51	54	58	61	64	66	67	70	70	70	71	69	68	68	68	69	70	70	69	63	59	56	50
	FA215 platform E side motor & casing @ 1m	242	19/09/2017	35	45	44	48	53	56	58	61	70	70	67	71	73	73	73	74	72	71	72	73	74	75	73	68	64	62	59
	FA215 platform W side motor & casing @ 1m	243	19/09/2017	34	43	43	54	54	57	57	61	68	69	69	71	74	75	74	76	75	73	74	75	73	74	73	68	65	64	61
	FA215 E side under discharge duct @ 1m	244	19/09/2017	41	44	46	53	54	56	57	59	63	66	65	69	69	68	68	68	66	65	65	66	66	67	65	59	54	52	44
	FA215 platform N side on E side of inlet box @ 0.5m and duct casing @ 0.8m	245	19/09/2017	34	44	44	54	55	55	60	60	65	66	64	69	71	68	68	65	63	62	61	61	61	63	62	52	45	41	38
	FA215 N platform centre N side inlet box @ 0.8m	246	19/09/2017	33	40	41	49	52	56	58	59	63	66	63	66	68	68	67	66	63	62	60	58	57	61	63	55	46	38	31
	FA215 N platform W side under inlet duct @ 0.8m	247	19/09/2017	33	39	41	50	55	58	58	58	62	68	68	70	71	71	71	70	68	67	66	65	64	65	65	57	52	47	41
Control Building Roof																														
	SW corner	279	19/09/2017	30	37	37	40	46	46	49	53	59	61	56	57	61	63	63	61	63	61	61	57	54	51	47	41	35	31	25
	SE corner	280	19/09/2017	28	36	35	38	44	47	50	55	59	61	57	59	62	64	64	61	63	62	60	58	54	52	48	42	37	30	22
	NE corner	281	19/09/2017	27	36	36	40	45	46	49	53	58	59	57	58	62	64	64	61	61	61	59	57	54	51	47	42	49	30	22

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
PHT	L8+ Top NW corner Pointing to stack @ 18m	336	6/10/2017	2.4	1.4	3.3	2.5	1.9	0.9	4.2	6.0	4.4	6.8	0.5	7.3	4.2	2.5	3.5	2.2	1.1	1.4	1.8	1.9	1.0	2.1	3.4	0.9	0.5
	L8+ Top NW corner Pointing to Gbox & motor @ 0.6m	337	6/10/2017	3.0	1.7	3.7	1.7	0.0	0.3	3.3	3.3	4.1	3.6	2.7	7.2	3.7	1.6	3.1	3.0	1.7	1.2	0.6	0.0	0.0	4.2	5.2	2.0	2.0
	L8+ Top SW side BE, 1m to motor	338	6/10/2017	1.2	3.1	2.0	0.5	0.6	1.9	0.4	1.7	3.7	3.9	1.3	6.2	4.2	0.9	3.1	2.4	0.4	2.5	1.2	0.4	0.4	3.6	4.8	1.9	1.8
	L8+ Top S side BE bearing @ 350mm	339	6/10/2017	3.1	2.1	2.1	2.8	0.4	1.1	0.4	0.5	3.7	1.8	4.2	8.0	3.8	1.5	1.7	1.7	0.3	0.9	2.1	3.2	1.6	0.9	0.8	0.9	1.3
	L8+ Top NE corner Gbox @ 1m	340	6/10/2017	1.9	3.1	0.5	1.4	5.0	0.8	2.2	2.3	4.1	5.1	3.6	11.6	7.3	1.8	4.1	3.1	0.8	0.8	2.6	3.2	1.5	0.1	0.3	0.5	0.0
	L8+ Lower platform, pointing to stack @ 17m	341	6/10/2017	0.4	3.3	2.3	0.6	0.2	0.6	2.5	4.2	2.8	4.0	0.3	4.5	2.9	0.8	1.4	1.1	0.2	2.0	1.3	0.4	0.4	0.6	2.0	0.8	0.1
	L8+ Lower platform, pointing to Gbox & BE drive @ 3.2m	342	6/10/2017	0.5	3.6	1.6	0.5	0.8	0.0	1.8	4.5	3.1	3.3	3.2	6.7	2.8	1.1	1.2	0.6	0.0	1.5	1.2	0.5	0.2	1.5	2.3	1.4	0.7
	L8 FA263 @ 1m to N side	344	6/10/2017	4.8	0.6	1.3	1.3	1.2	3.0	3.0	6.0	5.6	3.2	2.3	0.8	2.0	3.6	8.1	5.3	1.9	4.8	2.5	2.3	0.9	0.2	0.6	0.6	1.3
	L8 Vent for inlet filter shed AS35 FA263	345	6/10/2017	3.9	0.5	0.5	2.1	0.6	1.3	0.1	2.9	6.4	1.8	0.2	0.3	1.1	2.3	8.3	5.3	2.1	4.3	0.8	0.3	0.5	0.2	0.4	0.2	0.8
	By L7 access door 13 @ 2m on top of PHT	346	6/10/2017	5.0	2.9	1.0	1.6	0.4	1.6	2.9	3.5	5.3	4.2	0.0	0.4	0.3	1.8	3.3	2.6	1.9	0.0	1.3	1.7	0.4	0.2	0.4	0.0	1.1
	L8 new PHT centre	347	6/10/2017	0.3	0.5	1.0	1.7	0.9	0.9	0.5	1.9	3.2	2.7	0.2	0.6	0.2	0.6	1.2	0.5	0.2	1.1	0.9	0.8	0.4	0.4	0.8	1.5	0.1
	L8 new PH centre N side @ 2m to edge, facing centre	348	6/10/2017	1.3	0.8	1.1	1.2	0.5	0.1	0.6	0.4	3.7	3.9	1.2	0.4	0.9	0.1	0.4	0.2	0.3	0.3	0.1	0.5	0.4	0.4	0.1	0.1	0.7
	L8 new PH centre E side @ 2m to edge, facing centre	349	6/10/2017	1.9	3.6	0.3	0.5	0.9	1.6	0.1	2.8	2.7	3.4	0.7	0.1	0.5	0.4	1.1	1.0	0.8	0.5	0.6	0.5	0.8	0.5	1.1	1.4	0.0
	L8 new PH centre S side @ 2m to edge, facing centre	350	6/10/2017	0.4	1.4	1.7	0.9	0.4	2.1	0.7	1.1	3.1	1.5	1.0	0.5	0.4	0.8	0.7	0.3	0.3	0.1	0.1	0.1	1.3	0.1	1.2	2.2	0.3
	L7 new PH centre S side @ 2m to edge, facing centre	351	6/10/2017	2.6	1.6	3.6	2.9	2.9	0.4	0.5	2.5	1.0	2.8	1.4	0.5	0.2	0.7	0.5	0.1	0.0	1.2	1.0	0.2	0.3	0.1	1.0	0.1	0.3
	L7 new PH centre E side @ 2m to edge, facing centre	352	6/10/2017	2.8	2.8	1.5	1.5	2.3	2.0	2.5	0.9	2.6	2.4	0.3	0.1	0.7	0.7	0.9	0.9	1.3	0.2	0.7	0.3	0.5	0.3	0.2	0.7	0.3
	L7 new PH centre N side @ 2m to edge, facing centre	353	6/10/2017	7.3	3.6	1.7	0.5	1.3	1.1	0.1	3.3	2.4	3.4	0.4	0.4	0.1	0.4	0.4	0.8	0.9	0.4	0.4	0.5	0.4	0.6	0.3	0.0	0.5
	L7 new PH centre centre facing E	354	6/10/2017	0.4	1.5	1.4	1.7	2.0	0.1	1.0	1.7	3.2	3.6	0.3	0.6	0.4	0.7	1.4	1.2	0.7	0.6	0.8	0.4	0.3	0.4	0.6	0.4	0.6
	L7 between PHTs centre facing W	355	6/10/2017	4.0	0.9	1.2	0.2	0.3	2.5	2.0	3.0	1.5	2.0	0.6	0.8	0.3	0.9	2.5	1.3	0.1	0.9	0.9	0.1	0.4	0.3	0.9	0.1	0.7
	L7 old PHT S side centre edge @ 2m face centre	356	6/10/2017	2.9	0.5	2.6	2.4	0.4	2.8	0.8	3.9	3.9	3.7	0.4	0.9	0.9	1.4	3.4	2.0	1.3	3.8	2.2	0.6	0.2	0.0	0.9	0.1	0.4
	L7 under BE drive platform W side facing BE @ 1m	357	6/10/2017	2.0	1.1	0.8	3.5	0.2	0.7	6.3	5.0	4.8	4.1	0.9	0.4	1.5	0.3	1.0	0.2	0.1	0.6	0.5	0.3	0.4	0.7	1.5	0.3	1.0
	L7 BE drive platform E side @ 1m to Gbox coupling	358	6/10/2017	1.5	0.1	0.9	0.5	1.8	2.1	5.6	5.1	5.3	5.0	0.3	0.7	0.1	0.6	2.0	3.7	1.4	2.7	0.0	1.4	0.3	0.0	0.0	0.8	1.2
	L7 BE drive platform N side @ 1m to Gbox & 1m to E side of BE	359	6/10/2017	0.0	0.5	1.3	0.4	0.5	1.0	2.1	2.9	3.7	4.4	2.1	0.6	4.3	5.5	2.1	0.5	1.7	1.1	0.0	1.8	0.4	0.4	0.0	0.1	0.6
	L7 BE drive platform N side @ 1m to BE	360	6/10/2017	0.6	0.9	0.3	0.6	0.7	1.6	3.5	5.6	4.9	4.5	0.3	0.9	2.1	1.7	1.0	2.1	1.9	0.0	1.9	2.8	0.5	0.5	0.0	0.0	0.8
	L7 BE drive platform S side @ 1m to BE & 1m W side of motor	361	6/10/2017	1.4	0.6	0.0	1.8	1.9	3.4	3.0	2.0	3.6	2.7	1.6	0.7	3.3	1.1	1.7	2.3	0.8	0.6	1.1	1.7	1.2	0.6	1.2	0.5	0.3
	L7 BE drive platform W side @ 0.6m to BE	362	6/10/2017	2.3	2.3	1.3	0.6	2.5	3.4	2.5	6.0	4.6	5.5	0.1	0.5	0.3	0.9	0.4	0.3	0.1	1.1	0.6	0.5	0.4	1.3	0.1	0.2	0.4
	L7 centre between cylinders	363	6/10/2017	4.1	3.5	3.1	4.2	1.1	1.3	1.7	4.4	3.8	4.0	0.4	1.7	0.6	0.6	1.0	0.9	0.3	2.1	1.1	0.1	0.4	0.1	0.6	0.5	0.8
	L7 NW corner 2m to edge and stack	364	6/10/2017	1.3	1.5	3.7	5.1	0.3	2.2	0.0	4.7	1.6	1.6	2.0	3.2	0.4	1.3	0.5	1.2	0.7	1.6	1.3	0.1	0.1	0.6	0.1	0.1	1.1

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	L7 PHT centre N side opening to platform to L7 door 17	365	6/10/2017	3.0	0.2	1.1	3.6	2.1	0.8	0.1	2.7	2.8	2.2	1.9	2.0	0.6	1.8	0.8	0.1	0.4	1.2	0.7	0.0	0.1	0.2	0.5	0.3	1.0
	L6 top of RM silo FA260 @ 2.5m N side	366	6/10/2017	2.8	2.6	1.0	7.2	4.9	0.6	2.2	2.9	2.0	1.1	0.4	0.5	0.9	1.2	1.3	1.0	2.5	6.2	3.7	0.5	1.3	0.5	1.7	0.8	2.1
	L6 top of RM silo FA260 @ 1m E side	367	6/10/2017	3.2	3.3	1.7	7.3	3.0	1.2	0.8	2.0	0.9	0.9	0.9	2.5	0.6	1.3	0.4	1.1	1.3	3.5	2.2	0.1	0.9	0.2	1.1	1.1	0.5
	L6 top of RM silo FA260 @ 1m to motor end (N side)	368	6/10/2017	2.9	1.4	4.0	7.1	2.6	0.8	1.1	1.8	2.7	3.8	4.6	2.4	0.7	1.8	0.9	2.3	2.5	8.7	4.6	1.2	1.6	0.2	0.5	2.0	0.5
	L6 RM silo top on BE EL15 platform NW side @ 1m	369	6/10/2017	0.5	0.1	2.0	4.7	1.5	0.6	0.5	0.9	0.2	0.5	0.6	1.3	2.6	1.2	0.9	1.2	0.3	2.4	2.3	0.5	0.3	0.2	0.8	0.4	1.1
	L6 RM silo top on BE EL15 platform SW side @ 0.8m	370	6/10/2017	0.7	0.6	3.2	4.7	0.9	1.1	2.6	1.6	1.7	3.2	4.6	15.0	8.9	1.0	3.3	1.8	0.8	0.2	1.0	0.0	1.4	1.5	0.7	0.1	0.6
	L6 RM silo top on BE EL15 platform S side Gbox @ 1m	371	6/10/2017	0.8	0.0	1.7	3.4	1.0	0.1	2.9	3.7	2.9	4.2	5.1	14.3	8.6	4.3	8.2	1.9	0.3	1.8	1.2	1.1	1.8	4.6	3.4	0.4	1.1
	L6 RM silo top on BE EL15 platform E side Gbox @ 0.4m	372	6/10/2017	1.8	1.6	1.3	4.9	1.6	0.6	1.0	1.2	1.1	4.0	1.7	10.0	4.0	3.4	4.4	1.5	0.3	0.3	1.1	0.0	1.7	2.8	2.0	0.8	1.5
	L6 RM silo top, N side of platform @ 1m near discharge from baghouse below	373	6/10/2017	3.6	1.5	2.0	5.5	1.9	1.1	1.8	2.4	4.2	6.8	6.3	1.4	5.6	2.5	0.6	0.3	0.5	0.5	1.7	1.1	0.1	1.0	1.8	0.7	0.0
	L6 old PHT centre W side 2m to edge facing centre	374	6/10/2017	0.3	2.8	6.0	2.7	1.0	2.8	1.5	2.6	3.7	4.5	1.6	0.3	0.4	0.3	0.1	1.5	0.5	0.2	0.5	0.3	1.3	2.4	0.1	0.2	0.3
	L6 old PHT stack test port @ 200mm	375	6/10/2017	0.3	0.5	0.3	2.5	3.7	3.2	0.5	0.7	4.0	3.8	4.4	3.5	3.2	1.2	3.3	2.6	2.4	2.2	0.9	0.5	0.8	1.3	0.7	0.8	1.9
	L6 old PHT stack test port @ 200mm	376	6/10/2017	2.0	0.9	0.1	4.1	4.9	3.0	0.5	0.8	4.0	3.6	3.7	3.0	2.8	1.2	3.7	2.8	2.3	2.5	0.9	0.6	1.0	1.3	0.6	0.5	1.6
	L6 old PHT NW corner, stack @ 1m	377	6/10/2017	2.3	0.9	0.4	0.6	2.3	0.3	0.5	0.1	6.0	5.1	2.6	1.1	1.3	0.8	1.1	0.5	1.0	1.1	1.2	1.6	1.3	0.1	3.5	1.5	0.3
	L6 old PHT centre N side @ 2m to edge facing centre	378	6/10/2017	4.2	3.4	3.7	0.8	1.5	1.9	0.9	2.6	2.2	3.1	0.9	0.5	0.0	0.3	0.5	0.3	0.0	0.5	0.3	0.2	0.4	1.5	0.2	0.3	0.2
	L6 centre centre between PHTs facing W	379	6/10/2017	3.5	2.3	0.6	2.0	0.8	4.8	3.5	0.4	2.2	2.9	1.6	0.4	0.7	0.1	0.0	0.1	1.5	0.9	1.3	1.1	1.8	1.5	0.6	1.0	1.1
	L6 new PHT centre N side @ 2m to edge facing centre	380	6/10/2017	2.1	3.3	0.9	1.6	0.9	3.2	3.1	1.0	0.1	0.9	0.1	0.5	0.3	0.6	0.1	0.4	0.5	0.2	0.0	0.0	0.7	0.4	0.1	0.2	0.1
	L6 new PHT centre E side @ 2m to edge facing centre	381	6/10/2017	0.5	3.3	0.8	2.6	1.5	1.6	2.6	1.2	2.9	2.5	1.1	0.5	1.5	0.3	0.3	0.3	0.4	0.2	0.3	0.4	0.5	0.8	0.1	0.5	0.6
	L6 new PHT centre S side @ 2m to edge facing centre	382	6/10/2017	2.5	3.8	2.1	0.3	1.1	0.2	0.8	1.2	0.2	1.2	0.9	0.1	0.3	0.6	0.0	1.3	0.6	0.1	0.2	0.4	0.3	0.6	0.3	0.5	0.8
	L6 centre S side old PHT by elevator	383	6/10/2017	0.9	0.0	0.5	0.3	2.1	2.0	2.3	2.8	1.8	3.1	1.8	0.9	1.5	1.0	0.3	2.2	1.5	1.1	0.8	0.2	1.4	2.5	0.6	0.0	0.1
	L6 inside doorway to top RM silo room	384	6/10/2017	4.3	5.5	6.9	1.2	2.2	2.6	2.5	1.6	0.3	0.8	0.3	2.6	5.5	3.6	2.4	1.1	1.1	2.1	0.2	0.2	0.0	1.1	0.3	0.6	1.2
	L6 RM silo top room centre byt FA54 @ 1.2m	385	6/10/2017	4.2	4.8	10.4	3.2	5.0	5.9	1.9	0.7	0.3	2.6	4.3	1.7	2.5	5.6	2.0	7.5	5.4	0.9	2.9	1.9	0.7	0.3	0.1	0.3	1.6
	L6 RM silo top room in fully open E doorway	386	6/10/2017	0.4	1.4	3.6	2.2	3.6	1.7	1.2	1.6	1.3	3.2	3.6	3.0	3.9	7.5	5.8	5.6	6.5	0.3	3.1	2.0	0.6	0.3	0.3	1.2	1.8
	L6 RM silo top room inside S man door	387	6/10/2017	1.2	2.0	3.3	3.2	5.7	3.0	0.5	0.7	0.3	4.8	7.0	1.6	1.2	6.1	4.9	4.5	5.0	0.9	1.3	0.8	0.5	0.1	0.8	1.1	2.8
	L6 RM silo top room outside S man door	388	6/10/2017	0.0	0.4	1.8	1.0	2.5	1.5	0.8	1.7	0.4	0.6	0.5	0.4	2.2	0.1	1.8	0.1	0.1	0.9	0.8	0.1	0.5	0.1	0.4	2.3	2.2
	L5 old PHT centre S side by stair @ 2m to edge facing centre	389	6/10/2017	0.2	0.5	0.5	2.5	1.5	1.0	0.4	2.8	1.4	3.9	3.6	0.7	0.7	0.5	0.5	0.0	1.2	0.1	1.4	0.9	1.7	3.6	1.3	1.7	1.0
	L5 old PHT centre W side by gas valves centre	390	6/10/2017	2.0	1.3	0.2	0.5	2.0	2.0	2.0	1.8	2.6	3.4	1.7	0.6	1.3	0.6	0.7	1.2	2.7	0.2	5.3	5.4	4.0	5.1	2.6	3.7	3.8
	L5 old PHT NW corner @ 2m to edge, 1.2m to stack	391	6/10/2017	2.6	2.2	1.9	3.0	2.2	5.2	4.9	0.3	4.1	5.3	4.1	1.0	0.7	0.2	1.2	0.3	2.3	0.3	2.6	2.1	3.2	4.4	1.7	2.5	2.2
	L5 old PHT centre N side @ 2m to edge by L5 Door 5	392	6/10/2017	1.2	0.4	0.5	1.0	1.9	3.5	2.4	1.9	0.9	2.1	0.8	0.0	0.4	0.3	0.1	0.3	0.8	0.5	1.3	0.9	1.7	3.0	0.6	1.0	0.9

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	L5 centre centre between PHTs facing S	393	6/10/2017	0.8	0.5	0.0	1.8	1.4	1.9	1.3	1.6	2.0	2.9	1.5	0.4	0.3	0.2	0.2	0.1	0.3	0.3	1.0	0.7	0.6	1.9	0.1	0.2	0.2
	L5 new PHT centre N side 2m to edge facing centre	394	6/10/2017	0.6	2.6	0.3	2.4	0.0	2.2	2.2	0.8	0.1	1.2	0.8	0.3	0.9	0.2	0.1	0.2	0.3	1.0	1.0	0.4	0.3	1.5	0.0	0.0	0.2
	L5 new PHT centre E side 2m to edge facing centre	395	6/10/2017	0.6	2.3	1.7	0.0	0.8	2.2	4.1	0.1	0.6	0.4	0.7	0.3	1.0	0.1	0.0	0.5	0.2	0.0	0.2	0.5	0.8	0.3	0.3	0.6	0.2
	L5 new PHT centre S side 2m to edge facing centre	396	6/10/2017	0.1	0.2	1.4	2.8	1.7	0.5	1.0	0.7	1.3	1.8	0.9	1.4	3.3	1.6	0.3	0.6	0.7	0.5	0.4	0.2	0.2	0.3	0.5	0.3	0.0
	L4 old PHT centre S side @ 2m to edge	397	6/10/2017	1.7	1.1	4.5	7.7	1.8	2.6	0.9	0.3	2.6	3.1	1.7	0.1	2.3	4.0	1.8	0.3	1.0	0.0	0.0	0.0	0.5	0.4	0.8	0.0	1.1
	L4 old PHT SW corner @ 1m to water pumps SV09	398	6/10/2017	1.3	0.6	2.6	5.5	2.1	2.1	0.6	2.8	0.3	4.2	6.0	1.6	2.8	2.3	0.1	0.5	1.1	0.5	0.5	0.1	0.4	0.1	0.4	0.3	0.6
	L4 old PHT centre W side @ 2m to edge facing centre	399	6/10/2017	0.4	0.9	6.3	7.5	1.3	3.6	0.9	0.9	4.3	3.9	1.7	0.1	0.8	0.1	0.3	0.1	1.1	1.1	1.8	1.1	0.0	1.3	0.9	1.1	0.5
	L4 old PHT NW corner 1.8m to stack	400	6/10/2017	1.3	1.1	4.0	6.0	0.6	6.4	3.7	1.8	2.0	3.1	1.5	0.5	0.9	0.2	0.4	0.5	2.2	0.3	1.1	0.1	0.5	2.1	0.2	0.3	0.7
	L4 old PHT centre N side on E side of cylinder	401	6/10/2017	3.0	1.0	2.2	4.3	1.2	4.3	3.2	1.8	0.0	2.2	2.0	0.5	0.1	0.5	0.2	0.4	1.1	0.2	0.5	0.2	0.2	0.1	0.3	0.3	0.9
	L4 centre centre between main ducts from kiln	402	6/10/2017	1.1	2.5	0.9	3.1	3.8	1.6	0.6	1.6	0.6	1.2	1.8	0.5	0.1	1.1	0.7	0.1	0.5	0.2	0.3	0.2	0.8	0.2	0.1	0.4	0.3
	L4 new PHT centre N side @ 2m to edge facing centre	403	6/10/2017	0.3	2.4	0.8	0.4	0.5	1.7	2.4	0.0	0.8	1.8	1.3	0.2	0.5	0.5	0.2	0.2	0.7	0.2	0.4	0.2	0.6	0.3	0.5	0.2	0.5
	L4 new PHT centre E side @ 2m to edge facing centre	404	6/10/2017	1.2	3.0	1.2	4.2	2.0	1.9	3.1	0.0	0.4	1.5	1.8	0.3	0.3	1.1	0.4	0.2	0.5	0.3	0.4	0.4	0.7	0.3	0.5	0.0	0.4
	L4 new PHT centre S side @ 2m to edge facing centre	405	6/10/2017	0.6	1.6	1.3	4.3	1.2	2.2	2.1	0.3	1.1	2.1	1.8	0.3	0.3	1.1	0.4	0.2	0.3	0.2	0.2	0.3	0.4	0.6	0.5	0.2	0.6
	Top of ESP E side centre platformbetween stairs facing PHT	406	6/10/2017	2.4	0.4	2.5	3.0	2.4	1.0	0.2	3.5	3.0	4.5	0.1	2.0	1.1	1.3	0.5	1.0	1.4	1.9	1.3	0.1	0.5	1.6	0.3	0.2	0.4
	Top of ESP S side walkway E side facing S RM7	407	6/10/2017	1.0	1.1	3.7	6.1	2.8	1.2	3.1	3.5	1.5	2.3	0.9	2.7	1.8	1.4	0.8	0.1	0.5	1.3	0.8	0.3	1.1	0.7	0.1	0.4	0.8
	ESP top centre E side S platform facing PHT	408	6/10/2017	0.3	0.3	3.3	5.1	1.7	2.0	1.3	0.6	2.6	2.0	1.3	1.9	0.7	1.3	0.8	0.8	1.2	1.8	1.3	0.2	0.1	1.3	0.3	0.0	0.7
	ESP top centre N side platform to ESP opposite stack	409	6/10/2017	0.1	0.5	5.4	7.2	2.2	2.4	2.1	0.2	4.1	4.3	1.0	1.6	1.3	0.7	0.6	0.8	1.7	1.4	1.3	0.0	1.0	2.3	0.1	0.7	0.1
	L3 old PHT centre S side @ 2m to edge facing centre	410	6/10/2017	0.6	2.2	4.8	8.0	2.1	1.7	1.5	2.4	2.3	5.3	5.2	1.7	1.8	3.5	3.7	4.4	1.3	0.8	1.1	1.2	1.0	0.1	0.5	0.4	0.0
	L3 old PHT centre W side @ 2m to edge facing centre	411	6/10/2017	0.2	4.5	4.4	3.6	1.9	0.2	0.4	0.9	2.6	3.1	2.6	0.2	0.9	0.8	1.6	0.8	1.6	1.0	0.8	1.2	1.3	0.9	0.3	0.1	0.1
	L3 old PHT centre N side @ 2m to edge facing centre	412	6/10/2017	2.7	0.6	5.0	5.9	1.7	2.3	1.0	0.0	3.8	3.5	2.5	0.2	1.1	1.0	1.4	0.3	1.9	0.5	0.8	0.6	1.1	0.2	0.0	0.6	0.4
	L3 old PHT centre E side @ 2m to edge facing centre	413	6/10/2017	1.1	4.8	3.3	1.2	0.8	0.4	0.3	1.2	2.3	3.5	2.6	0.7	0.3	0.9	1.5	1.3	0.0	0.6	0.4	0.3	0.6	0.0	0.8	0.6	0.3
	L2.5 PHT NW corner above motor DC31, 1.1m to stack & 1.5m to top of entry duct to stack from FA39	414	6/10/2017	4.3	2.3	5.9	9.6	1.5	2.6	1.1	2.3	2.3	5.8	4.7	0.3	3.3	4.4	2.3	1.5	2.8	2.4	5.1	5.9	4.6	0.9	1.6	0.7	0.8
	L2.5 PHT discharge of Fan DC31 @ 0.8m	415	6/10/2017	4.7	1.2	5.1	10.8	1.5	0.8	1.4	1.0	0.4	3.6	3.7	1.9	3.8	3.1	1.3	1.0	1.7	0.0	0.1	1.7	2.9	0.3	0.3	0.8	0.8
	L2.5 PHT S side centre on stair platform	416	6/10/2017	1.8	1.2	5.0	7.1	1.6	0.4	1.6	1.6	2.6	3.3	0.0	0.8	0.3	4.7	2.4	2.3	0.9	1.1	1.4	1.4	0.8	0.6	2.2	1.2	0.8
	L2.25 PHT centre S side by E end SC48	417	6/10/2017	0.7	0.5	4.2	6.8	0.4	2.7	0.1	2.3	1.3	3.7	0.9	0.5	2.6	6.1	0.1	0.7	1.3	3.4	3.7	2.5	0.9	0.8	0.7	0.3	0.2
	L2.25 PHT centre W side facing fan discharge DC70 FA63 @ 4.66m, stack @ 6.35m and stack entry duct @ 6.23m	418	6/10/2017	4.3	2.5	9.6	15.1	1.8	4.6	1.6	0.5	4.3	6.2	2.2	0.5	0.6	2.2	1.6	1.1	0.6	1.1	1.3	2.3	1.3	3.0	0.9	0.8	0.3

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	L2.25 PHT centre W side facing fan discharge DC70 FA63 @ 4.66m, stack @ 6.35m and stack entry duct @ 6.23m	419	6/10/2017	3.5	0.8	11.4	13.8	4.3	5.8	1.5	0.1	4.6	6.4	2.2	0.3	0.4	1.6	2.3	1.9	0.2	1.0	0.9	1.9	1.0	2.6	0.7	0.8	0.5
	L2 PHT FA63 casing @ 1m E side	420	6/10/2017	0.4	3.8	6.6	6.8	3.0	0.6	1.4	1.5	3.1	5.2	3.3	1.5	2.0	0.8	3.1	3.0	0.4	0.4	0.3	1.1	1.8	0.1	1.0	0.2	0.4
	L2 PHT FA63 inlet and casing @ 1m E side	421	6/10/2017	1.0	1.2	5.9	9.0	2.9	1.3	1.0	2.4	1.6	3.3	1.3	0.5	0.8	1.8	2.6	2.0	0.6	0.2	1.5	2.3	2.7	0.2	1.0	0.5	0.7
	L2 PHT FA63 discharge casing @ 1m W side	422	6/10/2017	1.6	2.6	9.9	11.7	3.5	0.1	1.0	0.6	0.5	2.5	2.7	0.3	0.5	1.6	1.4	0.4	1.2	1.3	1.2	1.4	1.3	0.0	0.2	0.2	0.5
	L2 PHT FA63 discharge @ 1m W side	423	6/10/2017	2.8	2.2	8.5	13.9	0.4	2.7	0.6	0.3	1.0	2.3	1.0	0.3	1.1	4.0	3.0	0.9	2.6	0.2	0.8	1.0	1.4	0.1	0.6	0.0	0.4
	L2 PHT 1m to stack entry duct S side	424	6/10/2017	1.8	1.2	9.4	12.1	0.3	6.6	0.9	0.7	5.2	4.3	0.5	1.8	1.8	1.2	0.3	0.9	2.7	1.2	0.6	0.8	1.2	1.1	0.6	0.5	0.7
	L2 PHT FA66 inlet filter @ 1m	425	6/10/2017	3.4	0.3	6.7	10.3	1.4	5.5	4.2	1.8	2.9	3.2	1.0	0.6	0.0	1.6	1.9	1.1	1.1	1.3	1.1	1.6	1.2	1.6	0.6	0.1	0.7
	L2 PHT FA66 motor and casing SE side @ 1m	426	6/10/2017	4.2	1.8	5.4	10.6	0.3	6.0	2.3	0.2	2.8	3.8	0.9	0.9	0.5	0.7	1.8	1.5	0.2	0.8	1.8	1.9	2.1	0.8	0.3	0.1	1.2
	L2 PHT centre N side edge @ 2m facing centre	427	6/10/2017	1.6	1.4	8.2	10.1	1.9	2.6	0.3	2.3	0.8	3.0	1.1	0.2	0.5	1.2	1.7	1.0	0.6	0.3	0.3	0.8	0.8	0.3	0.5	0.3	0.1
	L2 PHT NW corner @ 1.5m to stack	428	6/10/2017	1.0	1.3	7.6	10.0	1.5	3.1	0.7	1.8	4.1	5.9	0.3	4.0	0.4	0.7	1.0	0.8	3.0	1.4	0.6	0.6	0.8	0.3	0.2	0.0	1.1
	L2 PHT N side of duct to stack @ 1m and W of stack @ 1m	429	6/10/2017	0.8	1.4	9.4	11.4	1.1	4.2	1.3	2.3	6.8	6.7	0.5	1.9	1.0	1.7	1.7	0.1	1.4	0.3	0.2	0.2	0.5	0.8	0.2	0.4	0.3
	L2 PHT N side of duct to stack @ 1m and W of stack @ 1m	430	6/10/2017	0.6	2.2	9.8	9.9	0.7	5.0	1.1	1.2	7.9	7.2	0.1	2.1	1.0	2.1	1.3	0.3	1.2	0.1	0.4	0.0	0.5	0.5	0.0	0.1	0.2
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	2.2	1.5	5.1	8.5	3.3	4.0	7.3	3.1	2.6	3.3	0.4	0.9	0.9	3.3	3.8	1.5	1.1	2.6	2.7	0.4	0.9	0.2	0.9	0.3	0.5
FA 38 & FA39	FA39 E side @6.6m in line with joint	432	6/10/2017	1.5	1.2	4.1	6.8	1.8	1.8	1.4	1.9	4.0	5.2	0.5	6.1	3.1	0.2	1.7	3.2	6.4	2.1	3.6	0.0	1.1	4.8	1.5	1.3	2.1
	FA39 E side @2.3m in line with columns	433	6/10/2017	0.2	4.5	6.7	7.7	2.2	2.2	1.4	0.2	7.7	5.6	1.8	6.5	3.3	0.1	2.5	2.4	7.8	0.0	2.8	0.8	2.4	5.7	1.8	0.9	2.4
	FA39 under E side @ 0.8m to discharge duct	434	6/10/2017	0.1	3.2	1.7	3.0	2.7	1.1	1.1	0.4	2.9	1.8	0.4	1.4	0.6	0.0	1.9	1.3	4.8	2.7	4.1	0.8	1.1	3.1	0.5	1.3	1.2
	FA39 E side motor platform @ 0.82m to coupling cover	435	6/10/2017	2.2	5.8	5.2	4.2	0.9	0.6	3.3	0.1	6.4	1.9	4.6	6.6	2.9	2.6	4.3	6.8	13.8	1.4	8.8	6.0	6.1	7.5	1.9	1.9	3.1
	FA39 motor platform centre E side@ 1m	436	6/10/2017	0.8	2.6	3.1	4.1	2.5	0.8	4.5	1.7	8.7	4.9	3.2	5.6	1.7	0.5	4.5	2.3	10.5	0.5	6.6	4.8	5.8	8.7	2.2	3.8	4.3
	FA39 motor N end @ 1.72 to end plates	437	6/10/2017	1.4	4.9	7.1	8.0	2.1	1.8	2.5	2.7	3.2	2.5	3.3	7.3	3.8	1.0	1.6	3.8	7.3	1.3	4.1	2.2	3.0	5.3	0.9	2.3	3.3
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	1.3	3.2	2.5	3.3	1.8	0.3	2.9	3.6	1.7	1.8	1.4	3.2	1.9	1.3	2.2	2.6	6.2	1.8	3.3	0.4	0.6	2.5	0.4	1.1	1.7
	FA39 W side at metal strip @5.39m to plinth	439	6/10/2017	1.1	2.8	4.9	5.8	1.0	3.1	2.2	6.5	0.5	3.6	2.2	6.2	2.4	0.8	3.2	1.3	2.4	6.6	3.8	0.9	2.6	6.6	1.9	2.0	3.4
	FA39 W side at columns @2.7m to plinth	440	6/10/2017	1.0	2.9	3.3	4.3	1.5	2.6	0.6	2.3	2.3	1.8	3.3	6.2	3.0	1.8	2.9	5.0	8.7	2.8	4.7	1.8	2.0	2.7	0.1	2.1	3.5
	FA39 W side motor platform at 0.8m to couling cover & 1m to coupling	441	6/10/2017	0.1	6.0	5.7	3.3	1.2	0.3	2.6	1.2	8.2	5.9	0.4	5.9	3.6	1.2	3.2	7.2	14.4	1.3	6.3	1.6	6.1	10.2	3.1	0.9	1.6
	FA39 W side @ 1m to cladding door open, 1.33m to casing	442	6/10/2017	0.2	4.2	4.1	5.5	2.1	4.4	0.9	5.3	5.3	6.9	0.3	3.1	1.8	1.4	1.8	4.8	6.1	6.1	5.9	0.6	1.4	2.3	0.8	0.5	1.6
	FA39 S side @ columns 2.7m to bearing	443	6/10/2017	2.3	3.9	3.5	5.3	1.5	1.8	2.2	3.3	2.5	3.5	0.3	1.8	1.0	1.3	1.6	3.2	4.6	3.9	3.9	0.0	0.3	1.5	1.0	0.8	0.2
	FA39 S side platform bearing cover @ 0.8m	444	6/10/2017	0.3	2.6	3.8	5.4	0.1	1.7	2.3	2.3	1.4	3.0	1.3	2.1	0.5	0.3	0.5	3.5	3.7	4.6	4.0	0.0	0.1	0.5	0.9	0.2	0.4
	Centre between FA38 & FA39 @ 10.8m facing E	445	6/10/2017	1.0	1.3	2.9	0.1	1.1	1.6	2.8	7.9	2.3	1.5	0.2	1.4	0.4	0.8	1.3	6.2	8.5	5.1	6.8	1.2	1.6	3.5	0.1	1.1	1.6
	Centre between FA39 & FA38 @ 7m facing W	446	6/10/2017	0.8	0.8	2.0	1.4	2.1	1.1	2.7	7.1	0.6	3.3	0.5	1.4	0.2	1.0	1.5	5.8	7.9	5.1	6.7	1.6	0.9	1.1	0.9	0.8	0.8
	FA38 E side @ 2.66m to base	447	6/10/2017	0.3	0.4	2.1	4.5	2.2	2.1	0.5	2.9	0.2	0.6	0.3	1.0	0.2	0.7	1.0	6.2	5.6	10.0	8.9	0.9	0.2	0.1	1.1	0.3	0.5

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	FA38 N end @ 2.7m to base	448	6/10/2017	1.9	0.6	0.2	2.0	2.2	0.6	3.1	3.7	2.7	0.5	1.9	0.5	2.2	0.1	0.3	3.8	3.0	6.4	4.9	0.0	0.4	1.0	0.6	0.1	0.5
	FA38 W side @ 5.13m to base at column	449	6/10/2017	1.1	0.7	0.1	2.2	1.2	1.4	0.7	2.3	0.9	2.1	0.8	0.5	0.0	0.6	0.3	7.1	6.3	9.5	9.4	2.8	1.0	0.3	1.1	0.5	1.7
	FA38 W side @ 10.26m to base at wall opening	450	6/10/2017	0.8	3.4	5.2	6.0	1.7	0.5	2.2	2.8	1.7	2.3	0.3	1.1	0.2	1.4	1.1	6.1	5.8	8.1	7.4	0.8	0.2	0.4	1.3	0.2	1.0
	FA38 motor platform W side @ 1m to couling cover, 1.9m to casing, 0.7m to motor side	451	6/10/2017	0.1	0.9	1.5	2.6	1.8	1.6	1.6	2.8	0.8	0.3	0.4	0.0	1.2	2.8	1.1	7.4	6.6	9.8	9.2	0.7	1.3	0.7	0.6	0.3	0.1
	FA38 at opening on S side of road facing FA38 opening	452	6/10/2017	1.3	1.1	0.9	2.3	1.2	0.1	2.1	3.8	1.3	3.1	0.9	2.6	0.7	1.7	1.8	4.5	4.2	8.5	7.2	0.1	1.0	0.4	0.8	0.0	0.8
	PHT L1 by doorway to blower room base of RM silo	431	6/10/2017	2.2	1.5	5.1	8.5	3.3	4.0	7.3	3.1	2.6	3.3	0.4	0.9	0.9	3.3	3.8	1.5	1.1	2.6	2.7	0.4	0.9	0.2	0.9	0.3	0.5
Fan FA92	Drive and casing vent fan FA92 NE side @ 1m	229	19/09/2017	3.5	1.2	3.3	4.0	2.0	1.5	0.1	0.1	0.6	0.5	2.4	6.7	5.1	3.0	0.3	0.7	0.1	1.6	0.8	0.5	0.1	0.2	1.4	1.7	1.6
	Casing and inlet E side FA92 @ 1m	230	19/09/2017	2.6	1.7	1.9	0.4	2.2	0.7	0.7	0.3	0.1	0.2	2.0	4.6	3.0	3.2	2.1	1.1	0.3	0.8	1.3	0.5	0.2	1.3	2.5	3.4	0.1
	FA92 inlet filter S side @ 1m	231	19/09/2017	3.3	1.3	0.0	0.6	2.2	0.5	0.6	1.1	1.2	1.9	1.8	0.1	0.2	0.6	0.6	0.1	0.1	0.1	0.8	0.9	0.0	0.4	0.0	0.0	0.8
RM7 Area																												
0*	RM6 Door @ 1.2m	136	19/09/2017	1.7	0.3	1.0	2.8	3.1	0.9	0.2	0.7	0.1	1.4	2.1	0.9	1.1	1.2	0.6	0.4	1.0	0.1	0.5	0.9	0.2	1.2	2.0	0.1	1.3
0	RM6 Door @ 13m	137	19/09/2017	0.3	1.7	3.8	2.3	1.8	1.8	0.5	0.8	1.7	1.4	0.9	1.0	0.3	1.3	0.5	0.2	0.5	0.4	0.1	0.6	1.1	0.9	0.2	0.2	0.8
	RM7																											
1	Edge of road opposite main W door	138	19/09/2017	0.3	1.0	2.2	2.9	0.0	0.1	3.3	2.8	2.5	3.0	0.3	2.5	1.7	1.6	0.8	0.5	0.6	1.1	0.8	0.7	0.3	0.4	0.2	0.8	0.9
2	RM7 W door @ 20m	139	19/09/2017	0.9	0.1	0.8	0.9	2.1	2.7	0.3	1.8	2.5	3.5	0.2	2.5	1.8	1.2	0.8	0.8	0.3	1.0	0.1	0.2	0.1	0.3	0.7	0.0	0.9
3	RM7 W door @ 31.2	140	19/09/2017	0.1	0.3	0.0	0.1	0.4	2.1	3.5	2.3	1.5	1.0	1.3	1.8	0.7	1.6	0.6	0.0	0.0	0.4	1.1	0.2	0.1	0.7	0.5	0.5	0.5
5	N side W roll door @ 1m	141	19/09/2017	0.8	0.9	1.1	1.8	1.9	2.9	3.4	2.6	0.8	0.7	1.6	2.2	0.3	1.2	0.6	0.3	0.0	0.1	0.8	0.1	0.0	0.5	0.5	0.4	0.7
6	N side vent E side of bin	142	19/09/2017	1.5	0.0	1.8	1.7	2.8	4.0	0.3	1.9	2.4	2.6	1.8	3.6	1.7	1.4	0.0	1.8	1.1	1.2	0.0	0.2	0.0	0.9	0.6	0.1	0.3
7	Man door NE corner @ 1m	143	19/09/2017	0.5	0.2	0.5	0.3	3.1	5.0	1.7	1.0	1.3	2.3	0.1	1.6	2.0	2.1	0.0	1.6	0.5	2.1	0.6	0.0	0.2	0.6	0.4	0.0	0.5
8	Vent E side N corner @ 1m	144	19/09/2017	0.1	0.2	1.3	4.4	0.5	2.4	1.6	3.1	2.6	3.1	0.6	1.1	0.5	1.8	0.3	1.2	1.0	0.3	0.7	0.0	0.3	0.8	0.0	0.3	0.4
9	E side under main duct	145	19/09/2017	1.7	1.2	0.3	1.2	0.2	2.9	0.9	3.5	0.7	2.7	0.0	0.7	0.5	1.4	0.4	1.4	0.5	0.7	0.3	0.3	0.1	0.6	0.2	0.5	0.5
10	S side compressor room doors, E side @ 1m	146	19/09/2017	0.8	0.1	3.3	5.6	4.1	7.7	1.9	2.3	0.2	1.7	1.8	1.1	0.3	0.2	0.0	0.2	1.5	0.9	0.7	0.1	0.1	0.1	0.3	0.7	0.3
11	S side compressor room - centre door @ 1m	147	19/09/2017	1.6	0.1	3.9	6.8	5.6	10.9	2.3	4.2	1.3	0.3	0.1	0.5	1.0	1.5	0.9	0.8	0.4	0.3	0.2	0.3	0.1	0.4	0.1	0.1	1.1
12	Switch room fan ducts N side @ 1m	148	19/09/2017	0.3	0.2	7.8	9.8	6.5	14.3	7.0	3.3	1.0	2.7	3.8	2.3	0.7	1.8	0.8	0.7	1.2	0.1	0.0	0.1	0.1	0.7	0.4	0.6	1.1
12A	Under switchroom fan duct E	149	19/09/2017	2.7	1.6	7.5	8.6	1.2	3.9	2.5	2.4	4.9	1.8	7.2	6.4	0.3	1.3	0.8	0.5	1.3	0.4	0.2	0.8	1.8	2.7	1.3	1.4	0.1
12B	Under switchroom fan duct W	150	19/09/2017	1.1	1.1	8.5	12.2	3.5	13.0	8.9	5.0	8.3	2.3	7.0	5.0	2.7	3.3	1.9	0.2	1.1	0.5	0.1	0.5	0.2	0.3	0.5	0.5	1.0
4	W side N corner vent @ 1m	151	19/09/2017	0.1	0.5	1.2	2.8	1.1	1.9	1.5	0.3	2.4	2.1	1.4	2.4	0.9	1.9	1.2	0.0	0.2	0.1	1.0	0.0	0.3	0.5	0.5	0.4	0.1
13	Under W duct fan FA249	152	19/09/2017	1.3	2.3	1.1	3.1	0.3	3.3	3.3	8.5	0.6	4.5	1.2	0.6	1.9	1.1	2.1	2.4	0.5	1.2	0.1	0.4	0.3	0.4	0.9	0.3	0.3
14	2m W side W motor platform FA249	153	19/09/2017	2.7	1.8	4.1	6.9	0.4	3.6	2.0	5.5	2.2	3.5	0.6	1.3	1.3	0.9	2.1	2.6	0.6	1.1	0.0	0.5	0.4	0.3	1.2	0.6	0.4
14'	W side motor platform, motor drive & fan casing @ 1m	154	19/09/2017	2.7	2.2	2.9	3.4	2.5	0.5	3.8	5.7	1.7	4.5	1.8	0.0	0.2	0.5	1.5	0.7	0.7	0.6	0.5	1.8	2.3	1.0	0.8	0.3	0.0
15	FA249 motor end @ 1m	155	19/09/2017	0.3	0.6	1.5	0.3	1.0	1.5	0.3	1.9	1.6	2.2	0.0	0.7	0.8	1.1	0.4	1.9	2.1	0.3	0.6	0.0	2.3	1.2	0.9	0.6	0.3
16	FA249 motor end @ 4m at column	156	19/09/2017	1.7	0.3	0.3	5.3	2.3	2.1	0.6	1.3	3.1	3.4	0.4	0.8	0.6	0.0	3.1	2.8	0.1	2.0	0.9	0.1	1.0	0.7	1.8	0.8	0.1
17	FA249 motor platform E side 1m casing & motor	157	19/09/2017	4.5	4.3	2.8	1.5	0.2	0.4	4.3	6.1	2.1	2.8	0.6	0.5	0.5	0.3	1.8	1.3	0.9	0.3	0.8	1.3	1.2	0.9	0.4	0.1	0.4
18	FA249 platform S side @ 1m to shaft	158	19/09/2017	1.1	2.7	0.4	1.1	1.0	1.3	4.1	8.8	0.3	2.9	1.1	1.3	0.4	0.8	0.5	0.8	2.2	0.8	0.1	0.6	0.0	0.4	0.3	0.7	0.2
	Repeat store	159	19/09/2017	1.1	2.7	0.4	1.1	1.0	1.3	4.1	8.8	0.3	2.9	1.1	1.3	0.4	0.8	0.5	0.8	2.2	0.8	0.1	0.6	0.0	0.4	0.3	0.7	0.2
18'	FA249 S platform under duct inlet box	160	19/09/2017	1.0	0.9	2.7	0.8	1.7	0.1	0.6	3.5	1.1	2.2	1.2	1.0	1.0	0.9	2.8	3.2	0.8	4.9	3.2	1.6	1.3	0.6	0.5	0.3	0.0
19	FA249 @ 6m S side	161	19/09/2017	0.5	1.1	1.7	2.1	0.0	0.8	1.7	4.2	0.6	0.8	0.1	0.3	0.3	1.1	0.4	0.8	0.1	0.0	1.3	0.0	0.2	0.1	0.3	0.0	0.2

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
20	FA249 S side @ 10.3m to fan plinth	162	19/09/2017	0.1	0.5	0.6	1.5	0.7	1.1	0.9	1.8	0.8	1.8	0.5	1.2	0.4	0.3	0.9	1.2	0.6	0.3	1.2	0.4	0.4	0.1	0.2	0.1	0.4
21	FA249 under E side duct & 1m casing S side	163	19/09/2017	1.9	1.9	1.3	0.2	0.3	0.8	6.8	11.4	0.1	5.5	3.1	1.4	0.4	0.2	1.8	2.7	1.5	0.4	0.8	1.0	2.0	0.7	0.5	1.3	2.1
22A	FA250 S side @ 5m by columns	164	19/09/2017	1.8	3.0	2.8	4.9	1.2	1.9	0.2	1.6	3.0	4.6	1.1	1.6	2.6	1.3	0.6	0.8	0.4	1.1	0.5	0.3	0.0	0.9	2.9	1.2	0.1
22	FA250 motor end @ 1m	165	19/09/2017	2.2	1.4	1.4	0.8	1.3	2.3	0.1	3.4	2.7	3.7	1.3	1.3	0.6	0.0	0.6	0.8	0.2	0.9	0.5	0.9	0.6	0.5	0.4	0.2	0.2
23	FA250 E side shaft & casing @ 1m	166	19/09/2017	2.0	1.0	4.2	3.3	2.5	1.8	3.0	4.3	5.1	5.1	0.4	0.8	0.2	0.1	1.7	1.3	1.0	0.1	1.1	1.3	0.7	0.1	1.3	0.4	0.4
23'	FA250 E side motor centre	167	19/09/2017	1.5	0.1	3.2	1.8	0.5	0.0	1.4	2.0	4.7	4.3	0.4	0.0	0.9	0.2	0.8	1.3	0.8	0.8	1.5	1.9	1.6	0.9	1.3	1.2	0.5
24	FA250 W side motor shaft @ casing @ 1m	168	19/09/2017	2.8	0.3	5.6	0.7	0.3	2.9	0.0	1.9	6.5	7.6	0.7	1.0	1.1	1.8	2.3	2.3	2.5	0.7	0.6	1.1	1.1	1.6	0.4	0.2	2.0
25	FA250 motor @ W edge of casing ~4m	169	19/09/2017	2.3	0.3	3.3	2.3	2.1	1.1	2.8	2.6	6.2	5.6	0.8	1.6	0.5	0.4	0.8	0.7	0.5	2.1	1.5	0.7	0.6	1.1	0.3	0.1	0.5
26	FA250W side @ 1m to casing & inlet box	170	19/09/2017	1.6	0.8	1.7	0.2	0.6	0.9	5.3	5.6	5.7	5.6	0.8	1.8	0.8	0.9	0.3	2.0	0.9	2.1	1.3	0.1	0.1	0.7	0.1	0.4	0.3
27	Under inlet box duct W side	171	19/09/2017	0.0	0.4	1.3	0.9	1.0	0.8	1.3	1.6	3.6	2.0	2.0	1.5	0.7	1.2	0.2	1.9	1.2	1.7	0.5	0.5	0.1	0.7	0.4	0.1	0.5
28	FA250 N side platform shaft bearing @ 1m	172	19/09/2017	4.0	4.4	0.2	1.8	1.7	0.1	2.9	3.6	3.4	3.1	1.9	2.1	0.6	1.6	1.0	1.2	0.8	2.1	0.3	1.5	0.7	0.4	0.7	0.3	0.4
29	FA250 E side ground level under discharge casing @ 1m	173	19/09/2017	0.8	1.1	0.1	1.2	0.1	2.9	1.3	2.0	3.6	3.3	1.1	1.6	1.3	0.8	1.8	2.8	0.9	2.2	0.9	1.1	1.8	0.3	0.5	0.2	0.2
RM7 Roof	Lower platform E side@ 1m to Magnete	174	19/09/2017	0.1	2.1	3.3	0.1	2.5	3.1	2.2	0.8	2.1	1.1	1.4	0.3	0.5	0.1	0.2	0.0	0.0	1.0	1.0	0.8	1.3	0.1	0.1	0.1	0.5
	Lower platform S side@ 1m to Magnete	175	19/09/2017	0.3	0.7	1.3	0.1	1.5	0.5	2.8	1.0	2.0	3.8	2.1	2.8	4.4	2.4	0.5	0.5	0.3	0.7	0.5	0.0	0.3	0.6	0.3	1.6	1.9
	Lower platform W side @ 1m to Magnete	176	19/09/2017	0.7	1.0	0.1	0.4	2.2	3.0	1.4	1.4	0.5	0.8	0.3	0.7	0.4	1.1	0.9	0.2	0.3	0.7	0.2	0.4	0.3	1.1	0.2	0.1	1.1
	Lower platform N side @ 1m to Magnete & 1m BE casing	177	19/09/2017	0.7	0.4	1.4	0.6	2.1	1.9	0.4	0.7	1.4	1.0	1.2	0.6	1.5	0.4	0.3	0.1	0.4	0.6	1.0	0.6	5.1	1.0	0.5	0.4	0.7
	Lower platform N side BE @ 1m	178	19/09/2017	1.3	0.9	2.4	2.0	4.1	3.1	3.0	2.1	4.1	4.2	0.5	1.0	1.3	0.4	0.8	0.6	1.6	0.8	0.3	0.4	2.1	0.7	0.7	0.2	0.1
	On adjacent platform @ 7m S side of Magnete	179	19/09/2017	0.6	0.7	0.9	0.1	0.2	0.4	0.8	2.2	1.5	1.1	1.6	0.1	1.0	0.3	0.8	0.8	0.8	0.7	0.3	0.4	1.1	0.3	0.5	0.5	0.5
	Upper platform NE of GB & drive shaft BE @ 1m	180	19/09/2017	1.9	0.8	3.3	1.1	1.3	0.9	0.1	0.2	2.2	1.4	1.3	0.7	0.5	1.6	1.1	0.2	0.6	0.0	1.1	0.5	2.0	0.5	0.6	0.7	0.5
	Upper platform N side of GB & drive @ 1m	181	19/09/2017	0.6	0.1	2.3	0.7	1.1	0.0	1.2	1.4	1.3	2.3	0.6	0.3	0.7	0.4	0.3	0.2	0.1	0.3	0.8	0.5	1.3	0.6	0.2	0.8	0.1
	Upper platform W side motor end @ 1m	182	19/09/2017	1.1	1.0	2.8	1.4	4.0	3.2	1.4	1.7	2.2	2.1	1.3	0.3	0.0	1.3	0.7	0.3	0.3	0.7	1.1	0.8	2.1	0.7	0.1	0.3	0.6
	Upper platform W side BE @ 1m	183	19/09/2017	0.0	1.6	0.8	2.5	3.7	4.6	3.1	1.7	2.3	2.5	0.7	0.0	1.1	0.3	1.0	0.0	0.6	0.1	0.8	0.5	2.1	0.1	0.2	0.0	1.1
	Upper platform S side BE door @ 0.5m	184	19/09/2017	0.5	2.2	2.8	3.6	4.0	1.4	0.2	1.2	0.3	0.5	2.2	0.4	0.1	1.6	0.8	2.1	0.9	0.3	0.1	0.3	1.3	0.8	0.8	0.9	0.8
	Upper platform E side BE @ 1m	185	19/09/2017	0.3	0.3	0.5	1.4	0.3	0.5	1.7	1.4	2.2	1.9	1.1	0.2	0.4	1.4	1.4	0.1	0.5	0.4	0.8	0.2	1.6	1.0	0.3	0.1	0.4
Baghouse Tower FA250	Platform same level as RM7 top access S side	186	19/09/2017	1.2	0.2	0.4	1.8	0.4	0.6	5.5	8.6	0.4	3.5	0.6	0.9	0.0	1.0	0.5	0.9	0.8	0.0	0.3	1.4	0.7	1.0	0.1	0.6	0.7
	Top platform at BH top level S end	187	19/09/2017	0.6	0.3	0.0	0.9	0.3	1.3	0.1	1.6	0.8	0.5	0.8	0.9	1.9	0.3	0.5	0.5	0.0	0.4	2.5	0.7	3.5	2.5	0.3	1.8	1.3
	In baghouse S doorway open	188	19/09/2017	0.3	0.2	0.6	0.0	1.1	0.1	0.3	0.9	3.7	3.4	0.1	2.5	4.9	1.2	0.8	0.3	0.3	0.7	0.2	1.0	0.6	0.6	1.3	1.0	1.1
	Inside baghouse centre	189	19/09/2017	2.6	2.1	0.4	3.0	3.2	0.4	1.3	2.7	0.9	0.9	0.5	0.6	1.8	0.3	0.5	0.1	0.3	0.8	0.6	0.3	0.2	1.4	0.4	0.0	0.8
SC12 platform	W end 1m to SC end	213	19/09/2017	1.6	0.4	1.8	1.3	1.9	2.0	1.4	0.8	0.8	0.8	0.2	0.5	0.1	1.5	0.7	2.8	3.1	0.6	0.4	0.9	1.3	3.7	3.9	2.0	3.4
	Centre SC12 under centre hopper of Baghouse	214	19/09/2017	2.0	1.3	0.0	4.2	1.9	1.3	0.6	1.2	2.4	4.4	1.3	1.6	6.5	0.5	1.3	7.4	12.8	7.4	0.2	2.0	0.3	0.8	6.1	7.3	3.4
	E end of platform near SC214 N end	215	19/09/2017	2.5	4.2	4.6	0.8	0.0	1.8	1.0	0.6	3.2	4.3	0.0	1.5	2.9	1.5	0.5	1.4	1.6	1.6	0.5	2.6	1.2	0.2	0.3	0.0	0.5
Base of baghouse hopper level	SW corner by S end SC211	216	19/09/2017	0.5	5.2	0.8	8.2	3.1	3.5	3.0	1.1	4.2	2.0	1.1	1.9	0.6	0.1	0.8	0.9	0.6	0.3	2.1	2.5	1.8	6.5	0.2	2.3	0.4

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	**Description**			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
	Centre W side, on E side SC211	217	19/09/2017	0.9	1.2	3.1	1.9	3.4	1.9	1.4	0.1	3.2	0.7	2.9	3.6	0.6	1.2	0.7	0.3	1.3	3.8	1.7	0.9	1.4	1.6	3.9	1.0	0.1
	Centre E side on W side SC210	218	19/09/2017	6.1	0.7	0.2	2.3	1.5	1.7	1.4	2.4	0.3	1.6	3.8	1.5	0.5	1.7	0.0	0.3	0.4	0.4	0.5	0.6	0.5	1.3	2.7	1.7	0.5
	N side FA252 & inlet	219	19/09/2017	2.6	3.2	3.1	2.6	0.0	1.7	1.2	0.5	0.5	0.4	0.8	0.4	0.8	2.6	0.8	0.8	0.2	0.1	0.9	0.3	0.6	0.3	0.3	0.8	0.4
Hopper base level	N end	220	19/09/2017	4.8	2.2	2.2	4.5	3.0	0.5	0.3	0.3	0.3	0.7	0.0	0.6	0.5	2.6	3.3	1.8	0.4	0.1	0.5	0.2	0.2	0.6	1.0	0.3	0.6
	Centre centre of platform between hopper bottoms	221	19/09/2017	0.9	3.7	5.2	1.5	3.2	3.0	0.9	0.9	2.1	2.5	2.3	0.2	3.1	6.6	3.6	2.3	0.5	0.7	0.1	0.1	2.3	4.9	1.0	3.1	4.0
RM7 Inside	Top level inside E doorway	190	19/09/2017	0.0	0.9	0.1	1.3	0.6	1.5	2.9	0.8	0.7	0.7	0.8	0.8	0.4	1.3	1.3	0.7	0.0	0.4	1.1	0.2	0.6	0.5	0.5	0.4	0.4
	Top level N side BE @ 1m	191	19/09/2017	0.8	4.0	4.8	0.6	2.6	0.4	2.4	0.8	1.7	0.1	2.0	1.4	0.7	1.6	1.0	0.7	0.4	0.0	0.5	0.3	0.6	0.3	0.1	0.8	0.3
	E side BE and conveyor feed DC206	192	19/09/2017	2.7	1.9	1.7	0.1	1.9	1.3	3.3	1.0	1.1	0.4	2.2	1.5	0.1	0.7	0.1	0.4	0.4	0.2	1.1	0.2	0.4	0.9	0.0	0.2	0.5
	By top of RM7	193	19/09/2017	2.3	0.2	0.3	0.1	1.6	1.0	0.9	1.3	0.0	2.0	2.8	1.7	0.1	1.1	1.1	0.5	0.2	0.2	1.2	0.4	0.7	0.2	0.9	0.3	0.3
	Top level W side of conveyor feed chute to RM7	194	19/09/2017	2.8	2.1	2.2	1.5	1.2	1.8	1.0	0.1	1.1	0.6	1.5	0.0	1.4	0.5	0.4	0.1	0.3	0.1	1.1	0.0	0.2	0.1	1.0	0.3	0.4
	Top level, W side of conveyor entry to chute	195	19/09/2017	1.8	1.0	1.1	0.3	1.2	0.1	1.3	0.0	1.3	0.3	1.3	0.2	1.1	0.9	1.3	0.6	0.1	0.1	0.7	0.0	0.8	0.0	0.3	0.5	0.2
	Top level W side of platform	196	19/09/2017	0.8	0.6	0.9	0.9	0.9	2.0	1.6	0.8	0.8	0.5	2.3	1.3	0.0	1.8	1.3	0.6	0.5	0.3	1.1	0.1	0.5	0.2	0.4	0.3	0.5
	Top level N side at wall opening for conveyor	197	19/09/2017	0.1	0.9	1.9	0.7	0.2	0.0	2.1	2.5	1.7	0.8	1.1	0.1	0.7	1.3	0.8	0.2	0.1	0.0	0.7	0.2	0.5	0.3	0.5	0.3	0.4
	Top level - feed conveyor walkway half-way - 10m to RM7	198	19/09/2017	0.3	0.0	0.3	1.6	1.4	0.1	0.7	1.2	2.1	1.9	1.8	0.5	1.4	2.4	3.2	1.4	0.0	0.5	1.1	1.8	1.6	2.3	0.4	0.1	0.9
	Level 3 BE N side @ 2.5m	199	19/09/2017	0.5	1.1	1.2	2.6	1.4	1.2	0.7	0.8	1.2	0.2	1.8	1.6	0.5	1.7	0.8	0.0	0.0	0.1	0.9	0.0	0.4	0.1	0.8	0.2	0.8
	Level 3 by duct from RM7 top @ 1m N side	200	19/09/2017	2.2	0.1	0.0	1.2	1.3	1.8	0.3	1.6	2.8	0.2	1.3	1.1	0.4	1.2	1.0	0.1	0.9	1.2	1.2	0.2	0.4	0.0	1.5	0.3	0.9
	Level 2 BE N side @ 2.5m & to N wall	201	19/09/2017	0.5	0.5	0.4	1.4	1.6	2.8	1.9	2.3	0.2	0.3	1.5	1.0	0.5	1.3	1.0	0.5	0.1	0.3	1.0	0.2	0.3	0.1	0.9	0.3	0.4
	Level 2 RM7 top & duct E side	202	19/09/2017	0.5	0.6	2.2	1.0	0.1	2.4	2.9	0.7	1.3	0.0	1.4	0.6	0.6	1.1	0.9	0.5	0.3	0.1	0.8	0.3	0.1	0.6	1.8	0.4	0.3
	Level 1 work bench BE N side @ 2.5m and N wall	203	19/09/2017	0.8	2.1	2.1	0.5	3.7	3.5	1.7	0.7	0.6	0.3	2.3	2.9	0.8	1.6	1.1	0.7	0.1	0.4	0.9	0.4	0.1	0.3	0.2	0.9	0.1
	Level 1 on RM7 platform W side @ 1m to body	204	19/09/2017	1.2	1.1	1.5	5.9	6.8	5.5	7.8	3.3	0.9	1.4	1.7	1.1	1.8	0.5	0.6	0.5	0.1	0.7	1.0	0.6	0.2	0.0	0.1	1.0	0.4
	Mezzanine platform W of RM7 body @ 3m	205	19/09/2017	3.9	1.1	0.1	0.7	2.9	2.8	3.4	3.0	1.5	0.2	1.6	1.6	0.5	2.8	1.5	0.1	0.0	0.4	1.0	0.3	0.0	0.0	0.8	0.3	0.3
	Ground floor E side of VF100 @ 1m and 2m to BE casing	206	19/09/2017	2.5	1.3	1.0	3.4	2.3	0.5	3.6	3.2	2.4	0.9	1.8	0.6	0.5	0.8	0.3	0.3	0.4	0.0	0.8	0.3	1.0	0.3	0.6	0.0	0.6
	Ground floor N side of BE @ 2.2m	207	19/09/2017	3.4	4.2	2.1	4.0	4.7	1.5	2.9	0.3	2.9	0.4	2.1	0.1	0.9	0.8	0.3	0.5	0.4	0.1	1.0	0.5	0.3	1.4	0.0	0.3	0.5
	Ground floor NE corner	208	19/09/2017	0.0	0.1	1.3	1.7	2.8	3.3	2.5	1.7	1.6	0.5	1.7	0.3	1.2	1.3	1.3	0.6	0.2	0.2	1.0	0.3	0.3	0.7	0.4	0.1	0.9
	Ground floor centre W side @ 4m to motor end	209	19/09/2017	0.9	2.2	3.0	2.0	0.4	0.1	3.7	2.1	0.9	0.3	2.6	3.1	0.2	0.9	0.8	0.0	0.0	0.3	1.3	0.1	0.1	0.4	0.8	0.1	0.7
	Ground floor motor N side @ 1.5m	210	19/09/2017	1.8	0.6	0.7	0.6	5.2	4.3	1.2	0.6	0.2	1.0	2.3	1.1	0.7	0.3	0.3	0.5	0.3	0.1	0.9	0.1	0.2	0.7	0.6	0.1	1.2
	Ground floor S side motor & RM7 body @ 2m	211	19/09/2017	0.1	2.2	1.8	1.5	2.6	1.4	0.9	0.5	1.8	0.5	1.3	0.9	0.3	1.5	1.1	0.6	0.3	1.3	3.3	0.7	0.6	0.4	0.8	0.3	1.6
	Ground floor S side RM7 body centre	212	19/09/2017	2.8	0.0	1.1	0.4	4.6	2.1	2.0	0.8	2.5	0.6	2.3	1.1	0.1	2.1	1.4	0.7	0.4	0.5	1.6	0.2	0.1	0.3	0.8	0.0	0.8
Kiln 6 North and South sides																												
30	Coal Road S side in line W side RM7	3	19/09/2017	2.6	1.6	0.1	0.1	0.3	1.0	2.1	3.3	2.7	2.7	0.3	0.9	0.8	0.3	1.0	1.8	0.6	0.8	0.4	0.1	0.8	0.5	0.6	0.8	0.1
31	Coal Road S side in-lin E side RM7	4	19/09/2017	2.5	3.5	0.0	2.2	2.6	1.8	0.4	2.2	2.6	5.2	2.8	0.4	0.8	0.1	0.1	2.3	1.0	0.1	0.3	0.2	1.3	0.5	0.0	0.8	0.4
32	Coal Road S side in-line FA249	5	19/09/2017	0.7	0.3	1.5	1.5	1.8	2.1	0.5	2.3	0.5	2.5	1.0	0.5	0.8	0.7	0.2	0.0	0.5	0.7	0.6	0.4	0.3	0.1	0.8	0.3	0.5
33	Coal Road S side Centre Blending Silo	6	19/09/2017	0.3	1.2	1.4	0.6	1.1	1.5	2.0	1.0	0.6	1.6	1.3	0.4	0.7	0.6	0.1	0.1	0.3	0.4	0.1	0.6	0.1	0.1	0.3	0.7	0.4
34	Coal Road S side E side PHT	7	19/09/2017	0.3	0.5	0.7	0.9	0.0	1.5	1.9	0.7	1.7	3.2	1.4	0.1	1.0	1.0	0.3	0.1	0.3	0.4	0.3	0.7	0.0	0.2	0.1	0.2	1.3
35	Coal Road S side E side new PHT	8	19/09/2017	0.5	0.3	2.2	4.4	0.8	2.7	2.9	0.1	3.1	3.6	0.4	0.1	0.5	0.1	0.3	0.3	0.1	0.3	0.3	0.4	0.1	0.1	0.1	0.4	0.3
36	Coal Road S side E side drive platform	9	19/09/2017	0.2	0.4	1.6	3.3	0.4	4.1	5.1	0.3	2.1	3.3	1.0	0.1	0.5	0.6	0.2	0.0	0.6	0.0	0.1	0.3	0.3	0.1	0.0	0.3	0.0

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
37	Coal Road S side centre column W support duct	10	19/09/2017	1.6	0.4	0.3	0.8	0.1	3.6	4.8	0.4	0.5	0.3	0.2	0.3	0.1	0.1	0.3	0.0	0.7	0.1	0.0	0.3	0.3	0.1	0.1	0.3	0.4
38	Coal Road S side centre pedestal	11	19/09/2017	1.3	0.1	1.2	0.6	0.9	2.8	3.5	0.8	2.0	0.7	1.7	0.5	2.5	2.6	0.7	0.0	0.6	0.1	1.6	0.6	0.5	0.1	0.9	1.5	1.4
39	Coal Road S side Between centre & E pedestal	12	19/09/2017	2.5	1.0	0.9	1.4	0.6	2.7	3.0	1.9	1.7	0.5	1.8	1.1	0.7	0.2	0.8	0.3	1.3	0.2	0.1	0.4	0.5	0.4	0.3	0.2	0.1
40	Coal Road S side E pedestal	13	19/09/2017	2.5	1.3	2.1	2.4	0.3	2.8	2.5	4.3	5.4	2.2	1.7	1.5	1.1	1.2	0.3	0.6	0.7	0.1	0.3	0.3	0.6	0.3	0.4	0.2	0.5
41	Coal Road S side W end Firing floor building	14	19/09/2017	3.3	1.6	2.9	4.4	0.5	1.8	1.8	1.0	0.2	2.1	3.4	1.4	0.4	0.8	0.8	0.8	0.4	0.2	0.4	0.2	0.6	0.4	0.1	0.4	0.3
42	Coal Road S side opposite grate	15	19/09/2017	1.7	0.3	0.6	0.2	0.9	1.0	1.8	1.9	3.9	0.6	3.1	1.0	1.2	1.4	0.8	0.9	0.2	0.4	0.5	0.2	1.2	0.0	0.3	0.1	0.0
43	Coal Road S side W side coal receival bin 25m to truck	16	19/09/2017	0.3	0.7	0.4	1.1	0.8	0.7	0.1	1.5	1.0	5.2	4.0	1.2	1.0	0.6	0.7	0.9	0.3	0.1	0.4	0.3	0.4	0.1	0.0	0.2	0.2
43	A Kerb E side CM opp CM fan discharge	17	19/09/2017	2.1	2.5	3.5	0.5	2.0	1.0	0.2	1.1	0.3	5.3	8.1	1.4	1.3	1.4	0.4	0.3	0.6	0.5	0.6	0.0	1.1	0.5	0.4	0.4	0.3
43A	Kerb opposite CM fan discharge	472	6/10/2017	3.9	2.6	4.9	2.3	1.8	2.1	0.8	0.8	2.3	2.2	1.8	0.4	2.7	6.6	0.8	1.1	1.4	1.0	0.4	0.8	0.1	0.3	0.4	0.1	2.0
Southern fence line																												
43*	S fence Opp E end kiln	273	19/09/2017	1.8	1.0	2.4	5.0	1.3	1.9	3.0	0.9	2.0	4.9	3.1	0.3	1.3	1.3	0.1	0.1	0.5	0.5	0.3	0.5	0.2	0.3	0.4	0.1	0.3
38*	S fence at corner post opp centre pedestal of kiln	274	19/09/2017	1.8	0.3	2.8	4.2	0.9	2.2	2.6	0.5	0.6	1.7	0.1	0.3	1.2	0.3	0.9	0.1	0.9	0.6	0.3	0.8	0.2	0.3	0.2	0.1	0.1
34*	S fence, Opposite W side PHT	275	19/09/2017	1.3	0.3	1.6	2.5	0.2	1.7	0.9	0.1	2.1	1.3	1.6	0.6	1.7	0.5	0.1	0.2	0.3	1.0	0.6	0.6	0.0	0.3	0.3	1.0	2.2
Coal Mill South wall Area																												
44	CM fan room door @ 2m	18	19/09/2017	0.7	1.6	1.0	0.1	2.3	2.3	2.7	2.7	1.1	4.6	6.3	1.5	1.1	1.3	0.5	0.7	0.8	0.4	0.5	0.1	1.1	0.4	0.7	0.5	0.5
44	CM Fan Room door open S side @ 1.5m to open door, 4m x 4m	469	6/10/2017	3.6	0.5	0.1	2.0	1.4	1.4	1.3	1.9	0.3	1.5	3.6	1.5	0.5	2.1	0.4	0.1	0.3	0.2	0.7	0.4	0.0	0.6	2.5	0.9	0.8
45	CM S roll door and wall vent @ 10m S side	20	19/09/2017	0.4	0.9	0.8	0.4	0.6	0.9	0.5	0.4	0.9	3.2	3.7	0.4	0.4	0.2	0.6	0.4	0.4	0.5	0.5	0.0	0.9	0.0	0.6	0.8	0.4
45'	~20m S of CM open doorway and motor room	471	6/10/2017	3.3	1.8	2.3	5.3	3.1	0.2	0.6	0.3	0.5	1.3	0.1	1.2	1.2	1.8	2.8	1.6	0.3	0.3	0.2	0.2	0.9	0.0	0.8	0.5	0.2
46	CM room wall vent @ 2m	21	19/09/2017	2.2	2.3	1.5	0.6	1.3	2.3	1.4	0.1	0.6	1.5	0.5	0.8	0.3	1.0	0.3	0.1	0.4	0.6	0.7	0.2	0.4	0.0	0.3	0.6	0.7
46	Doors to CM room open S side - in doorway 4.5m x 4m	470	6/10/2017	3.5	3.3	2.2	1.4	0.7	1.5	0.6	0.5	0.0	0.1	0.8	0.6	1.0	2.3	0.8	0.3	0.0	0.0	0.6	0.1	0.5	0.2	0.5	0.5	0.5
47b	b Between Grate and Coal Mill Room	22	19/09/2017	1.2	0.3	1.5	0.0	1.2	0.7	1.5	1.3	1.1	2.5	1.8	1.9	3.1	4.5	0.6	1.7	0.2	1.7	0.2	0.3	0.2	0.0	0.4	0.5	0.7
47a	A At kerb in line East End of Grate	23	19/09/2017	1.5	0.7	2.0	0.9	0.1	1.3	1.2	1.6	1.1	0.4	0.2	0.1	0.7	1.0	1.4	1.0	0.0	0.5	0.6	0.1	0.2	0.1	0.2	0.6	0.5
47	Opp FA264 & Shute	24	19/09/2017	0.7	0.2	1.2	1.5	0.5	1.4	0.7	1.1	2.9	3.6	1.1	0.9	1.7	0.2	0.7	1.4	1.4	0.0	0.4	0.3	0.2	0.1	0.2	0.6	0.1
47c	c FA 200 S Side @ 5m	25	19/09/2017	0.6	0.3	0.4	0.4	0.7	0.8	0.7	1.0	1.5	2.0	0.5	0.9	3.3	2.9	1.0	1.3	0.8	0.3	0.3	0.6	0.3	0.1	0.6	1.1	1.0
48	Opp. E pedestal roller	26	19/09/2017	0.3	0.4	0.3	1.1	1.8	1.4	2.0	0.9	4.9	6.1	0.8	1.2	1.1	0.8	0.3	0.7	0.0	0.1	0.1	0.4	0.2	0.3	0.2	0.6	0.4
49	Half way between centre & E pedestals	27	19/09/2017	0.5	1.2	0.0	0.2	2.2	0.9	1.1	1.3	2.7	1.4	0.3	0.8	0.5	0.6	0.3	0.7	0.2	0.3	0.3	0.3	0.4	0.0	0.1	0.7	0.5
50	Opp. Centre pedestal	28	19/09/2017	2.1	1.4	1.5	1.9	0.9	1.3	1.8	2.2	4.3	0.9	2.5	0.4	0.3	0.1	0.3	0.2	0.3	0.4	0.2	0.4	0.2	0.1	0.3	0.3	0.5
51	Half way between Centre & Western pedestals	29	19/09/2017	1.8	1.4	1.1	1.9	0.1	1.6	1.8	3.5	4.1	0.8	1.1	0.2	1.0	2.1	1.1	0.5	0.2	0.4	0.3	0.4	0.2	0.6	0.4	0.4	0.7
52a	A Opp E end of kiln drive platform	30	19/09/2017	2.2	0.8	0.2	0.8	0.5	0.8	2.3	1.9	3.0	0.3	3.1	1.4	3.4	7.0	3.2	0.6	0.4	0.1	0.6	0.4	0.8	1.5	0.6	0.8	1.8
52	Opp W pedestal roller	31	19/09/2017	1.0	2.0	4.5	4.5	0.9	1.5	2.1	1.3	1.7	0.7	0.5	1.8	2.9	3.3	1.6	2.1	1.0	0.5	1.4	0.1	0.1	0.4	0.6	0.4	1.4
Kiln Drive Platform	S side S motor end @ 1.5m kiln drive	222	19/09/2017	1.5	1.2	3.2	7.1	2.5	0.9	1.0	0.0	1.6	4.2	6.9	5.3	1.0	6.3	2.9	0.6	0.3	0.0	1.3	3.1	4.6	4.4	2.4	3.2	3.0
	S side S drive GB @ 1.5m kiln drive	223	19/09/2017	2.3	0.6	5.4	7.6	0.9	1.9	1.2	1.8	3.5	6.1	9.6	7.2	2.7	10.2	3.7	0.2	0.8	0.2	1.3	0.8	2.8	4.3	0.8	1.7	3.2
	S drive motor end @ 1m kiln drive	224	19/09/2017	0.1	0.1	3.0	5.3	1.8	0.4	0.5	1.1	3.7	4.8	6.1	5.3	2.5	10.7	4.4	1.5	0.0	0.7	2.9	4.2	2.3	2.1	2.5	2.2	1.7
	Between drive motors kiln drive	225	19/09/2017	1.6	1.4	6.8	5.7	1.3	1.5	0.1	0.2	1.5	3.7	11.8	8.9	0.6	7.5	3.4	0.7	1.1	1.1	1.4	0.2	3.6	4.0	2.8	3.6	3.1
	N side motor end @ 1m kiln drive	226	19/09/2017	0.2	0.3	2.9	5.2	3.1	1.6	0.0	1.3	4.0	4.4	3.3	2.9	1.4	7.4	3.2	1.1	0.1	1.1	0.6	1.1	1.8	1.1	2.2	0.7	0.8
	N side motor N end @ 1.5m kiln drive	227	19/09/2017	1.6	0.3	2.0	3.7	2.7	1.4	1.8	1.9	1.9	4.9	8.0	4.2	2.5	6.1	2.1	1.2	0.2	0.8	0.3	0.6	1.8	0.3	3.8	0.7	0.4

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	N side N gearbox @ 1.5m kiln drive	228	19/09/2017	3.3	0.0	4.5	5.6	2.6	1.9	0.6	0.8	2.4	4.4	5.3	1.6	5.0	8.2	0.6	3.1	0.1	1.6	0.3	0.2	1.5	0.3	2.2	0.0	0.5
53	Kiln drive platform Centre E end on platform	32	19/09/2017	1.8	2.3	0.2	2.0	1.5	0.4	1.2	1.7	2.0	3.6	3.2	0.5	0.8	1.7	1.7	0.5	0.1	0.0	0.5	1.1	0.1	0.1	1.6	1.0	0.1
54	W end RM6	33	19/09/2017	1.7	0.2	0.5	1.0	0.1	1.4	0.3	1.8	3.9	4.4	0.3	2.5	1.7	1.8	0.6	2.0	0.7	5.1	3.7	0.3	1.9	1.1	0.3	0.4	0.1
55	Centre RM6	34	19/09/2017	1.1	0.1	2.1	3.3	0.8	0.5	1.3	2.4	3.0	3.7	0.2	2.0	1.7	2.5	1.5	2.9	3.0	4.6	3.9	0.3	2.8	1.2	0.1	1.2	1.3
56	E End RM6	35	19/09/2017	0.4	1.3	1.0	1.1	0.4	1.3	1.3	4.0	2.0	3.3	0.3	1.9	2.0	2.7	1.3	3.6	2.7	6.9	5.3	0.1	1.7	0.8	0.0	0.6	0.3
57	N side of road opposite opening to FA38	453	6/10/2017	1.8	2.9	3.1	3.3	1.7	0.2	0.8	1.7	2.7	3.0	1.0	2.1	0.4	1.8	1.2	4.6	3.4	8.1	6.4	0.2	1.4	0.4	0.8	0.1	0.7
57'	N side of kerb opposite FA38 roll door closed	454	6/10/2017	2.1	1.9	1.2	4.6	1.8	0.3	2.1	2.6	2.0	3.3	1.1	1.7	2.5	3.7	2.9	3.8	4.1	8.0	6.6	0.5	0.3	0.8	1.5	0.4	0.6
57	Door opp FA38	36	19/09/2017	3.9	0.9	2.3	4.2	0.5	2.2	1.9	4.6	1.1	3.1	0.6	1.6	1.9	2.5	2.0	3.0	3.1	6.0	4.4	0.4	0.8	0.0	0.5	0.1	0.4
58	Half way between FA38 & FA39	37	19/09/2017	3.5	1.3	5.8	7.0	0.7	2.1	1.9	3.4	2.2	3.9	1.3	0.9	1.0	1.1	1.7	2.6	5.2	2.7	3.0	0.4	0.5	0.2	0.9	0.1	0.4
58	Half way between FA38 & FA39, N side of road	455	6/10/2017	2.0	1.1	4.6	8.5	1.6	1.9	1.9	1.7	3.5	3.1	0.7	3.4	3.1	2.8	2.8	1.3	2.6	5.1	4.1	0.6	1.1	2.8	0.1	0.8	1.5
59	Opp FA39 end	38	19/09/2017	0.1	3.4	4.4	5.6	1.3	1.6	0.8	1.3	2.8	4.9	2.1	3.4	3.0	1.5	2.7	2.1	6.4	1.3	2.7	0.3	0.3	0.8	0.1	0.3	1.2
59	FA 39 from far side of road @ 7.9m to motor platform	438	6/10/2017	1.3	3.2	2.5	3.3	1.8	0.3	2.9	3.6	1.7	1.8	1.4	3.2	1.9	1.3	2.2	2.6	6.2	1.8	3.3	0.4	0.6	2.5	0.4	1.1	1.7
60	Opp Conditioning Tower	39	19/09/2017	0.1	3.5	3.0	2.6	1.3	0.6	2.2	4.1	1.8	3.6	0.7	2.1	1.7	1.2	1.8	2.5	5.3	2.5	2.9	0.1	0.8	0.5	0.8	0.6	0.5
60	Opposite conditioning tower N side of road	456	6/10/2017	1.5	0.2	1.1	3.4	2.3	0.7	2.0	2.6	1.8	3.1	0.8	2.1	2.7	3.2	3.0	4.8	9.1	1.2	4.0	1.3	0.8	1.9	0.8	1.0	1.2
60'	Opposite NW PHT column	457	6/10/2017	0.4	0.5	3.8	7.1	3.1	0.2	0.9	1.5	1.3	2.3	1.1	0.9	1.0	1.1	3.2	1.8	8.6	0.8	3.1	0.8	1.6	4.0	0.7	0.4	1.4
61	Opp centre PHT	40	19/09/2017	4.0	1.7	2.9	2.1	0.1	0.8	0.5	1.8	1.1	3.4	1.9	0.8	1.5	2.1	1.5	2.3	4.5	0.3	0.5	0.1	1.3	0.3	1.0	0.3	0.4
61	Opposite NE PHT column	458	6/10/2017	2.2	0.6	4.0	4.3	1.1	0.9	1.7	0.1	1.6	2.6	1.2	0.9	1.0	1.4	1.3	3.4	6.2	0.2	2.0	0.9	0.1	1.1	0.4	0.3	0.5
63	Opp E side new PHT	43	19/09/2017	3.0	0.6	4.8	3.3	0.2	0.9	2.3	0.6	0.4	1.9	1.1	0.7	1.1	2.2	1.1	0.6	0.8	0.7	0.1	0.4	0.4	0.0	0.7	0.3	0.1
63	Opposite E side new PHT	459	6/10/2017	0.0	0.5	1.3	0.4	0.5	1.0	2.1	2.9	3.7	4.4	2.1	0.6	4.3	5.5	2.1	0.5	1.7	1.1	0.0	1.8	0.4	0.4	0.0	0.1	0.6
64	Opp. E end drive platform	42	19/09/2017	5.0	0.3	3.9	2.6	0.1	0.8	2.7	0.5	1.2	1.0	1.6	0.2	1.4	2.7	0.5	0.5	0.2	0.7	0.0	0.5	0.2	0.3	0.9	0.3	0.5
65	Opp column for return duct W side	44	19/09/2017	1.9	1.2	4.8	1.8	1.8	0.9	1.8	0.4	1.9	0.1	1.1	0.1	0.2	0.8	0.5	0.1	0.1	0.4	0.2	0.4	0.3	0.3	0.1	0.5	0.6
65	Opposite S duct support tower	460	6/10/2017	5.2	0.6	3.6	2.6	0.1	0.3	1.6	0.2	1.8	0.8	3.0	0.3	1.3	1.9	0.3	0.8	0.5	0.1	0.6	0.0	0.2	0.3	0.6	0.3	0.6
66	Opp centre pedestal	45	19/09/2017	1.7	1.7	2.5	2.0	1.8	1.3	2.0	0.6	0.4	0.1	0.8	0.7	0.3	0.2	0.0	0.3	0.1	0.5	0.1	0.5	0.4	0.2	0.2	0.4	0.7
67	Half way between centre & e pedestals	46	19/09/2017	0.6	0.1	0.4	0.4	1.1	0.9	1.0	1.1	0.6	0.3	0.2	1.2	0.0	0.1	0.3	0.2	0.2	0.6	0.3	0.5	0.4	0.2	0.1	0.6	0.5
68	Opp E pedestal	47	19/09/2017	1.4	0.8	4.9	2.9	2.4	1.0	1.3	0.3	1.6	0.7	1.7	0.3	0.4	0.6	0.0	0.2	0.0	0.5	0.0	0.1	0.8	0.1	0.3	0.0	1.2
69	Centre courtyard	48	19/09/2017	0.0	0.4	1.4	0.8	0.3	0.2	0.4	1.7	3.3	2.3	0.2	0.1	0.3	0.4	0.0	0.3	0.1	0.5	0.1	0.0	0.8	1.4	2.2	1.2	0.9
Grate Cooler Fan Courtyard Area																												
	FA201 N side coupling @ 1.5m	234	19/09/2017	0.6	1.3	0.5	2.4	0.6	0.9	1.5	0.0	0.6	0.2	0.2	0.0	1.0	0.8	0.1	0.2	0.1	0.6	0.1	0.2	0.2	0.2	1.1	0.9	0.5
	FA201 N side inlet & casing @ 1m	235	19/09/2017	1.9	1.2	0.3	0.3	1.8	0.1	0.5	0.2	0.8	0.6	0.7	0.8	0.5	1.2	0.2	0.6	0.5	0.6	0.1	0.3	0.1	0.1	0.9	0.9	1.7
	Between FA201 & FA203 & 1.5m to FA202 N side	236	19/09/2017	0.4	1.9	3.3	0.2	0.3	0.5	0.6	0.0	3.3	3.2	0.5	0.1	0.5	0.4	0.5	0.6	0.0	1.0	0.2	0.1	0.3	0.9	1.3	0.5	0.8
	FA203 inlet & casing @ 1m	237	19/09/2017	2.2	1.7	0.5	0.0	1.6	0.4	0.3	0.5	1.3	2.3	0.8	0.2	1.0	0.2	0.6	0.5	0.8	0.1	0.1	0.1	0.6	2.3	5.0	2.3	0.6
	Between FA203 & FA205 and 2m to FA204 N side	238	19/09/2017	4.6	1.2	1.3	1.1	2.3	0.3	1.3	1.4	1.8	1.4	0.2	0.3	0.8	0.5	1.1	1.1	1.2	0.0	0.2	0.2	0.5	2.3	4.9	1.5	1.2
	Between grate and Coal Mill Room W door	239	19/09/2017	1.4	3.5	1.6	0.3	2.8	3.2	0.3	1.3	2.0	2.8	0.7	0.4	0.5	1.8	0.1	1.5	0.8	1.1	0.1	0.3	0.1	0.1	1.0	0.5	0.1
	Coal Mill Room N roll door @ 1m	240	19/09/2017	2.7	2.1	0.9	0.6	0.3	1.3	3.2	2.9	1.5	0.3	2.6	1.2	0.5	2.1	0.3	0.6	1.0	1.3	0.2	0.9	1.5	0.4	0.2	1.3	0.2
Kiln Firing Floor	KFF centre opening N side	248	19/09/2017	0.1	1.6	3.7	1.8	1.9	3.1	0.6	1.5	2.6	0.6	1.3	1.3	0.5	0.7	0.2	1.0	0.3	1.3	0.6	0.7	1.3	0.8	0.8	0.8	0.5
	FA209 E side inlet & filter silencer	249	19/09/2017	0.2	0.1	0.4	0.3	0.0	1.6	0.0	2.3	1.3	0.1	0.1	0.0	0.0	0.3	0.4	0.0	0.3	0.5	0.2	0.2	0.2	0.5	0.5	0.1	0.7
	FA209 W side inlet @ 1.2m	250	19/09/2017	0.3	0.4	1.1	0.3	1.2	1.0	2.0	0.5	0.6	1.0	1.9	0.8	1.0	2.1	0.2	0.1	0.3	0.3	0.8	0.1	0.3	0.3	0.1	0.1	0.2
	KFF centre S side opening	251	19/09/2017	0.2	0.6	0.3	0.5	0.9	0.9	0.1	1.6	1.7	0.9	4.0	2.8	0.4	0.9	1.3	1.8	1.2	1.1	0.4	0.0	0.2	0.4	0.1	1.3	1.8
	FA210 S side seal fan inlet E side @ 1.5m	252	19/09/2017	0.4	0.3	0.2	1.8	2.6	2.6	0.6	1.3	1.0	2.3	0.0	1.3	1.8	0.3	2.2	0.9	0.2	0.1	0.0	0.7	0.2	0.2	0.1	0.9	1.9
	FA210 S side seal fan inlet W side & casing @ 1m	253	19/09/2017	1.1	0.4	2.1	0.1	0.3	0.3	0.8	0.0	0.3	0.5	0.7	0.5	0.3	0.8	1.3	0.4	0.2	0.1	0.4	0.2	0.0	0.5	0.1	0.6	1.6
	FA200 inlet N side @ 1.2m	254	19/09/2017	0.3	0.1	1.0	0.1	2.8	1.6	1.2	1.3	3.0	3.4	1.0	0.5	1.1	0.3	0.1	0.1	0.5	0.5	0.4	0.2	0.1	0.6	0.2	0.0	0.2
	New replacement FA211 centre under kiln, inlet @ 1m	255	19/09/2017	1.1	2.1	4.6	0.8	1.7	0.9	3.5	0.3	2.0	2.2	2.2	2.5	0.6	1.6	1.2	0.2	0.5	0.3	1.1	0.6	0.1	0.1	0.5	0.6	0.5

Table 3.2: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data - Tonality Assessment of measured one-third octave band spectra

Location		File	Date	Tonality of LAeq dBA in One-third Octave Band frequency Hz																						
Number	Description			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
	Centre KFF @ 2m to elevator conveyor duct S side	256	19/09/2017	0.1	1.3	1.2	1.0	0.1	0.2	0.2	0.6	0.6	0.3	1.6	2.2	1.0	0.8	0.8	1.1	2.5	0.5	0.3	0.2	0.5	0.5	0.4	1.2	2.2
	KFF burner air cannon N side @ 2m	257	19/09/2017	1.1	1.1	0.4	0.7	0.2	1.3	1.1	0.3	1.1	0.4	1.1	1.3	0.2	0.5	0.5	2.0	0.8	1.5	0.1	1.4	0.5	0.3	1.5	0.4	0.9
	KFF burner air cannon N side @ 2m	258	19/09/2017	0.4	0.4	0.9	1.2	0.4	1.2	1.4	0.5	1.0	0.3	1.3	1.3	0.0	0.5	0.3	1.1	0.1	2.1	1.0	0.4	0.2	1.6	0.8	0.0	0.9
Radicon Cooler	L1 S side fan @ 0.6m	259	19/09/2017	0.8	1.6	1.7	4.1	1.6	1.3	1.3	0.8	0.8	0.0	0.0	0.0	1.0	0.4	0.4	1.1	0.6	0.5	0.2	1.6	3.1	0.3	0.6	0.6	0.4
	L1 centre fan @ 1m	260	19/09/2017	0.4	3.4	3.5	2.0	0.3	0.8	1.1	0.0	0.6	1.5	0.2	0.7	2.0	0.9	1.3	0.9	0.4	0.3	0.4	1.1	2.4	0.2	0.3	0.4	0.4
	L1 N side fan @ 1m	261	19/09/2017	0.5	0.1	2.5	5.1	0.3	1.4	0.9	0.1	1.2	1.5	1.2	2.8	3.3	0.8	1.4	1.0	0.2	0.0	0.1	1.0	2.2	0.1	0.6	0.6	0.7
	L2 centre fan @ 1m	262	19/09/2017	0.5	1.2	1.7	5.3	0.4	2.8	2.1	0.5	0.3	0.3	0.2	1.5	2.3	0.2	1.8	1.6	0.8	0.4	0.3	0.5	1.3	0.3	0.0	0.0	0.3
	L2 S fan @ 0.6m	263	19/09/2017	0.6	1.5	3.0	6.7	0.5	2.2	1.6	0.1	0.6	1.2	0.1	0.9	1.9	1.6	2.3	0.3	0.9	1.1	0.6	0.6	2.0	0.1	0.0	0.0	0.3
	L2 N fan @ 1m	264	19/09/2017	0.4	0.8	3.3	6.6	0.6	3.3	2.5	0.6	0.7	0.8	1.3	2.8	3.4	2.5	4.6	2.1	0.4	0.3	0.0	0.3	0.6	0.1	0.2	0.2	0.4
	L3 centre fan @ 1m	265	19/09/2017	0.8	1.6	2.7	5.3	0.8	2.2	1.5	0.2	0.3	0.3	0.0	0.3	1.7	1.0	3.0	3.8	2.6	0.4	1.4	1.2	0.9	0.8	0.7	0.2	0.2
	L3 S side fan @ 0.6m	266	19/09/2017	1.6	1.2	4.2	7.4	0.1	1.5	0.9	0.3	0.0	0.8	0.2	0.3	0.8	0.9	2.4	0.8	0.5	0.8	0.6	0.4	2.5	0.2	0.2	0.3	0.3
	L3 N side fan @ 1m	267	19/09/2017	1.3	1.6	3.2	6.6	0.3	3.3	2.6	0.1	1.1	1.8	1.1	0.8	2.2	0.8	3.6	4.1	2.2	0.3	0.5	0.3	1.4	0.4	0.4	0.2	0.3
	L4 centre fan @ 1m	268	19/09/2017	0.3	0.5	0.7	3.6	0.4	2.3	2.3	0.9	0.3	2.0	0.3	1.6	3.3	1.8	0.2	4.9	6.3	0.9	0.5	0.3	0.1	2.1	0.4	0.8	1.3
	L4 S side fan 2 0.6m	269	19/09/2017	3.0	2.2	3.7	3.6	1.1	3.6	2.7	0.6	0.8	0.9	1.3	1.4	1.8	3.7	0.5	4.9	1.2	4.5	2.8	2.7	3.6	0.1	0.8	0.6	0.1
	L4 N side fan @ 1m	270	19/09/2017	0.8	1.0	3.2	4.7	0.4	2.0	1.7	0.1	0.7	0.8	1.8	2.1	2.4	1.1	1.6	5.7	6.5	1.0	1.8	1.1	0.1	2.7	0.8	0.4	0.3
	L5 face E	271	19/09/2017	1.5	0.6	2.2	4.0	0.2	3.4	3.1	1.1	2.9	1.4	2.5	2.5	2.6	1.8	0.8	1.9	4.4	0.7	0.3	1.0	1.9	1.3	0.3	0.3	0.4
	L5 face W	272	19/09/2017	1.2	0.6	1.6	3.6	2.4	0.4	2.0	1.5	0.0	0.7	0.9	0.7	2.3	2.3	1.1	0.6	2.1	0.2	0.2	0.7	1.0	1.3	0.3	0.3	0.3
Stack Fan FA215	S side ground level @ 2m to motor end FA215	241	19/09/2017	6.3	2.0	0.4	0.1	0.5	0.3	0.0	1.0	0.3	1.3	1.8	0.0	0.1	1.1	0.5	0.3	0.3	0.1	0.4	0.9	0.5	2.0	0.5	0.3	1.0
	FA215 platform E side motor & casing @ 1m	242	19/09/2017	5.5	2.7	0.4	1.5	0.2	0.3	2.6	4.0	1.6	3.3	1.0	0.8	0.3	0.6	1.3	0.2	1.3	0.6	0.5	0.3	1.2	1.8	0.5	1.1	0.7
	FA215 platform W side motor & casing @ 1m	243	19/09/2017	4.7	5.2	5.2	1.2	1.4	2.4	0.8	2.4	1.0	1.2	0.4	1.1	0.6	1.3	1.6	0.7	1.7	0.3	1.8	1.6	1.4	1.7	1.1	1.2	1.5
	FA215 E side under discharge duct @ 1m	244	19/09/2017	0.9	2.7	3.0	0.4	0.3	0.3	1.3	0.9	1.7	2.4	2.2	0.1	0.2	0.3	0.4	0.4	0.3	0.5	0.3	0.1	1.0	2.5	0.8	1.4	2.7
	FA215 platform N side on E side of inlet box @ 0.5m and duct casing @ 0.8m	245	19/09/2017	5.1	5.4	4.8	0.5	2.5	2.5	2.7	2.4	1.3	3.4	1.3	2.6	1.8	1.8	0.6	0.1	0.6	0.1	0.5	0.6	1.4	4.2	0.9	2.1	0.0
	FA215 N platform centre N side inlet box @ 0.8m	246	19/09/2017	3.4	3.8	2.5	0.3	0.9	0.5	1.9	0.8	2.8	2.7	0.4	0.8	0.6	0.3	0.4	0.3	0.1	0.1	0.4	2.5	0.9	5.4	0.2	0.7	0.2
	FA215 N platform W side under inlet duct @ 0.8m	247	19/09/2017	2.0	3.1	1.3	1.3	1.6	0.1	2.3	0.3	2.3	0.5	0.2	1.2	0.3	0.1	1.3	1.0	0.1	0.0	0.2	1.1	1.1	3.5	1.2	0.4	0.8
Control Building Roof																												
	SW corner	279	19/09/2017	3.0	1.1	1.8	2.8	1.0	0.6	1.3	2.6	3.0	3.0	1.3	1.2	0.4	1.7	2.8	2.6	1.0	1.7	0.4	0.0	0.9	0.5	0.4	1.1	0.8
	SE corner	280	19/09/2017	4.7	2.3	1.3	1.9	0.5	1.0	0.9	0.8	2.8	2.8	0.3	0.4	1.0	1.5	2.4	1.6	0.1	0.9	0.1	0.2	0.8	0.5	0.3	0.6	0.1
	NE corner	281	19/09/2017	4.6	1.5	1.2	2.4	1.1	0.9	0.3	2.1	1.3	1.3	1.3	0.3	1.5	1.2	1.2	0.3	1.2	0.1	0.4	0.4	1.0	0.3	6.1	13.1	5.3

Figure 3.6A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 8

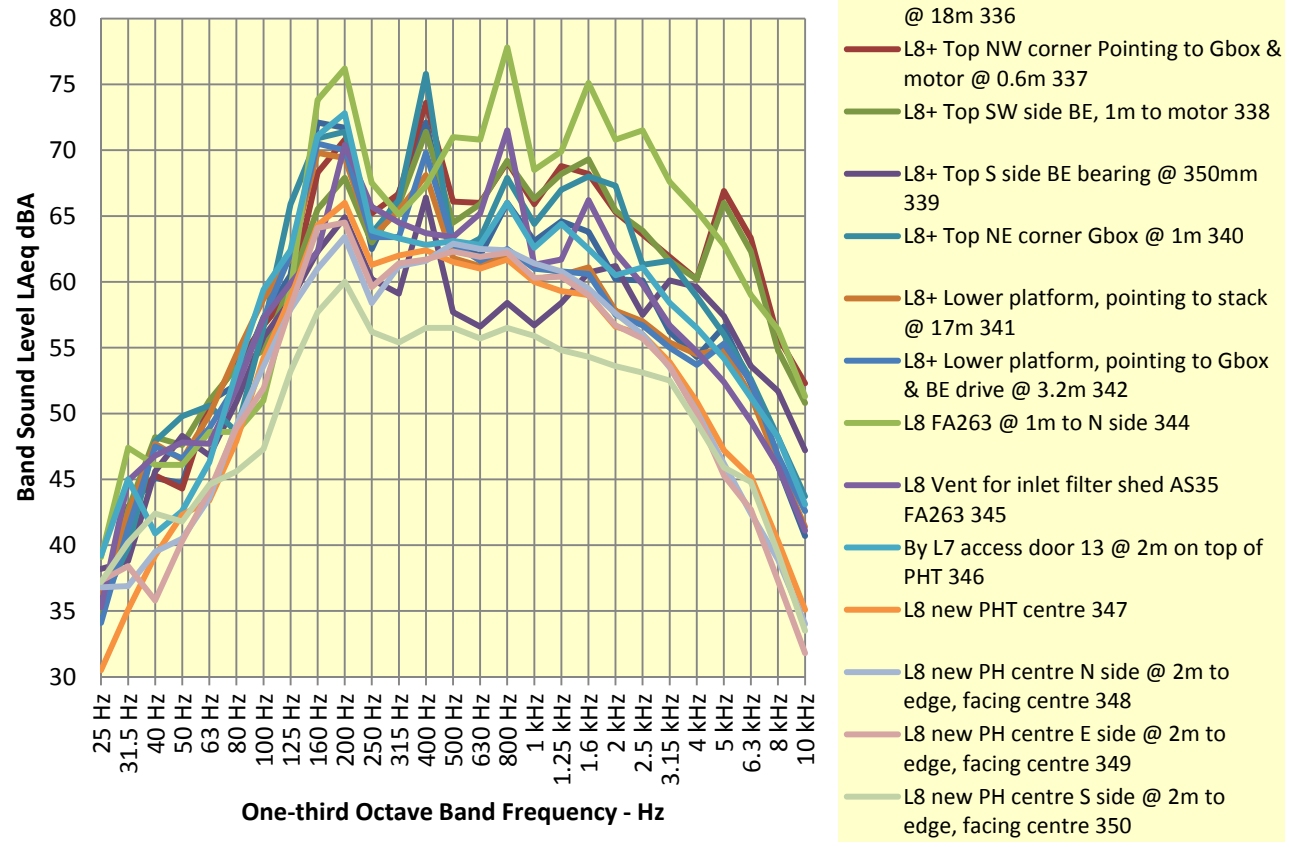
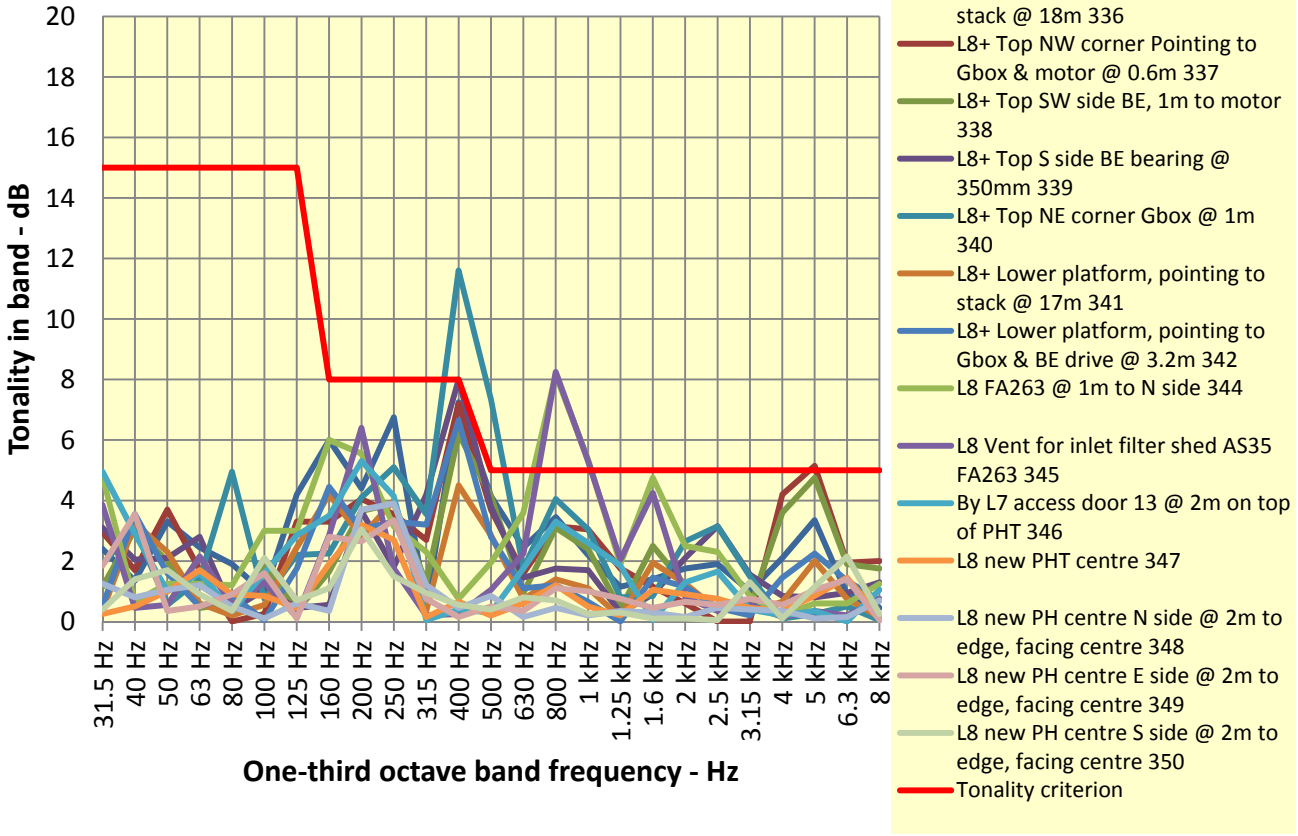


Figure 3.6: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 8



Spectra & Tonality graphs: na28 data 2017

Figure 3.7A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 7

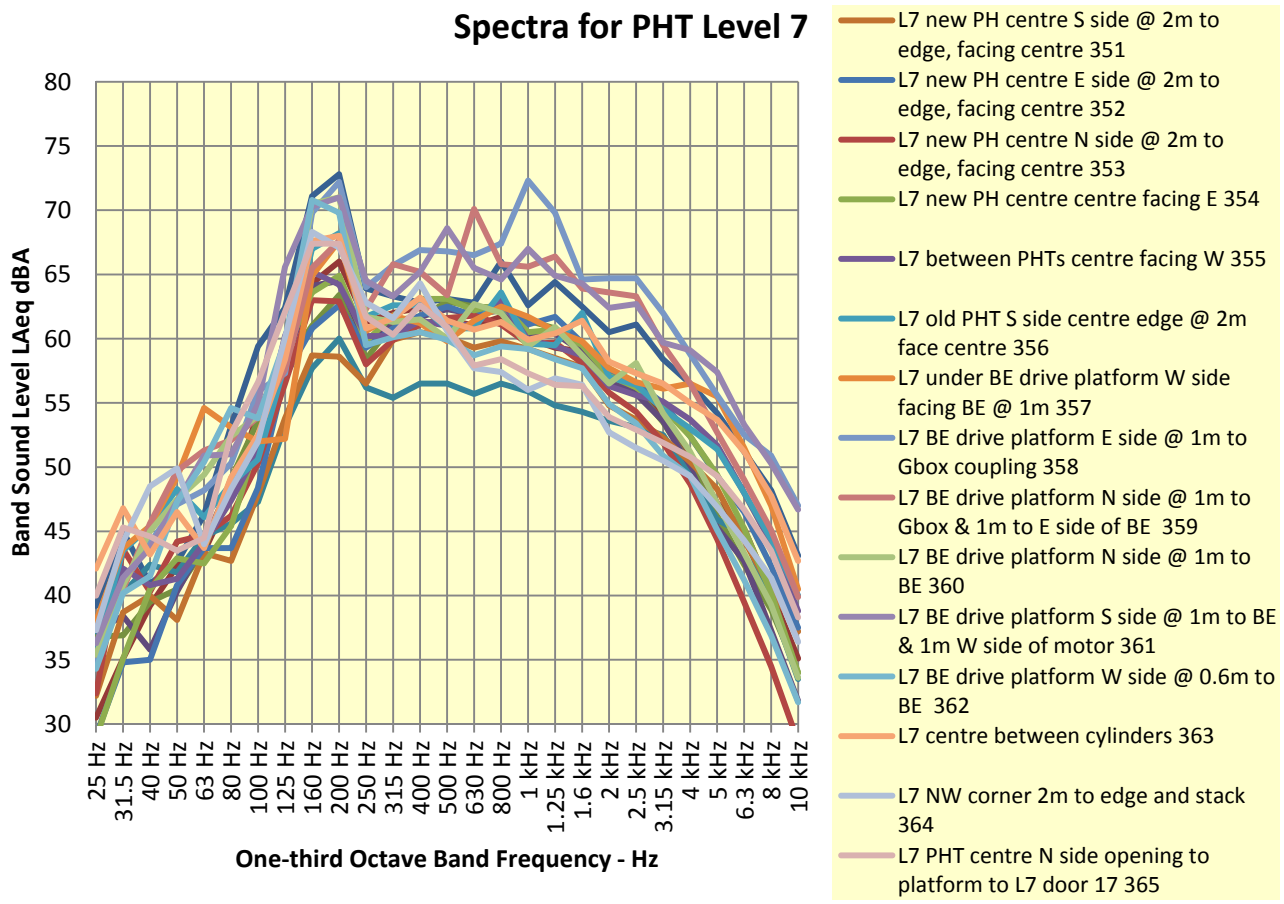
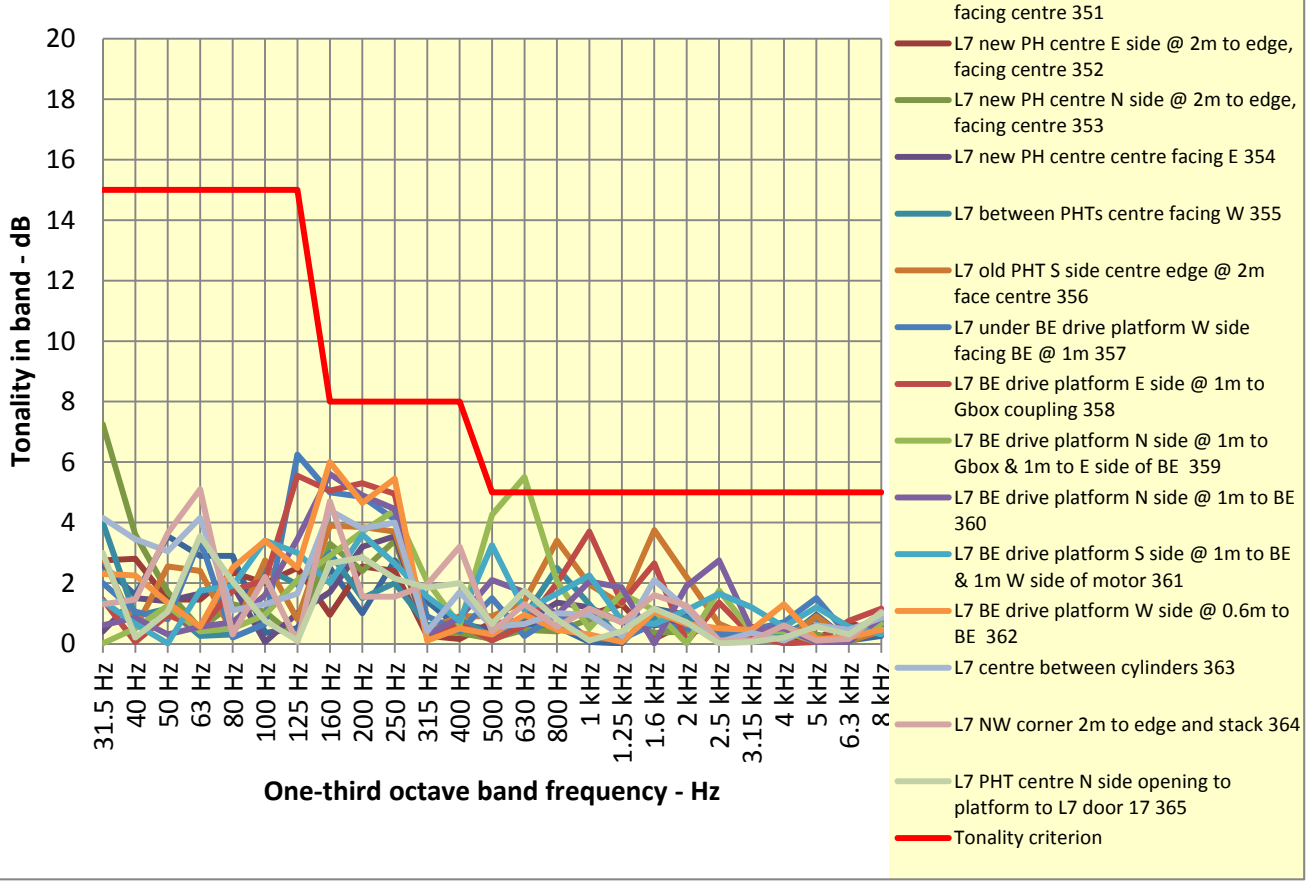


Figure 3.7: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 7



Spectra & Tonality graphs: na28 data 2017

Figure 3.8A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 6 RM Silo Top

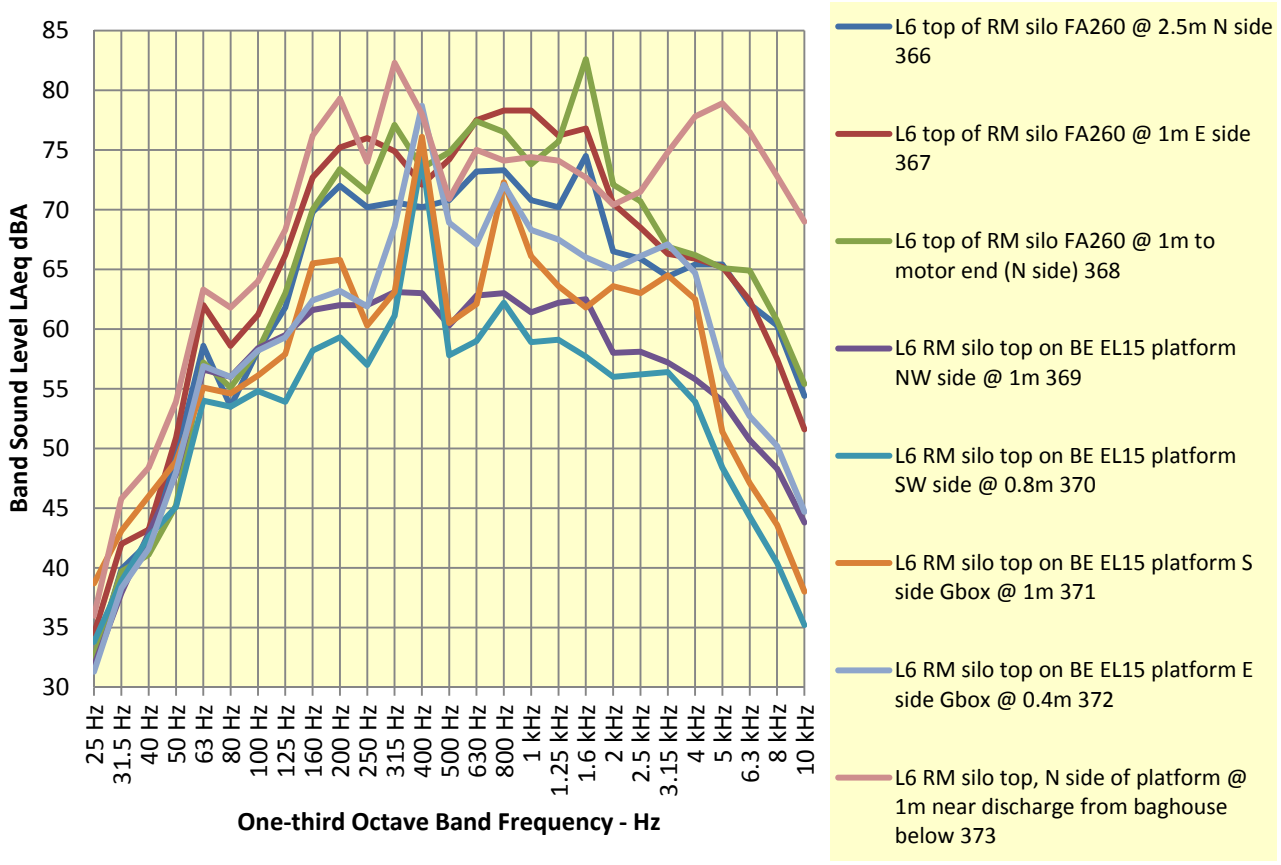
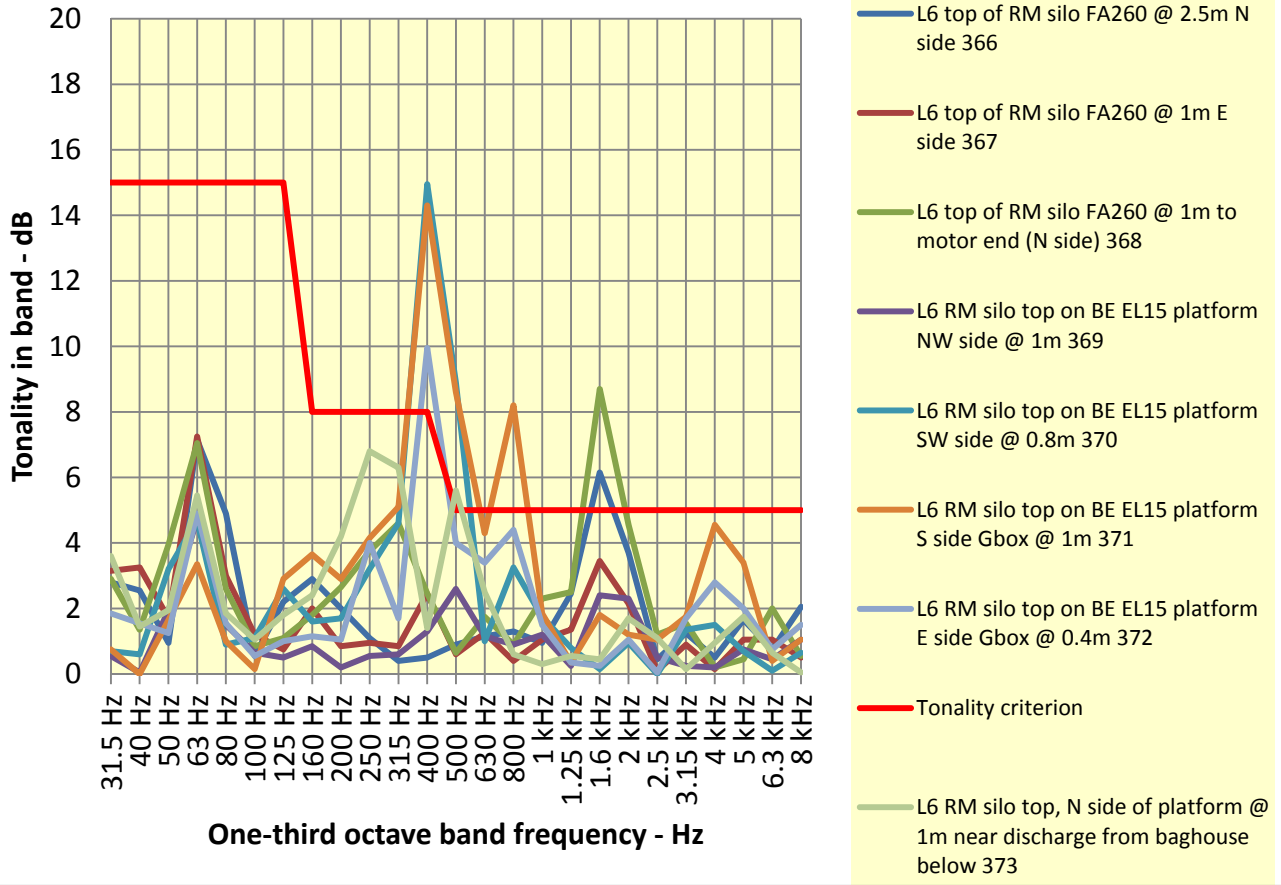


Figure 3.8: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 6 RM Silo Top



Spectra & Tonality graphs: na28 data 2017

Figure 3.9A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 6

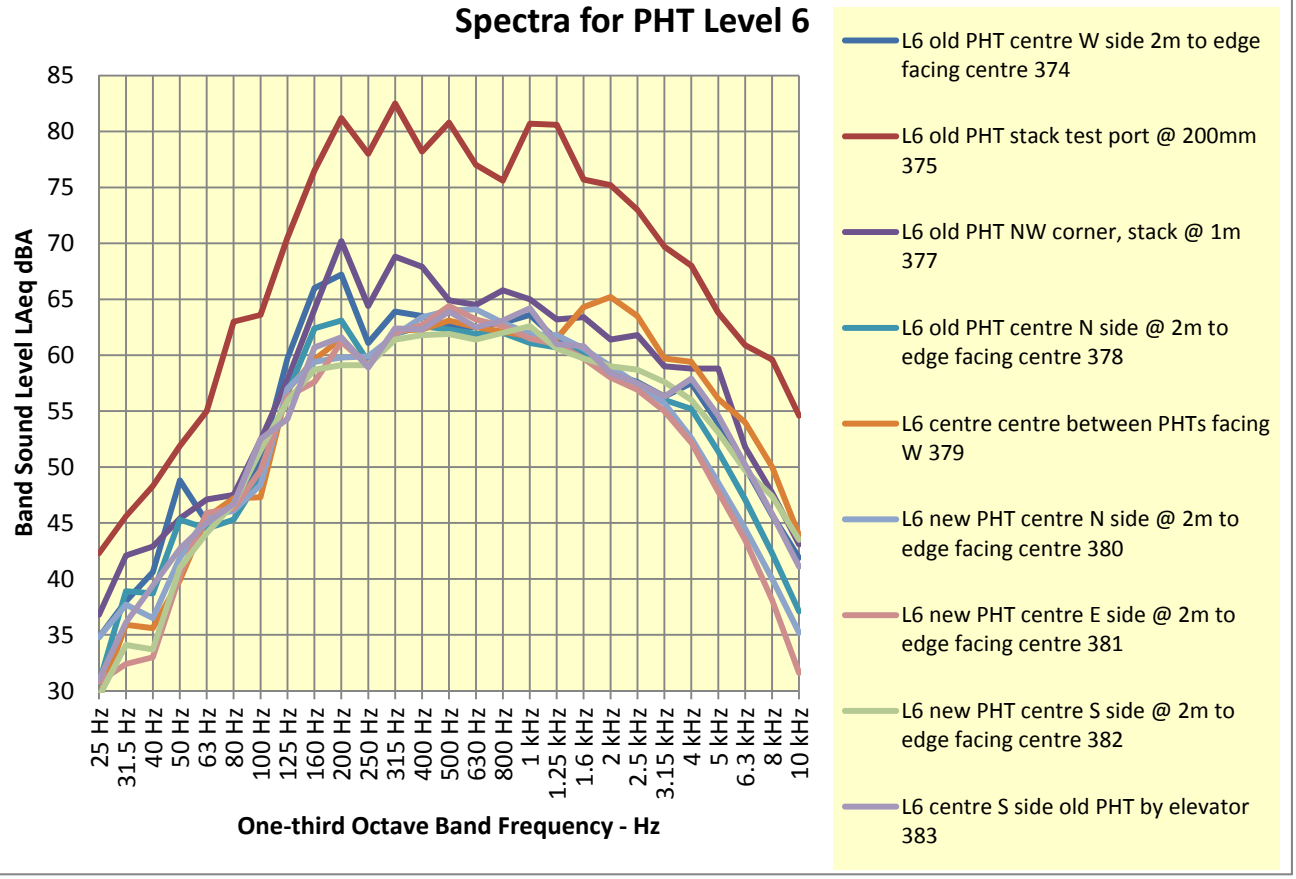
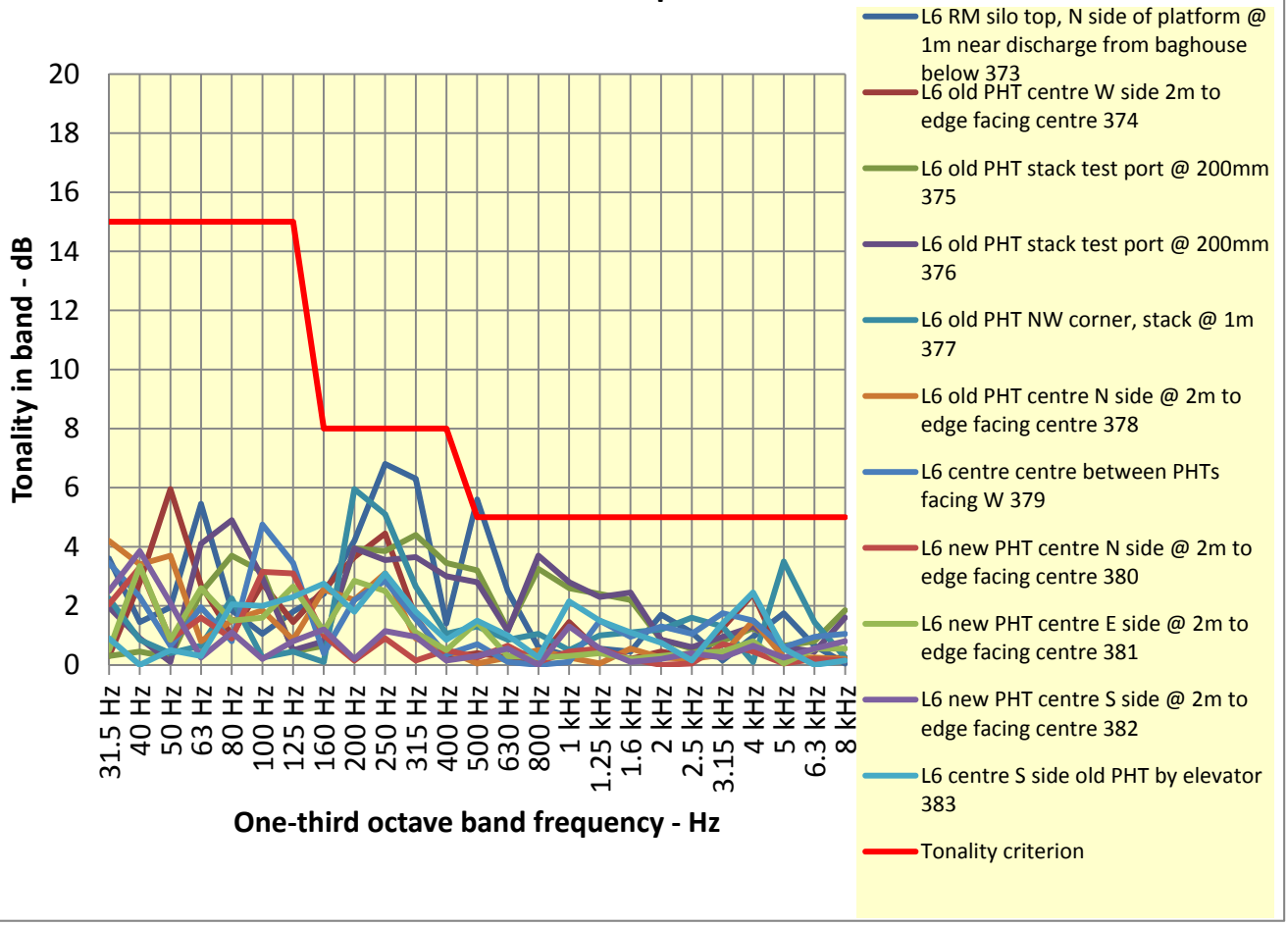


Figure 3.9: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 6



Spectra & Tonality graphs: na28 data 2017

Figure 3.10A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 6 inside top RM Silo

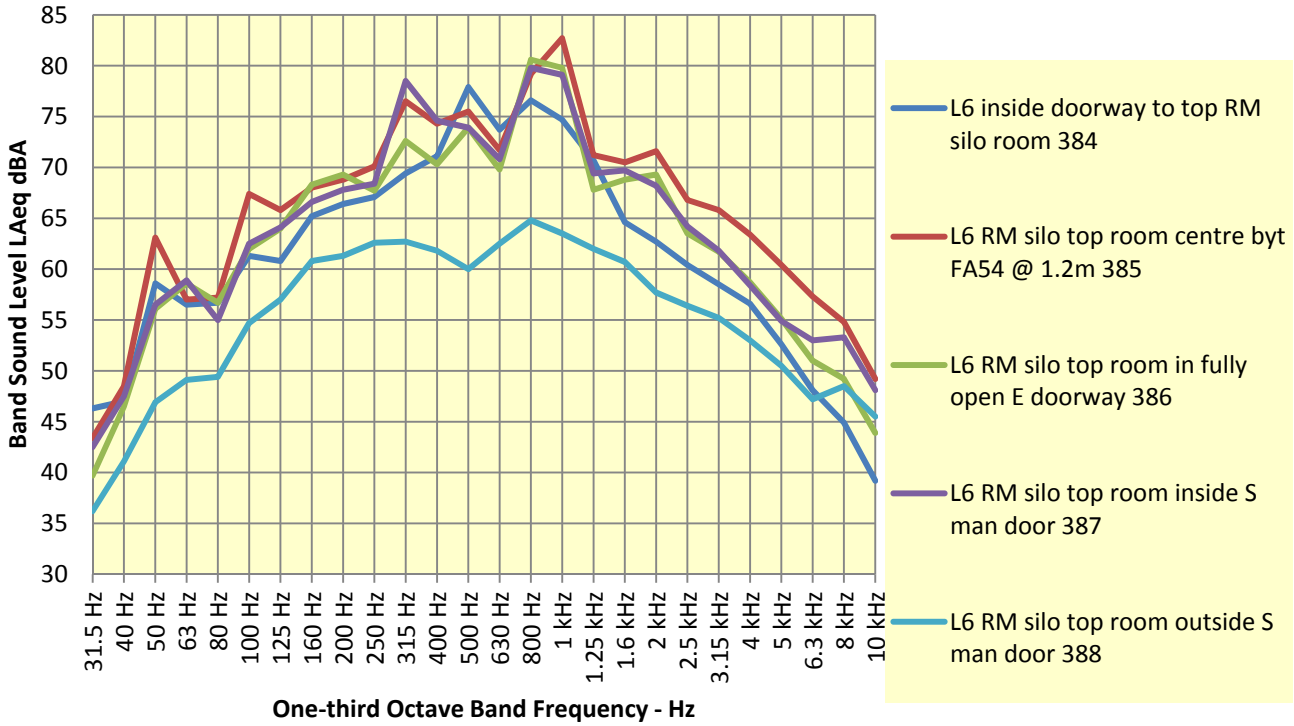


Figure 3.10: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 6 inside RM Silo top

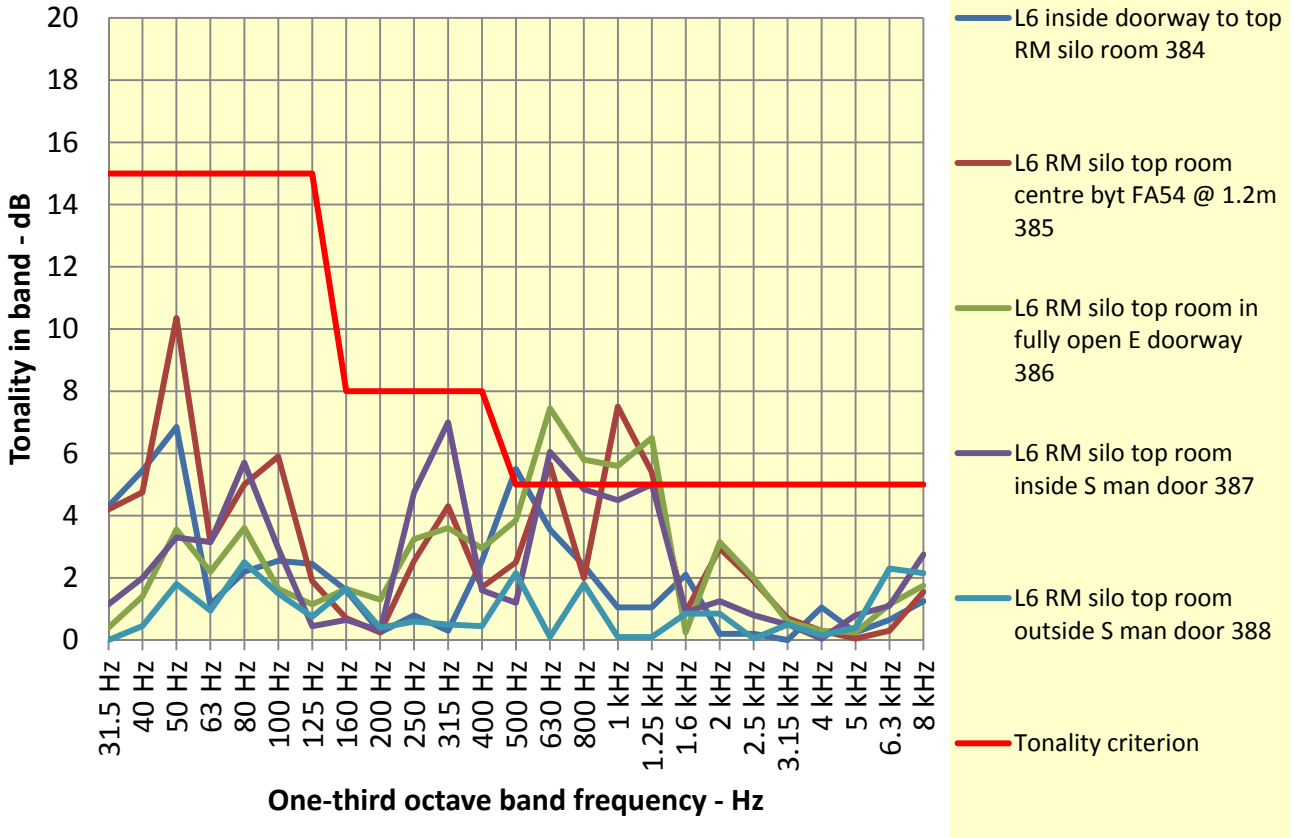


Figure 3.11A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 5

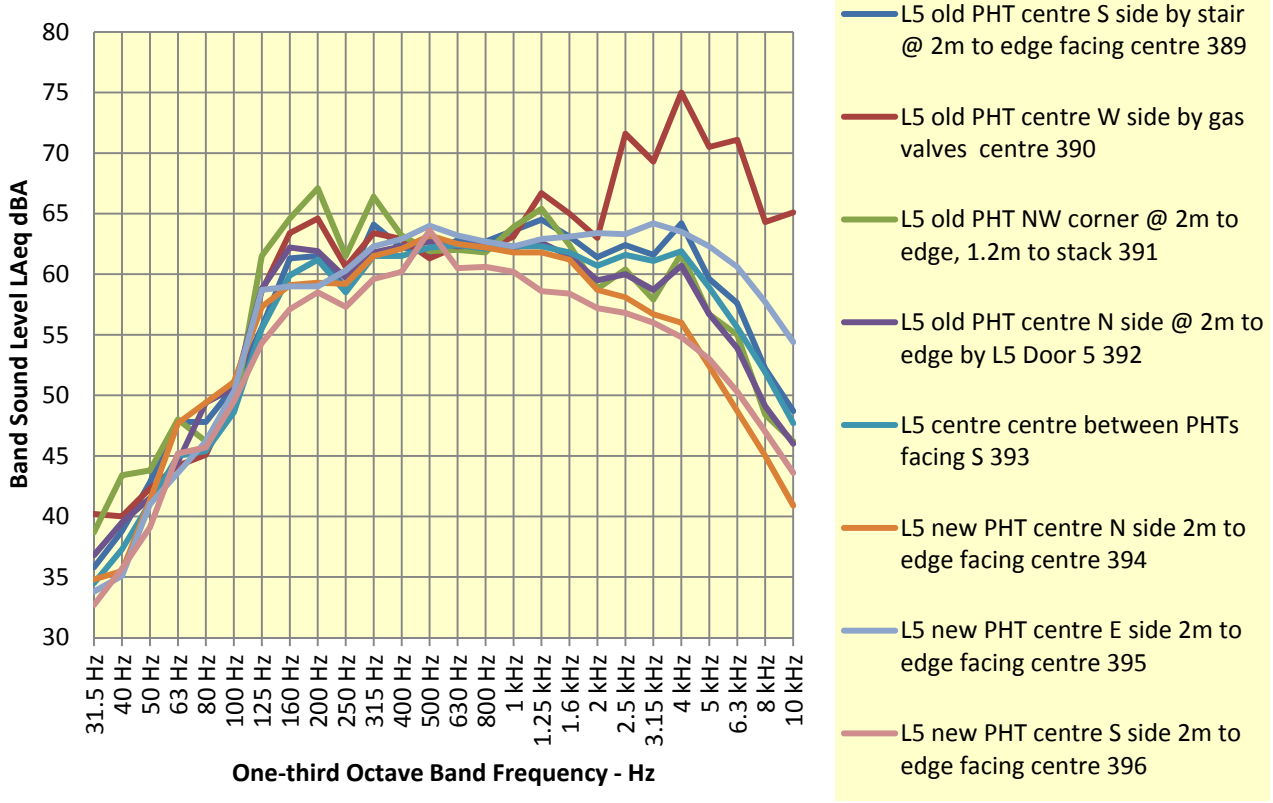
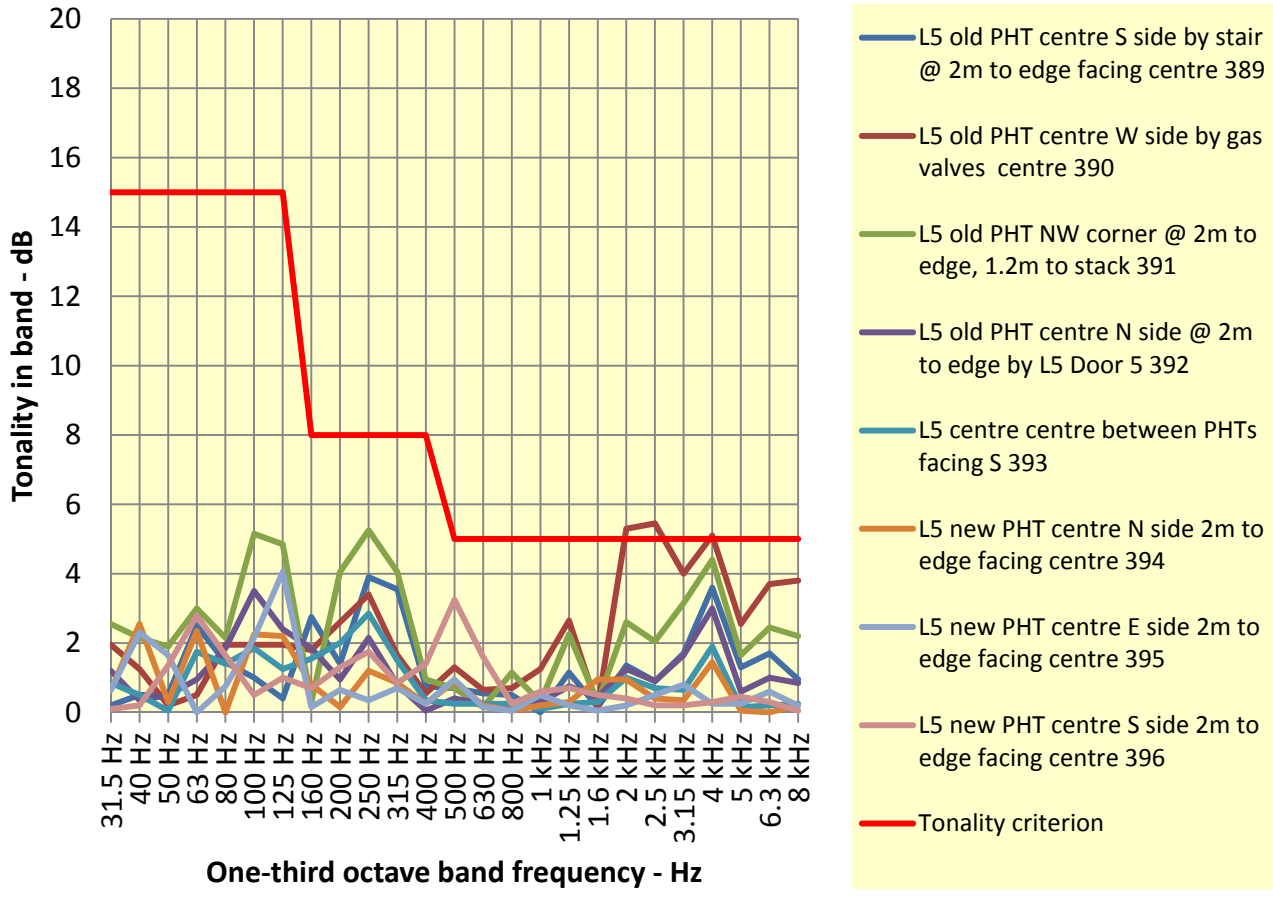


Figure 3.11: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 5



Spectra & Tonality graphs: na28 data 2017

Figure 3.12A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 4

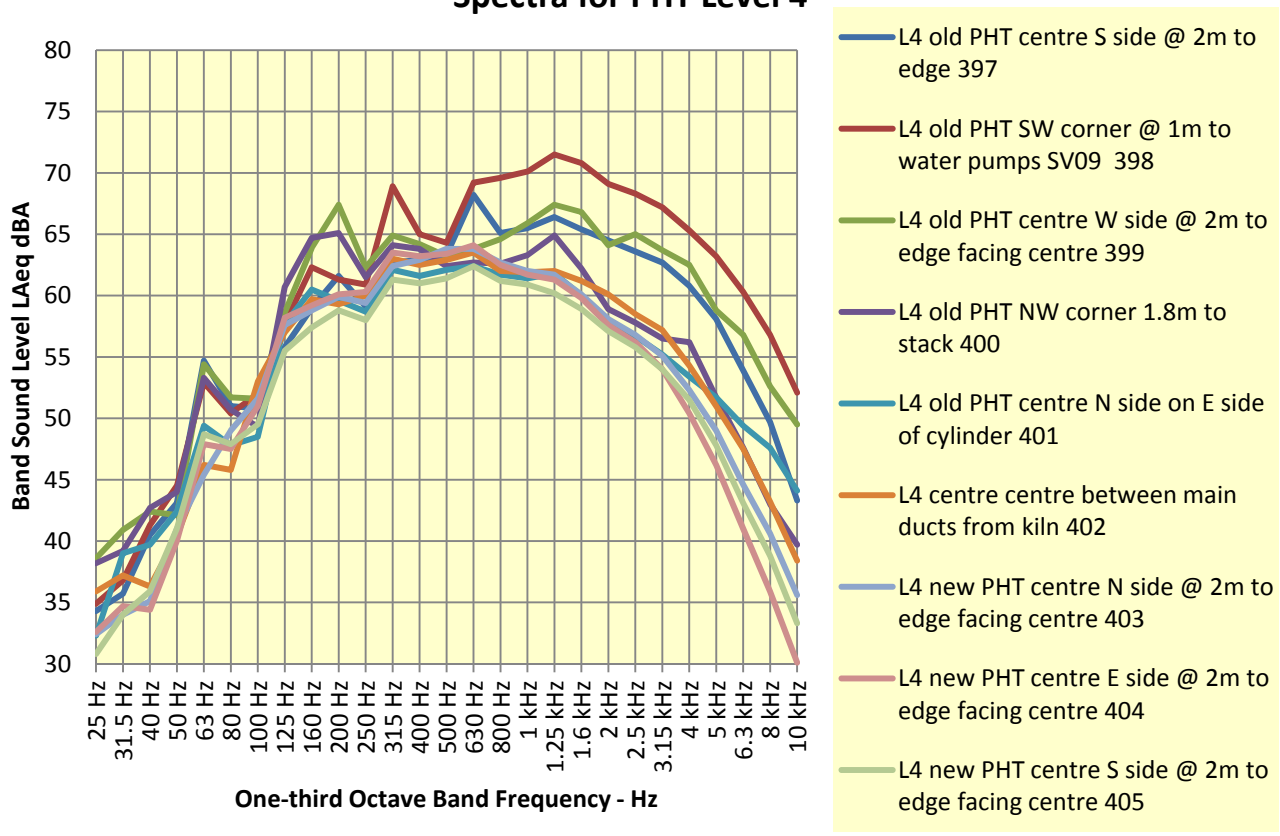
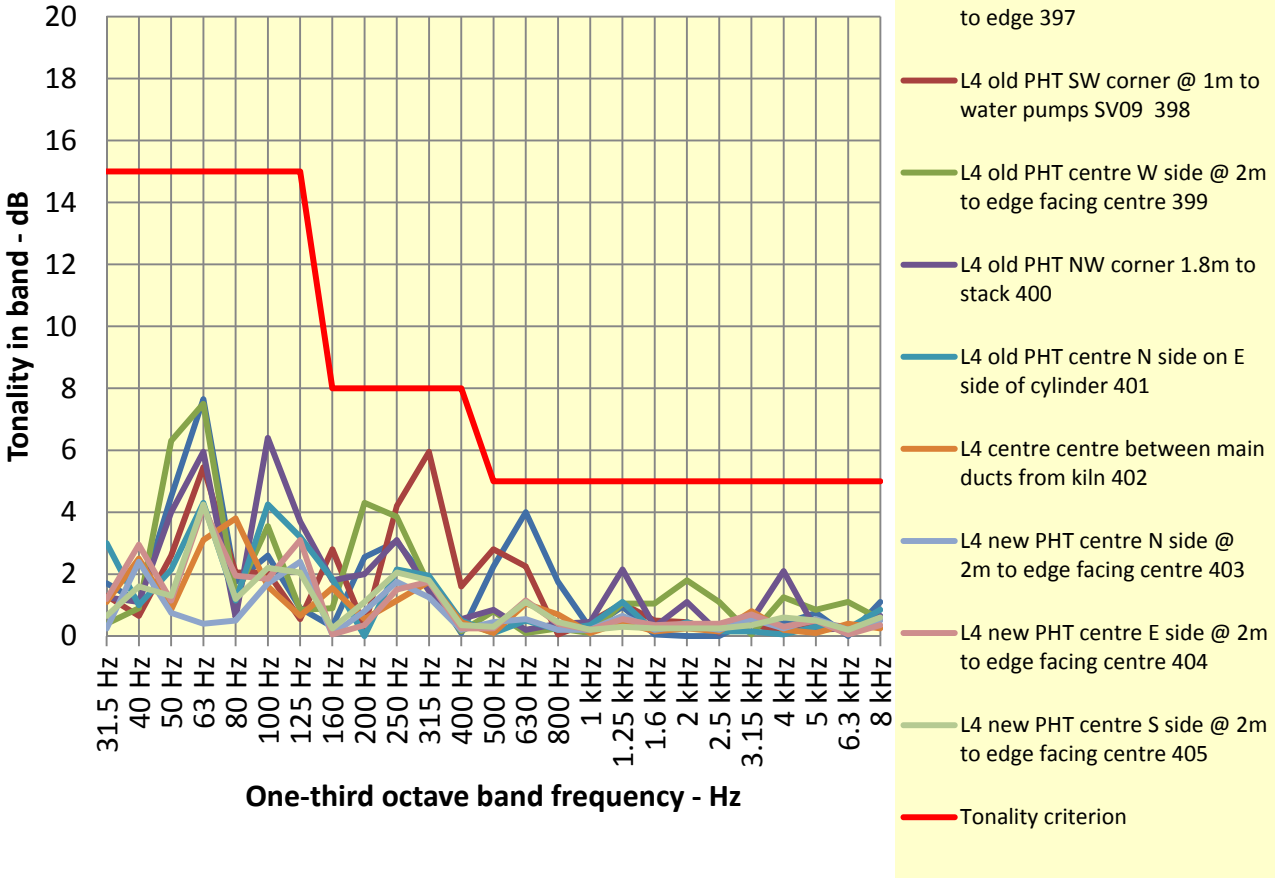


Figure 3.12: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 4



Spectra & Tonality graphs: na28 data 2017

Figure 3.13A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 3 and on ESP facing PHT

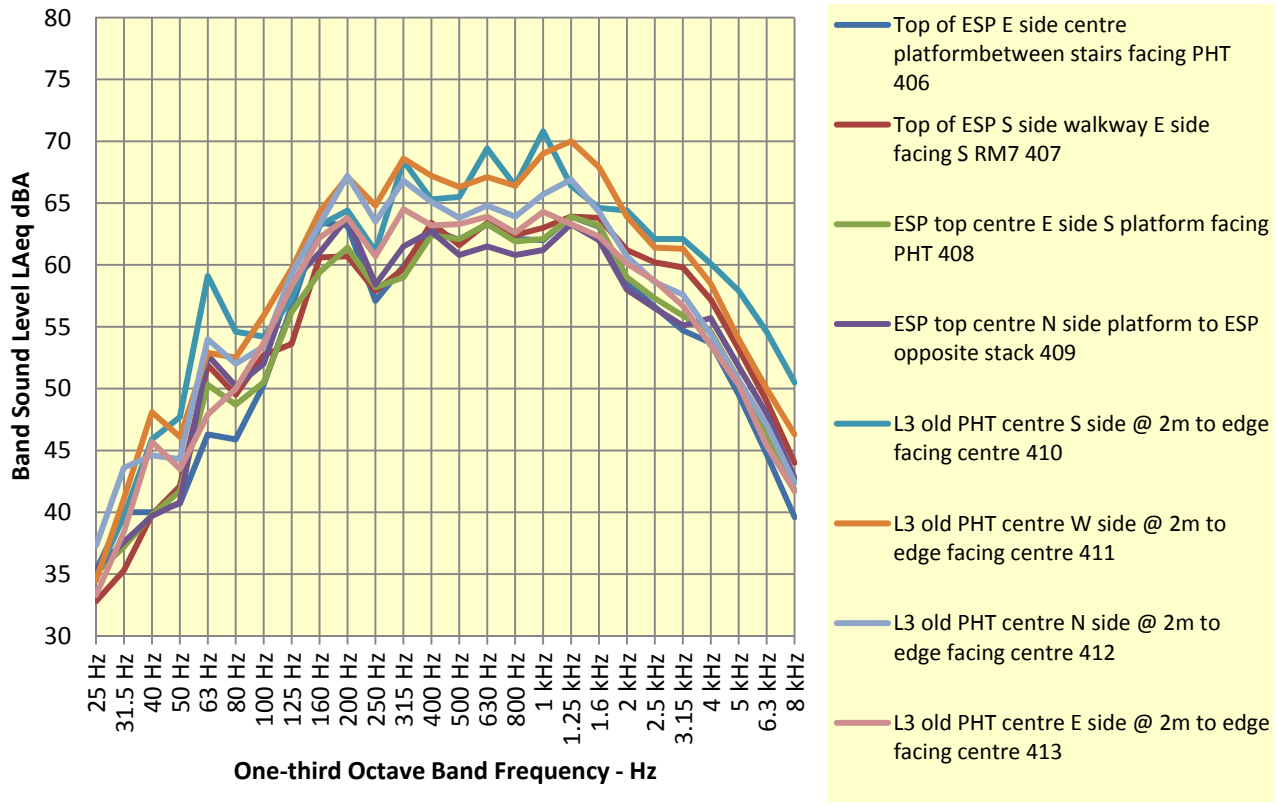
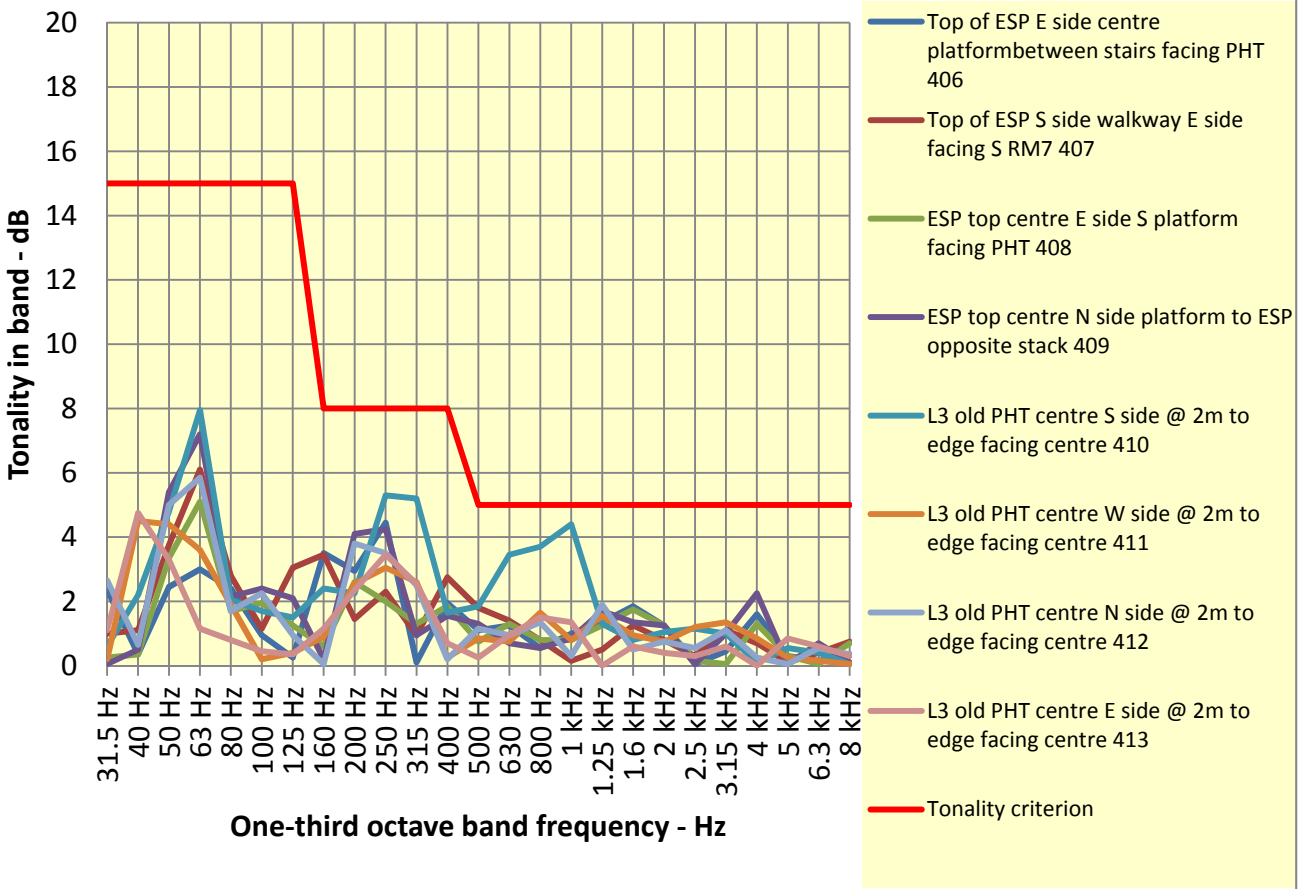


Figure 3.13: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 3 and ESP top East side



Spectra & Tonality graphs: na28 data 2017

Figure 3.14A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 2.5 and 2.25

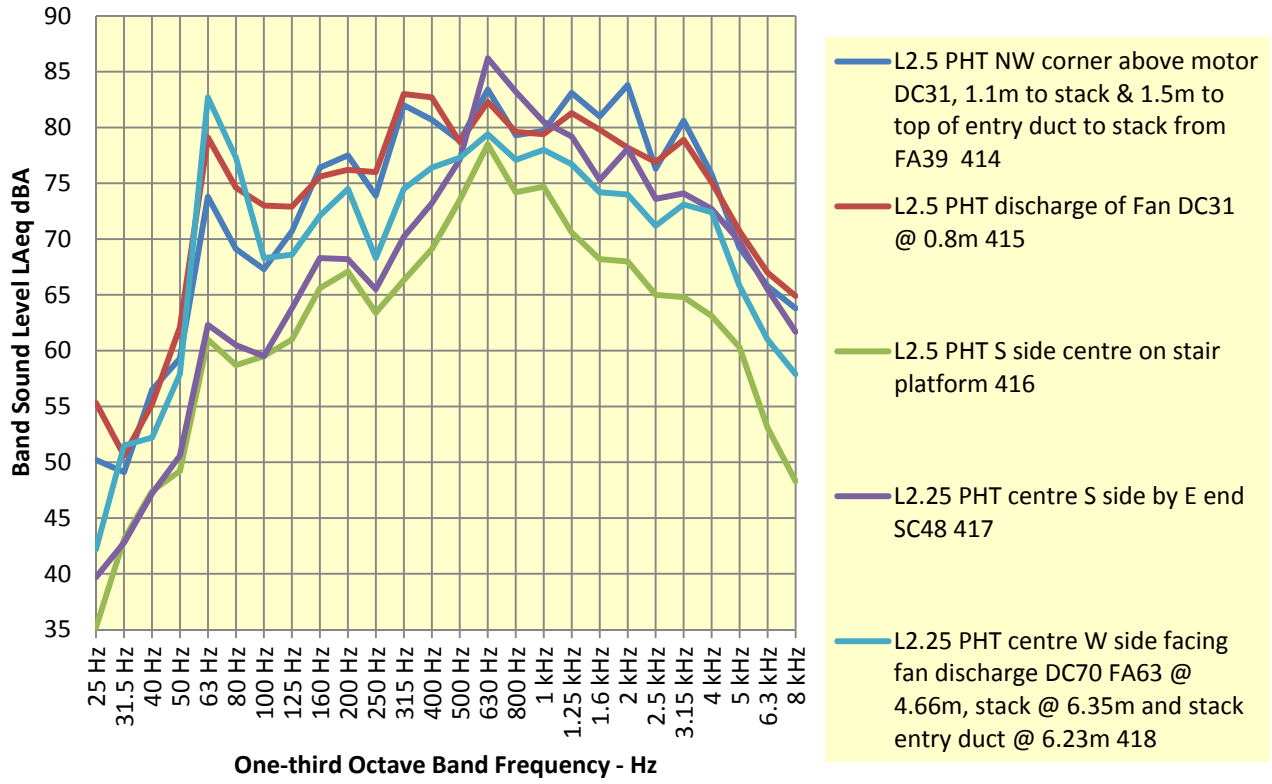
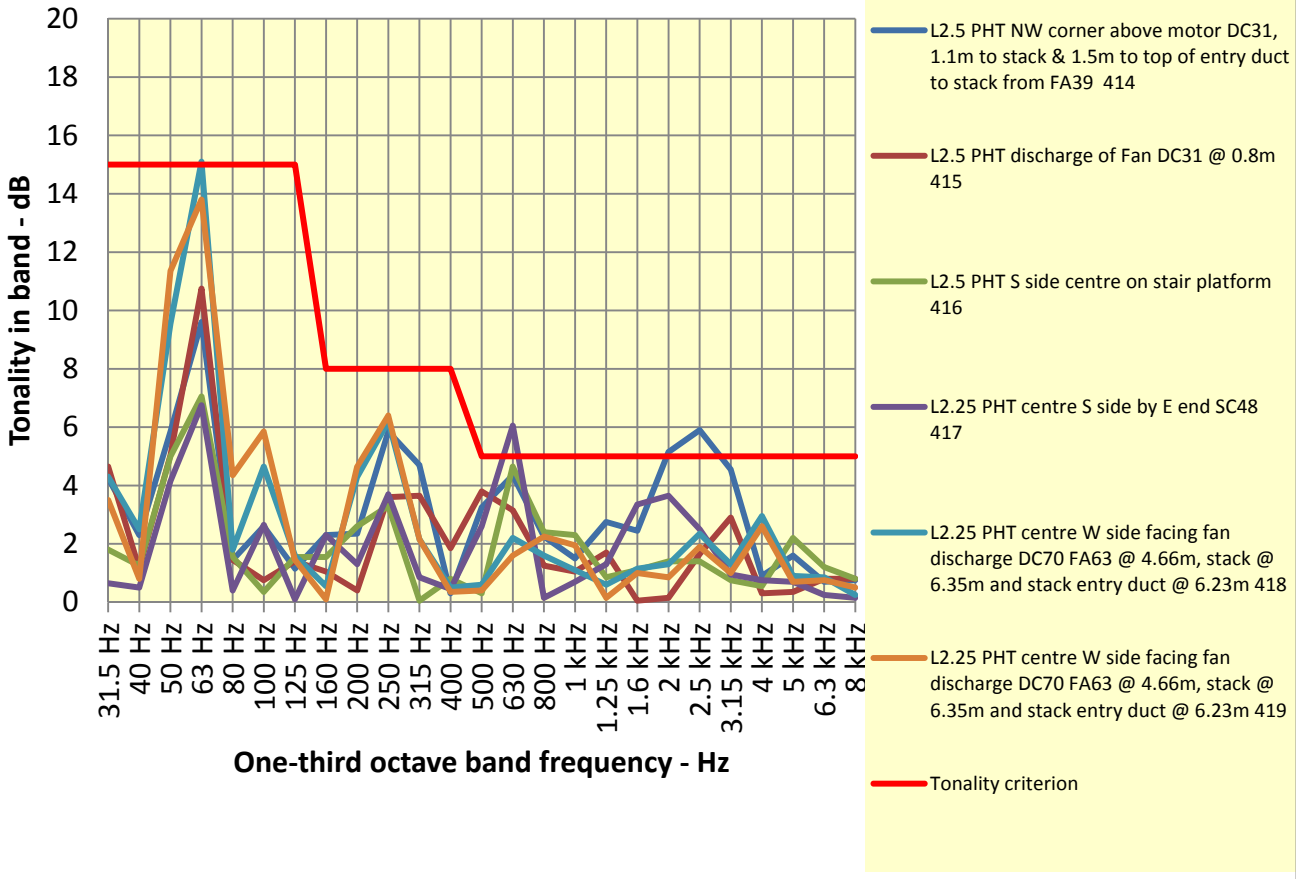


Figure 3.14: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 2.5 and 2.25



Spectra & Tonality graphs: na28 data 2017

Figure 3.15A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Level 2 and 1

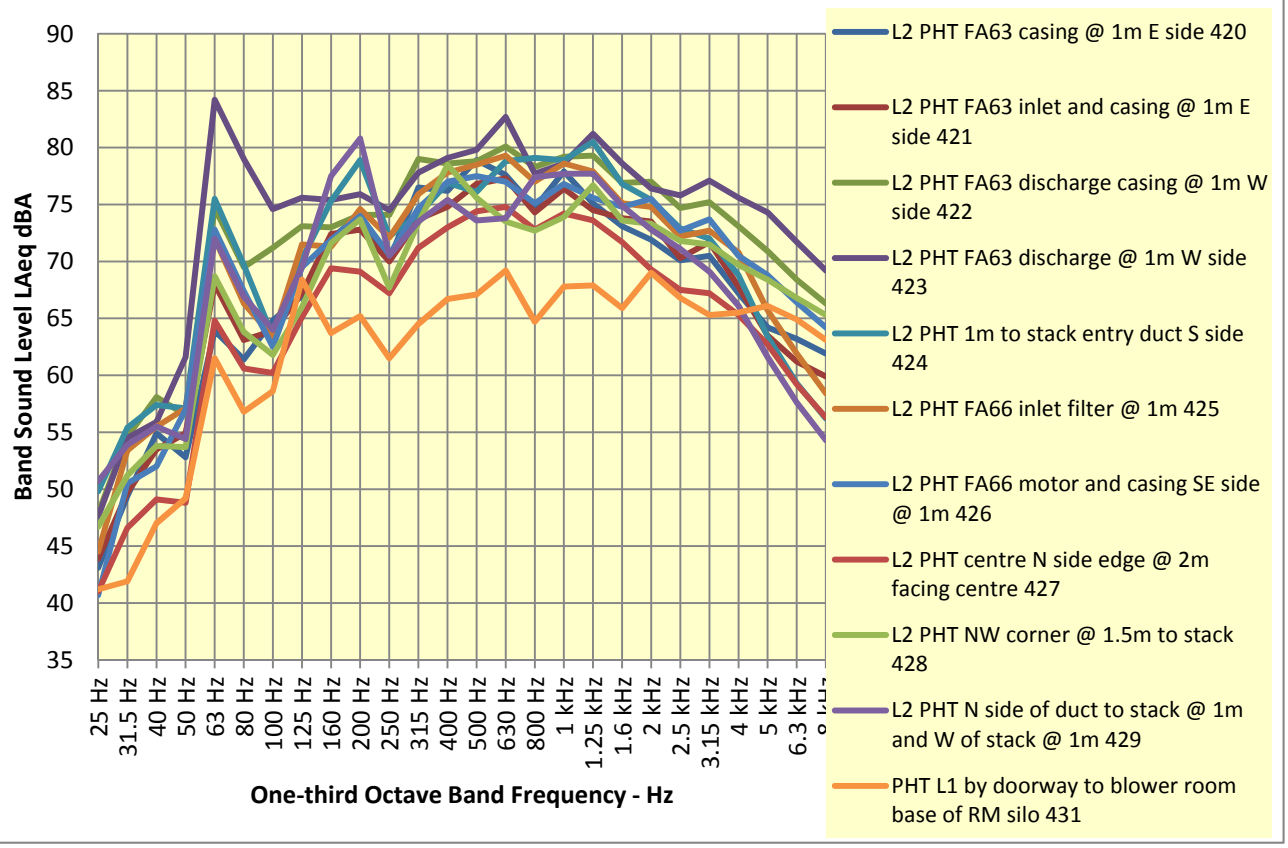
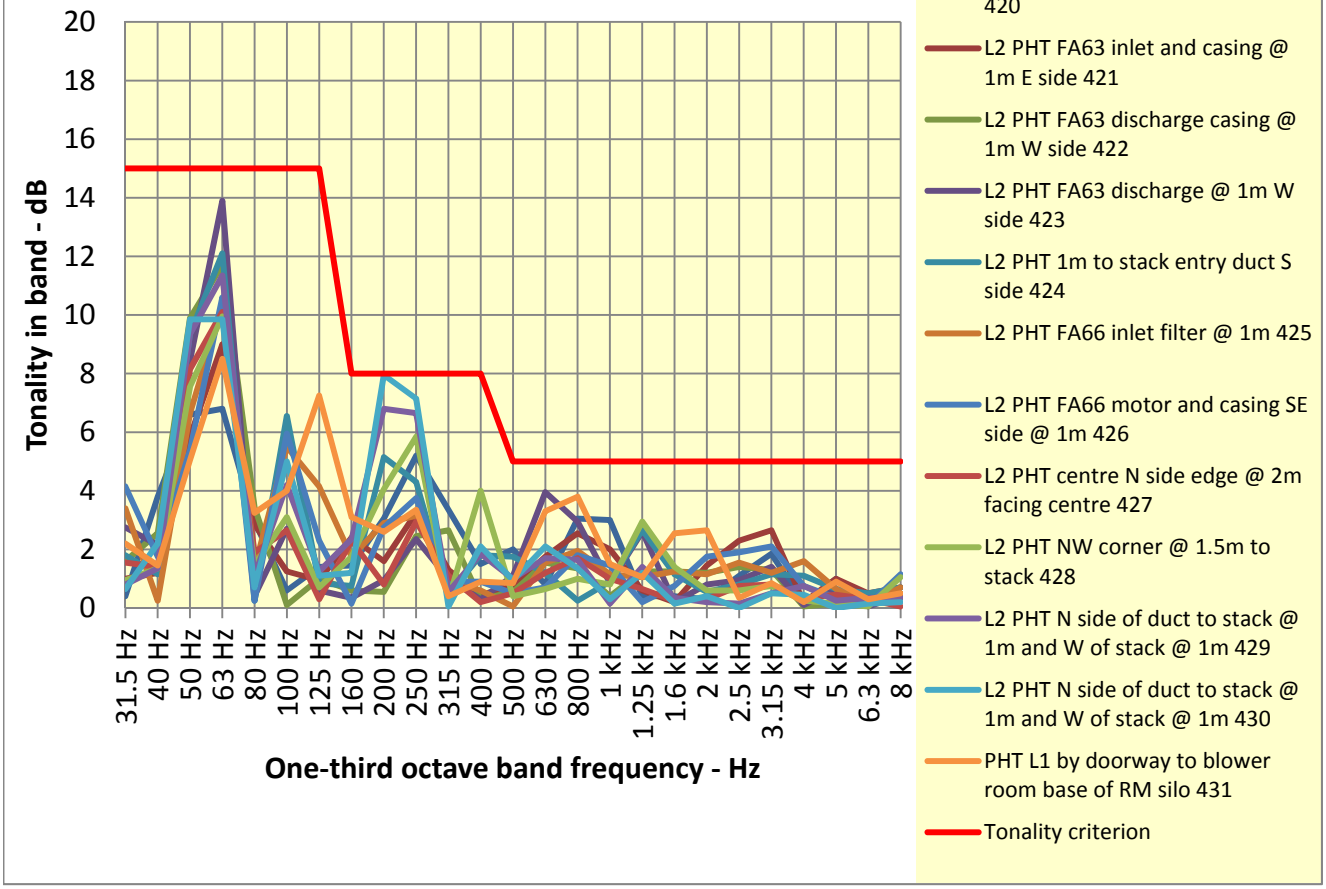


Figure 3.15: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT level 2 & 1



Spectra & Tonality graphs: na28 data 2017

Figure 3.16A: Boral Cement Berrima - One-third Octave Band Spectra for PHT Fans FA38 & FA39

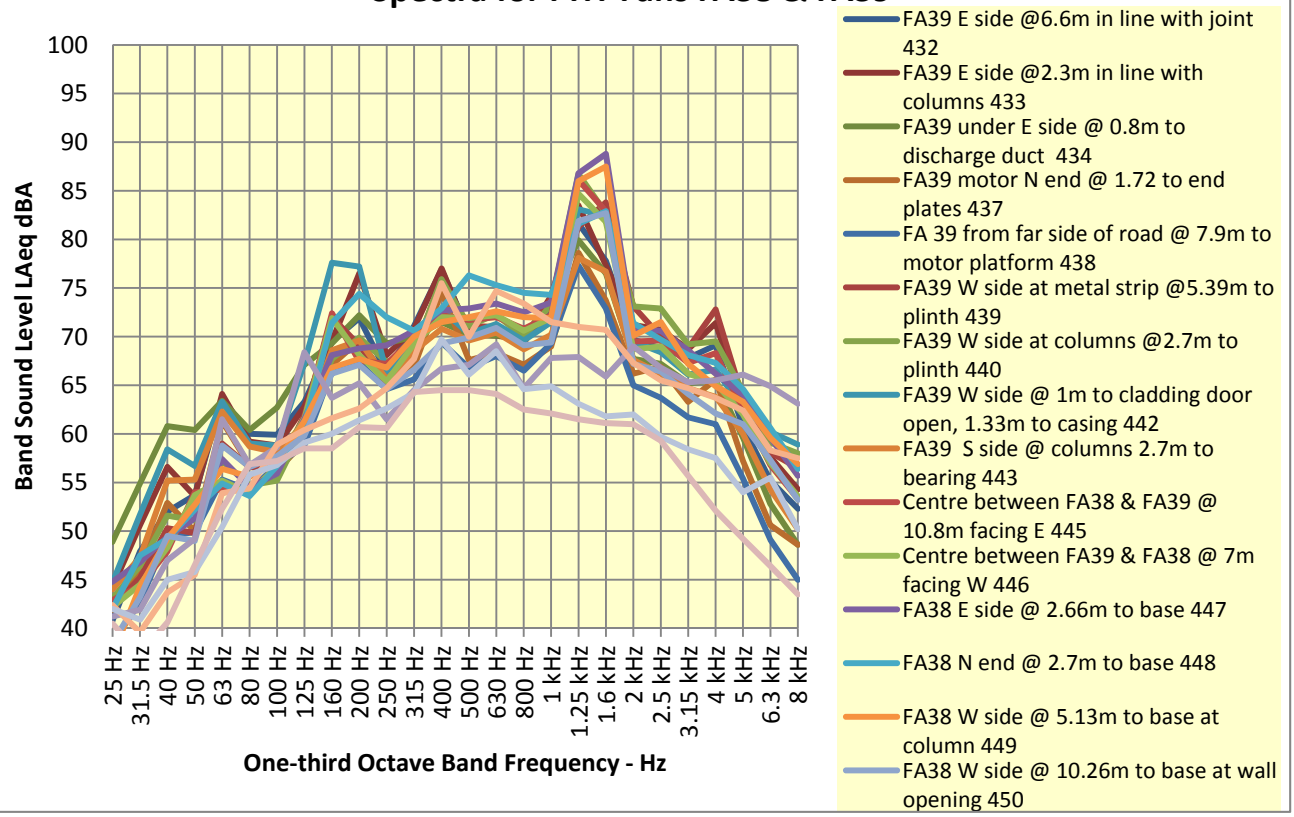
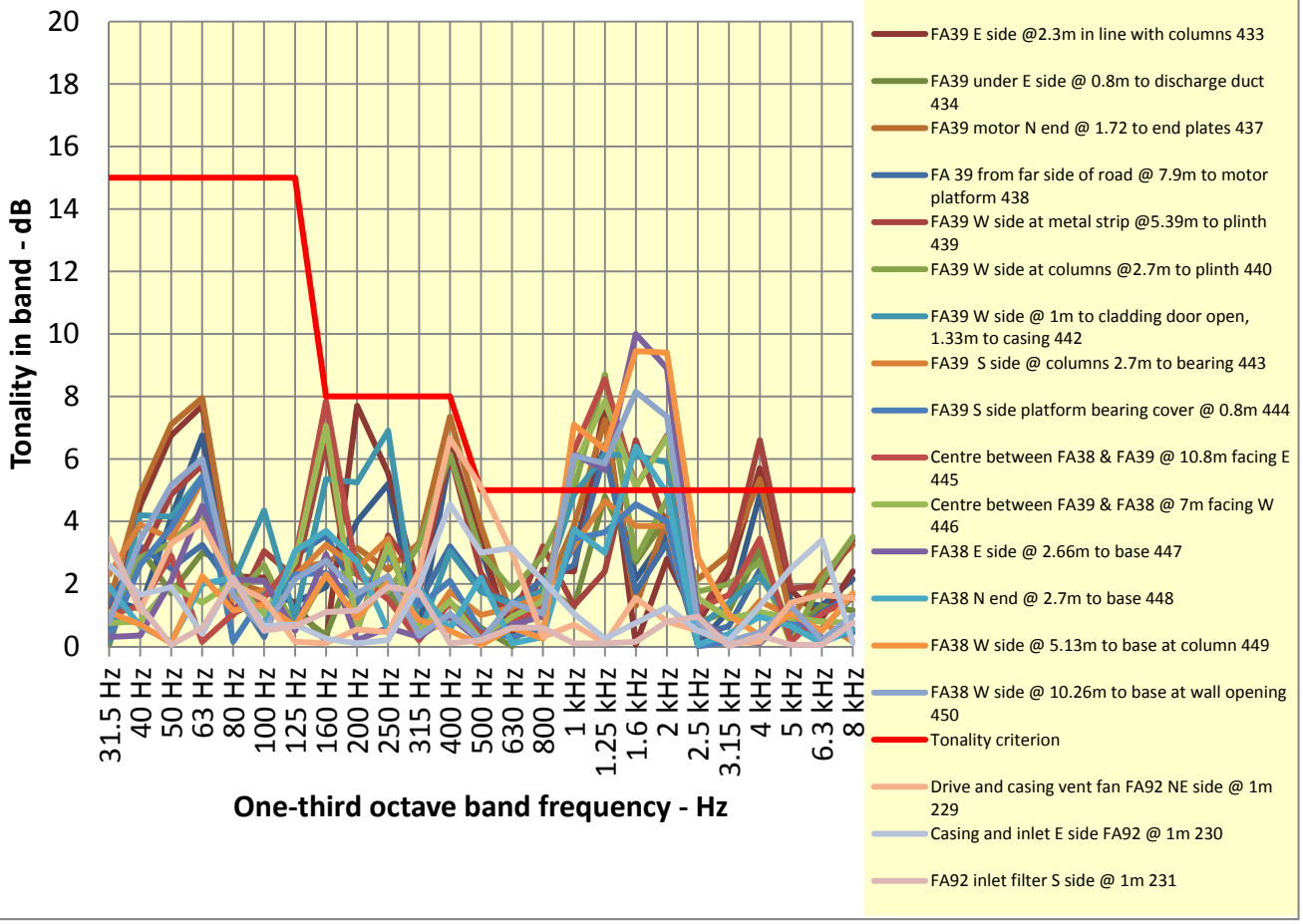


Figure 3.16: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for PHT FA38, FA39 & FA92



Spectra & Tonality graphs: na28 data 2017

Figure 3.17A: Boral Cement Berrima - One-third Octave Band Spectra for RM7

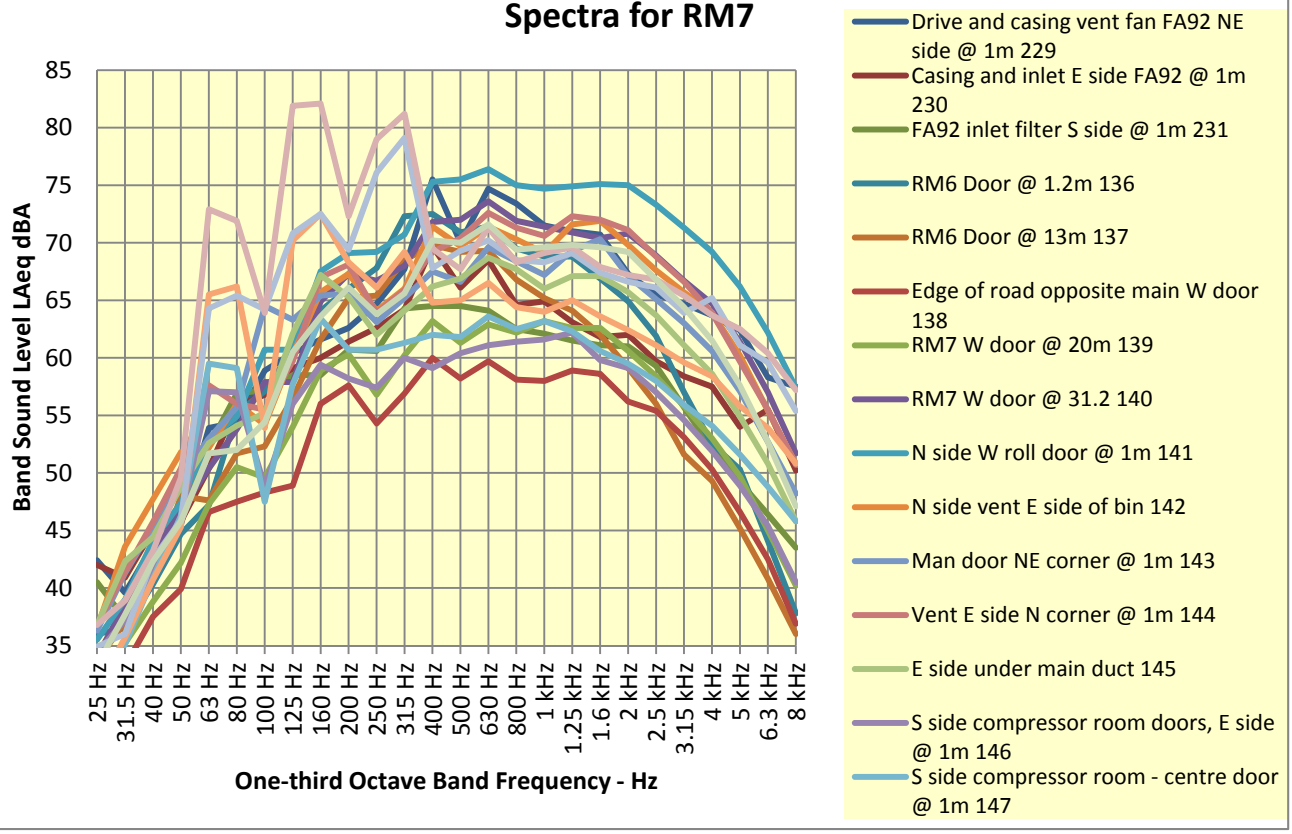
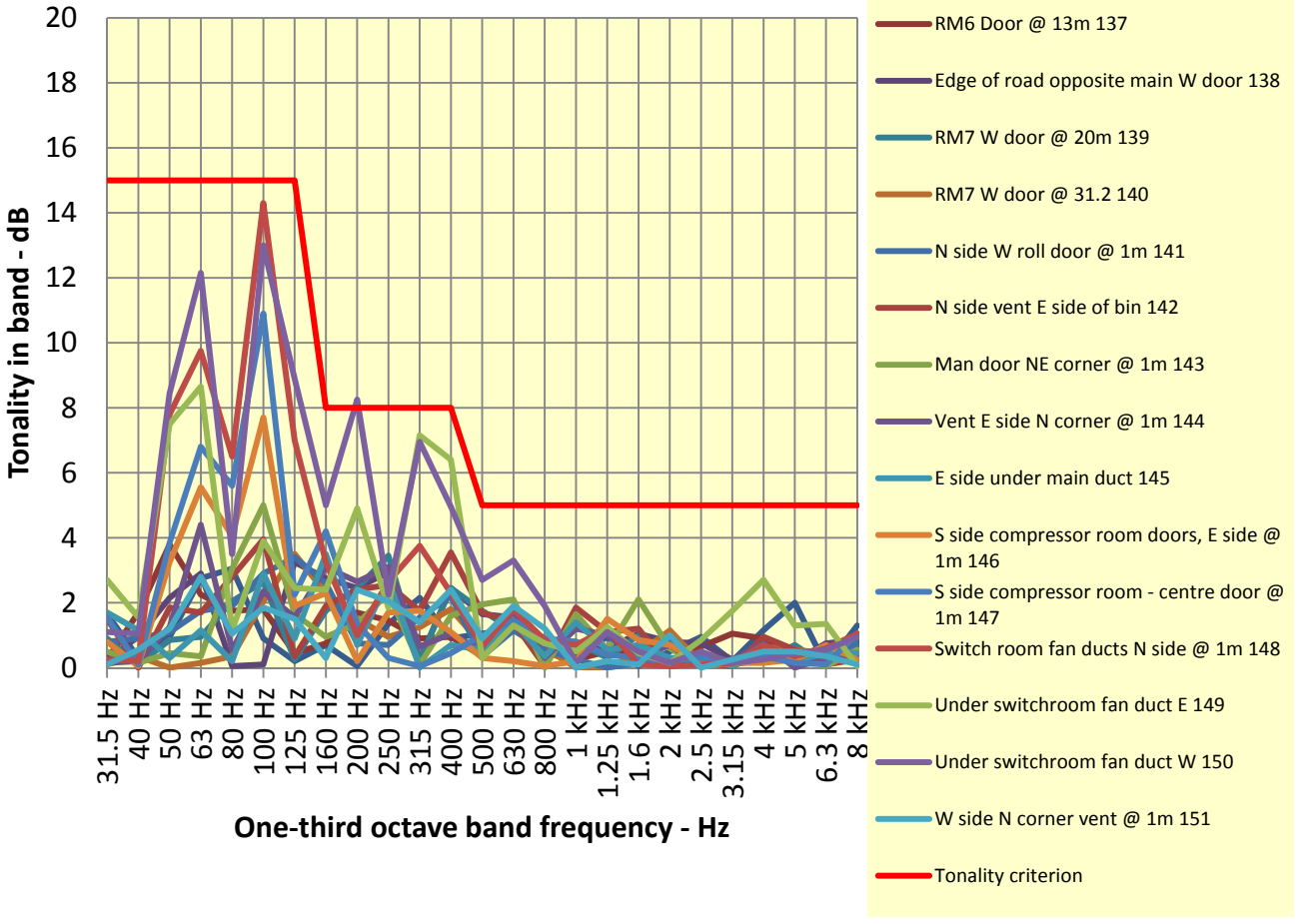


Figure 3.17: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for RM7



Spectra & Tonality graphs: na28 data 2017

Figure 3.18A: Boral Cement Berrima - One-third Octave Band Spectra for RM7 Fans FA249 & FA250

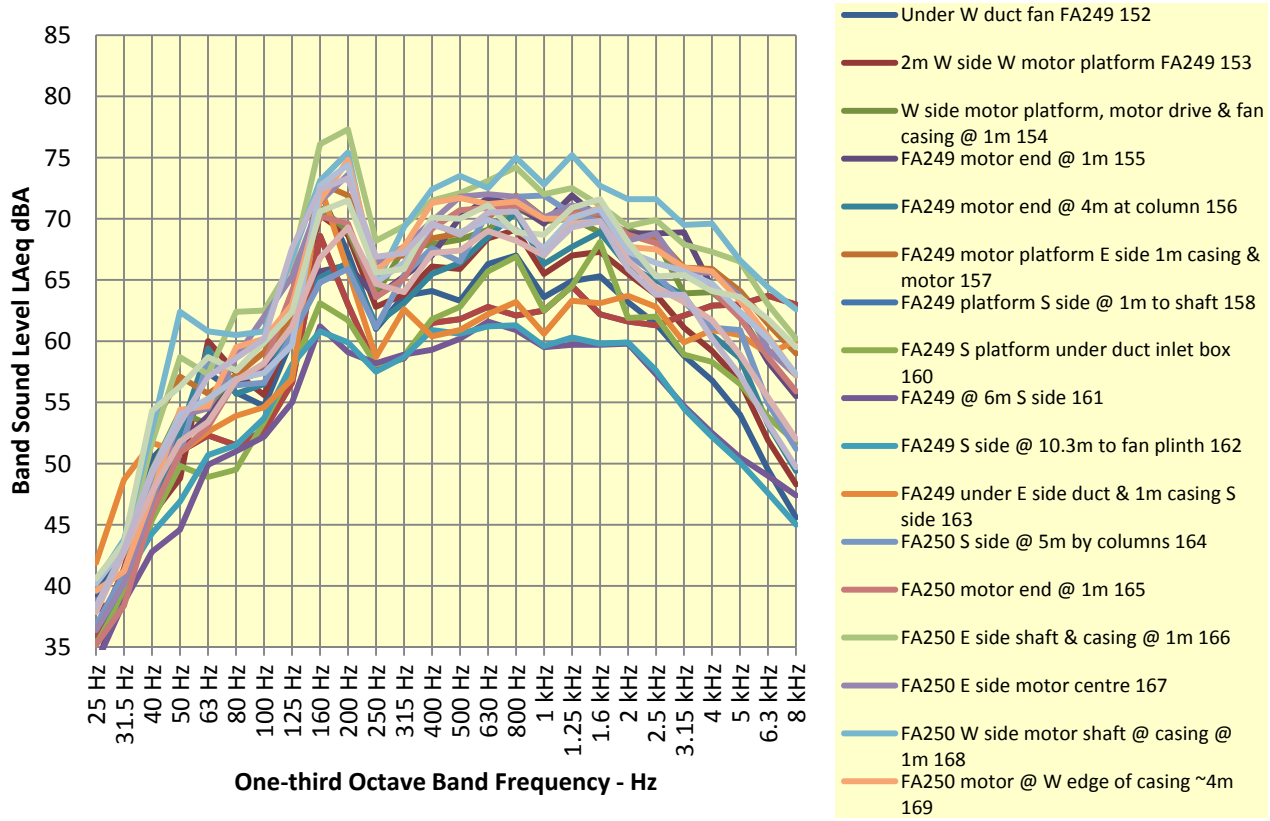
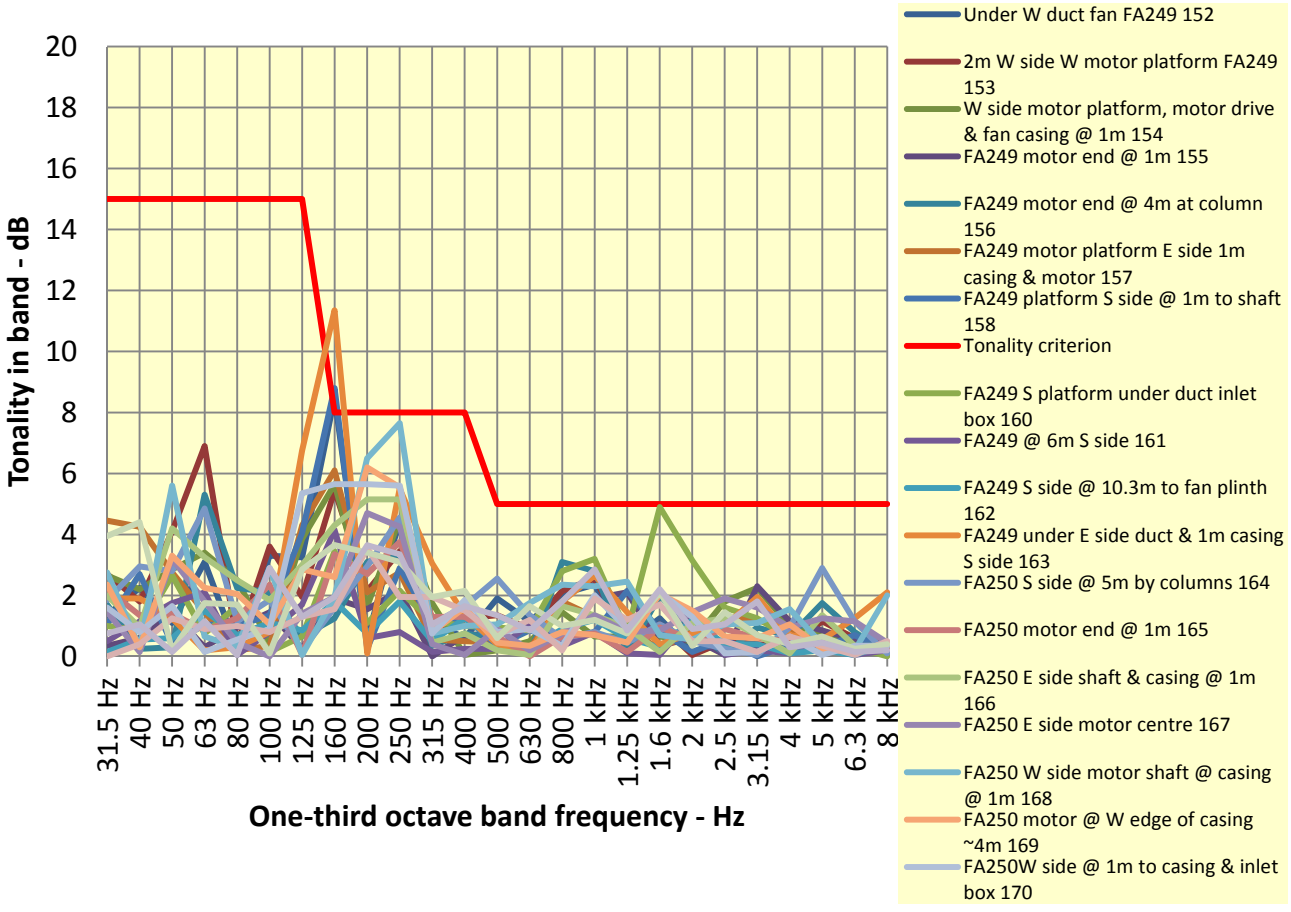


Figure 3.18: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for FA249 & FA250



Spectra & Tonality graphs: na28 data 2017

Figure 3.19A: Boral Cement Berrima - One-third Octave Band Spectra for RM7 Roof

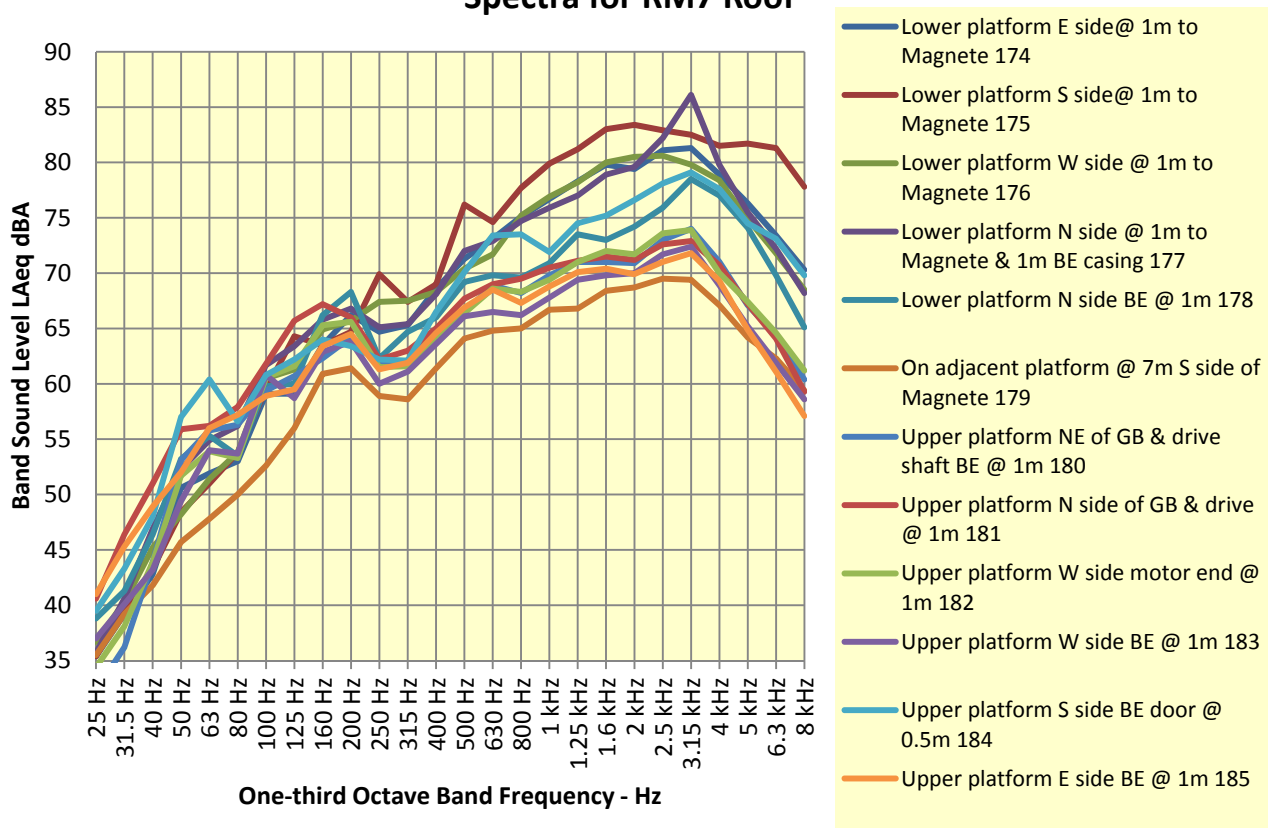
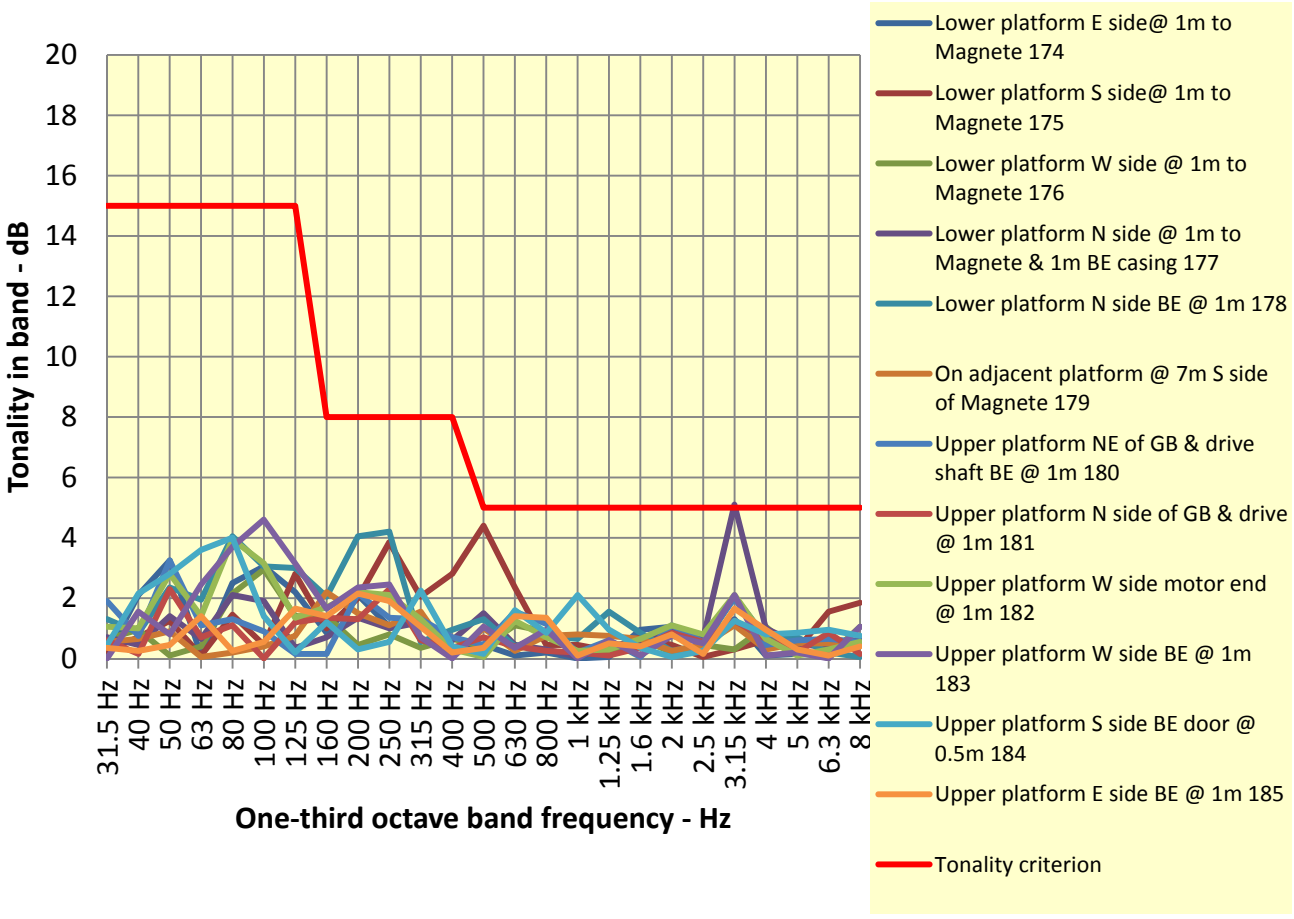


Figure 3.19: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for RM7 Roof



Spectra & Tonality graphs: na28 data 2017

Figure 3.20A: Boral Cement Berrima - One-third Octave Band Spectra for RM7 FA250 Baghouse

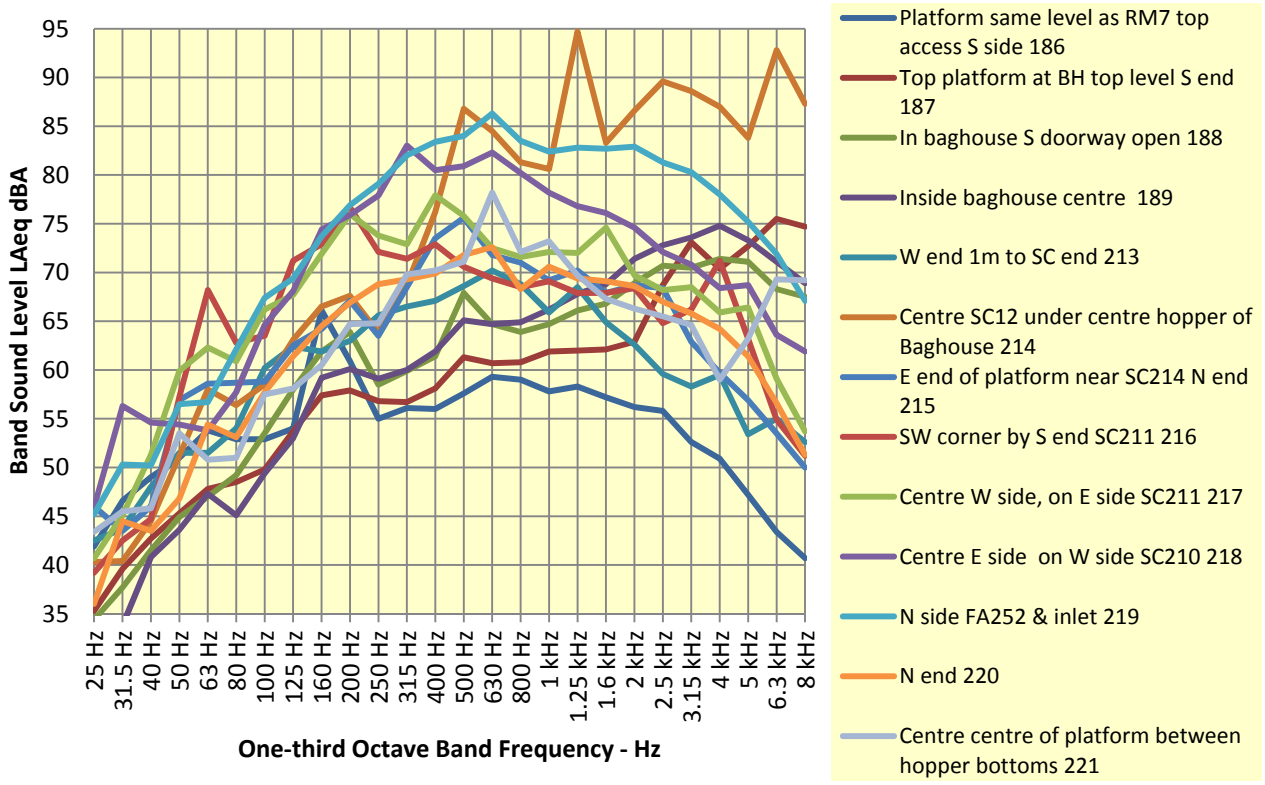
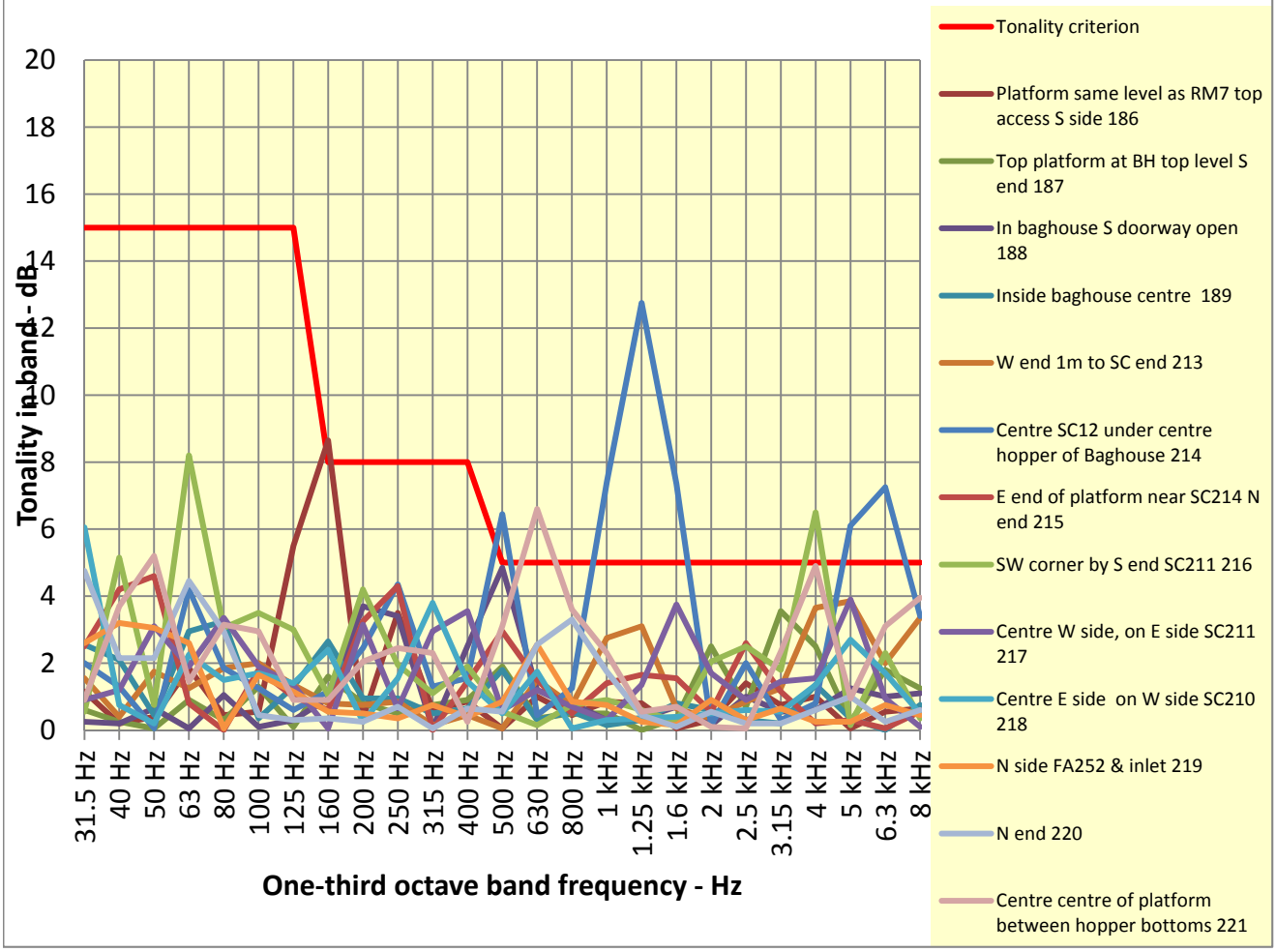


Figure 3.20: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for RM7 FA250 Baghouse



Spectra & Tonality graphs: na28 data 2017

Figure 3.21A: Boral Cement Berrima - One-third Octave Band Spectra for K6 southern sid

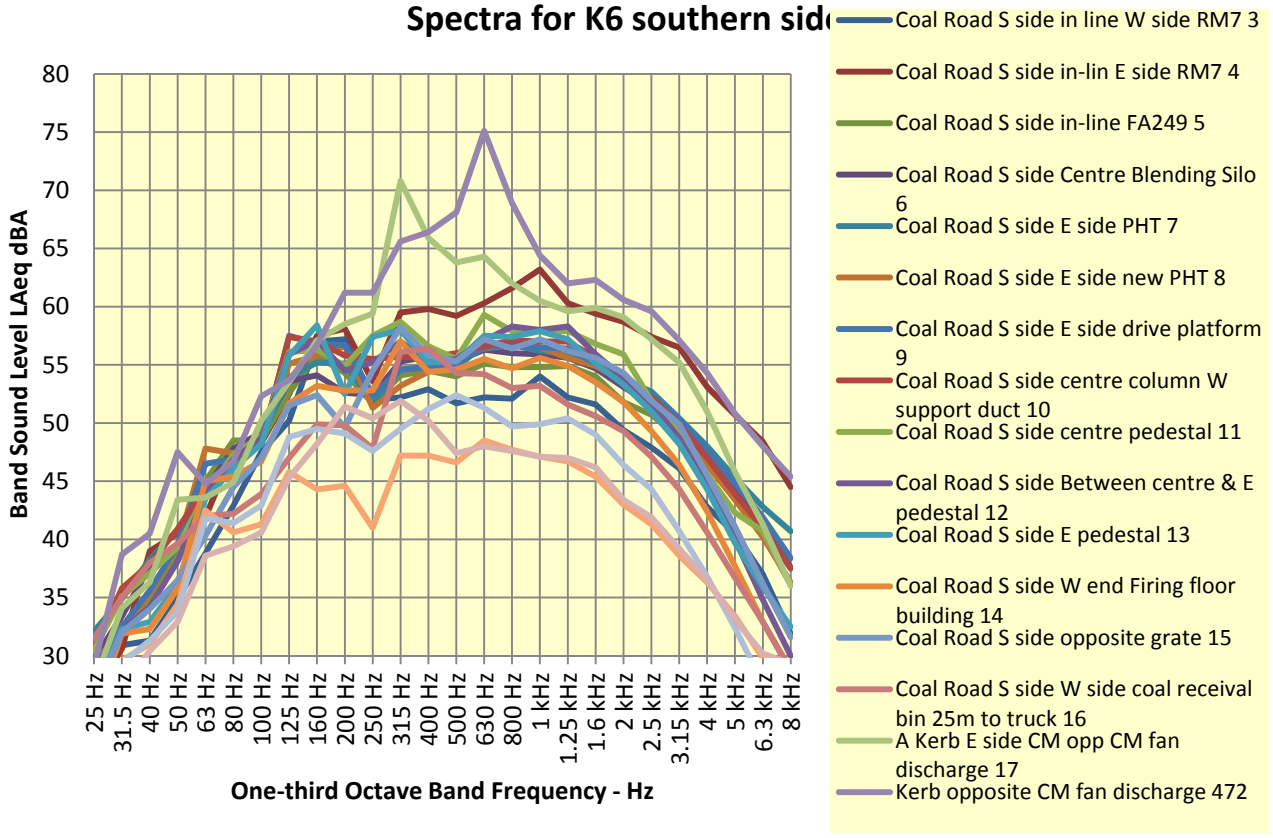
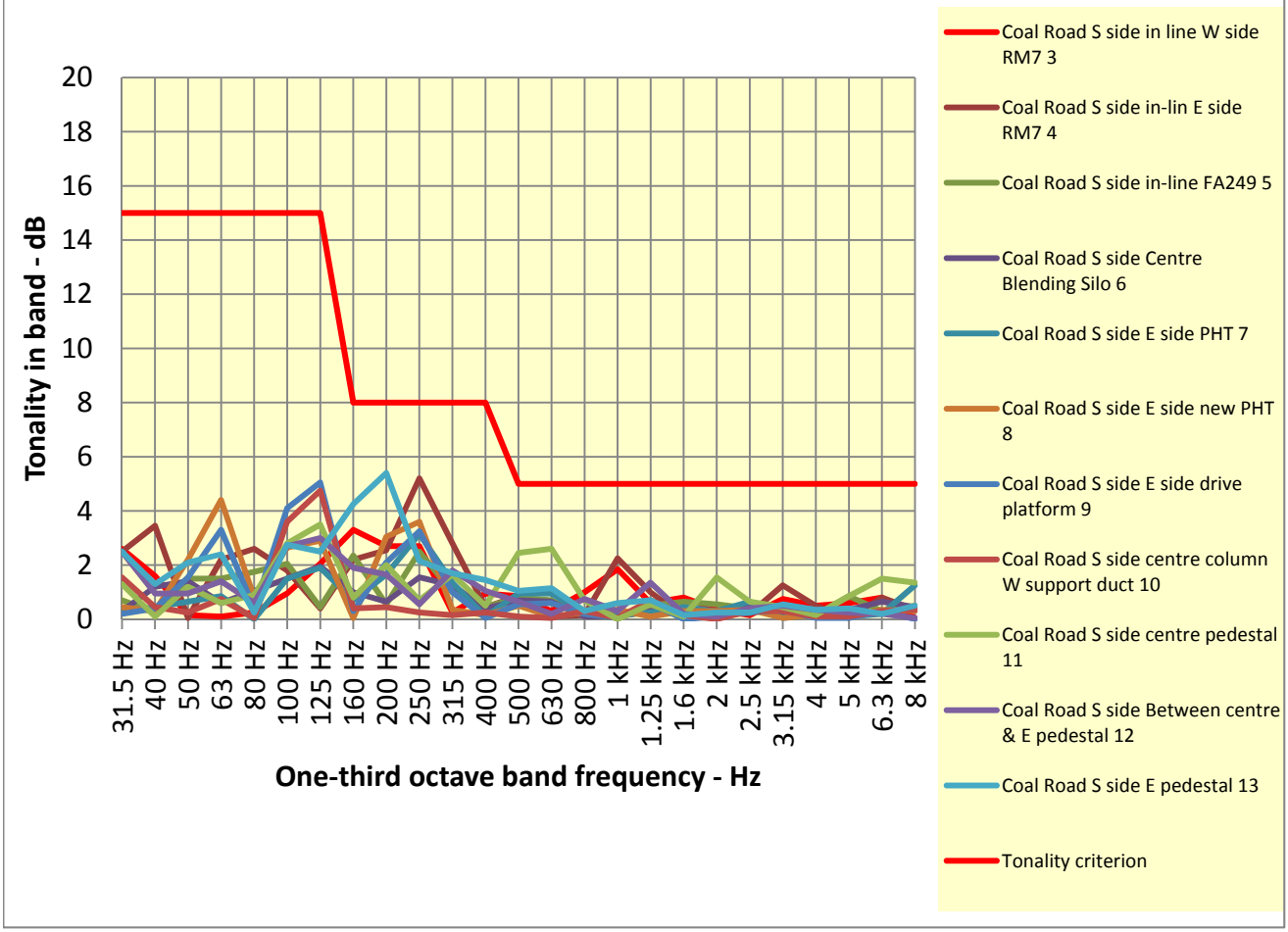


Figure 3.21: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 South side of Coal Road



Spectra & Tonality graphs: na28 data 2017

Figure 3.22A: Boral Cement Berrima - One-third Octave Band Spectra for K6 southern side of Coal Mill building

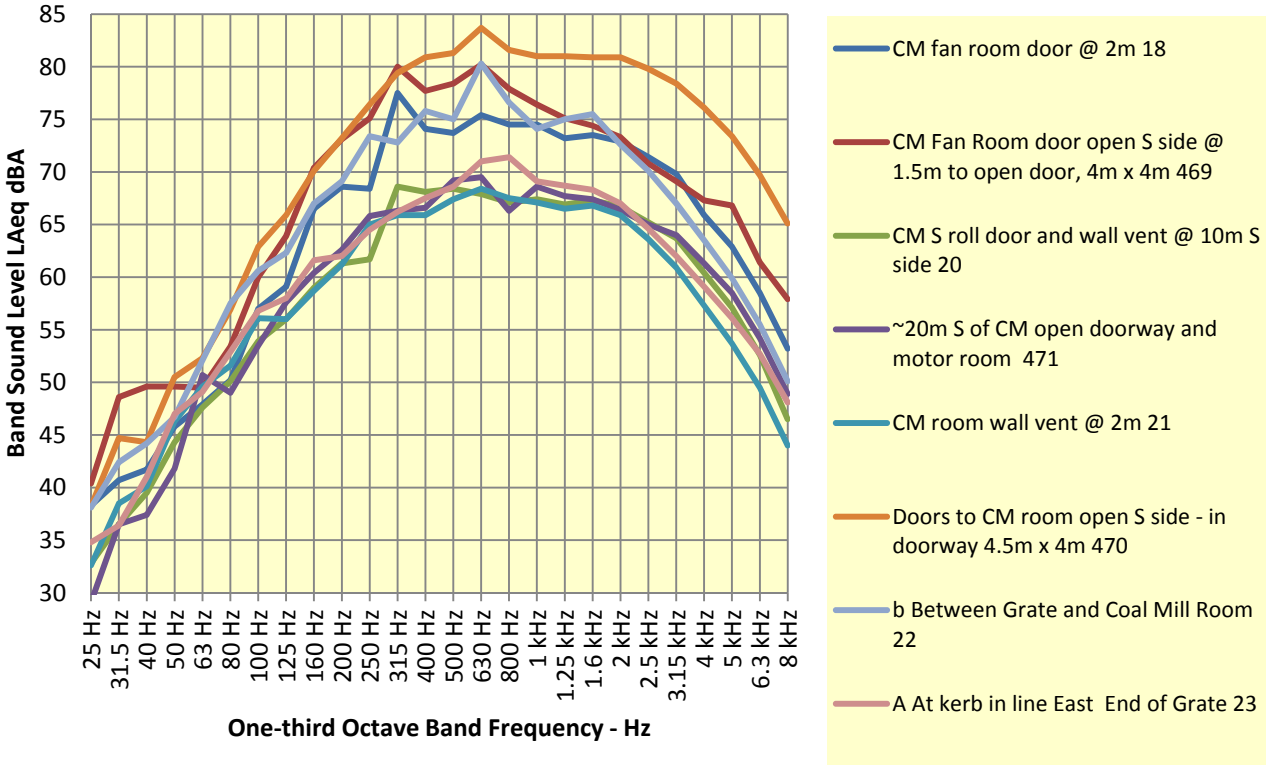
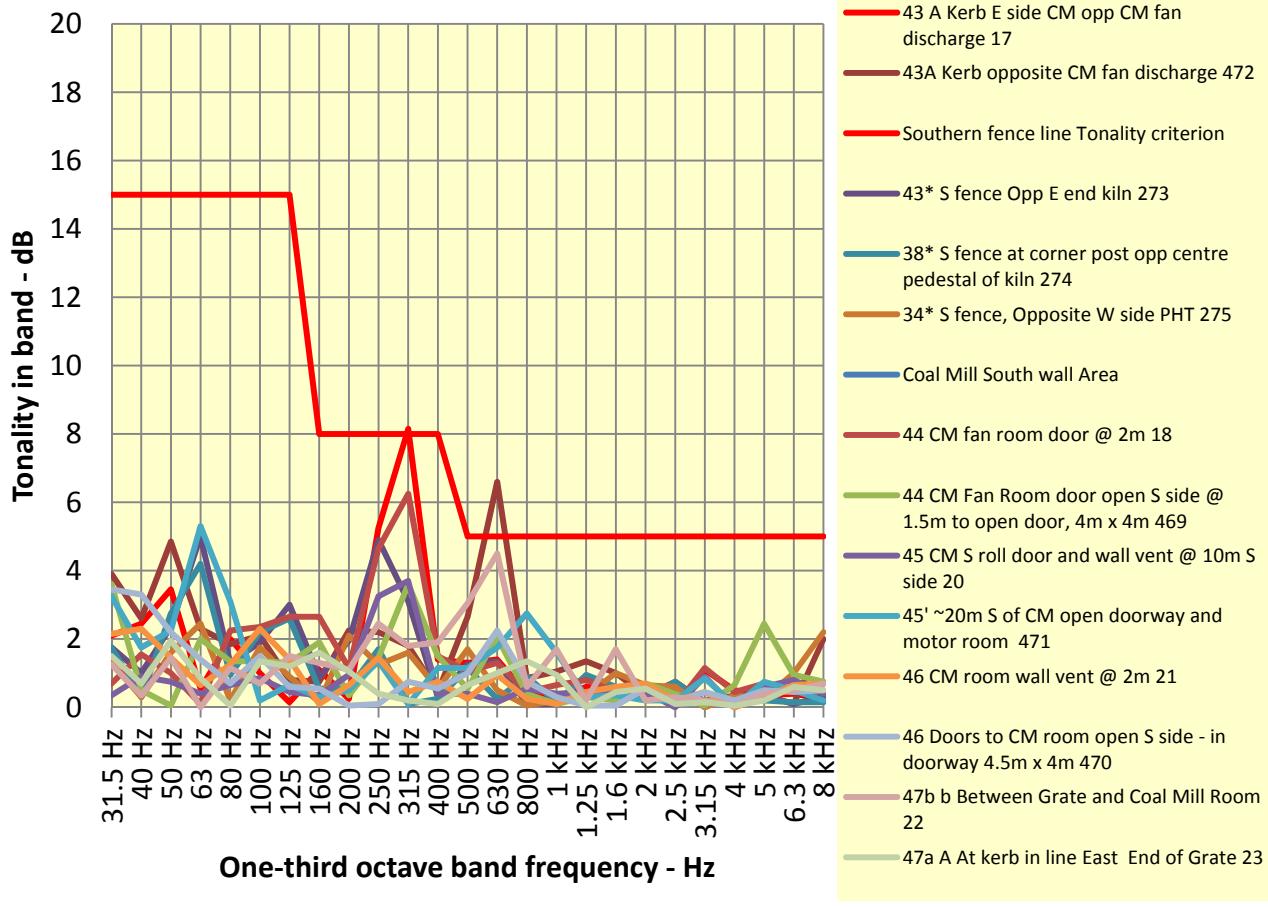


Figure 3.22: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 Southern side of Coal Mill building



Spectra & Tonality graphs: na28 data 2017

Figure 3.23A: Boral Cement Berrima - One-third Octave Band Spectra for K6 southern side of Kiln 6 at 13m

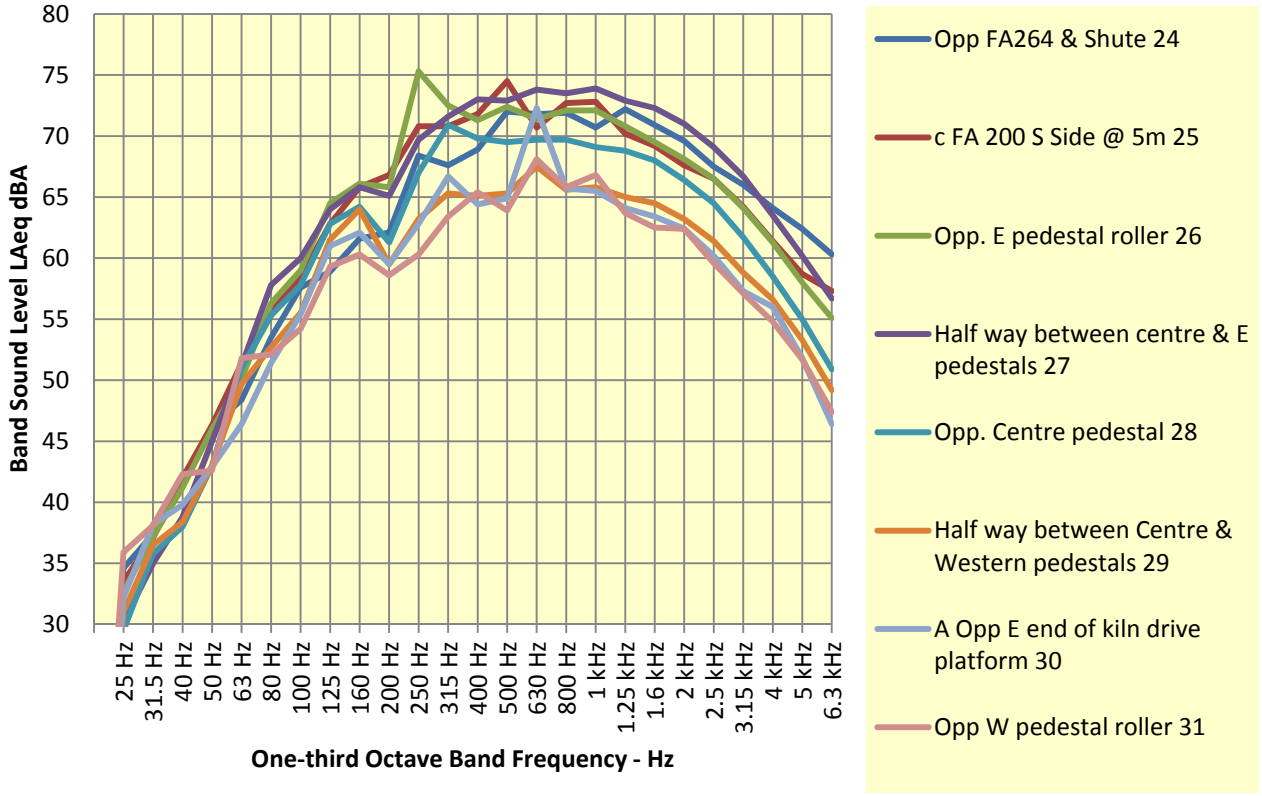
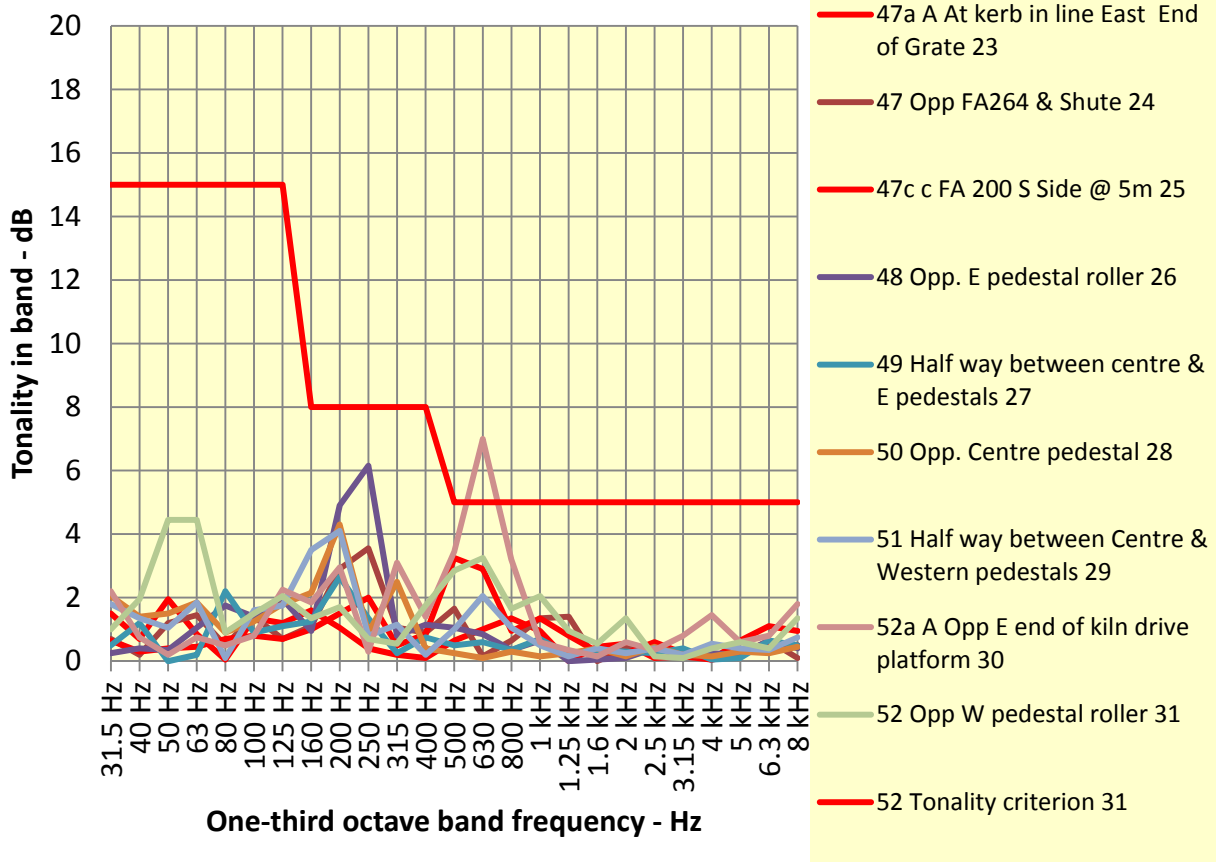


Figure 3.23: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 Southern side of Kiln at 13m distance



Spectra & Tonality graphs: na28 data 2017

Figure 3.24A: Boral Cement Berrima - One-third Octave Band Spectra for K6 Kiln drive platform

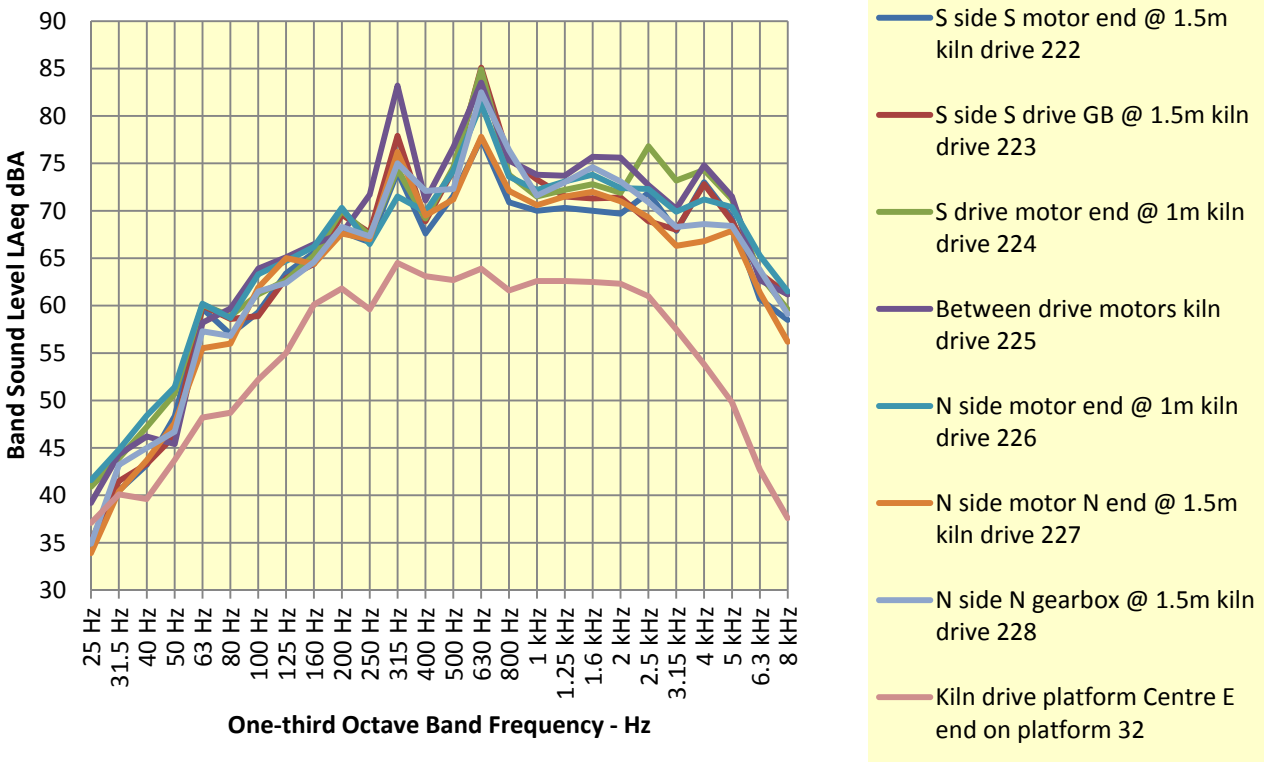
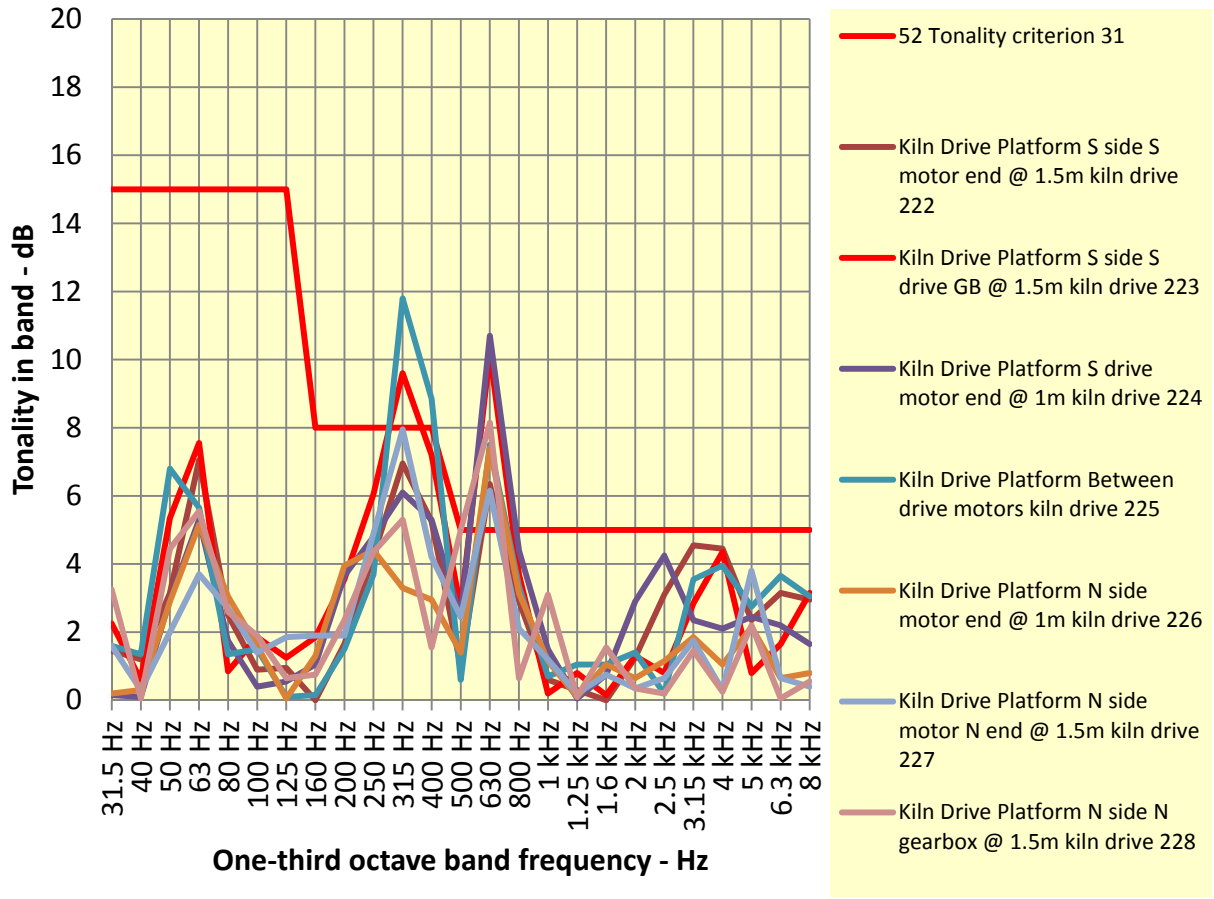


Figure 3.24: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 on Kiln Drive platform



Spectra & Tonality graphs: na28 data 2017

Figure 3.25A: Boral Cement Berrima - One-third Octave Band Spectra for K6 Kiln north side of road from RM6 to new PHT

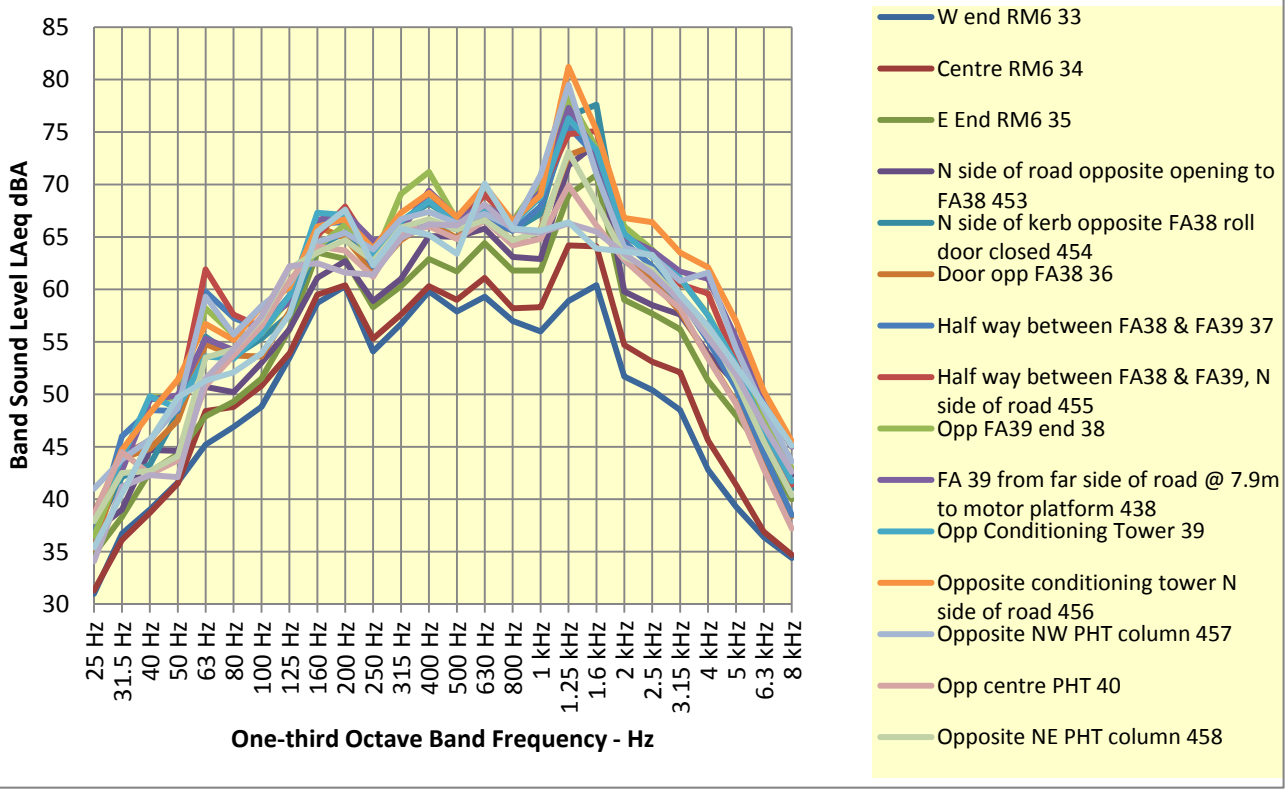
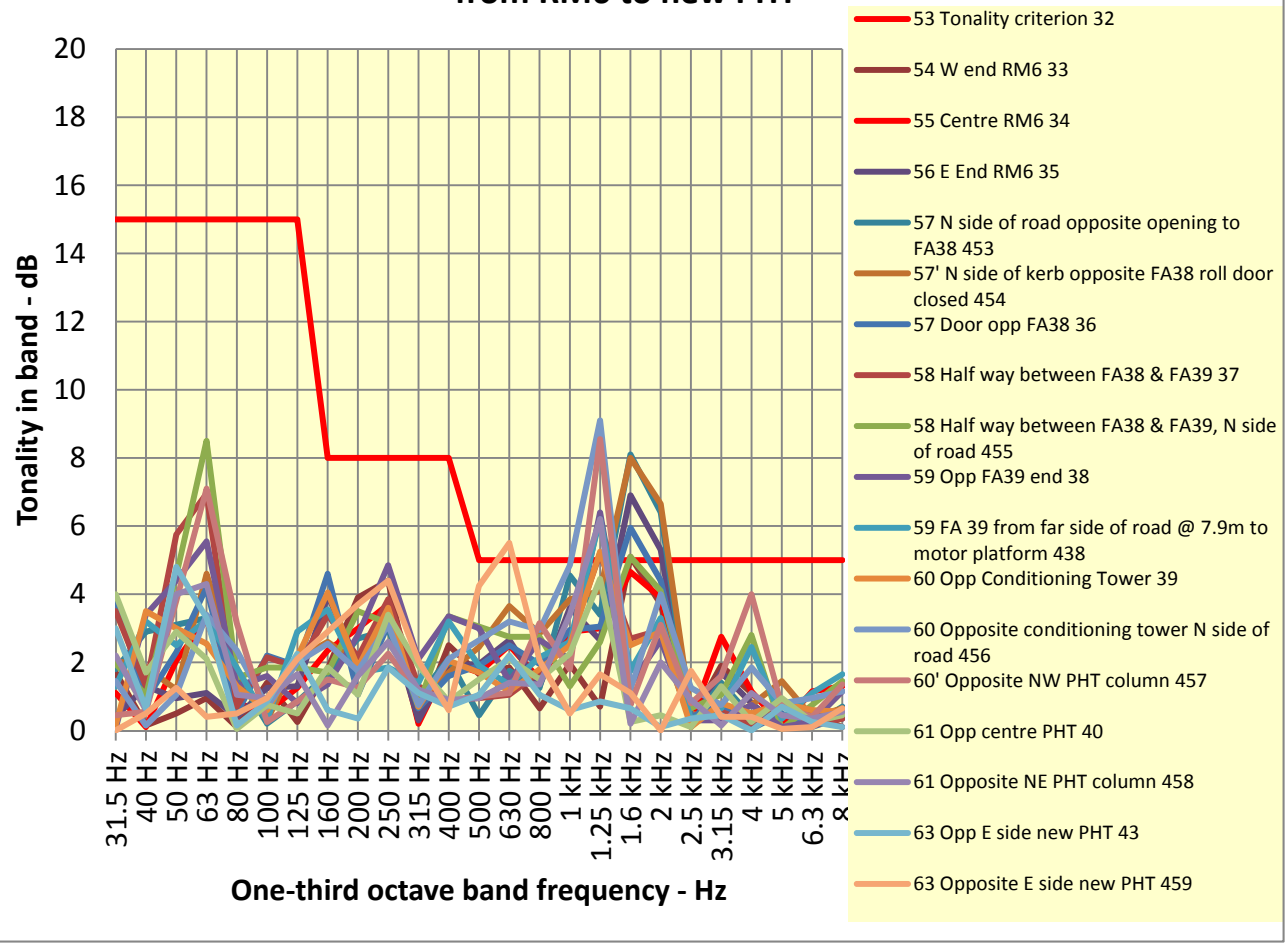


Figure 3.25: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 northern side at road kerb from RM6 to new PHT



Spectra & Tonality graphs: na28 data 2017

Figure 3.26A: Boral Cement Berrima - One-third Octave Band Spectra for K6 Kiln north side of road from drive platform to grate cooler fan courtyard

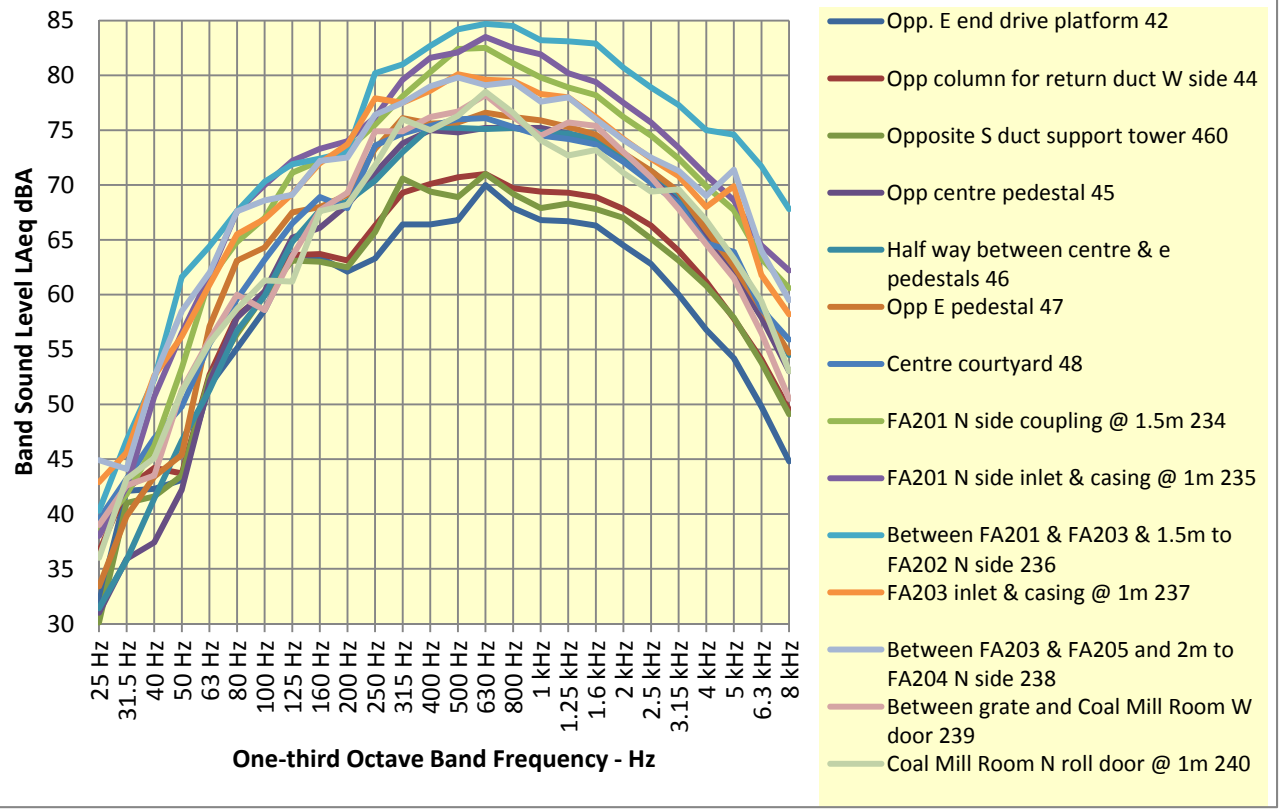
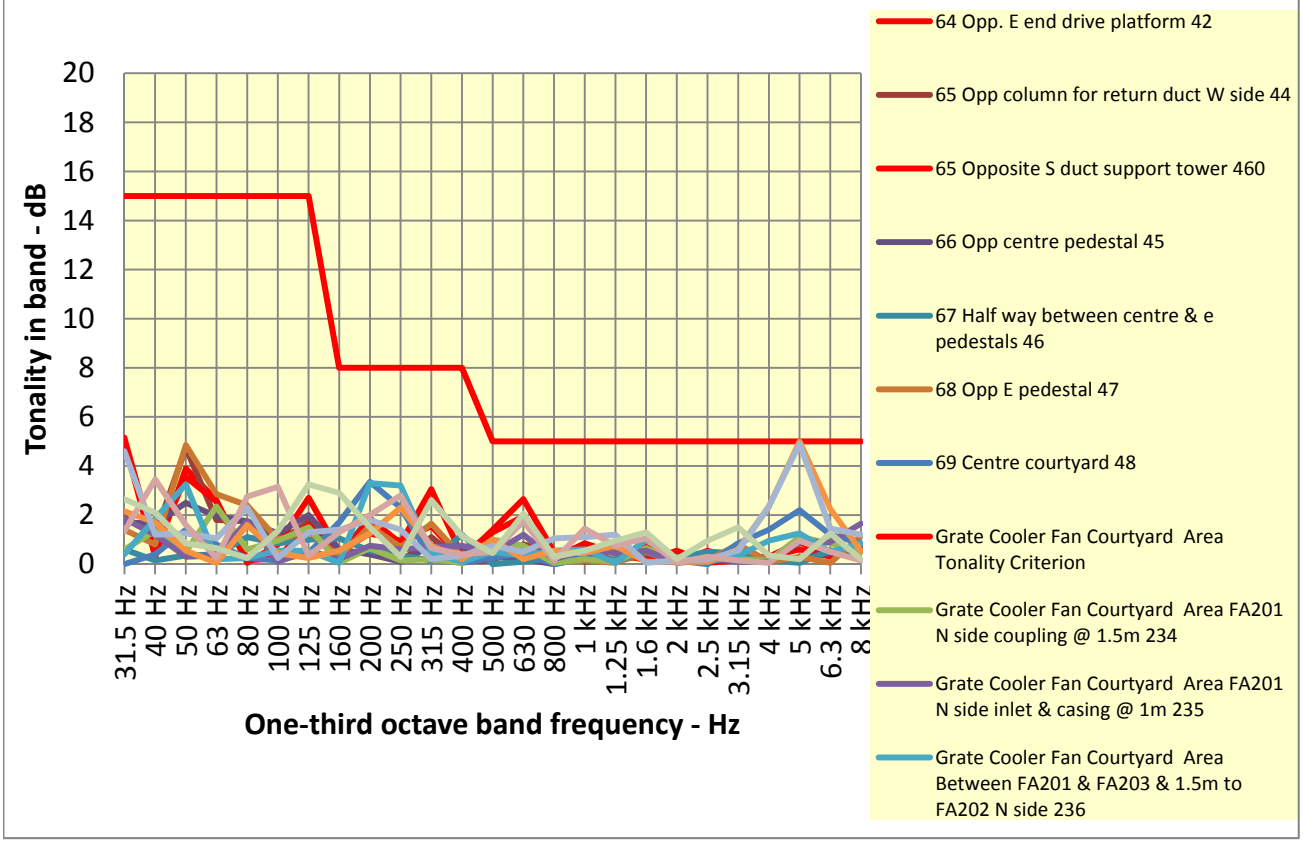


Figure 3.26: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 northern side from of road from drive platform to Grate cooler fan courtyard



Spectra & Tonality graphs: na28 data 2017

Figure 3.27A: Boral Cement Berrima - One-third Octave Band Spectra for K6 Kiln Firing Floor area

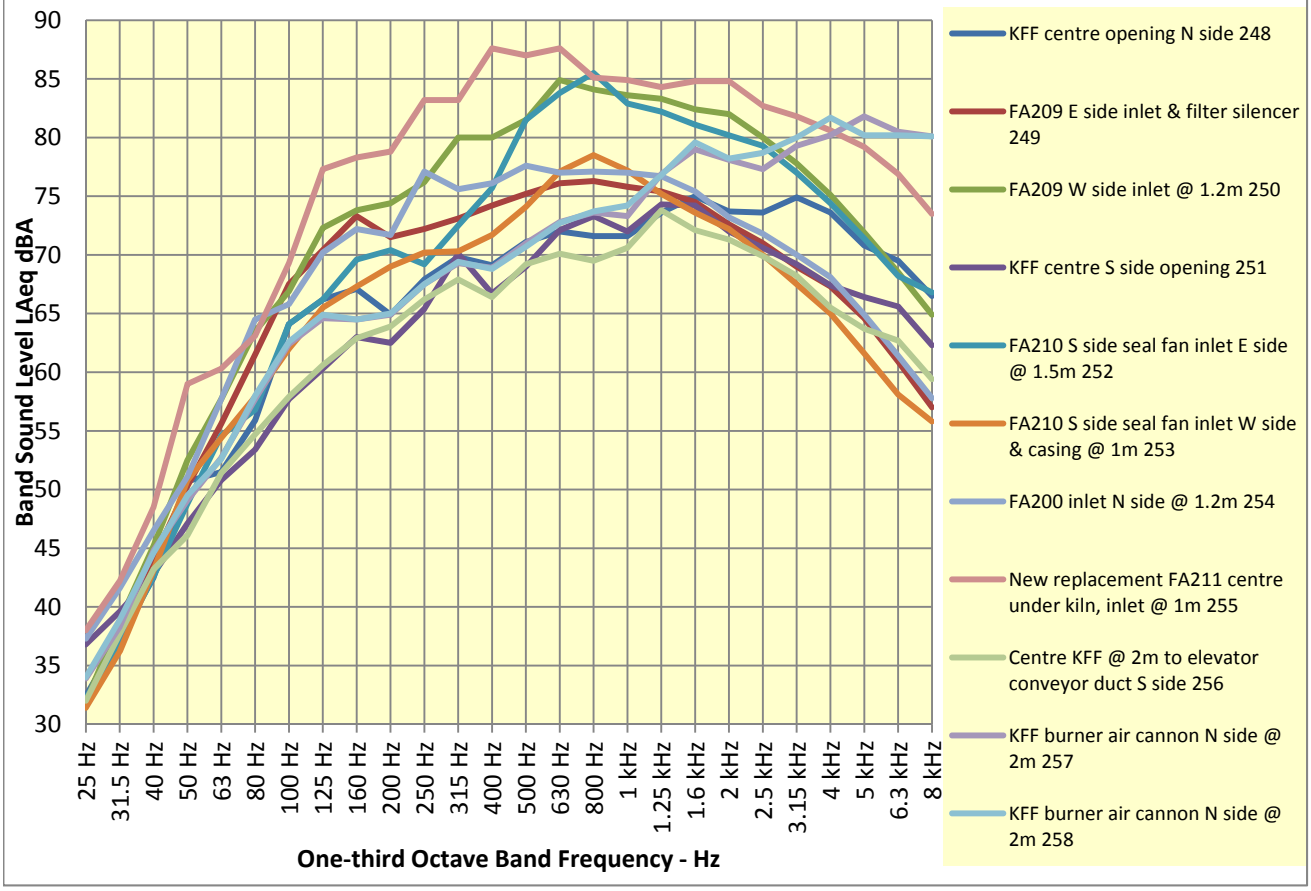
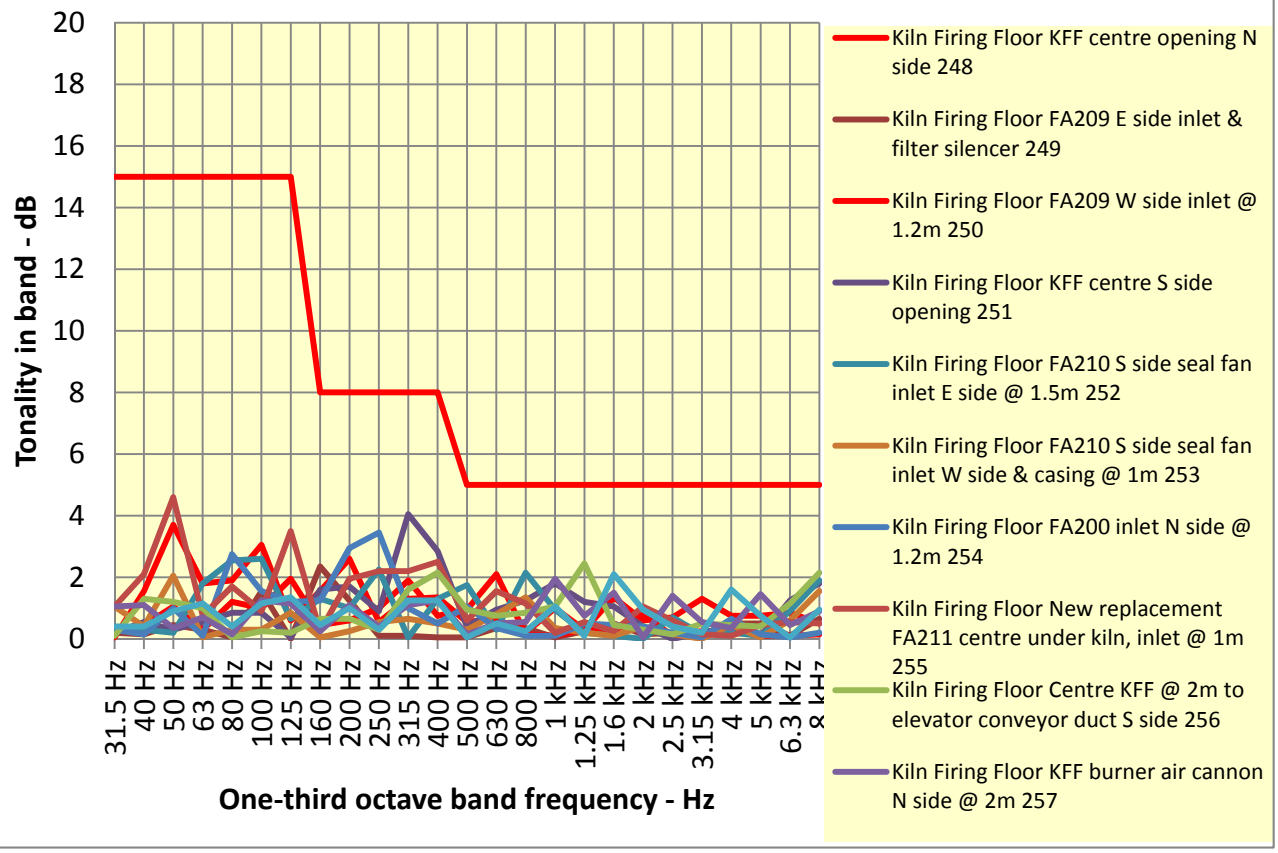


Figure 3.27: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 Kiln Firing Floor



Spectra & Tonality graphs: na28 data 2017

Figure 3.28A: Boral Cement Berrima - One-third Octave Band Spectra for K6 Radicon Cooler

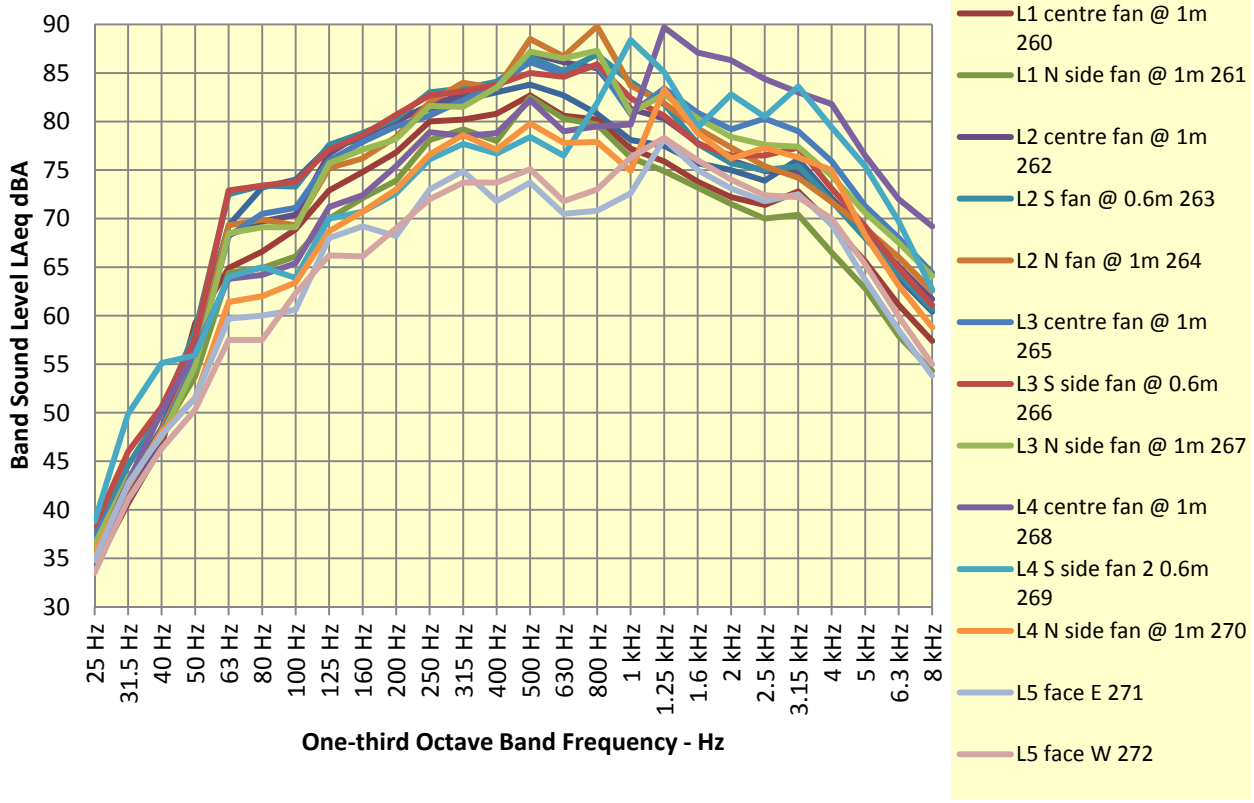
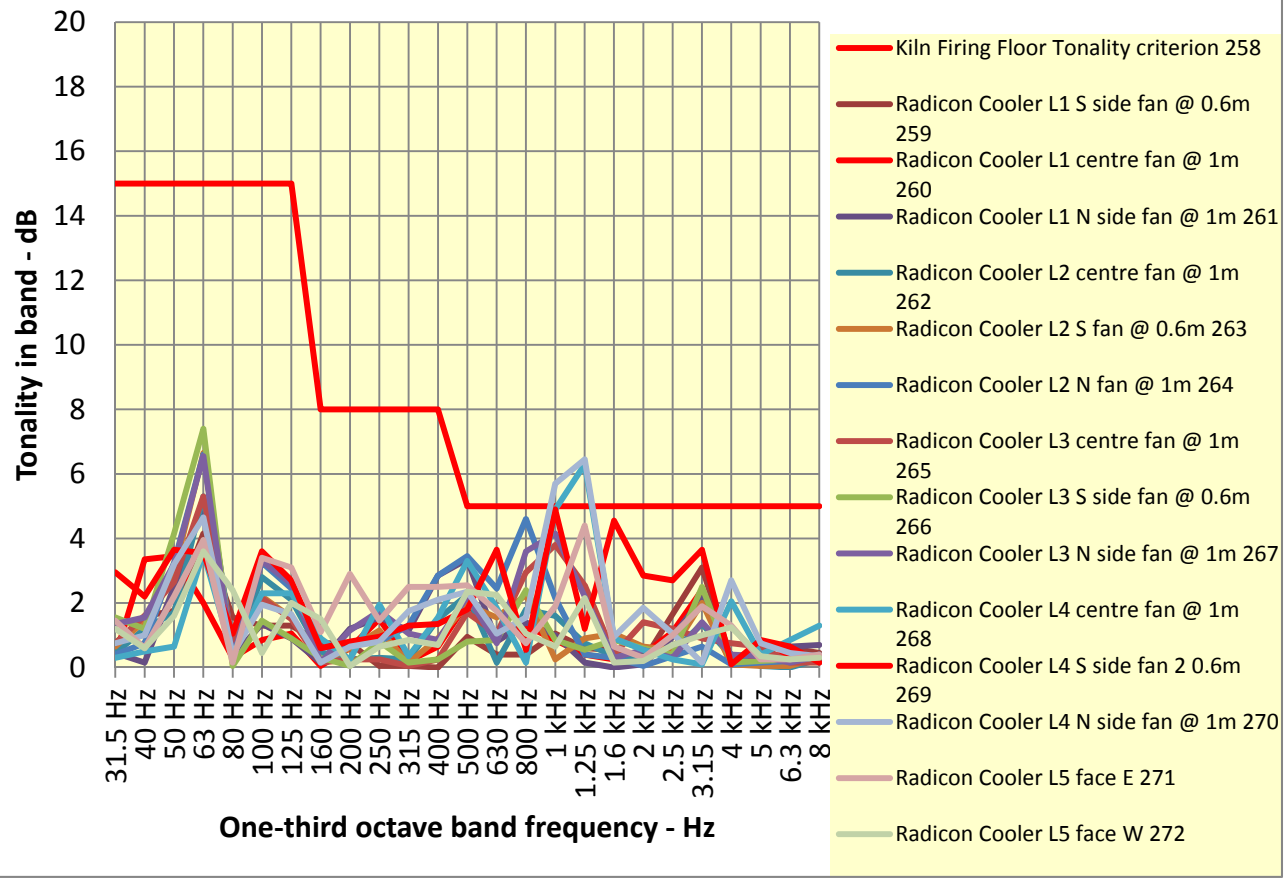


Figure 3.28: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 Radicon Cooler



Spectra & Tonality graphs: na28 data 2017

Figure 3.29A: Boral Cement Berrima - One-third Octave Band Spectra for FA215

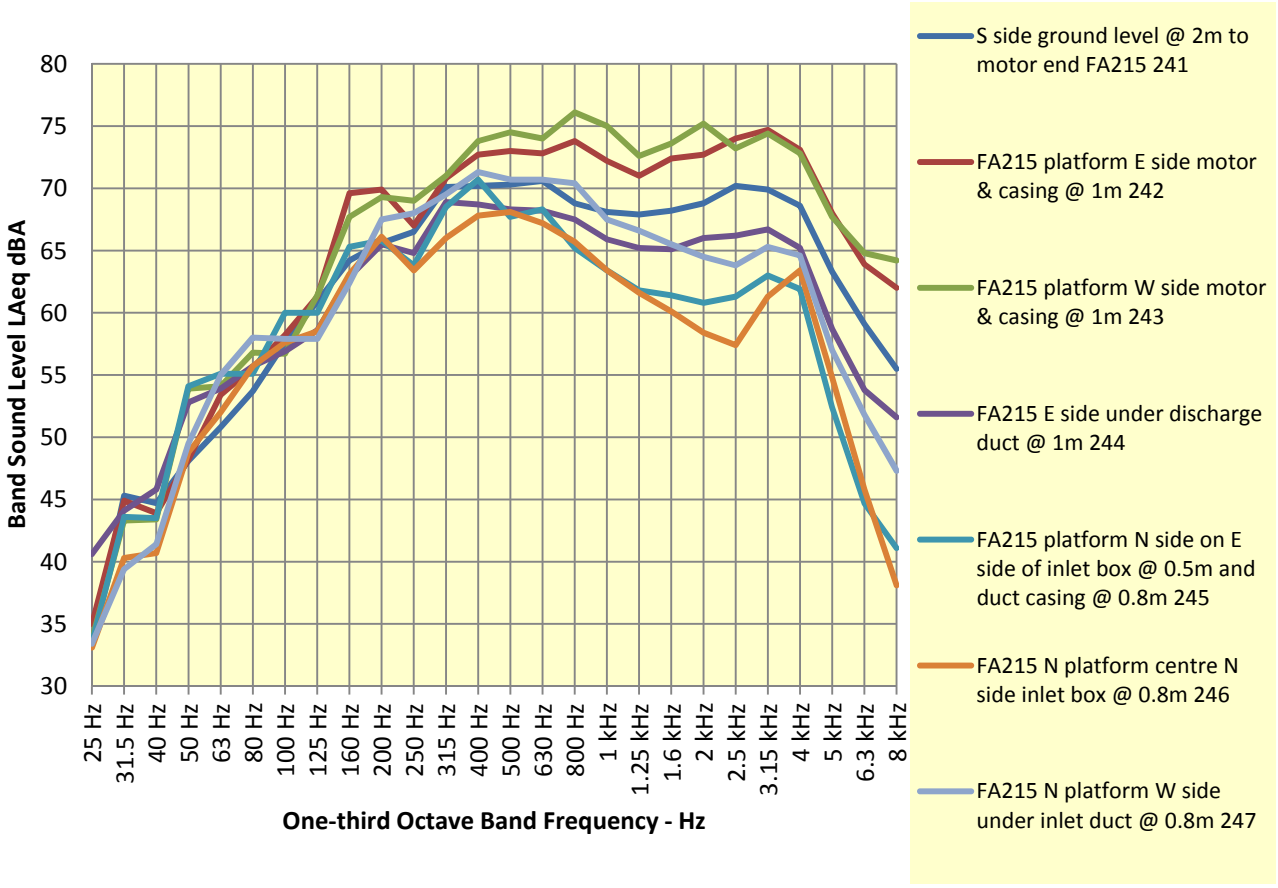
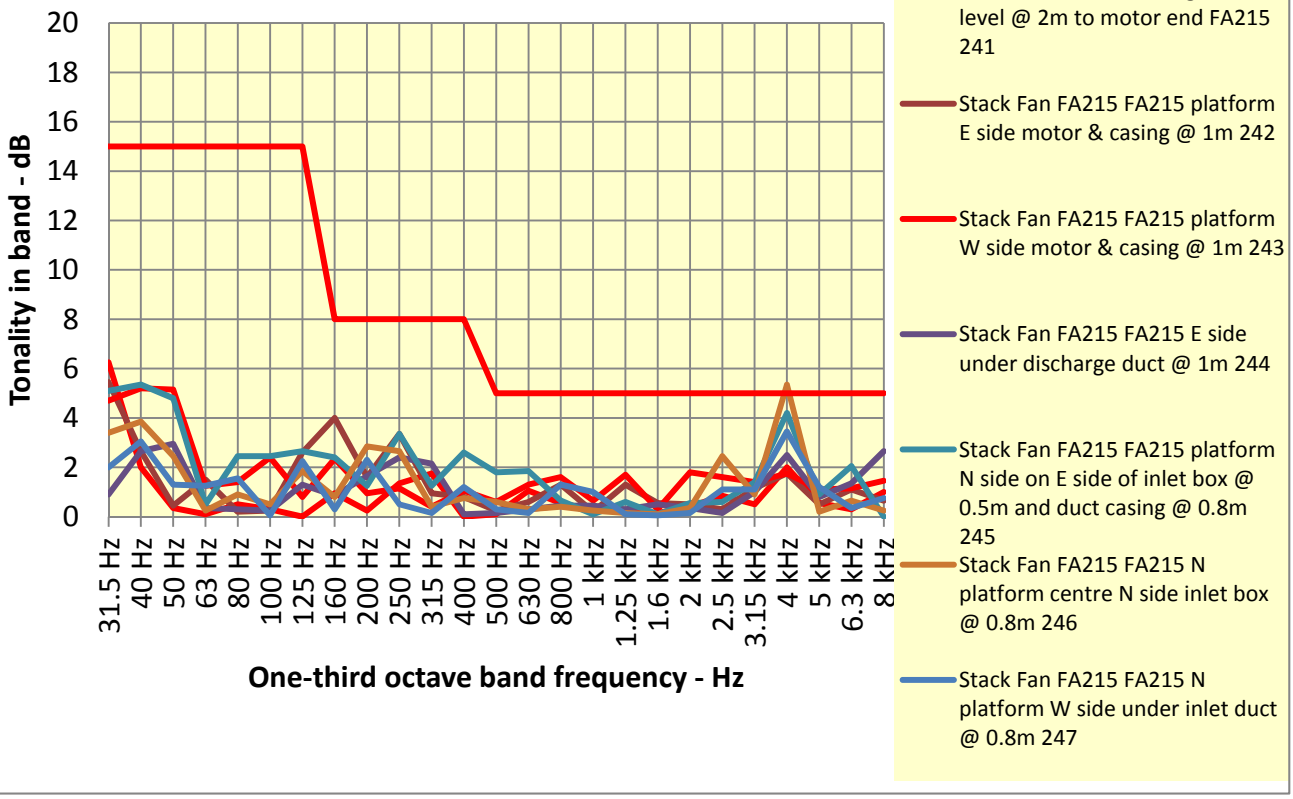


Figure 3.29: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Kiln 6 Radicon Cooler Baghouse fan FA250



Spectra & Tonality graphs: na28 data 2017

Figure 3.30A: Boral Cement Berrima - One-third Octave Band Spectra for Control building Roof

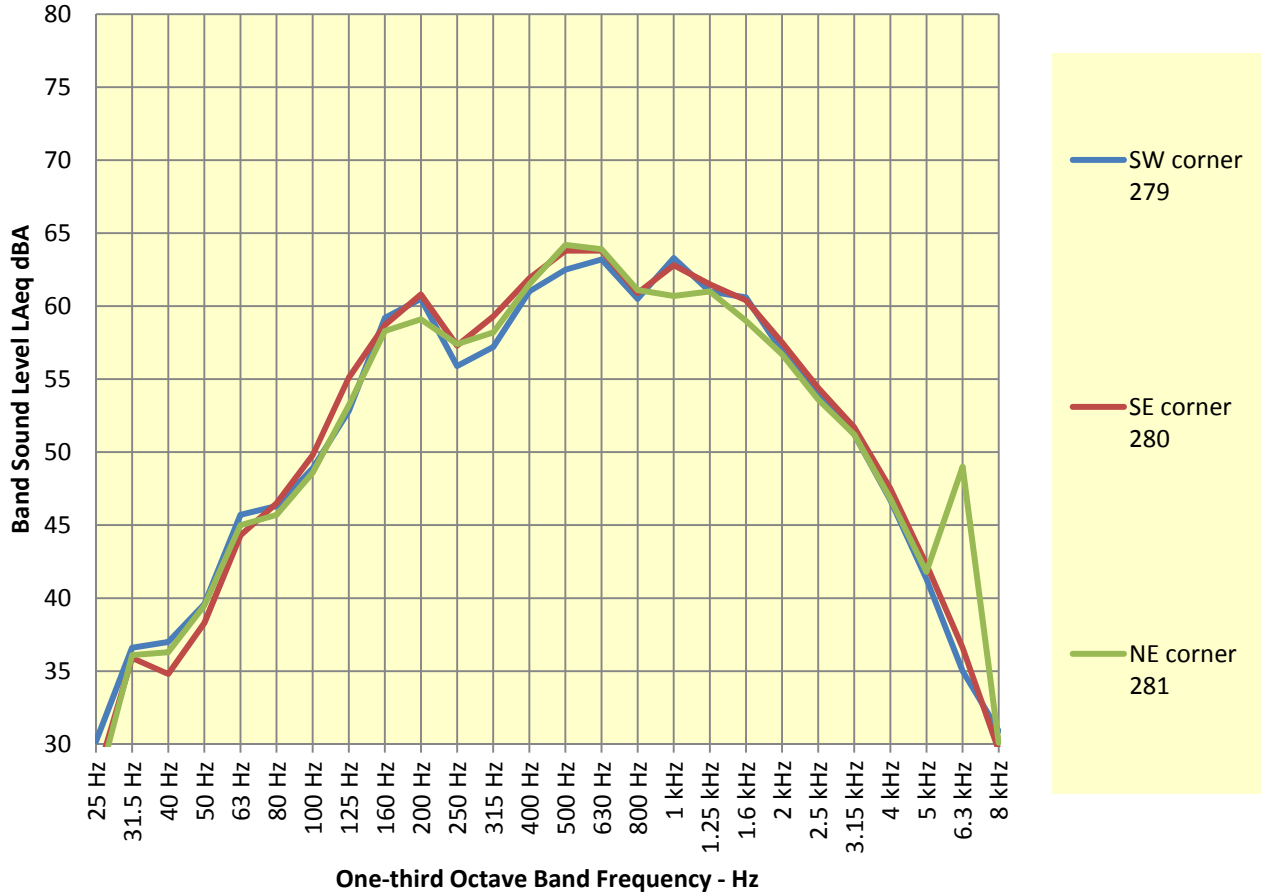
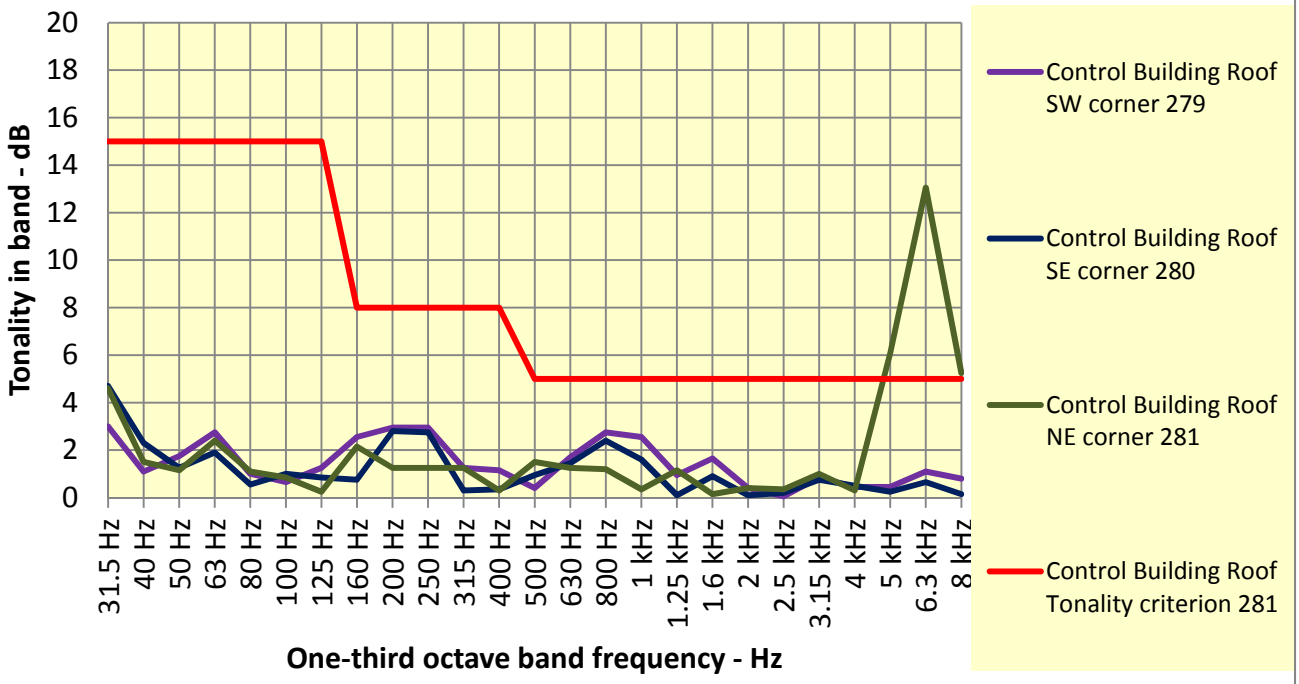


Figure 3.30: Boral Cement Berrima Annual Noise 2017 - Tonality of One-third octave band spectra for Control Building Roof



Spectra & Tonality graphs: na28 data 2017

Table 3.6A: Boral Cement Berrima Annual Noise Survey 2017

Site measurement LAeq Spectral data for CM7 and CM6 areas

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																									
Number	Description			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
A	Top of stairs	49	19/09/2017	32	44	40	42	49	50	52	55	58	58	57	60	64	64	62	61	61	61	59	57	55	51	48	43	40	35	29
C	Top of stairs S	50	19/09/2017	29	44	39	41	48	50	51	54	57	58	57	61	65	64	62	62	61	61	60	58	56	53	48	43	37	31	25
J'	Edge of concrete opp, J.	51	19/09/2017	32	43	39	43	46	49	54	58	61	60	59	62	64	64	65	65	63	61	60	58	55	52	48	42	36	30	26
J	Vents N of baghouse	52	19/09/2017	33	48	43	45	50	53	57	62	68	64	64	68	67	68	69	67	65	62	62	59	56	52	47	42	36	31	27
J"	under baghouse & 1m to wall vent	53	19/09/2017	37	44	46	47	51	57	59	66	70	66	65	71	69	69	70	68	68	65	65	61	59	53	48	45	38	34	29
J	Vents N of baghouse	54	19/09/2017	44	44	41	48	45	49	57	62	65	64	63	68	67	68	68	66	69	65	64	62	59	56	53	52	49	45	40
I	Vent S of door @ 1m	55	19/09/2017	33	44	42	45	48	53	58	61	63	64	66	66	68	69	68	67	65	64	63	62	60	55	51	45	39	33	28
H	W roller door @ 1m	56	19/09/2017	34	52	46	46	49	54	60	63	68	66	67	71	74	74	74	72	71	69	69	68	67	64	61	54	48	42	35
F	Wall vents N on W side @ 1m	57	19/09/2017	33	41	40	44	47	54	57	59	63	64	65	64	67	68	67	66	65	63	63	61	58	55	50	43	35	28	22
E'	Man door to compressor filter room@ 1m	59	19/09/2017	33	38	38	42	45	49	52	55	56	58	56	56	58	61	60	58	58	59	57	52	49	46	42	36	30	24	20
E	Compressor room door @ 1m	59	19/09/2017	33	38	38	42	45	49	52	55	56	58	56	56	58	61	60	58	58	59	57	52	49	46	42	36	30	24	20
L	N wall vent W side @ 1m	60	19/09/2017	31	37	35	41	43	46	49	60	56	59	62	60	62	64	61	59	60	58	55	53	50	48	45	40	36	30	23
M	Between wall vents @ 1m to wall	61	19/09/2017	29	35	37	40	42	44	48	54	56	56	56	56	60	64	63	58	59	57	54	52	50	49	45	40	34	28	22
N	Wall vents N wall E side @ 1m	62	19/09/2017	29	33	36	40	46	48	50	56	58	58	60	61	60	63	62	60	60	59	57	54	51	49	47	41	37	31	26
O	Line E side of Comp House 13.5m to control point	63	19/09/2017	37	33	37	41	44	48	49	54	57	59	59	58	61	65	64	61	61	59	57	55	53	51	48	42	37	31	25
K	Line level with G centre of compressor house	64	19/09/2017	34	36	36	41	44	47	49	54	57	58	58	58	62	68	67	62	62	60	58	57	55	53	50	44	39	33	26
G	Line N side of transfer house 13.5m to it, in-line W edge CM7	65	19/09/2017	31	37	37	41	45	46	48	54	56	58	58	58	64	67	67	61	62	60	58	57	56	53	50	44	40	34	32
D	At corner N of Admin	66	19/09/2017	29	37	35	40	47	47	49	51	54	55	54	58	61	65	61	61	62	59	57	54	52	49	46	39	34	26	20
P	1m N roll door CM7	68	19/09/2017	36	40	41	44	47	55	59	61	65	66	66	67	71	72	72	72	71	69	67	66	64	62	57	51	44	37	37
T	Kerb Opp W wall CM5	102	19/09/2017	33	42	40	41	48	48	53	57	61	62	59	63	64	64	64	63	63	63	62	60	57	54	50	45	39	34	30
S	Kerb opp E side CM7 tower	103	19/09/2017	34	49	44	42	49	49	52	56	61	62	62	67	65	65	65	63	63	64	62	60	58	55	50	45	38	30	21
S'	Kerb Opp W wall CM7	104	19/09/2017	35	49	44	41	47	48	52	57	61	61	59	63	65	67	63	64	63	63	62	59	58	55	50	45	40	34	26
R	corner SW of CM7	106	19/09/2017	34	50	44	42	51	50	51	55	60	60	63	74	67	63	63	63	63	63	61	58	56	53	49	43	39	33	28
TS3	TS3 L3 11.7m to FA34 discharge	217	19/09/2017	61.8	64.2	64.3	69	73.9	75	74.3	73.8	72.7	74.1	72.4	71.5	71	70.7	72.7	70.1	69.1	70.6	71.9	68.2	65.6	64.8	64.5	62.5	59.2	57.1	54.8
	TS3 N side L1 opening to N	276	19/09/2017	24.7	33.2	39.5	45	41	45.1	48.1	53.3	54.9	55.4	57.9	58.2	61.4	63.5	64.5	63.3	63.8	63.5	60.3	57.9	56	55.3	51.8	49	47.6	42.7	37.5
	TS3 Platform L3 facing CM5 fan	277	19/09/2017	31.5	36.7	39.1	43.4	44.7	48.1	53.1	58.8	59.1	60.2	61.6	61.4	63.4	65.5	65.3	63.1	62.3	61.8	60.2	58.8	58	57.2	54.5	50.7	47	41.4	36.8
(CM6)	Platform opposite CM6 W wall fans	278	19/09/2017	31.7	34.5	37.5	41.7	48.2	49.3	50.6	54.5	59.8	59.9	59.1	61.6	62.1	63	63.2	62	60.9	60.9	58.7	55.8	53.5	55.8	53.8	52.4	49	45.6	41.5
CM7 Inside	Inside centre Compressor room	282	19/09/2017	26.1	33	36.7	42.5	45.2	52.6	59.8	67.6	65.1	65.5	63.4	63.1	65.6	64.9	66.1	67.8	68.8	69.9	71.2	74.6	79.2	78.8	82.8	81.7	82.5	78.1	71
	Inside W roll door Compressor room	283	19/09/2017	29.4	32.2	36.5	41.7	46.2	52.1	59	67.1	64.4	64.8	64.2	64.9	66.7	68.3	68.7	70.8	73.5	74.4	76.7	79.1	83.5	83.2	86.5	85.8	86	82.4	76.6
	H* Inside main W roll door @ 1m	284	19/09/2017	36.3	51.1	48.3	53.3	56.7	59.7	64.6	72.3	77.7	80.2	80	82.8	84.4	87.9	86.2	85.5	84.3	83.8	83	82.3	82.4	81	78.3	73.3	67.5	61.1	53.9
	F* Inside NW corner	285	19/09/2017	38.5	50.6	47.8	51.2	49.4	55.8	63.8	68	74.5	77.9	78.6	78.4	80.9	84.4	84.1	83.7	83	81.8	79.5	78.7	77.5	74.6	71.3	65.7	59	52	44.4
	I* W side by hydraulics bench	286	19/09/2017	39.5	41.9	46.9	52.1	54.4	62.6	70.2	73.8	76.9	79.8	80.8	81.4	84.4	85.6	86.1	84.7	84.1	83.2	82	81.9	84	79.4	78	72.3	66	59.9	53.7
	J* inside vents	287	19/09/2017	39.6	56.2	50.5	52.2	52.3	57.5	63.6	70	75	75.8	76.3	82.8	81.2	81.5	82	80.9	83.4	79.1	78.1	77.7	77.5	74.7	72.4	68.2	60.1	53.3	48
	J'* SW corner by vents at baghouse	288	19/09/2017	39	53.6	50.2	50	52	56.1	63.9	68.8	72	73.7	75	76.9	78.1	80.1	80	78.4	78.6	76.9	76	74.7	74	71	68.6	65.1	57.4	50.7	45.2
	N side centre mill 2m to wall	289	19/09/2017	35.4	46.4	44.6	48.6	52.3	63.4	69.7	71.6	75.6	77.8	79.1	79.7	81.8	84.8	85.1	85.7	85.2	84.5	82.2	81.9	79.8	76.1	72.7	67.1	60.9	54	46.6
	P* inside main N roll door	290	19/09/2017	33.3	42.7	43.9	51	54.4	64.4	64.4	70.1	75.9	78.3	78.2	79.8	82.8	85.4	86.8	84.9	84.5	83.3	82	81.3	80.7	78.3	75.5	70	63.6	57.4	56

Table 3.6A: Boral Cement Berrima Annual Noise Survey 2017
Site measurement LAeq Spectral data for CM7 and CM6 areas

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	Description			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
	Centre E side of mill at column line	291	19/09/2017	35.3	41.2	48.6	52.3	56.4	62.5	68.6	72.5	76.9	80.7	81.4	84	87.4	88.7	90.1	90.2	92	91.4	92	92	92.5	90.5	86.9	81.7	76.7	70.9	63.1
	Platform N end mill centre	292	19/09/2017	31.5	42.8	43.2	47.2	52.5	63.7	72	71.4	75.2	79	78.9	79.3	82	85.6	86.3	87	86.3	85.5	83.4	82.4	81.1	78.3	75.3	69.6	63.9	57.8	50.8
	Platform top of mill level by N wall & conveyor 701A	293	19/09/2017	35.7	44.5	43.6	48.6	55.7	61.3	66	69.6	75.5	76.4	78.5	77.9	79.8	82.2	82.8	83.3	82.5	81.5	80	79.1	78.2	75.4	71.9	66	59.8	54.9	51.9
	Top of mill centre platform	294	19/09/2017	37.5	46.7	45.7	50.3	60.4	67	68.1	72.9	76.2	78.3	79.5	80.7	81.3	82.6	83.6	83.1	82.9	82.2	81.4	81	80.4	78.2	74.9	69.5	63.5	57.8	52.4
	Bucket elevator S side on platform at mill top level	295	19/09/2017	37	44.4	46.8	50.6	56.1	62.3	66.3	69.7	73.5	75.6	78.4	78.1	78.6	79.9	80.8	79.8	78.9	77.8	76.8	75	73.5	71	67.7	64	58	51.4	46.3
	BE stairway at roof level	296	19/09/2017	39.4	48.9	45.5	48.5	54.1	59.2	64.6	67.7	72	76.5	77.6	78.3	79.1	79.6	81.1	80.8	80.8	81.4	80.5	78.7	77.3	74.6	70.7	65.3	58.9	51.6	44.6
	1st platform above roof level in BE tower W side	297	19/09/2017	34.9	46.9	44.2	48.4	53.1	57.9	62.4	65.7	70.8	73.5	74.6	75.8	74.6	75.9	76.4	75.3	75.2	74.3	73.2	71.7	70.5	67.6	63.9	59.5	53.7	48	41.8
	2nd platform in BE tower by fans FA703 & FA720, W side wall @ 1m	298	19/09/2017	37.1	48.7	44.2	46.4	50.6	57	61.8	62.6	68.3	70.8	70.7	74	72.2	72.3	72.5	71.7	71.2	70.5	70.2	68.3	67.1	65.4	62.6	59.8	55.4	52.1	44.3
	Between Fans FA703 on & FA720 off	299	19/09/2017	35.6	51.6	45	47.8	50	58	61.8	64.7	66.1	70.4	70.7	72.4	73.4	73	73.8	73	72.8	73.1	73	70.9	69.5	67.2	65.1	62.8	61.3	59.2	54.9
	At crossway to CM5 level, N side at transfer to conveyor	300	19/09/2017	34.8	40.2	41.9	47.3	53.4	60.2	63.1	65.1	66.7	69.2	69.1	71.5	71.7	71.3	71.4	71	70	69.9	69.1	67.6	66.9	65.9	63.1	61.5	57.4	53.7	44.5
	At crossway to CM5 level, W side by wall @ 1m, BE @ 1.8m	301	19/09/2017	37	44.5	43.2	47.5	51.3	56.8	60.1	62.9	67.3	69.6	69.7	72.2	71.5	71.5	71.6	70.4	70	70.4	69.7	69.4	69	69.9	68.9	65.4	60.3	56.5	48.4
	At W end crossway to CM5 by vent in S wall	302	19/09/2017	35.3	41.1	41.7	47.4	54.2	57.6	59.5	61.1	64.9	64.4	64.7	66	66	66.6	67.2	66.2	65	65.5	64.2	62.6	60.8	59.6	57.3	54.3	49.4	44.9	35.2
	Top level BE tower W side NW corner	303	19/09/2017	36	46.2	43.3	47.2	49.3	56	59	63.6	66.2	69.7	69.2	69.7	69.8	69.9	70.7	71.3	71	72.3	70.6	70.1	70	70.9	69.4	69.1	65.8	63.2	53.3
	Top level BE tower S side BE @ 0.8m	304	19/09/2017	39.9	44.6	46.3	50.3	51.9	58.9	62.4	62.5	62.9	68.3	67.9	68	70.2	68.4	69.7	70.4	70.1	70.1	69.8	69.2	67.8	68.9	70.5	68.6	64.8	61.9	52.9
	Top level BE tower E side by drive motor end @ 0.8m	305	19/09/2017	33.3	46.7	43	52.3	52.2	60	63.6	63.6	65.9	67.6	68.2	70.6	77.2	70.8	71.8	72.5	73.7	75	72	71.1	70.5	70.2	67.4	67.1	63.4	60.8	51.2
	Crossway to CM5 E end by opening in floor	306	19/09/2017	34	40.8	42.8	50.6	54.3	55.5	59	62.2	65.7	69	68.6	67.4	66.9	64.7	64.3	62.9	62	61.6	61.4	59.6	57.1	54.1	52.2	49.8	44	40.8	39.6
	Main baghouse SE corner top, 4m to E wall	307	19/09/2017	36.2	47.1	43.2	46.8	51.5	56.4	60.9	66.5	71.6	76.4	75.3	75.8	75	75.7	76.3	75.7	75	74.6	73.8	72	70.8	68.1	65	65.1	64.2	60	59
	Base of main baghouse SW corner	308	19/09/2017	39.2	48.3	43.8	43.3	53.4	58.4	63	66.8	70.9	73.3	73.9	76.9	76.5	76.7	76.9	75.9	75.8	74.2	73.5	71	69.1	66.2	62.2	59.8	55.4	47.7	43.3
	Main mill motor fan platform NE side, motor & casing @ 1m	309	19/09/2017	37	51.2	49.2	55.8	58.8	61.7	66.7	66.2	72.1	75.3	75	76.3	78.7	79	80.7	79.4	78.6	78.6	77.8	76	74.7	72.9	70.7	73.8	71.2	63.8	60.6
	SW side of mill motor fan @ 2m to casing inlet & discharge ducts	310	19/09/2017	40.4	56.6	50.4	53.3	62.8	58.5	63.1	66.9	71.4	73.9	73.2	73.8	75.4	75.9	76.8	76.4	75.4	75.2	75.1	72.7	71.2	69	67.1	66.2	62.8	55.6	51.4
	Mill drive motor fan motor drive end @ 1.5m	311	19/09/2017	37.3	54.8	49.9	59.7	59.3	65	65.2	68.2	72.8	76.3	76.5	84.7	83.1	83.5	86.1	83.9	83.3	80.5	80.8	77.8	76.7	76.4	72.6	74.8	66.6	62.1	61.3
CM5 area	L1 Larox Valve @ 1.2m	465	6/10/2017	37.1	34.2	38.2	45.4	52.6	50.5	53.4	57.9	61	64.1	59.9	62.9	69.6	77.9	76.2	73.6	73	82.6	75.5	78.2	80.2	79.5	76.8	75.1	73.9	70.8	68.4
	DC702 by duct through N wall, @ 1m to motor & casing	466	6/10/2017	41.4	37.3	40.5	50.1	52.2	53.1	54.6	58.3	60.3	63.3	60.2	61.5	63.7	64.6	67	63.6	66.1	66	62.8	61.5	59.8	57.4	54.6	52.2	49.3	46.6	42.9
	FA34 motor & casing S side @ 1m	467	6/10/2017	33.8	36.6	38.9	51.2	61.8	57.9	59.4	66.1	69	72.9	69.2	68.8	70.4	68.4	67.2	66.4	67.2	66.1	66	66.7	63.7	64.5	68.8	61.2	53.8	50.1	45.3
	FA502 @ 1m to motor & casing & discharge	468	6/10/2017	35.5	39.2	46.4	54.1	56.7	56.8	62.1	63.2	68	72.3	69.9	69.8	74.5	73.5	70.6	69.7	70	70.3	71.5	68.3	67	67.2	64	64.1	56.8	51.6	46.9

Table 3.6A: Boral Cement Berrima Annual Noise Survey 2017
Site measurement LAeq Spectral data for CM7 and CM6 areas

Location		File	Date	A-weighted LAeq dBA in One-third Octave Band frequency Hz																								
Number	**Description**			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
CM6	W wall fan from far platform @ 7.3m to splitters, 5.8m to wall	461	6/10/2017	53.9	49	55	57.8	61.8	64.1	61.4	61.6	60.1	60.9	61.8	64.9	73.3	77.7	78.1	76.7	76	77.1	75.9	72.4	68.3	66.6	67.8	65.8	62.8	60.8	52.8
	W wall fan from close platform 2.9m to centre bottom of silencer at wall	462	6/10/2017	58	54.1	61.1	66.6	65.9	67.9	63.6	62.5	61.6	63.6	64.6	73.1	79.1	81.4	83.1	82.7	83.7	84.8	81.9	80.1	75	73.7	74.2	71.3	68.3	66.6	59.2
11	9.8m from S wall	84	19/09/2017	32	36	39	43	50	52	52	59	63	61	60	63	62	64	66	66	64	64	63	60	58	56	51	46	40	33	26
13	E side S roll door @ 1m	85	19/09/2017	30	35	38	41	45	47	49	54	58	60	58	60	59	61	63	63	63	62	62	59	57	55	53	48	42	37	28
14	CM6 E side centre door @ 1m	86	19/09/2017	30	35	38	42	46	49	51	54	58	59	59	61	60	61	61	62	63	62	63	60	61	62	60	53	48	42	33
15	2m from Clinker Building opp 13 & 14	87	19/09/2017	30	35	38	41	42	45	48	54	61	62	58	60	59	59	62	64	64	61	61	59	57	54	49	44	39	33	27
18	Door opp Comp Room @ 1m	88	19/09/2017	30	33	38	44	46	45	49	53	55	57	58	61	60	61	62	62	62	61	60	58	58	54	51	47	42	37	33
19	Clinker Building @ 2m opp 18	89	19/09/2017	26	32	39	42	43	44	48	53	56	56	59	62	60	61	62	63	64	63	62	60	59	57	53	49	45	41	36
20	Man door - open 100mm	90	19/09/2017	31	32	36	41	41	45	46	52	56	56	58	60	59	61	61	62	62	61	59	58	57	54	50	46	42	37	31
21	1m Outside vent fan filter	92	19/09/2017	28	31	31	40	43	45	48	52	55	58	56	58	58	59	60	60	61	59	57	54	52	49	44	40	36	29	22
22	E side N wall vent @ 1m	93	19/09/2017	32	33	34	38	38	43	47	49	55	54	57	58	59	61	62	60	60	60	58	56	56	52	49	47	41	36	30
23	Centre N wall vent @ 1m	94	19/09/2017	31	32	32	38	39	42	47	49	53	54	56	57	58	61	61	59	60	60	59	56	53	52	50	46	38	31	25
24	W side N wall vent @ 1m	95	19/09/2017	32	32	34	41	39	42	46	50	53	54	54	55	57	59	60	58	58	58	56	53	50	48	44	40	37	38	37
17	E roll door opp Mill	96	19/09/2017	33	32	35	41	45	48	51	54	58	60	62	65	67	71	71	70	70	71	71	70	70	68	65	64	61	57	53
16	E wall centre @ 2m	97	19/09/2017	36	39	41	43	46	48	51	54	57	59	59	60	61	62	62	63	63	64	62	61	59	56	52	50	45	40	36
25	11m N of CM6	98	19/09/2017	35	34	33	42	40	45	46	50	52	53	54	56	57	60	62	59	60	61	58	55	53	50	45	41	37	34	27
26	22.6m N of CM6	99	19/09/2017	27	33	33	37	41	47	48	50	52	53	53	55	57	59	62	58	58	60	57	54	51	48	44	41	37	31	25
11	9.8m from S wall	123	6/10/2017	31	35	38	42	51	52	53	58	61	61	60	62	63	63	67	70	70	65	65	64	66	61	60	54	46	40	31
13	E side S roll door @ 1m	124	6/10/2017	32	34	39	42	46	47	50	53	58	60	59	64	64	61	63	63	65	62	61	61	57	55	51	45	40	33	28
14	CM6 E side centre door @ 1m	125	6/10/2017	33	34	39	42	47	50	53	58	61	62	64	65	65	65	66	65	64	63	61	60	57	54	50	45	39	32	27
16	E wall centre @ 2m	126	6/10/2017	36	32	37	39	45	47	52	54	57	59	60	62	62	63	63	62	63	62	60	58	56	53	49	44	39	37	36
16	E wall centre @ 2m	127	6/10/2017	37	33	37	40	46	48	51	54	58	60	60	61	62	63	62	62	62	62	59	58	55	53	49	44	39	31	25
17	E roll door opp Mill	128	6/10/2017	37	33	39	43	47	49	53	58	60	61	65	68	71	70	70	69	70	71	68	66	63	59	56	51	47	41	36
18	Door opp Comp Room @ 1m	129	6/10/2017	32	31	37	41	46	47	50	56	62	58	61	63	62	64	68	62	70	74	65	65	69	65	63	59	54	50	44
20	Man door - open 100mm	130	6/10/2017	36	36	39	43	46	48	50	54	64	59	59	61	60	62	66	64	64	65	64	64	62	61	59	54	50	43	38
19	Clinker Building @ 2m opp 18	131	6/10/2017	33	31	37	42	45	46	50	53	57	58	59	63	62	61	63	63	64	67	61	59	60	57	53	50	44	39	33
15	2m from Clinker Building opp 13 & 14	132	6/10/2017	29	34	38	41	43	46	51	54	58	59	59	61	60	60	62	63	63	61	60	58	56	54	50	46	42	37	35
21	1m Outside vent fan filter	134	6/10/2017	43	33	38	44	44	47	52	55	57	56	59	62	64	64	63	65	60	59	56	54	51	47	44	41	42	31	23
22	E side N wall vent @ 1m	135	6/10/2017	44	35	39	44	44	48	52	55	58	62	63	66	67	67	66	65	63	63	60	57	53	49	47	42	38	34	32
23	Centre N wall vent @ 1m	136	6/10/2017	36	37	40	45	47	55	57	61	64	66	68	72	73	71	71	70	69	69	67	65	62	57	53	50	44	38	34
24	W side N wall vent @ 1m	137	6/10/2017	34	37	41	48	48	52	52	57	62	65	65	69	70	69	69	67	65	64	62	59	56	52	49	45	41	36	33
25	11m N of CM6	138	6/10/2017	31	31	36	40	42	47	49	53	54	56	59	62	60	60	60	59	59	58	57	54	51	47	43	40	35	30	27
26	22.6m N of CM6	139	6/10/2017	33	31	36	42	42	45	49	51	54	56	55	59	61	59	59	58	58	58	56	54	50	45	41	38	34	29	24

Table 3.6: Boral Cement Berrima - 2017 Annual Noise Assessment - Site Sound Levels for CM7 Project and CM6

Comparison and difference with results for previous years for the same locations

Differences highlighted pink if greater than 3 dB

Area	Location	File	Date	Statistical Sound Level - LAeq dBA											Difference to 2016 = 2016 - 20XX dB								
		No.		LAeq 2017	LA90 2017	LAeq 2016	LAeq 2015	LAeq 2014	LAeq 2013	LAeq 2012	LAeq 2011	LAeq 2010	LAeq 2009	LAeq 2006	2016	2015	2014	2013	2012	2011	2010	2009	2006
CM7	A Top of stairs	49	19/09/2017	72	71	72	73	73	72	71	73	69	70	70	0	-1	-1	0	1	-1	3	2	2
	C Top of stairs S	50	19/09/2017	72	72	72	73	71	71	71	71	70	72	72	0	0	1	1	2	1	2	0	0
	D At corner N of Admin	66	19/09/2017	71	0	72	72	72	70	69	68	67	73	73	-2	-2	-1	0	1	2	4	-2	-2
	E Compressor room door @ 1m	59	19/09/2017	69	69	71	72	74	73	74	75	76	76	75	-2	-3	-5	-4	-5	-6	-7	-7	-6
	E' Man door to compressor filter room@ 1m	59	19/09/2017	69	69	69	71	70	69	71	71	69	74	73	0	-1	-1	0	-2	-2	0	-5	-4
	F Wall vents N on W side @ 1m	57	19/09/2017	76	76	76	76	77	77	77	75	76	77	78	0	0	-1	-1	-1	1	0	-1	-2
	G - Line N side of transfer house 13.5m to it, in-line W edge CM7	65	19/09/2017	73	72	75	75	74	72	70	68	69	78	81	-2	-1	-1	1	4	6	4	-5	-8
	H W roller door @ 1m	56	19/09/2017	82	82	81	80	80	81	80	77	78	78	77	1	3	2	2	2	5	4	4	5
	I Vent S of door @ 1m	55	19/09/2017	77	77	77	78	78	79	79	87	78	78	85	0	-1	-1	-2	-2	-10	-1	-1	-8
	J Vents N of baghouse	52	19/09/2017	77	77	78	77	79	80	86	89	83	83	86	0	0	-2	-2	-9	-12	-6	-6	-9
		54	19/09/2017	78	77																		
	J' Edge of concrete opp, J.	51	19/09/2017	73	73	74	75	74	75	78	84	77	80	74	0	-1	-1	-2	-5	-11	-4	-7	-1
	J" under baghouse & 1m to wall vent	53	19/09/2017	79	79	80	81	82	81						-1	-2	-3	-2					
	K Line level with G centre of compressor house	64	19/09/2017	74	72	72	74	72	71	72	68	69	78		1	0	1	3	1	6	5	-5	
	L N wall vent W side @ 1m	60	19/09/2017	71	71																		
	M Between wall vents @ 1m to wall	61	19/09/2017	70	69	73	74	73	72	70	79	71	76	76	-3	-4	-3	-2	0	-9	-1	-6	-6
	N Wall vents N wall E side @ 1m	62	19/09/2017	71	70	71	71	71	69	69	67	70	76	75	-1	0	0	2	2	4	1	-5	-4
	O Line E side of Comp House 13.5m to control point	63	19/09/2017	72	71	73	75	73	72	70	67	67	78		-2	-3	-1	0	2	5	5	-6	
	P 1m N roll door CM7	68	19/09/2017	81	80	81	81	80	81	81	76	79	87		-1	-1	1	-1	-1	4	2	-7	
	Transfer Station #TS3 Level 1 N side opening	276	19/09/2017	73	72	71	71								2	1							
	TS3 Platform opp fan discharge	277	19/09/2017	74	73	75	75	77	75	77	75	74			-1	-2	-3	-1	-3	-1	0		
	TS3 Platform opp fan discharge	464	6/10/2017	75	74	75	75	77	75	77	75	74			0	-1	-2	0	-2	0	1		
	R corner SW of CM7	106	19/09/2017	77	76	76	75								1	2							
	S' Kerb Opp W wall CM7	104	19/09/2017	74	74	74	74								0	0							
	S Kerb opp E side CM7 tower	103	19/09/2017	75	74	75	76								0	-2							
	T Kerb Opp W wall CM5	102	19/09/2017	74	73	75	76								-1	-2							
CM6	11 9.8m from S wall	123	6/10/2017	77	76	78	76	78	77	79		77			-1	1	-1	0	-2		0		
	13 E side S roll door @ 1m	124	6/10/2017	73	73	75	80	81	82	82		83			-2	-7	-8	-9	-9		-10		
	14 CM6 E side centre door @ 1m	125	6/10/2017	75	75	76	74	75	77	74		74			-1	1	0	-3	1		1		
	15 2m from Clinker Building opp 13 & 14	132	6/10/2017	72	71	73	78	78	89	79					-1	-6	-7	-17	-7				
	16 E wall centre @ 2m	126	6/10/2017	72	72	73	74	75	80	74		77			-1	-1	-2	-7	-2		-5		
		127	6/10/2017	72	72							72											
	17 E roll door opp Mill	128	6/10/2017	80	79	82	74	75	78	77		75			-3	5	4	2	3		5		
	18 Door opp Comp Room @ 1m	129	6/10/2017	79	78	76	82	83	85	82		85			2	-4	-5	-7	-4		-6		
	19 Clinker Building @ 2m opp 18	131	6/10/2017	74	73	72	77	77	75	77		76			1	-3	-4	-1	-3		-2		
	20 Man door - open 100mm	130	6/10/2017	75	74	73	75	75	78	73		72			2	0	0	-4	2		3		
	21 1m Outside vent fan filter	134	6/10/2017	72	71	72	73	75	72	74		74			1	-1	-2	0	-2		-2		
	22 E side N wall vent @ 1m	135	6/10/2017	75	75	82	82	84	81	83		85			-7	-7	-9	-6	-8		-9		
	23 Centre N wall vent @ 1m	136	6/10/2017	80	80	83	84	86	84	85		86			-3	-3	-5	-3	-4		-5		
	24 W side N wall vent @ 1m	137	6/10/2017	78	77	80	78	81	81	81		83			-2	-1	-4	-3	-4		-6		
	25 11m N of CM6	138	6/10/2017	70	69	74	74	75	74						-4	-4	-6	-4					
	26 22.6m N of CM6	139	6/10/2017	69	68	80	71	72	74	75		77			-11	-3	-3	-5	-6		-9		
	Door platform near CM6 W wall fan @ 5.7m	461	6/10/2017	86	84	87	85	84	88			81			-1	0	2	-2			5		

Figure 3.34A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill Western side locations

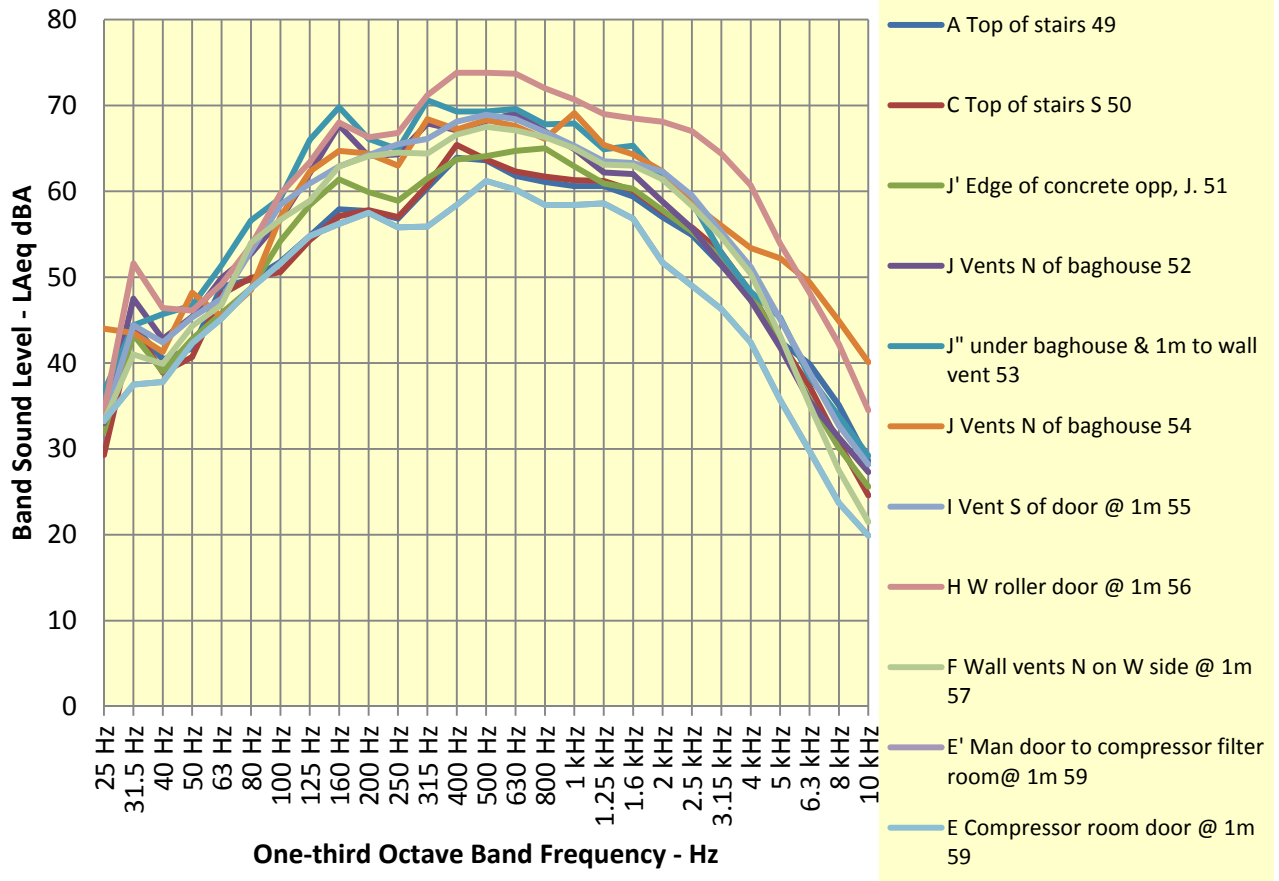
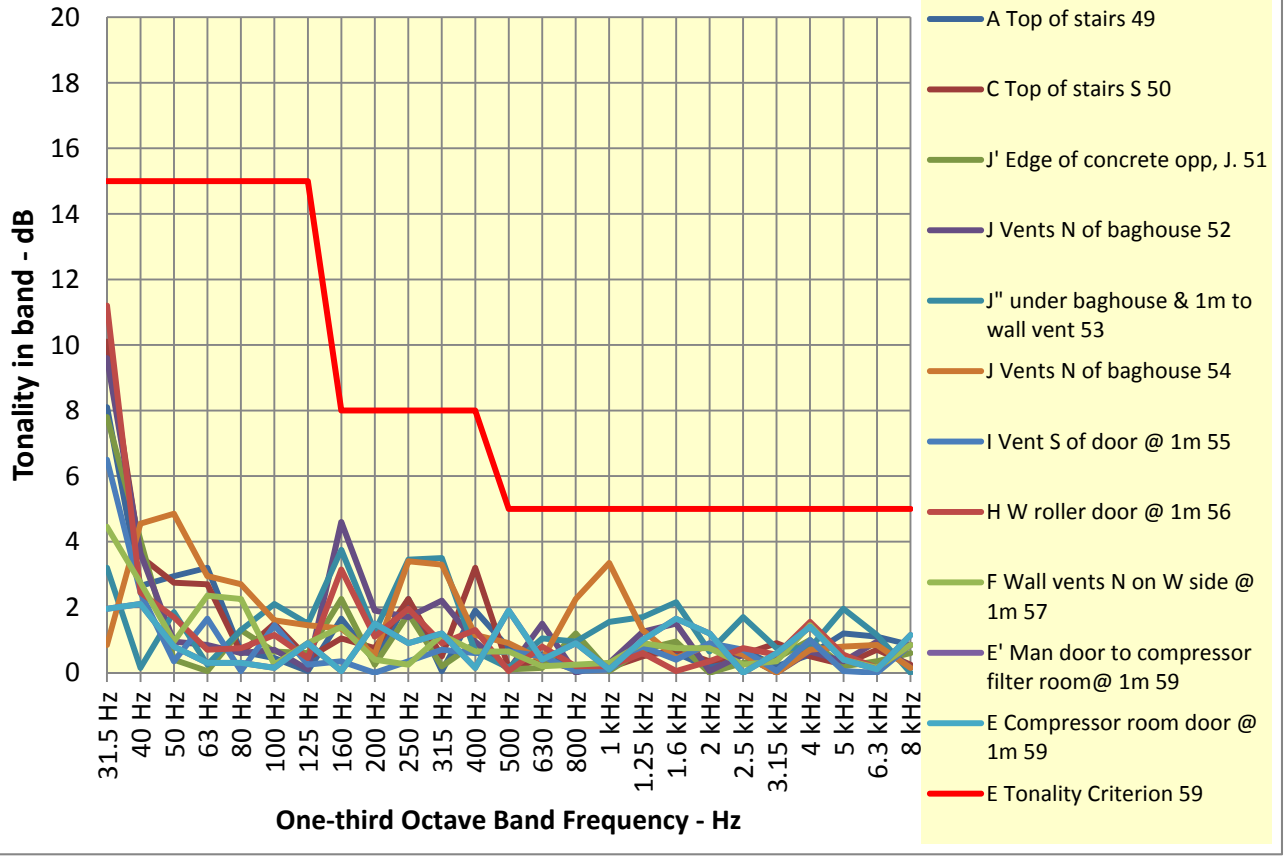


Figure 3.34: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill Western side locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.35A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill Northern side locations

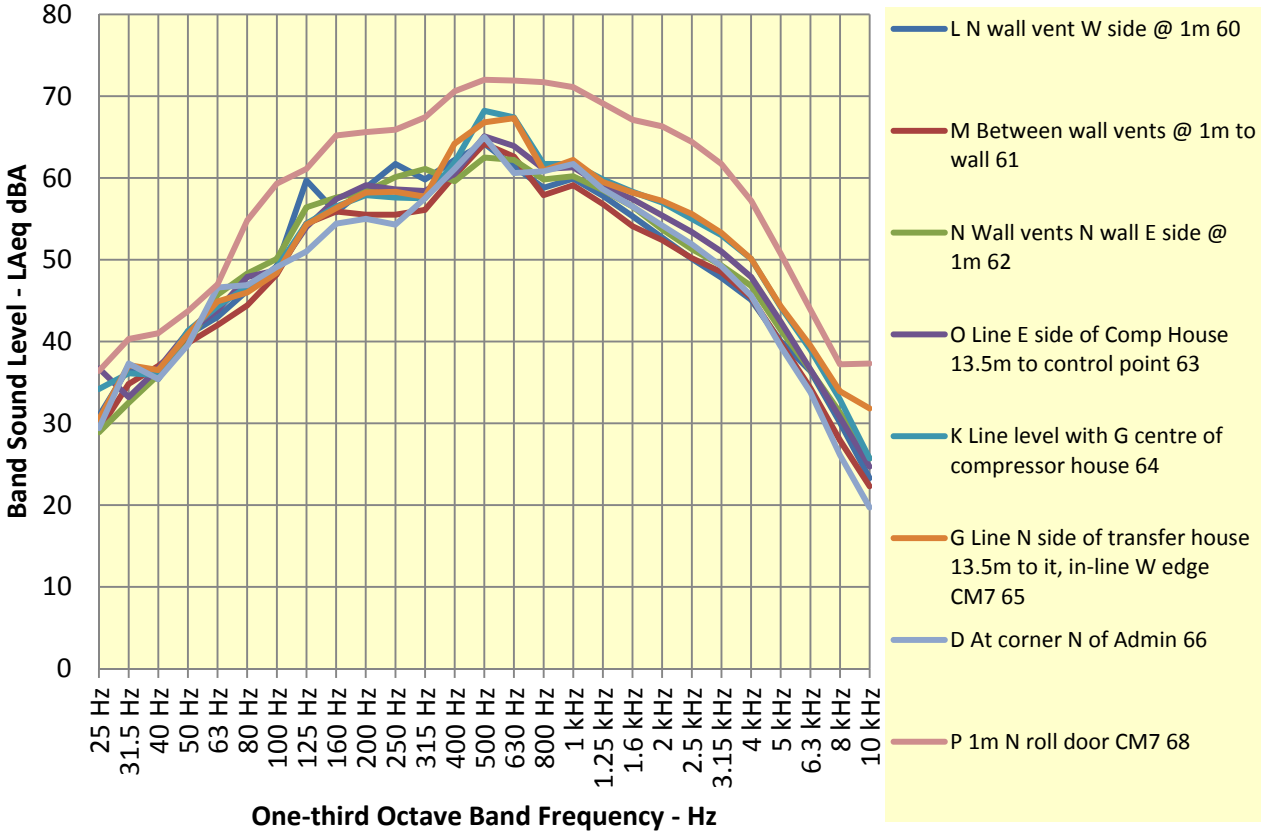
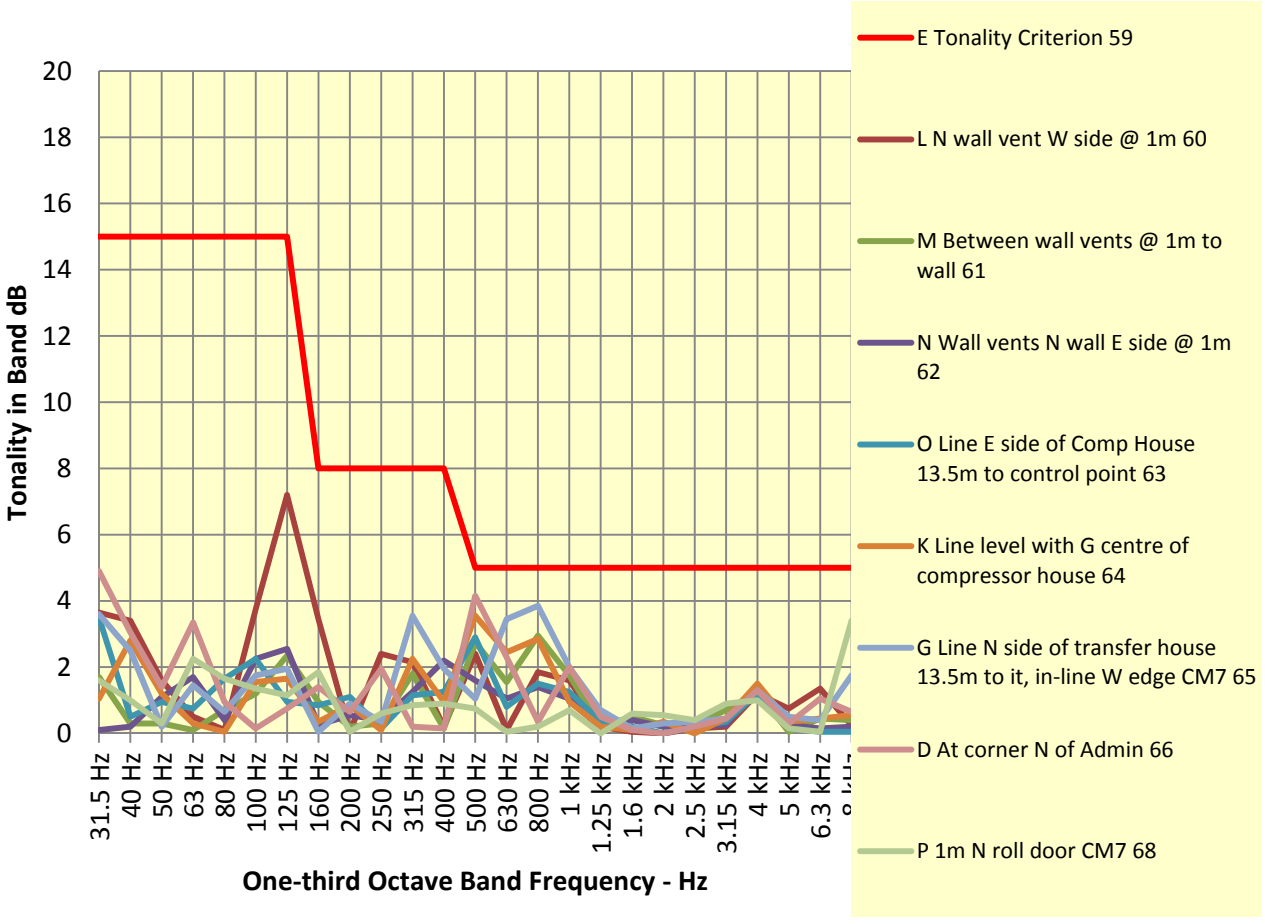


Figure 3.35: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill Northern side locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.36A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill Southern side and TS3 locations

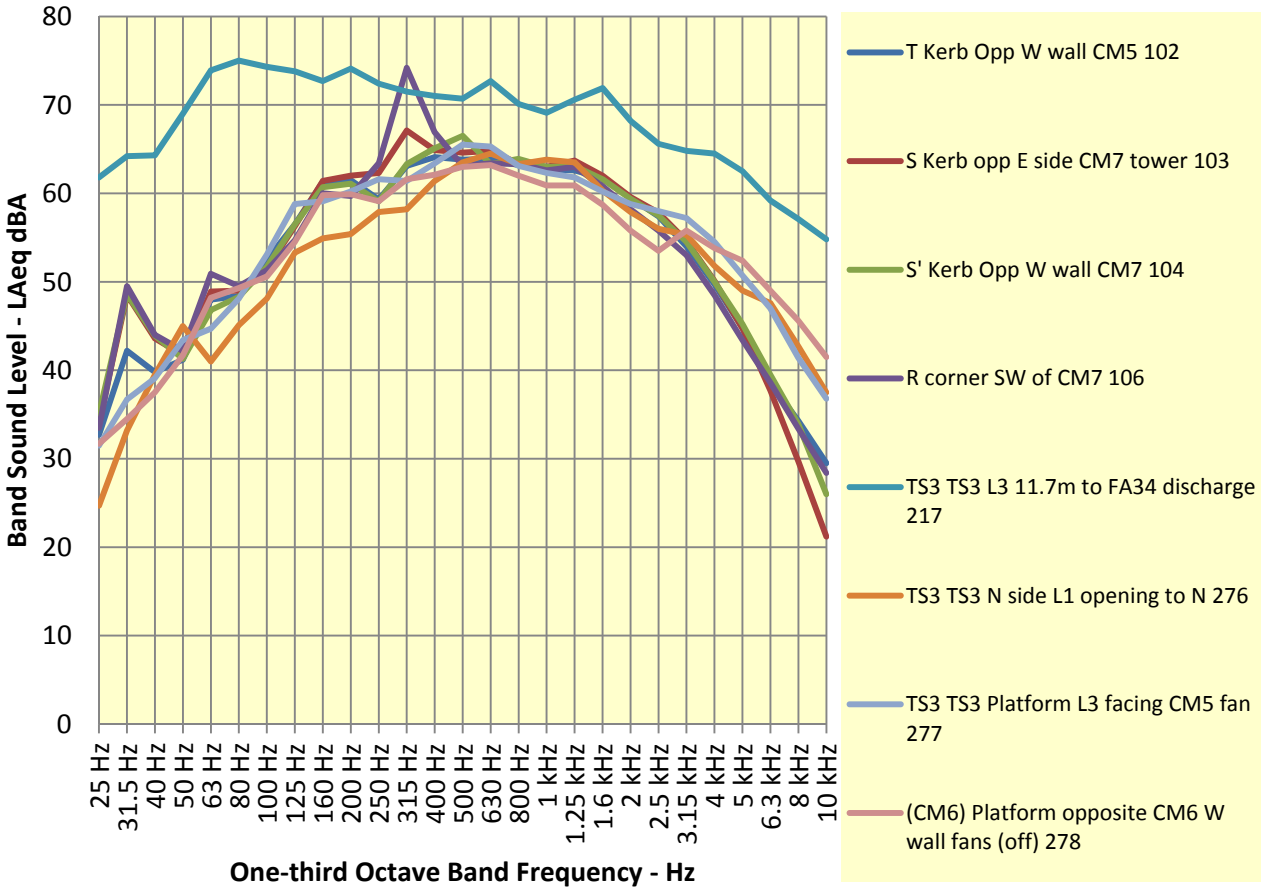
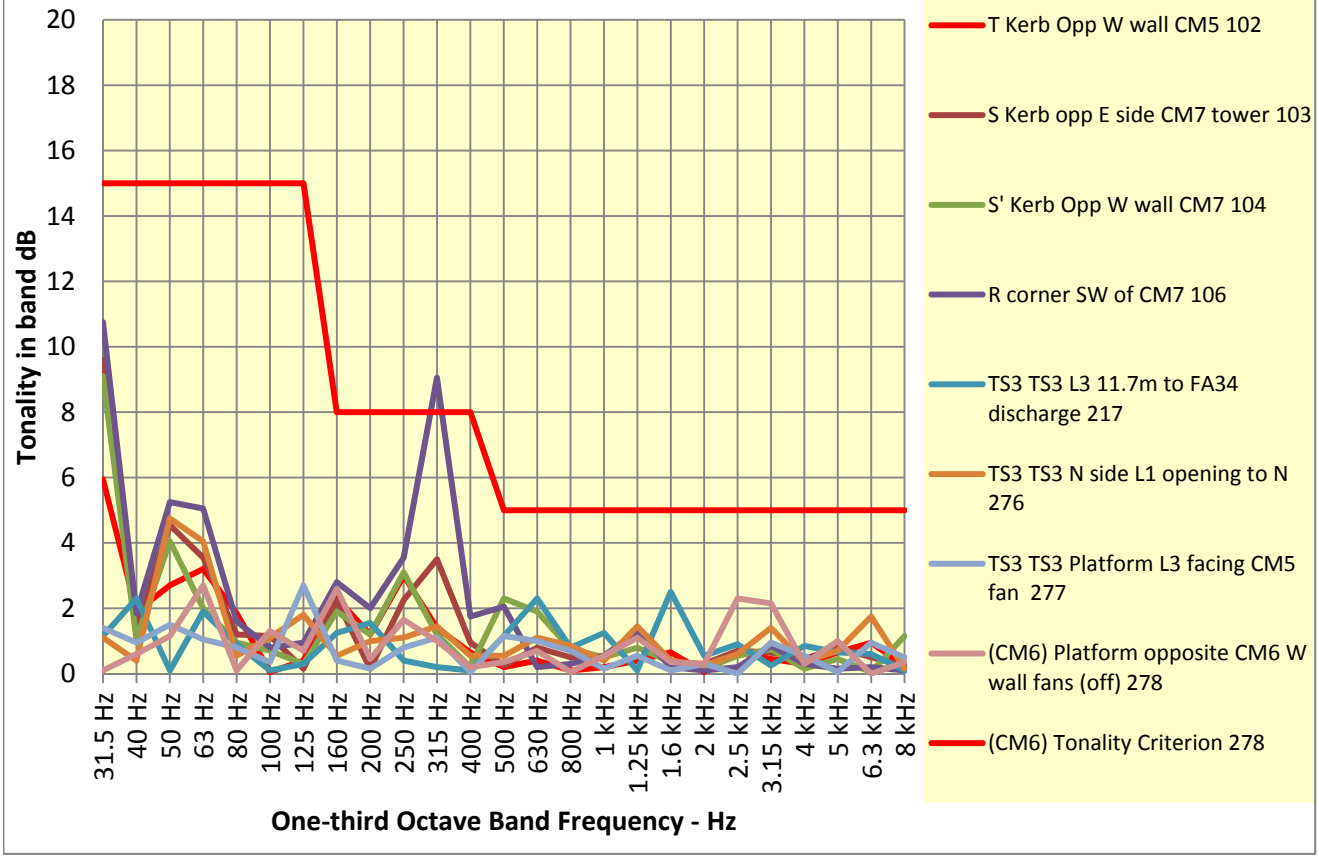


Figure 3.36: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill Southern side and TS3 locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.37A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill inside locations ground level

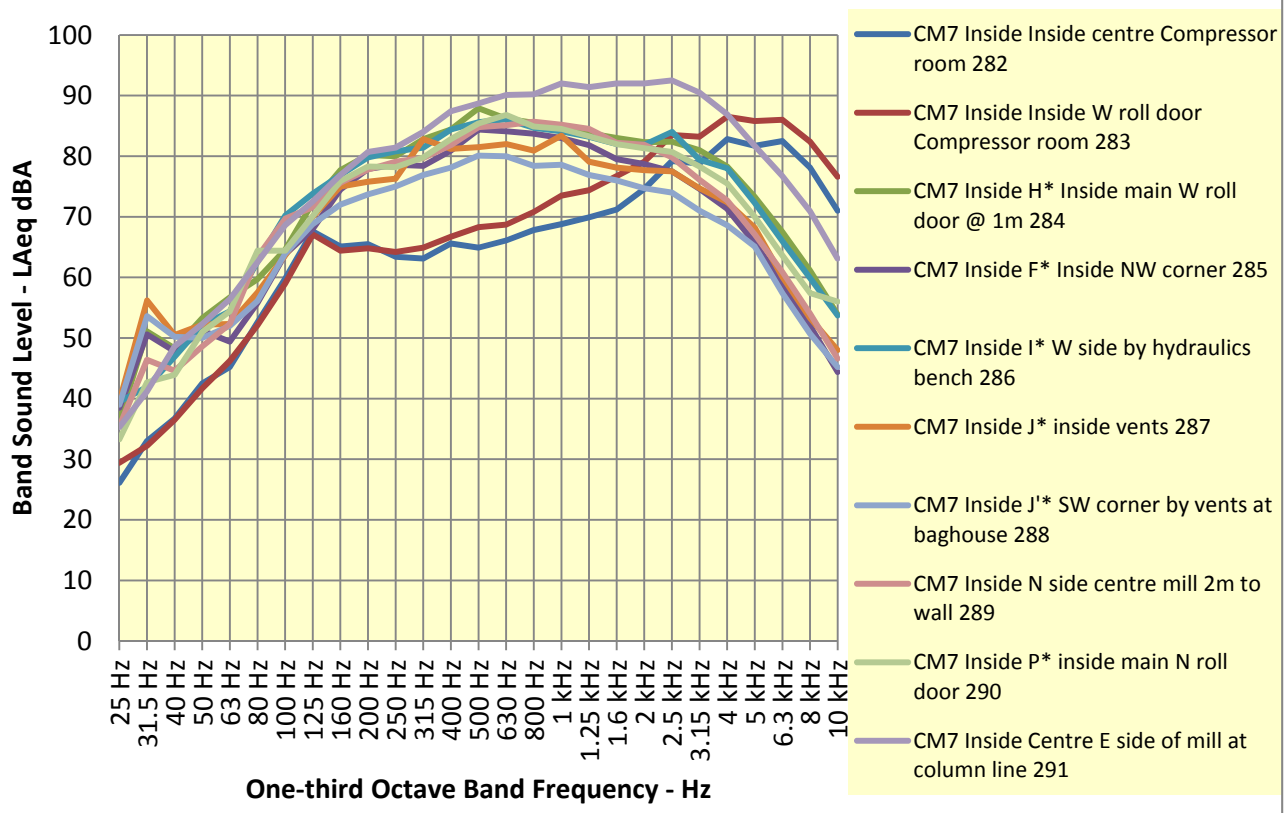
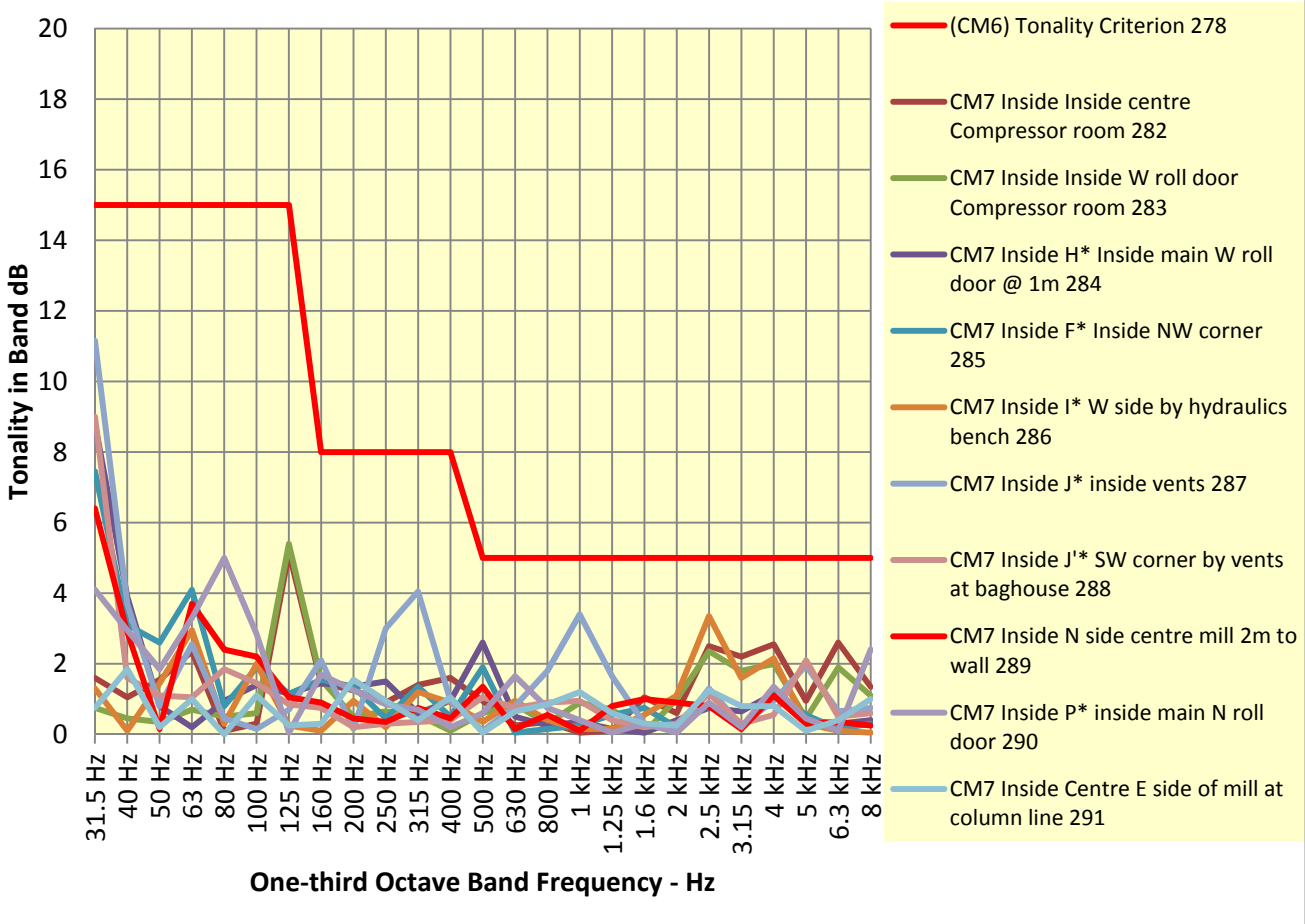


Figure 3.37: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill inside ground level locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.38A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill inside locations inside mill platform level locations

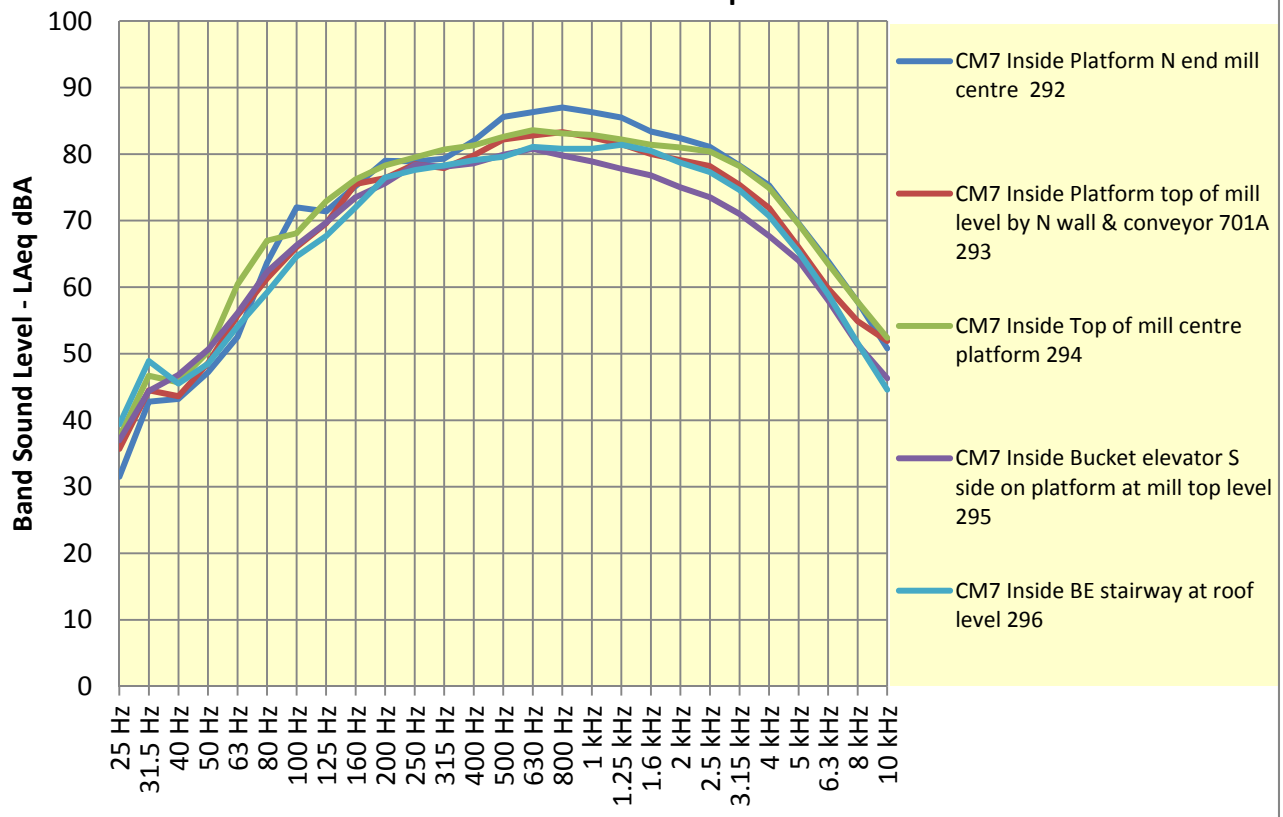
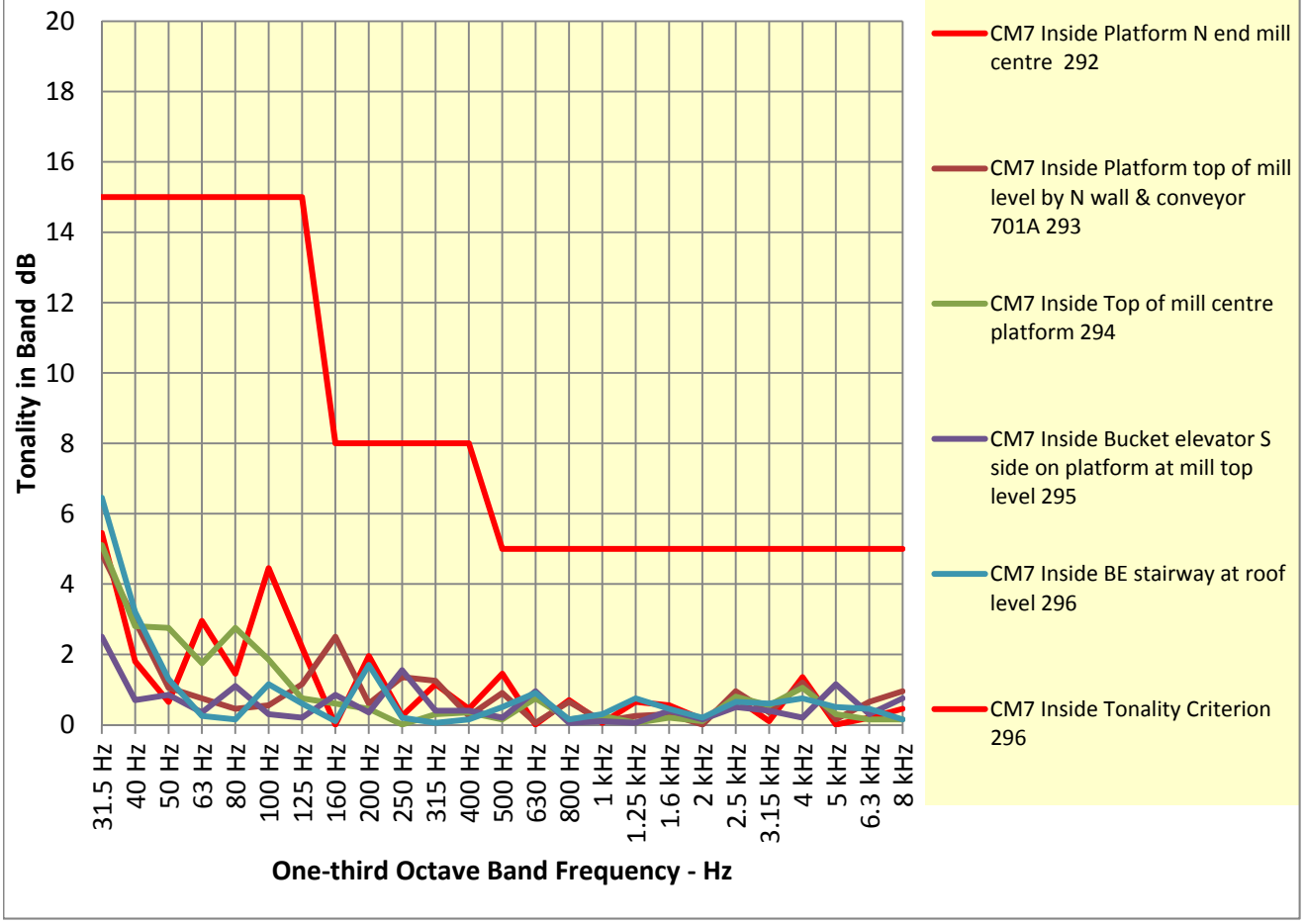


Figure 3.38: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill - inside mill platform level locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.39A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill inside locations inside BE tower locations

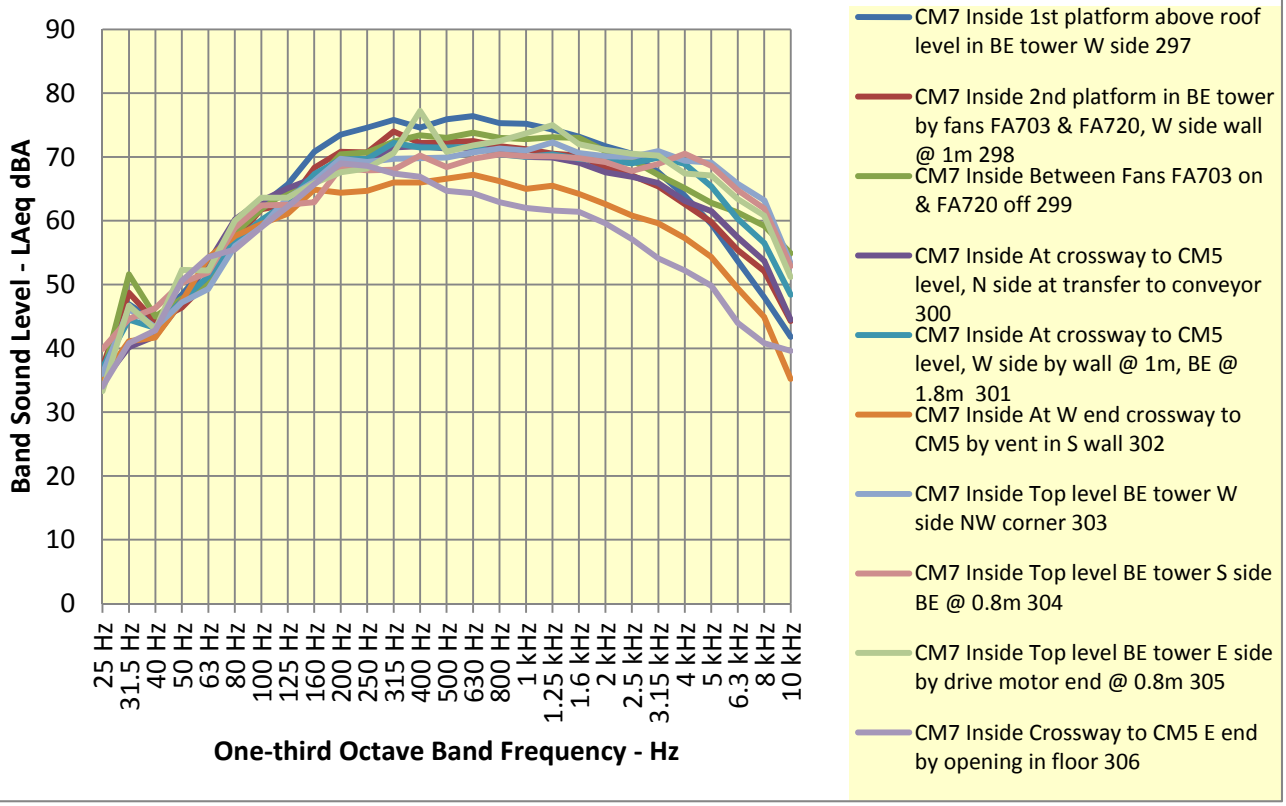
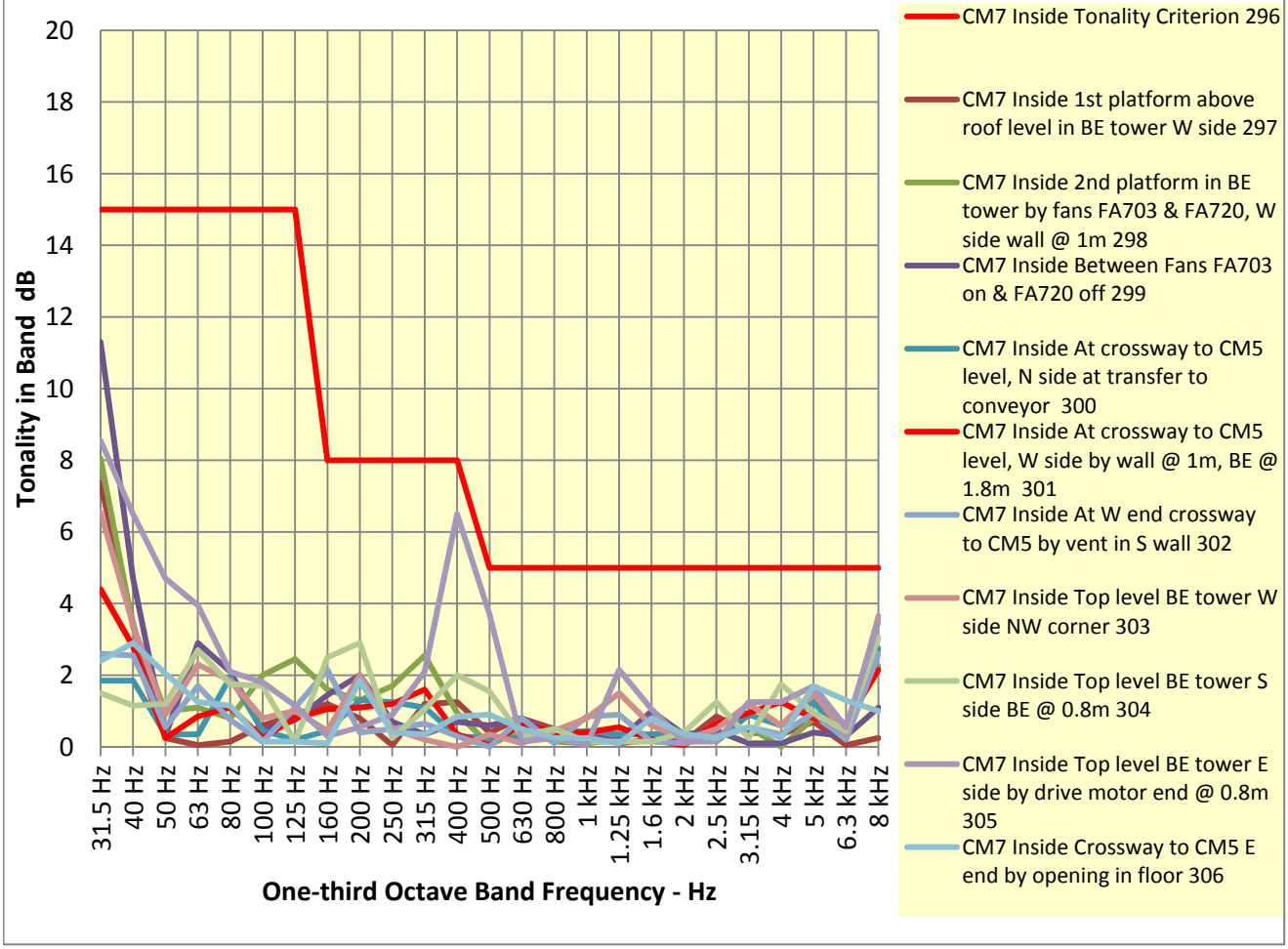


Figure 3.39: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill inside BE tower locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.40A: Boral Cement Berrima - One-third octave band spectra for No.7 Cement Mill inside locations inside main baghouse and mill drive area locations

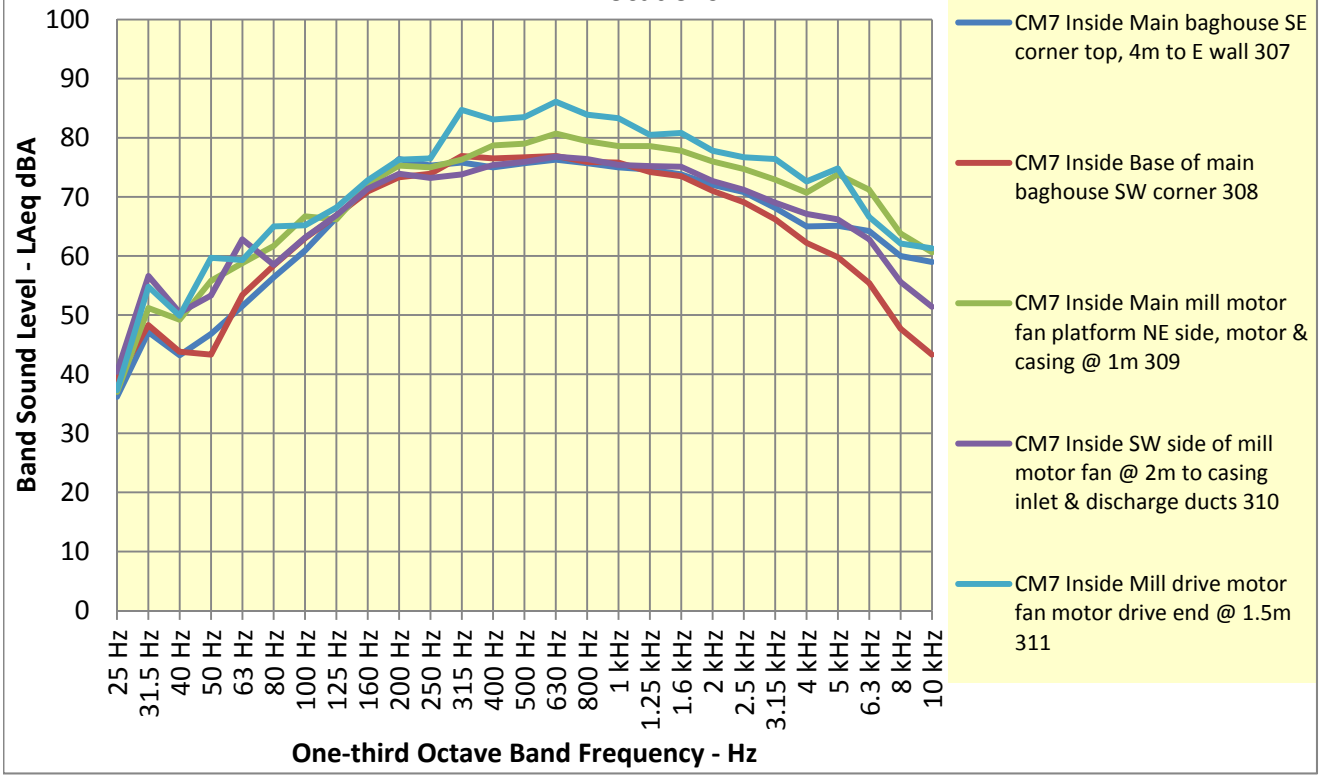
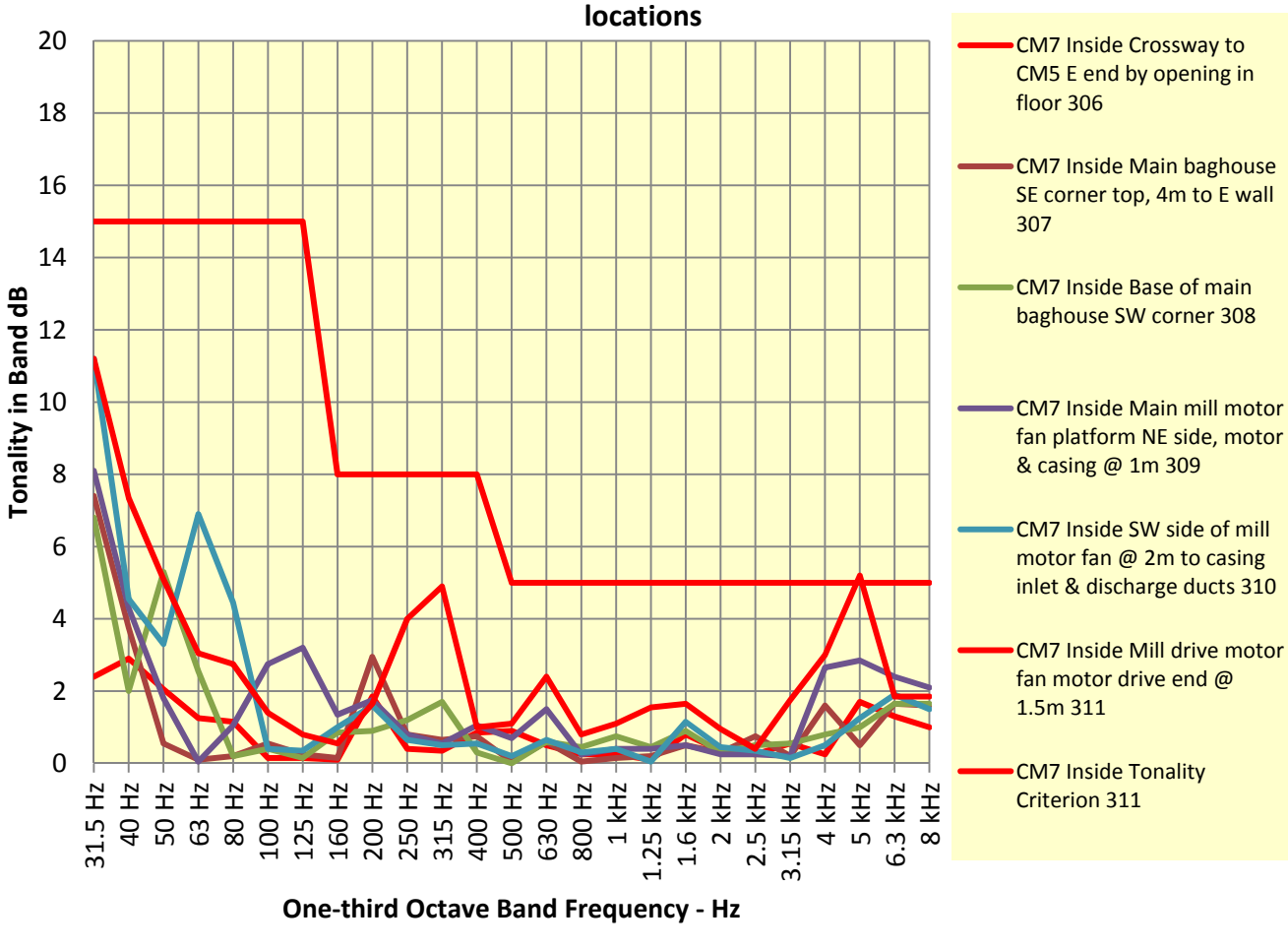


Figure 3.40: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.7 Cement Mill inside - main baghouse and mill drive locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.41A: Boral Cement Berrima - One-third octave band spectra for No.5 Cement Mill Building inside locations

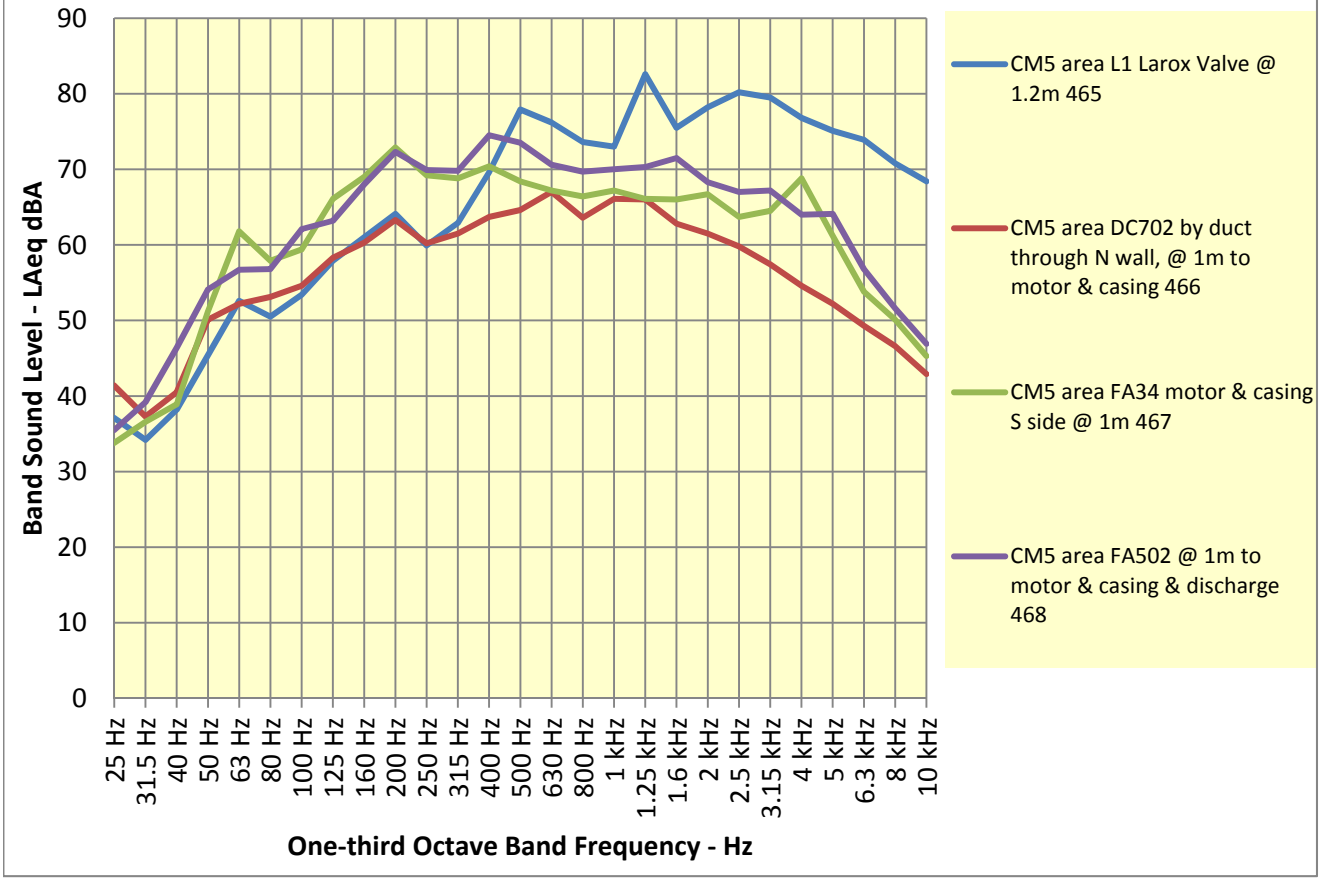
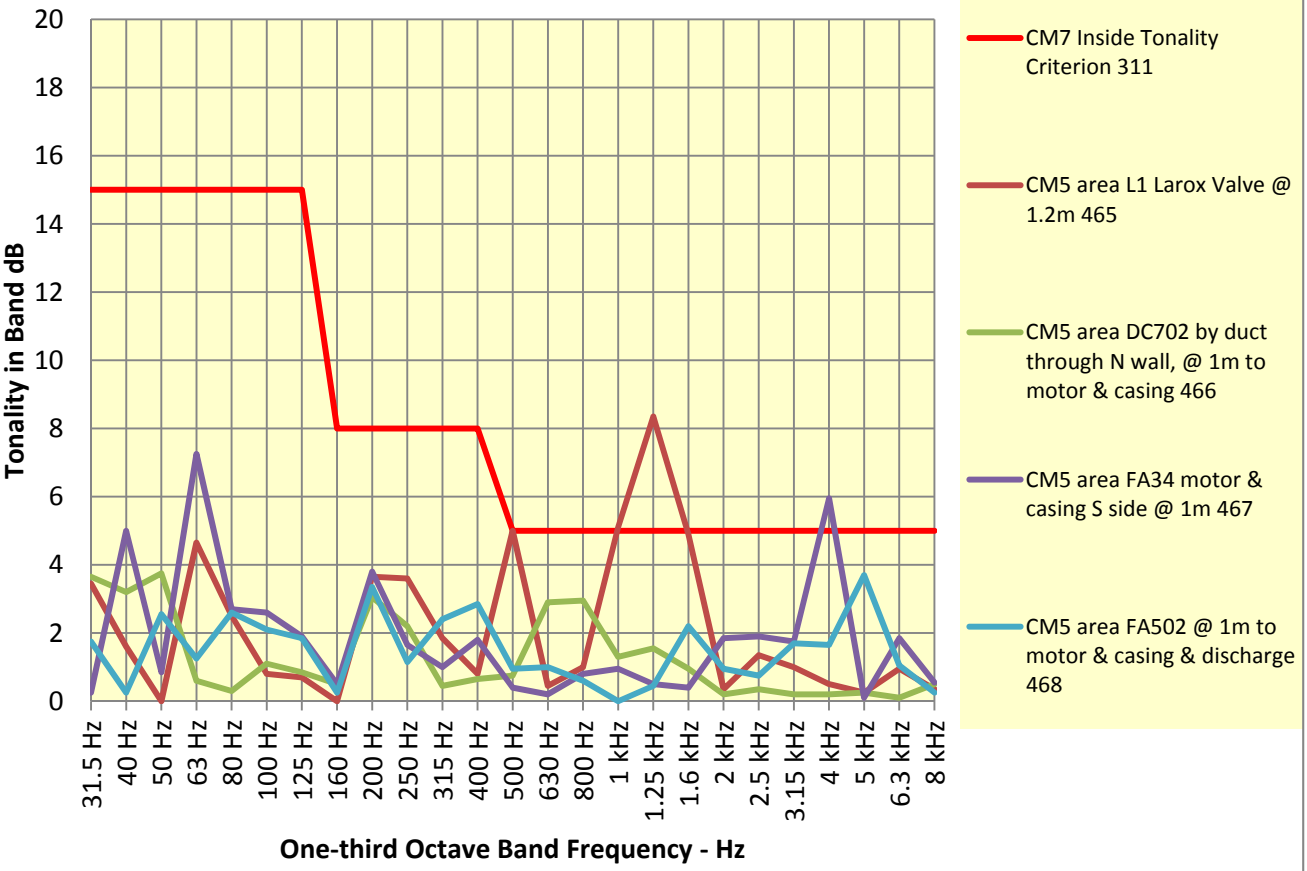


Figure 3.41: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.5 Cement Mill building inside locations



Spectra & Tonality graphs: na28 data 2017

Figure 3.42A: Boral Cement Berrima - One-third octave band spectra for No.6 Cement Mill Building outside locations - Western Wall fans from conveyor gantry platform

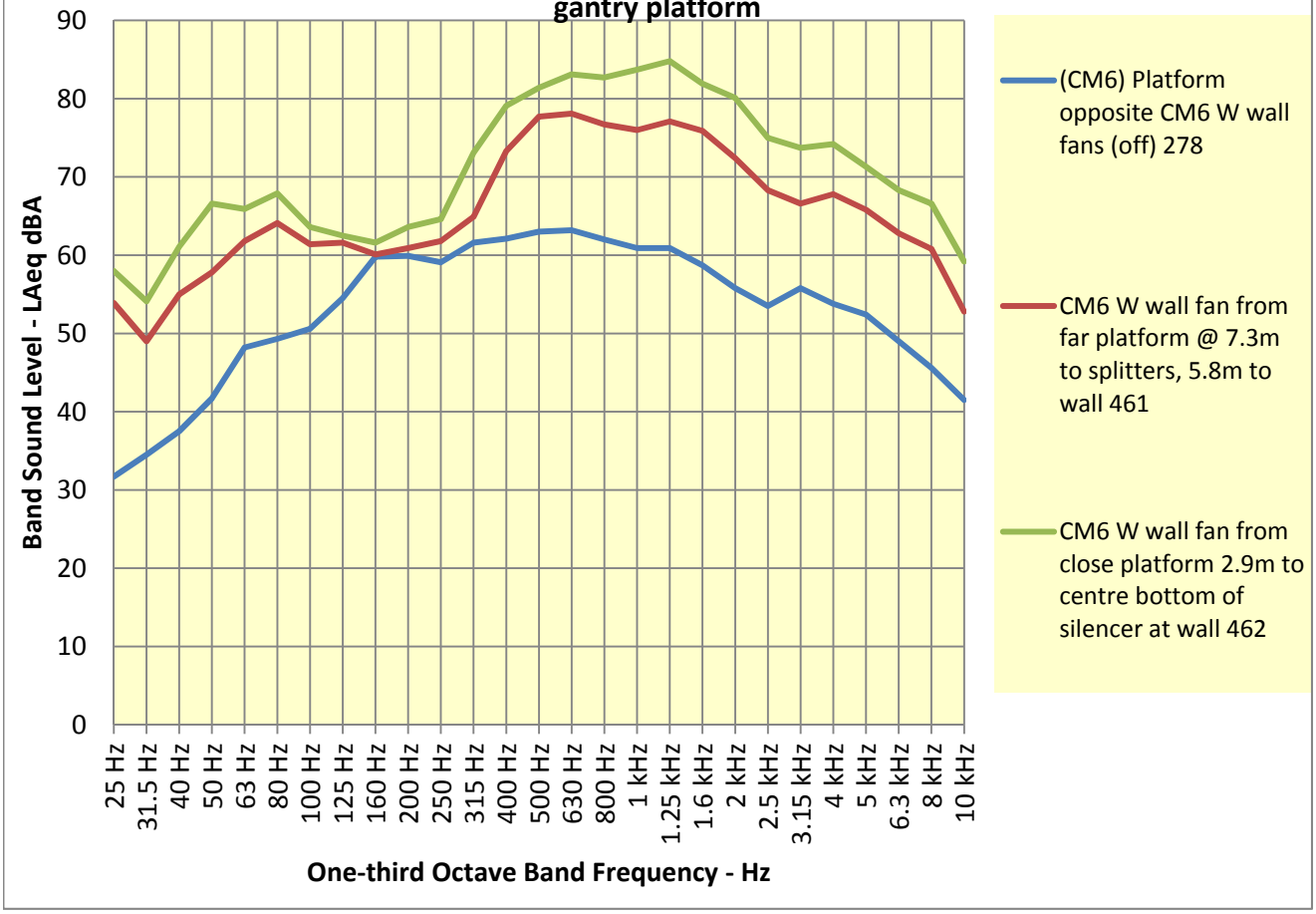
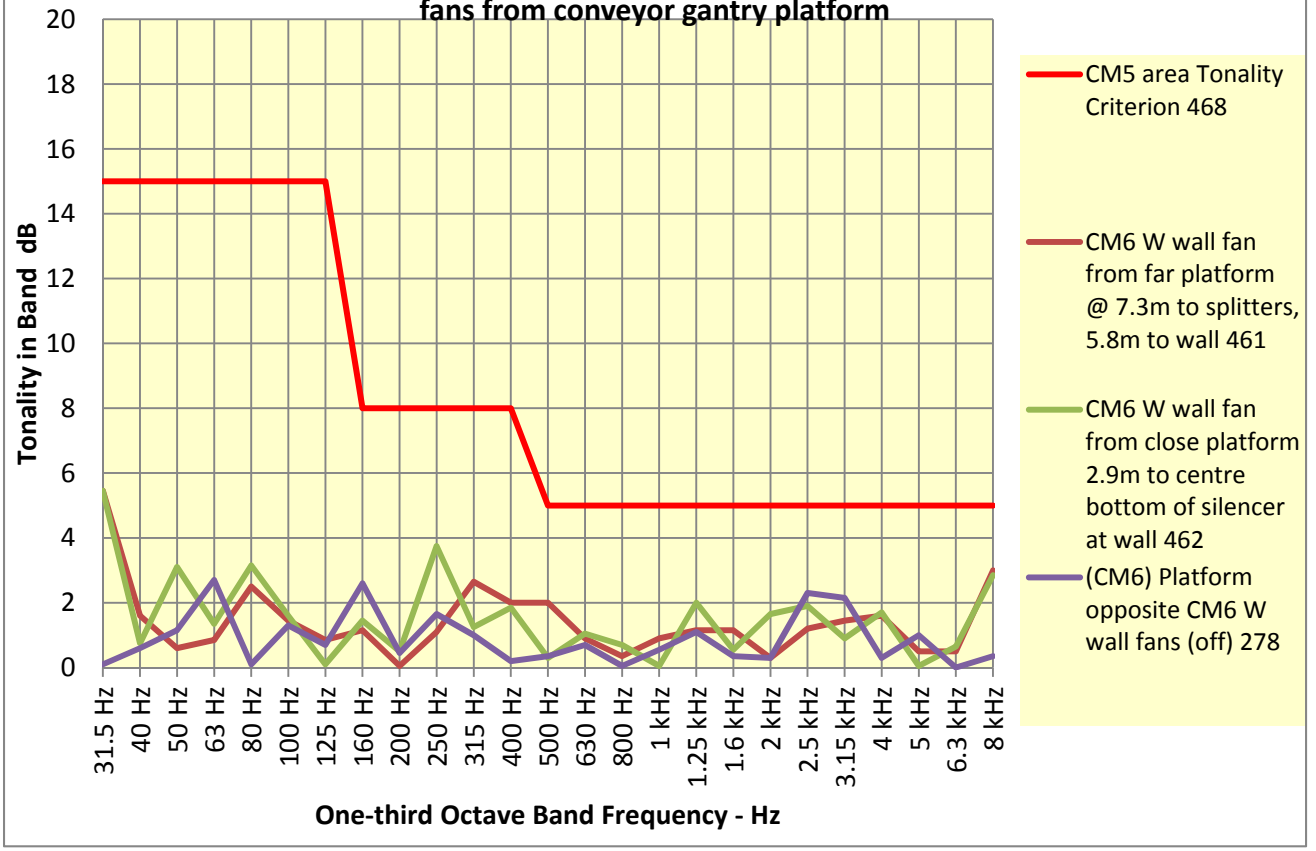


Figure 3.42: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.6 Cement Mill building outside locations - Western wall fans from conveyor gantry platform



Spectra & Tonality graphs: na28 data 2017

Figure 3.43A: Boral Cement Berrima - One-third octave band spectra for No.6 Cement Mill Building outside locations - southern and eastern side

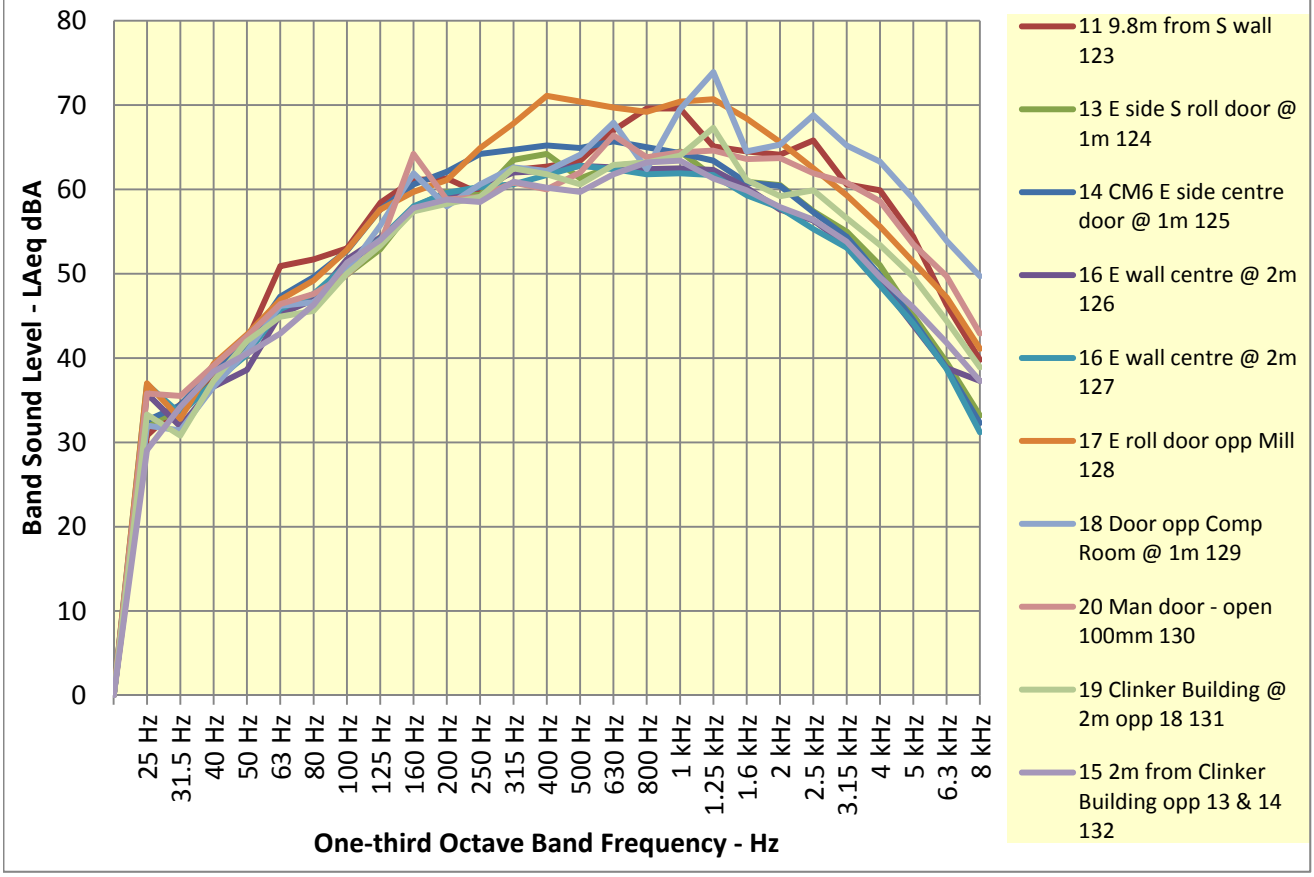
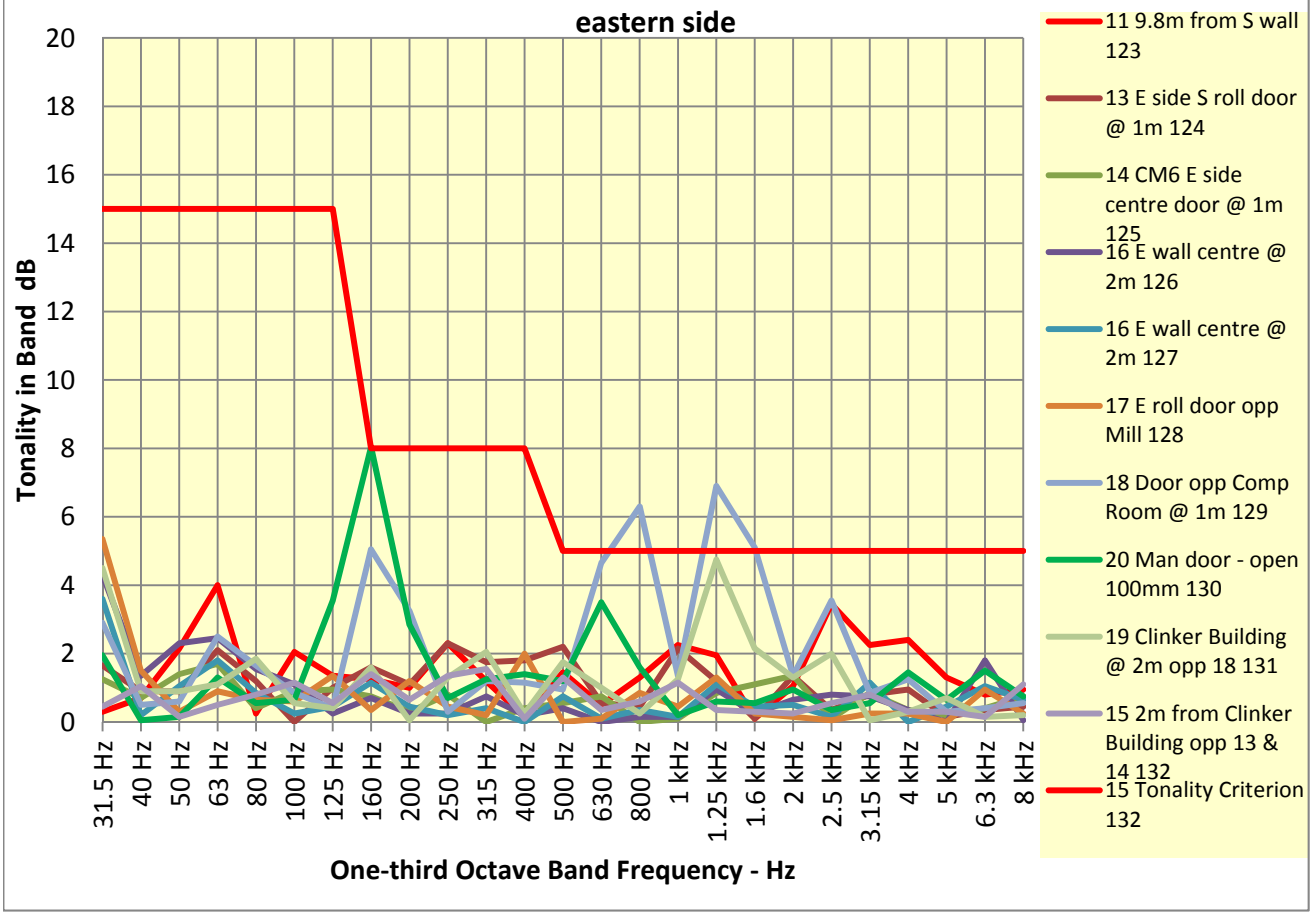


Figure 3.43: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.6 Cement Mill building outside locations - southern and eastern side



Spectra & Tonality graphs: na28 data 2017

Figure 3.44A: Boral Cement Berrima - One-third octave band spectra for No.6 Cement Mill Building outside locations - northern side

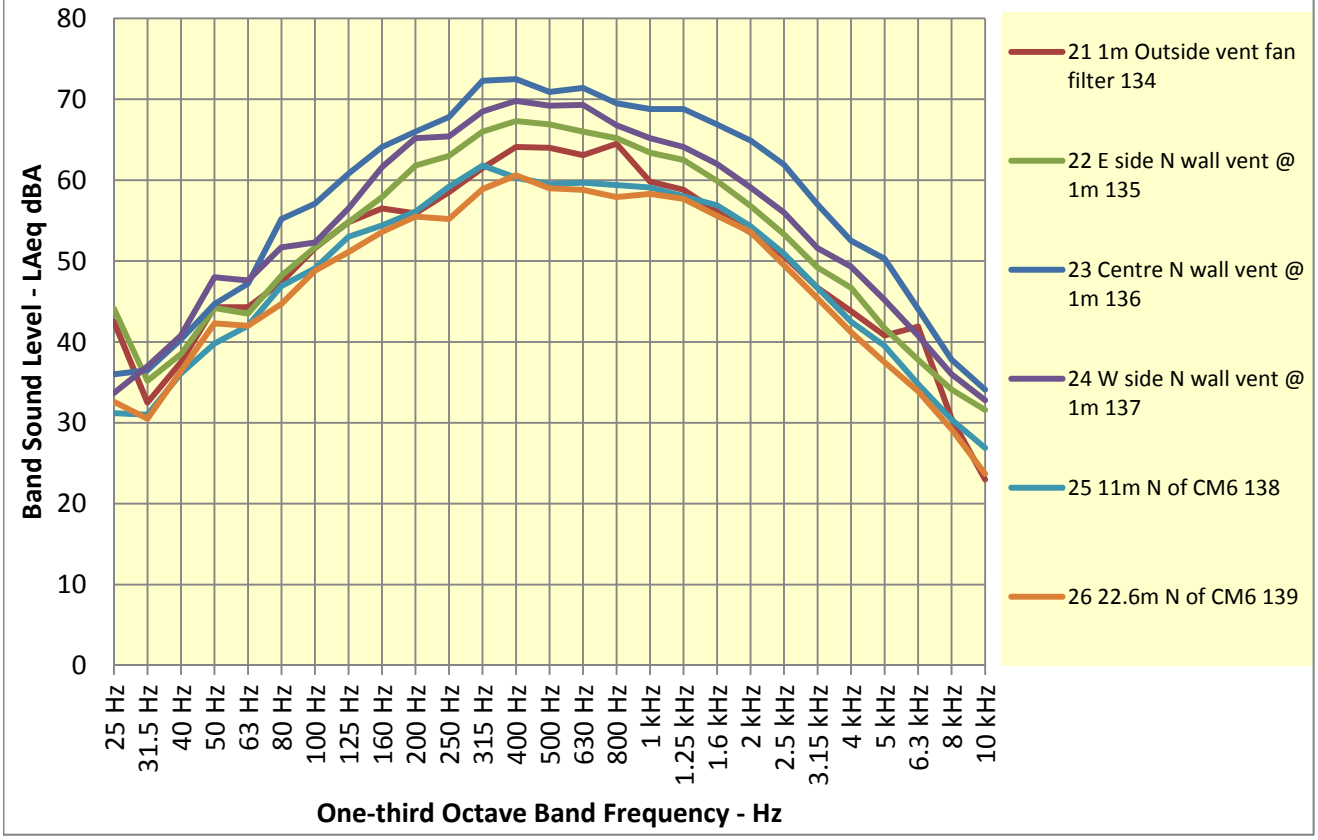
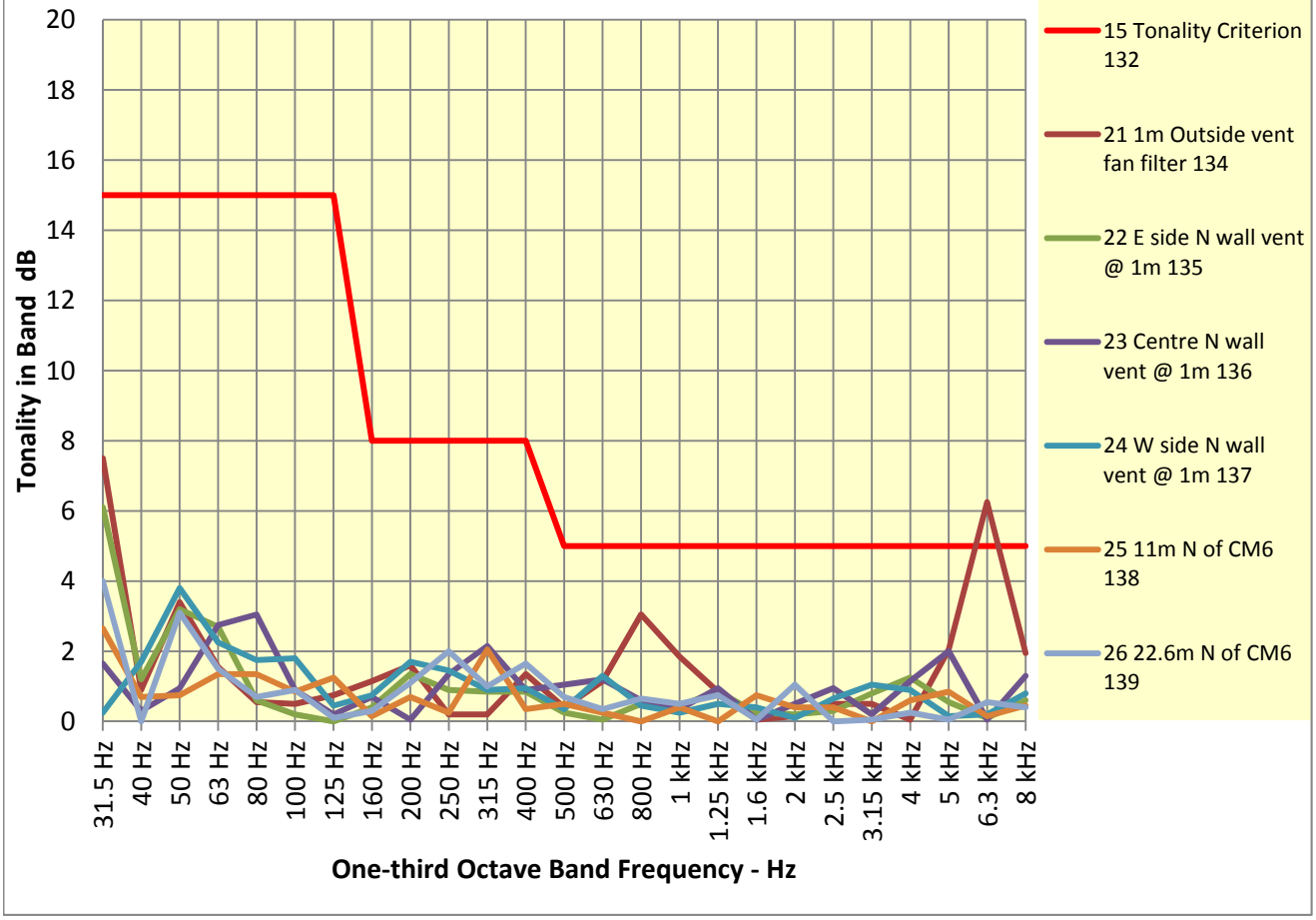


Figure 3.44: Boral Cement Berrima - Tonality assessment of One-third octave band spectra for No.6 Cement Mill building outside locations - northern side



Spectra & Tonality graphs: na28 data 2017