Boral Cement Limited

Berrima Works

Noise Management Plan
(Appendix 6 of OEMP)

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Version History:

Version	Date	By Whom	Description of Changes
1	30 November 2006	Grant Williams	Original version
2	26 April 2007	Grant Williams	Update to include Cement Mill 7 Project Noise Criteria
3	25 May 2008	Grant Williams	Updated to comply with Boral Cement Corporate Environmental Noise Standard
4	16 June 2008	Grant Williams	Updated monitoring sites
5	27 October 2008	Grant Williams	Added contact details for monitoring sites
6	September 2011	Alex Wnorowski	Global revision and formatting change
7	September 2014	Michael Curley	3-yearly review
8	March 2018	Michael Curley	Update to include new requirements from Modification 9 development consent
9	April 2020	Greg Johnson	Update to include EPL Variation (Whole of site noise limit) and MOD 11 and 12 (Use of Isotainers and Whole of Site Noise Limit)

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Attachments

1. PURPOSE

Many activities that are undertaken on Boral Cement sites generate noise. These include handling, grinding and crushing of materials, train and truck movements and kiln cooling fans.

The purpose of the Berrima Cement Works (the Works) Noise Management Plan (the Plan) is to ensure that all personnel are aware of their obligations relating to environmental noise, such as site noise limits, and are able to implement appropriate controls and management techniques for the operation of the Works to minimise noise nuisance in the local community.

The Plan also enables compliance with the conditions specified in the development approvals for Kiln 6 (DA No. 401-11-2002-i) and Cement Mill 7 (DA No. 85-4-2005-i), including the consolidated DA for modifications 1 to 12 to DA No. 401-11-2002-i (as Modified); and Environmental Protection License 1698 (EPL)

2. SCOPE

The Plan has been prepared in accordance with Condition 6.4(a) of the consolidated consent and addresses the following sub-conditions in Table 1.

Table 1: Noise Related Consent Conditions

Condition	Detail	Section
6 Environmental management		
Operational environmental management plan		
6.3B	Prior to the use of isotainers on the site, the applicant must update the OEMP required by condition 6.3 of this consent and include:	
a	A Code of Practice for operators of the isotainer reach stacker to reduce LAmax noise events	Attachment 1.
b	Noise monitoring and management requirements specified in conditions 3.3 to 3.6 of the consent.	
6.4	As part of the OEMP for the cement works upgrade, required under condition 6.3 of this consent, the Applicant shall prepare and implement the following Management Plans:	
a	A Noise Management Plan to outline measures to minimise the impacts from the operation of the cement works upgrade on local noise levels.	Appendix 6
	i. all major noise sources including those arising from the upgrade of Kiln 6 and the installation of Cement Mill 7	Section 6.1
	ii. noise criteria for particular activities	Table 3
	iii. monitoring of noise emissions from the Kiln 6 and Mill 7 upgrade	Section 5.2

	iv.	protocols for the minimisation of noise emissions	Section 6.2 & 6.3
	v.	provision of measures to manage the cumulative impact of all the noise sources on site	Section 6.2 & 6.3
	vi.	management of non-compliance, if identified	Section 8.1

3. DEFINITIONS

Table 2 Definitions

Term	Definition
Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
AEMR	Annual environmental management report
Background noise	The underlying level of noise present in the ambient noise, excluding the noise sources under investigation.
Decibel (dB)	A unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
Environmental noise	Noise that may have an impact on the community, outside the site boundary.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 decibels.
DA	Development Approval - a consent issued by the Department of Planning and Environment, detailing site-specific construction and operational conditions that Boral Cement must comply with.
DPE	NSW Department of Planning and Environment
EPA	NSW Environmental Protection Authority
EPL	Environmental Protection License 1698

4. RESPONSIBILITIES

The general responsibilities in Table 2 apply in relation to this Plan.

Table 3 Responsibilities

Role	Responsibility
Employees	Responsible for ensuring that the environmental noise standards for their work are achieved. This includes: ➢ observing any noise control instructions and procedures that apply to their work or operations; ➢ taking action to minimise or prevent noise incidents; ➢ identifying and reporting noise incidents; and ➢ monitoring, reporting and assisting in the control of noise emissions to keep within approved levels.
Team Leaders / Front Line Supervisors	Responsible for minimisation of noise emissions arising from work methods and the working environment. This includes: ➢ identifying, reducing and preventing noise emissions; ➢ monitoring operations and maintenance work to ensure noise emissions are maintained within approved levels; ➢ initiating action to prevent noise incidents; ➢ identifying, reporting and recording noise incidents; and ➢ initiating corrective actions to overcome noise incidents.
Production Manager, Technical Manager and Maintenance Manager	Responsibility and authority to ensure that the site environmental noise objectives are achieved. This includes: ➢ ensuring staff are trained with respect to noise awareness, responsibilities, instructions and procedures; ➢ ensuring noise incidents are investigated and corrective and preventative action taken; ➢ ensuring operations comply with the conditions of Development Approvals, Environmental Protection Licence and relevant legislation; ➢ reviewing operations and implementing strategies to reduce noise emissions from the Works; and ➢ developing and implementing contingency plans as required to remedy noise nuisance and minimise noise complaints.
Environmental Sustainability Manager/	Responsible for:

Environmental Business Partner	➢ ensuring periodic noise monitoring is carried out; ➢ ensuring that an appropriate management plan is developed and implemented if noise limits are found to have been exceeded; and ➢ reviewing noise complaints received to determine if particular noise issues/trends are being identified.
Site Operations Manager	Responsibility and authority to ensure that the site environmental noise objectives are achieved. This includes: ➢ approving any communications to external parties on noise generating activities before their release; ➢ ensuring all personnel are aware of EPL, DA and other regulatory requirements relating to plant noise; ➢ implementing Boral environmental policy on site; ➢ ensuring site environment performance objectives and targets are established, monitored and achieved; ➢ defining responsibilities for the OEMP; ➢ ensuring the availability of resources; ➢ communicating the importance of the OEMP and meeting the statutory and regulatory requirements; ➢ conducting management reviews of the OEMP; ➢ ensuring that material environmental incidents are immediately reported to 5 compulsory government authorities; ➢ verifying the implementation of corrective and preventive actions; and ➢ recognising and responding to community concerns.

5. NOISE LIMITS AND MONITORING

5.1 CURRENT LIMITS

The DAs for the Upgrade of the Kiln 6 Upgrade (DA 401-11-2002-i) and Cement Mill 7 (DA 85-4-2005-i) up to and including MOD 9 include noise criteria for each project. The same criteria are duplicated in the EPL.

Subject to compliance with these and other conditions in the DAs and EPL, the Kiln 6 and Cement Mill 7 can be operated 24 hours per day and seven days per week.

The DAs define the maximum allowable noise contribution limits from the operation of Kiln 6 (Table 3) and Cement Mill 7 (Table 4). This condition requires Boral Cement to design, construct, operate and maintain all new and upgraded components forming part of the upgrade of Kiln 6 or the installation of Cement Mill 7 to ensure that for each receiver location listed in the following tables, the noise level at each receiver location does not exceed the maximum allowable noise contribution limit at the receiver location specified.

These criteria were amended for MOD 12 to provide a whole of site noise limit and a single noise compliance point. This is also reflected within the sites EPL.

Table 4 – Whole of Site Limits including modifications up to MOD 12): Maximum Allowable Noise Contribution Limit (dB(A))

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

Note*: The location as per Appendix 2 of the Consolidated Consent is shown in Figure 1 below.

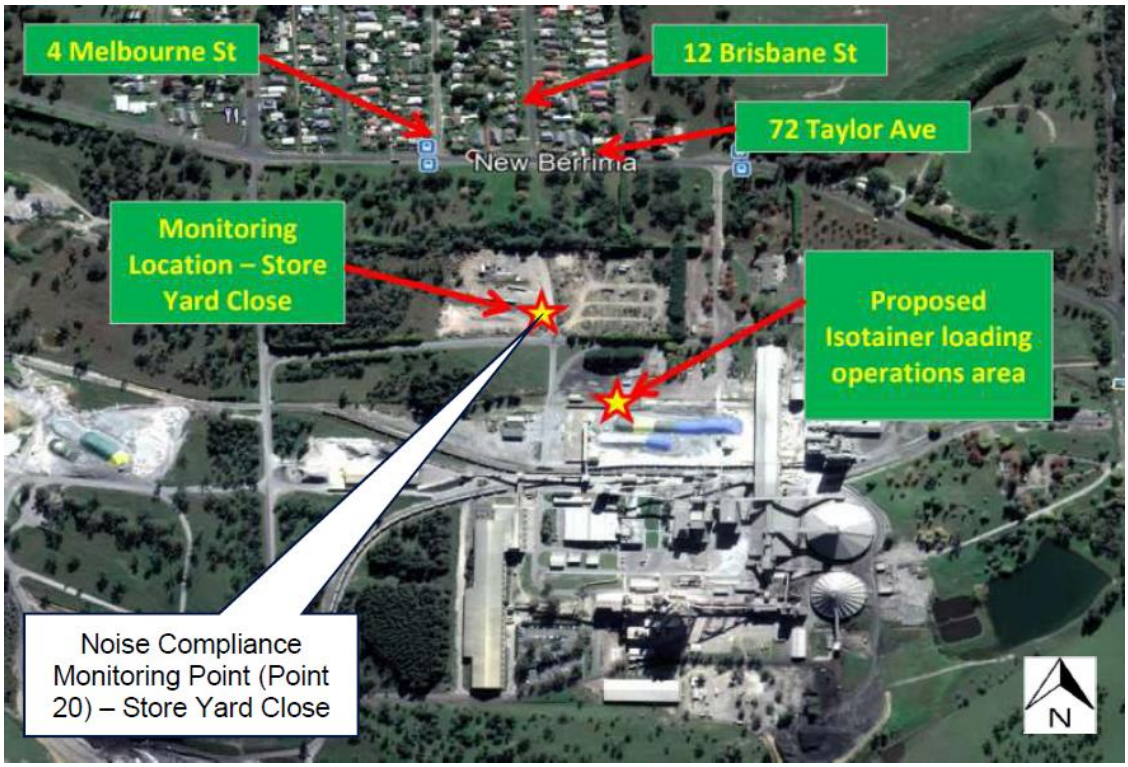

Table 5 – Cement Mill 7 Project only: Maximum Allowable Noise Contribution Limit (dB(A))

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

The maximum allowable noise contributions apply under all meteorological conditions, except:

a) during wind speeds greater than 3 ms^{-1} measured at 10 m above ground level; or

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

Noise must be measured:

a) at the most affected point on or within the receptor site boundary or at the most affected point within 30 m of the dwelling (rural situations), where the dwelling is more than 30 m from the property boundary; and

b) where applicable, subject to the modification factors provided in Fact Sheet C of the EPA's (2017) *Noise Policy for Industry*.

5.2 MONITORING

Environmental noise monitoring is undertaken annually by a qualified noise consultant to assess noise levels at residential receiver locations and compare it to objectives in the DAs.

Monitoring is undertaken for a minimum of 24 hours and typically over a period of seven days. Sampling intervals are 15 minutes.

In case of noise limit exceedance, data is compared with the operational reports to identify activities that were in progress during the monitoring period.

Meteorological data is recorded during the monitoring period.

As per requirements of the NSW *Protection of Environment Legislation Amendment Act 2011* (POELA Act), Boral is obliged to publish on the Work's webpage the monitoring data that are required by the EPL. The summary report is updated each month with all new results received in the preceding month and uploaded by the 10th working day of the next month.

Noise is only monitored annually or if a complaint is received, as the EPL does not specify monitoring frequency. The annual monitoring results are reported in the annual environmental management review to DPE and annual return to EPA. The noise results are also included in the monthly data summary required under the POELA Act in the report submitted the month after the monitoring occurred.

In addition to the periodic monitoring, trained and competent Works personnel can monitor and record environment and plant noise using portable monitoring equipment.

5.3 NOISE PRP

The current whole of site limits were established following the acceptance of the EPL 1698 PRP 7 which was added to the EPL in December 2019 and modified within the Kiln 6 consent in April 2020.

Accordingly, as per condition 3.3A Any new or upgrade development projects the subject of any modification to this consent must give consideration to the Project Specific Noise Levels identified in the document titled 'PRP – Response – Identifying Environmental Noise Objectives For Berrima Cement Plant' 27 March 2018, prepared by Recognition Research.

6. MANAGING SPECIFIC NOISE SOURCES

6.1 PLANT NOISE SOURCES

As a part of the studies for the Kiln 6, Cement Mill 7 and solid waste derived fuels (MOD 9) , Isotainer (MOD 12) projects, maximum sound power levels for major noise emission sources were identified.

Sound power level of the major noise sources associated with the upgraded plant was assessed by measurement of sound pressure levels at a set distance and calculation of sound power levels. The methods employed were in accordance with the requirements of AS1217.7-1985: Acoustics - Determination of sound power levels of noise sources - Survey method.

The sources along with their maximum allowable sound power level (SWL), where relevant are:

- *Raw materials handling* – contained within existing buildings and contribution to noise is minimal. No specific SWL was set.
- *Raw Mill* – new vertical spindle mill in new building on the southern side of existing building. Allowable SWL is 117 dB(A).
- *Raw Meal Handling* – new bucket elevators and air slides on the south side of the existing kiln. No specific SWL was set.
- *Gas Cleaning* – new baghouse on the southern side of the existing electrostatic precipitator. The allowable SWL is 103 dB(A).
- *Preheating* – new preheater tower with new cyclones and a calciner. The allowable SWL is 98 dB(A).
- *Cooler & Clinker Handling* – the cooler bed was widened and additional cooling fans provided. The allowable SWL is 103 dB(A).
- *Coal Mill* – dynamic separator system added with fan and dust filter system. No specific SWL was assigned for this item.
- *Cement Mill 7* – no specific SWL was assigned for this project. Assigned internal design reverberant sound pressure level (SPL) used in the calculations is 102 dB(A).

Solid Waste Derived Fuels Project:

- *reception shed*:
- internal conveyors – 78 dBA;
- crane system – 93 dBA;
- debaler unit – 100 dBA; and
- road truck – 102 dBA.
- *external plant and equipment*:
- external conveyors – 78 dBA;
- road trucks – 102 dBA (per truck);

- conveyor drive – 102 dBA;
- hoppers – 90 dBA;
- hydraulic power pack – 84 dBA; and
- fork lift – 94 dBA.

Use of Isotainers Project:

Operation	Noise Source Description - Activity	Sound Pressure Level - L_{Aeq} dBA	Distance (m)	Sound Power Level - Total dBA
Train Activity	Train Loading to and from stack- North	73	8.5	100
	Train Loading to and from stack- Centre	73	8.5	100
	Loco idle (81 Class)	70	10	98
	Loco moving (82 Class)	74	10	102
Truck Activity	Truck loading to and from stack - Centre - 5 min per 15 (height average stacker engine bay and stack)	71	17	103
	Truck loading to and from stack - North - 5 min per 15 (height average stacker engine bay and stack)	71	17	103
	The truck return to intersection	71	3	88
	The truck return Accelerating @ intersection	72	12	102
	The truck return around loop to fill	71	3	88
	The truck backs in to fill	72	12	102
	The truck accelerates return from storage bay	72	12	102
	Truck Loaded from fill to intersection	70	4	90
	Truck Loaded accelerate from intersection	72	12	102
	Truck Loaded constant from intersection to Bay	70	4	90
	Truck Accelerates loaded from fill	72	12	102
Filling isotainers	Filling the isotainers	63	12	92

6.2 ENGINEERING CONTROLS

Noise controls can be incorporated into equipment at the design stage or retrofitted later, typically at a higher cost. Possible measures that could be considered for the reduction of noise from the Works include:

- For fans

- Selection of the most aerodynamically efficient device for the task or application, with the lowest speed motor and impellor (sound level is proportional to the fifth power of the rpm).
- Where inlets or discharges are open to atmosphere, the inclusion of appropriate silencers to reduce noise emission whilst minimising system pressure effects.
- Provision of enclosures for high noise motors or gear-boxes or fan casings. Enclosures can be fabricated from steel, concrete, timber or other material, depending on site and cost constraints, and explosive atmosphere considerations.
- Where enclosures are unsuitable, fan-casing break-out noise can be reduced by the application of suitable cladding to the exterior of the casing.
- Consideration of operation at different speed settings for heat exchanger fans, to suit climatic conditions, or having thermostat-controlled operation.
- Keeping doors on enclosures closed where reasonably practicable

- For materials handling, crushing and preparation

- Selection of size based on mechanical efficiency (i.e. not over or undersized for most of the operational range involved).
- Provision of damped chutes for high impact areas of hard materials to reduce dropping impact noise.
- Design of conveyors to minimise drop-height at chutes and the number of transfer points.
- Efficient use of screens for the separation of materials, including non-steel screens to reduce impact noise on screens, and damped discharge chutes.
- Use of vibration isolation and mounting of vibrating sections and items.
- Keeping doors on enclosures closed where reasonably practicable

- For solenoid valves and air-cleaning and handling systems

- Reverse pulses on bag-houses directed to a common manifold with silencing, in place of individual, small discharger silencers which often clog and become ineffective after a short period.
- Small silo-top bag filter systems having adequate silencing on the discharges.
- The most effective approach is to provide a ceiling noise specification for the installed new plant such that the noise criteria can be achieved.
- It is then necessary to select equipment that can achieve specification. Where specification sound levels cannot be achieved, detailed acoustic design measures would be required to reduce the noise levels.
- Keeping doors on enclosures closed where reasonably practicable

-For Isotainer Handling

- The reach stacker used onsite must have the best available technology employed to minimise LAMax noise during operations
- All vehicles including Reach Stackers and Trucks used in Isotainer loading and unloading are to have broad-band reversing alarms installed.
- The locomotive of the tain transporting isotainers to the site must be relocated to the eastern end of the train as soon as practicably possible after arrival during daytime to avoid such movements in the evening or night-time periods.
- See Reach Stacker Operators Code of Practice within Attachment 1.

6.3 BUFFER ZONES AND SCREENING

The Works is located in a predominantly rural environment. The community potentially affected by noise emissions from the Works is the village of New Berrima, located to the north of the Works. Nuisance noise is most often experienced at this location, especially at the times of prevailing southerly winds, temperature inversions and/or low cloud cover.

7. IMPLEMENTATION & TRAINING REQUIREMENTS

All employees should, through delivery of an appropriate training program, understand the following points:

- the most appropriate times to undertake high noise generating activities;
- the importance of keeping the doors and windows closed at all times in buildings containing noisy equipment (such as mills);
- the importance of timely equipment maintenance to prevent unnecessary noise (e.g. worn out bearings, loose rattling covers, etc.);
- the notification procedure, should it be necessary to undertake these activities outside of these times (e.g. in the case of emergency maintenance); and
- the need for use of suitable equipment such as acoustical enclosures when undertaking noisy activities, in order to minimise transmission of noise.
- All operators of the reach stacker are to sign and acknowledge the requirements within the Reach Stacker Operators Code of Practice (see Attachment 2)

Further information can be found in the Boral Cement's Corporate SOP No. **CEM-ENV-005** ***Environmental Training***.

8. REPORTING AND RECORD KEEPING

Record keeping is undertaken in accordance with various Boral policies and procedures.

- Boral Cement maintains a document control system named WizBiz to facilitate effective management and document control over controlled documents;

- SIMS/Sequence software is mandatory to record all incidents on site, with any actions arising that are tracked until progressed and closed; and

- All records are to be kept for the time periods required by statutory timeframes and/or Boral policies (Refer to Boral HSEQ Group Standard GRP-HSEQ-2-04-Document Control and Records Management.

Boral Cement has various reporting and record keeping requirements defined in the DAs and the EPL. Condition 7.3 of the MOD consent requires preparation of an annual environmental management report (AEMR) and Condition R1 of the EPL requires preparation of an annual return. Refer to sections 5.2.1 and 5.2.2 of the OEMP for details.

8.1 NOISE COMPLAINTS

The complaint procedure in Section 5.3 of the OEMP will be implemented if a noise complaint is received at the Works.

A contingency plan may need to be developed and implemented as required to remedy noise nuisance and to minimise noise complaints. The complainant is to be contacted with feedback within 24 hours of receipt of the complaint. Complaints shall be recorded in the Boral incident management system.

If a complaint is a result of existing equipment malfunction, this malfunction is to be attended to within one working day of the complaint being received if possible.

Monitoring conducted as a result of a complaint is to be compared with DA criteria and relevant standards.

A summary of the noise complaints is to be included in the AEMR and in the annual return.

9. REFERENCES

The business has access to the applicable legislation relevant to the OEMP via the Boral Group Standard GRP-HSEQ-1-04 Legal and Other Requirements.

10. Attachment 1: Reach Stacker Operators Code of Practice