Boral Cement Limited

Berrima Works

Water Management Plan (Appendix 11 of OEMP)

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Version History:

Version	Date	By Whom	Description of Changes
1	7 October 2008	Grant Williams	Original version
2	20 September 2011	Alex Wnorowski	Global revision and formatting change
3	September 2014	Michael Curley	3-yearly review
4	March 2018	Michael Curley	Update to include new requirements from Modification 9 development consent
5	April 2020	Greg Johnson	Update to include MOD 11 and 12

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1. PURPOSE

The objective of the Water Management Plan (the Plan) is to provide a water management system for the operation of the Berrima Cement Works (the Works) including the Kiln 6 Upgrade. The Plan addresses:

- stormwater management; and
- process water supply to the Works.

Water is an important resource for the cement manufacturing industry. It is used for process equipment cooling and in the control of emissions from the process. Water is also used for the suppression of fugitive dust emission from the site.

In the past, the Works relied on the Wingecarribee River to supply process water. To improve sustainability and conserve natural resources, two large dams (Lake Breed and Lake Quality) were constructed on land adjacent to the site to collect stormwater runoff, prevent uncontrolled discharges to the environment and provide a supply of process water for use on site. There is also additional water storage capacity in the shale quarry. Construction of the two dams has enabled the Works to significantly reduce its dependence on the Wingecarribee River with daily extraction averaging approximately 0.4 – 0.6ML/day.

2. SCOPE

The objective of the Plan is to provide a water management system for the operation of the Works. The Plan addresses:

- site process water uses;
- current and alternative sources of process water;
- stormwater management;
- compliance with all relevant legislative requirements;
- promotion of employee and community environmental awareness;
- opportunities to reduce water consumption; and
- compliance with work health and safety requirements on the site.

This Water Management Plan (the Plan) identifies the controls and water management techniques with respect to the operation of the Works and forms part of the Operational Environmental Management Plan (OEMP). The Plan also allocates responsibilities and accountabilities for managing operational water issues.

The Plan incorporates water related conditions in the development approvals (Das) 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- and Environment Protection License 1698 (EPL).

It is noted the DA and EPL do not specifically require preparation of a water management plan, however, the consent did require the preparation of a Water Supply Strategy which was prepared in 2003. This management plan incorporates findings of that original study and present day updates.

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3. DEFINITIONS

Table 1 Definitions

Term	Definition
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
DPIE	NSW Department of Planning, Industry and Environment
EMS	Environmental management system
EPL	The site-specific Environment Protection Licence (No 1698) issued and managed by the NSW Office of Environment and Heritage
EPA	NSW Environmental Protection Authority
OEMP	Operational environmental management plan
PIRMP	Pollution incident response management plan

4. RESPONSIBILITIES

The responsibilities of the personnel, including water management, are summarised Table 2.

Table 2 Responsibilities

Role	Responsibility
Employees	Responsible for ensuring that the environmental standards for their work are achieved. This includes: ➢ observing any environmental instructions and procedures that apply to their work or operations and products, including usage of water; ➢ taking action to halt or prevent environmental incidents; ➢ identifying and immediately reporting environmental incidents; and ➢ monitoring and controlling water discharges (if any) to keep within approved levels.
Team Leaders / Front Line Supervisors	Responsible for the prevention of poor environmental performance arising from work methods and the working environment. This includes: ➢ identifying, reducing and preventing environmental

	problems, including water usage and discharges; ➢ monitoring operations and maintenance work to ensure water discharges are maintained within approved levels; ➢ initiating action to prevent environmental incidents; ➢ immediately reporting environmental incidents to the Operations Manager and the HSE Advisor; and ➢ initiating corrective actions to prevent similar incidents reoccurring.
Production Manager	Responsibility for ensuring that the environmental objectives are achieved. This includes: ➢ ensuring staff are trained and updated on environmental awareness, environmental responsibilities and procedures; ➢ ensuring environmental incidents are investigated and corrective and preventative action taken; ➢ ensuring operations comply with the conditions of site DAs, EPL and other relevant legislation; ➢ reviewing operations and implementing strategies to reduce water use from the Wingecarribee River; ➢ developing and implementing contingency plans to respond to incidents and minimise environmental harm ➢ immediately reporting environmental incidents to the Operations Manager or HSE Advisor; ➢ ensuring the proper management of waste and chemical products to ensure that they cannot contaminate stormwater runoff or affect dam water quality; and ➢ monitoring the flow of water over the Wingecarribee River weir and ceasing the recovery of water when water stops flowing over the weir.
Environmental Sustainability Manager/ Environmental Business Partner	Responsible for ensuring the effectiveness of the OEMP. This includes: ➢ ensuring the OEMP is established, implemented and maintained; ➢ ensuring personnel are aware of the requirements of the EPL, DAs and other regulatory documents relating to plant operation and its environmental performance; ➢ reporting on the performance of OEMP and need for improvements; ➢ reporting non-compliances with EPL, DAs and other relevant legislation requirements; ➢ immediately reporting material environmental incidents to 5 compulsory government authorities; ➢ promoting the awareness of environmental performance and requirements throughout the organisation; ➢ coordinating the auditing of the OEMP to verify the implementation of corrective and preventive actions ➢ overseeing timely and accurate collection of data,

	including monitoring programmes for site emissions and discharges; and ➢ reporting of emission data and environmental performance results. ➢ monitoring and ensuring compliance with the procedures;
Business Analyst	Responsibility for ensuring the recording and reporting of site water use. This includes: ➢ establishing procedures for the recording of site water use and water sources; and ➢ reporting water use for management review.
Site Operations Manager	Responsible for ensuring the operation of the Works' environmental management system. This includes: ➢ implementing Boral Cement 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. Site Operations and potential impacts on water quality

Cement is produced at the Works by the dry process in No. 6 Kiln (see Figure 1 for process schematics). The sequence of operations at the Works with respect to their water quality impact potential is described in Table 4.

Table 1 Sequence of operations

Operation	Description	Potential for Water Impact
Unloading of limestone	Limestone/limestone-yellow shale mixture from Marulan Limestone Mine is transported to the works by rail. The limestone is unloaded and taken by conveyor belt to the preblend heaps. The conveying system is enclosed and the transfer points are fitted with dust collection	Minor

Operation	Description	Potential for Water Impact
	systems.	
Quarrying	Blue shale is excavated using a bulldozer.	Minor Surface Water Held in Pit
Additive raw material delivery, storage and transfer	The additive materials such as blue shale, yellow shale, iron source materials and gypsum for cement production are delivered to the works by road. They are stockpiled on site in open stockpiles and/or on the Shale Pad. The various materials are transferred to the Shale Pad or Shale Crusher by road transport and/or front end loaders. The Shale Pad area is bunded and covered. The area is swept to remove spilt material.	Minor
Coal delivery and storage	Raw coal is delivered by road and unloaded through a hopper for transfer to the raw coal blending system. When coal shed is full, excess coal is stored in an open stockpile. The raw coal is wet and the transfer system and coal blending is enclosed.	Minor Stormwater Drainge on side of the roadways Stormwater captured at the edge of stockpiles
SWDF storage, handling and feeding system	SWDF delivered to site in covered vehicles to designated storage building.	Minor fugitive odour emissions
Additive raw material crushing	The additive materials, blue shale, yellow shale, iron source materials are crushed in the Shale Crusher and transferred to the Proportioning Bins..	Minor
Preblending	The limestone from rail deliveries is laid down in a series of windrows on the preblend heap. These windrows form layers that help to reduce the effect of any variations in the limestone quality. One heap is being built while the other is being reclaimed. The operation is contained in a building.	None Stormwater does not have access
Reclaiming	The preblend heaps are reclaimed by the reclaimer. The reclaimer scrapes limestone from the face of the heap across all the layers laid down during the build of the heap. This further reduces any effects of variation in limestone quality.	None Stormwater does not have access

Operation	Description	Potential for Water Impact
	The operation is contained in a building.	
Proportioning of raw materials	During the reclaiming of the limestone from the preblend heap the other raw materials are added from bins in careful controlled proportions to adjust the chemistry of the mixture to ensure that the finished clinker will have the right quality. The operation is contained in a building.	None Stormwater does not have access
Grinding of raw materials	The mixture of raw materials is ground up finely in the raw mills to make raw meal. Hot air from the kiln is drawn through the mills to dry the raw materials. The raw milling is to help the raw materials mix properly and make the mixture easy to burn in the kiln. The operation is contained in a building.	None Stormwater does not have access
Homogenising	The raw meal is stored in the homogenising silo. The homogenising silo mixes the raw meal, reducing any variations in the chemistry raw meal.	None Stormwater does not have access
Burning	The raw meal is fed to the preheater tower. As the raw meal is heated in the preheater tower and kiln, carbon dioxide (CO2) is liberated from the limestone. In the hottest part of the kiln, the burning zone, chemical reactions take place, which convert the raw meal into “clinker”. Hot gases from the preheater system are quenched in the conditioning towers and then used to dry the raw materials in the raw mills. The gases from the raw mills are de-dusted in either an electrostatic precipitator of bag filter.	Potential for leaks/spills of production water a requirement for effective maintenance systems is required, this is completed by the onsite maintenance team.
Cooling	The hot clinker that is formed in pieces about the size of large marbles is passed through the cooler where air cools the clinker. The hot air from the cooler is recycled to burn the fuel in the kiln. This helps reduce the amount of fuel needed. Excess cooling air is cooled in an air-to-air heat exchanger then de-dusted in a bag filter.	Potential for leaks/spills of production water a requirement for effective maintenance systems is required, this is completed by the onsite maintenance

Operation	Description	Potential for Water Impact
		team..
Clinker transfer to storage	Clinker is transferred from the clinker cooler to storage in bucket conveyors. The transfer system is enclosed.	None
Clinker storage	Clinker is tipped from the bucket conveyor to the storage areas, the Mole or the A Frame.	None
Clinker transfer to milling/despatch	Clinker from Mole and A Frame are transferred to the cement mill feed hoppers or the clinker despatch silo by a conveyor system. The transfer system is enclosed The road despatch silo is fitted with a telescopic chute.	None
Clinker despatch	Clinker is stored in the despatch silo prior to loading and despatch. Clinker is despatched by road trucks or by rail bulk wagons.	None
Finished cement grinding	The cooled clinker together with a small amount of gypsum to control how fast the cement sets is ground in the cement mills to make the finished product cement. Other additives can be mixed with the clinker to make different types of cement.	None
Cement storage and despatch	The ground cement is stored in silos until required by our customers. Cement is despatched by road bulk trucks or by rail bulk wagons to other despatch depots.	None.

Production of Clinker by the DRY Process

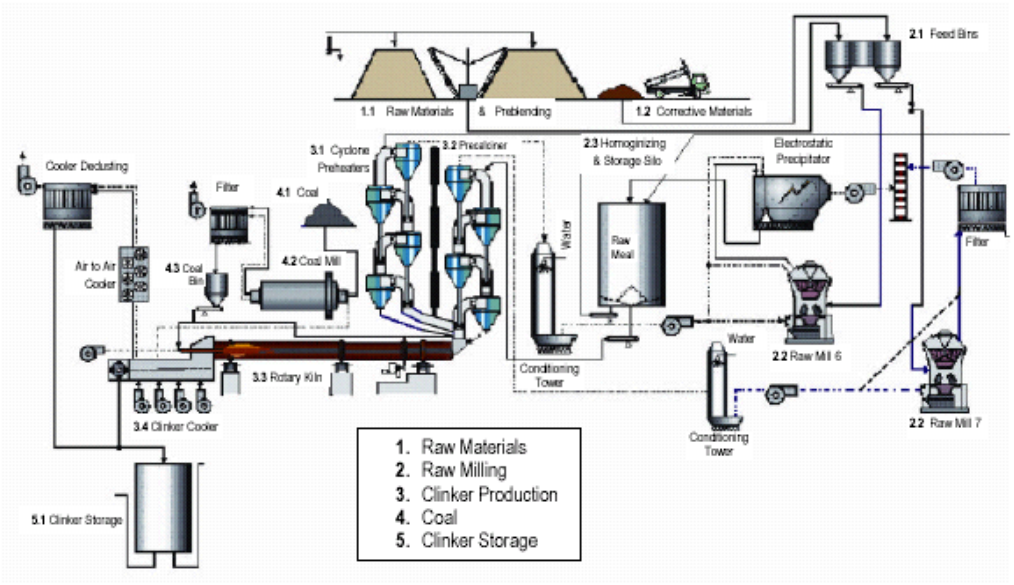


Figure 1 Clinker Manufacturing Process

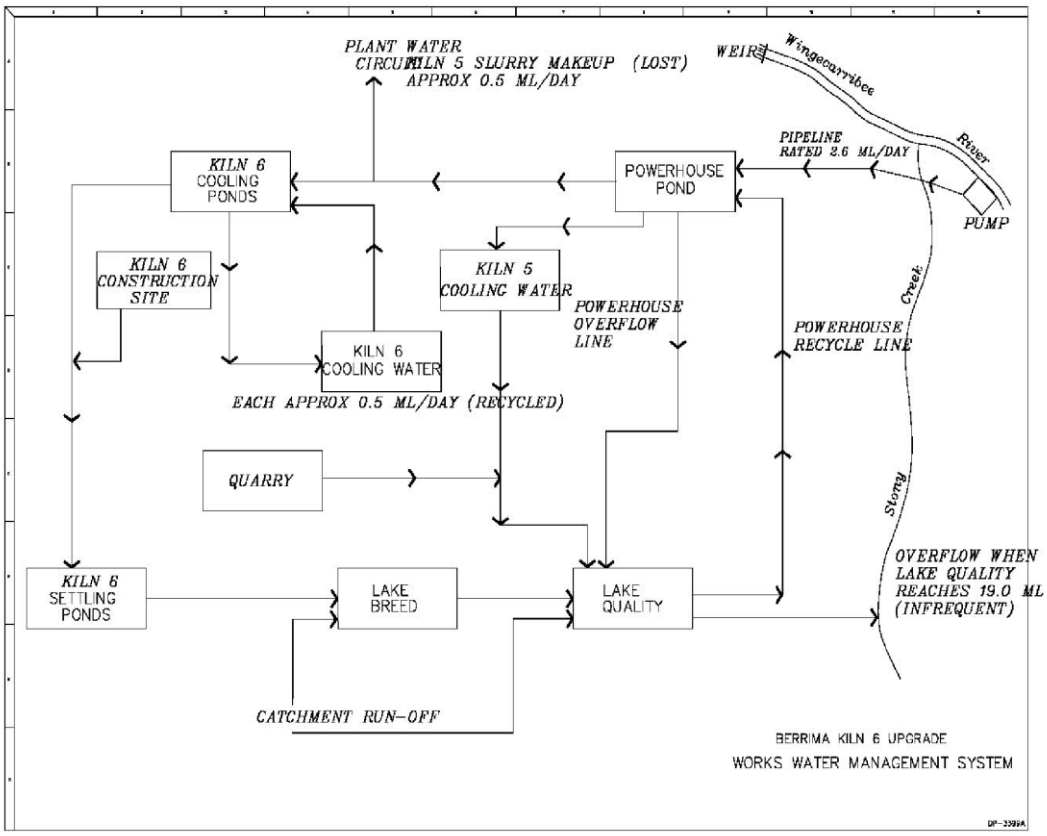
6. SITE WATER USAGE

Water for process use is pumped from Lake Quality to the Power House Pond. Water is treated using a commercial biocide before being pumped into the Works water circuit. The water supply and circulation system is shown in Figure 1.

The treated process water is used for:

- process cooling water – to maintain the operating temperatures of the process equipment;
- conditioning tower – humidification of the process gasses and dusts is critical to ensure the efficient operation of the electrostatic precipitators. This humidification is normally achieved with water drawn off the drying of the raw materials in the raw mills. When the raw mills are off, the water must be replaced and the conditioning tower performs this function;
- cooling water – the process gasses must also be cooled to improve the efficiency of the dust collection in the electrostatic precipitators and protect the bag filter; and
- fugitive dust emission control – water is used to water roads, the site shale quarry and stockpiles to assist in the control of fugitive dust emissions.

Figure 1 The Works' Water Supply and Utilisation



7. PROCESS WATER SOURCES

7.1 Current sources of process water

Process water requirements are currently drawn from stormwater which is collected from the local catchment and stored in the two settlement dams, Lake Breed and Lake Quality . The capacities on the dams are 15 ML and 19 ML respectively. Water from Lake Breed is pumped into Lake Quality, treated with biocides and used in production processes via a spillway, via a spillway .

During periods of low onsite rainfall when the dam onsite levels are low, process water supplies are pumped from the Wingecarribee River under Water Access License 25452 (provided water is flowing over the weir).

In the event that onsite water has been depleted and water from the river is unavailable due to low flows, while not ideal, water can be sourced offsite via trucking water from the Council water supply or a licensed provider.

7.2 Alternative Sources of Process Water

Historically, the cement works has depended on water supply from the Wingecarribee River due to the wet process technology. However, with the use of the dry process technology and the construction of on-site water storage dams, this dependency has been reduced.

The company has investigated the use of alternative sources of process water to further reduce the dependence on water sourced from the Wingecarribee River. The investigations identified three potential sources:

1. treated wastewater from Bowral sewage treatment plant – this source was deemed sufficient to meet the Works' water requirements however quality and logistics in sending to site is uneconomical;
2. treated wastewater from Berrima sewage treatment plant – this source was deemed insufficient to meet Works' water requirements regarding available volume and quality; and
3. water from the Medway (Berrima) Colliery – this source was deemed sufficient to meet Works' water requirements.

Engineering studies, including budget cost estimates, have been completed for each.

There is significant potential for the Medway (Berrima) Colliery water to be supplied to the site. Boral holds a Water Access Licence with an annual volume of 1400ML available. Boral also owns a former rail corridor from the mine to the Works which could be used to pipe the water. Subject to capital approvals and capital availability there is potential for the installation of the pipeline in the medium term.

8. STORMWATER MANAGEMENT

Stormwater from the site is collected and either discharged directly into Lake Quality or via the collection ponds into Lake Breed. Water from Lake Breed is pumped into Lake Quality.

During normal operation, the water in Lake Quality is used for process water and there is no discharge into Stony Creek.

During periods of high rainfall Lake Quality may fill and overflow into Stony Creek. An oil collecting boom fitted to the discharge point prevents the discharge of oil from the dam.

Water levels in the dams are monitored electronically and used to determine when a discharge to the water course occurs.

- The main sources of potential contamination of the stormwater on the site include:
- Suspended Solids (sediment/particulate matter) contamination in the stormwater runoff from the site;
- oil and other liquid contamination due to spills and leaks; and
- process wastewater.

Solid contamination is minimised by regular and routine site cleaning and using settling ponds and weirs. Existing emergency procedures are used to contain and clean up oil and other liquid spills and leaks.

9. ENVIRONMENTAL MANAGEMENT

Spill prevention and control During any construction activities on site spill prevention and sediment controlconstruction will be managed in accordance with the Boral Cement Pollution Incident Response Management Plan (PIRMP) and the SOP CEM-ENV-014 Spill Prevention and Control. Spill prevention equipment and measures aim to eliminate or reduce the probability

of spills occurring and reduce the degree of damage that could occur to the surrounding environment. In places or situations where a spill risk exists, the following measures will be implemented:

- placement of spill-risk facilities away from sensitive environments (sufficient to allow for effective intervention prior to pollution occurring in the event of a spill);
- use of secondary spill containment facilities such as bunding around all storage tanks and other areas where hazardous substances are stored;
- ensuring risky activities such as tank loading are undertaken on bunded, hardstand areas;
- avoiding risky activities at times when weather events may magnify the harm caused by a spill;
- ensuring drainage structures can be sealed to halt passage of spilt fluids; and
- training of employees and contractors in good environmental practice.

The site utilizes universal spill kit wheelie bins that are audited and stocked regularly by a specialised local supplier (see Appendix 2 of emergency response plan for locations). Spill kits are registered and mapped; personnel are trained in the proper use of spill kits. The site's hazardous substances storage areas, oil and fuel storage tanks, bunds and compounds comply with the requirements of Australian Standard AS 1940:2004.

10. MONITORING

10.1 Method

All sampling and monitoring is undertaken in accordance with the relevant Australian Standards:

AS/NZS 5667.1:1998 Water Quality — Sampling — Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples;

AS/NZS 5667.10:1998 Water Quality — Sampling — Guidance on sampling of waste waters; and

Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales.

Sampling is undertaken by a trained person (a technician from the ALS laboratory). The samples are analysed by a laboratory (ALS) NATA accredited to carry out the tests required.

10.2 Monitoring Schedule

10.2.1 *Monthly and Quarterly Monitoring*

For process quality purposed the water in Lake Breed and Lake Quality are generally sampled and tested monthly and the water in the Wingecarribee River is sampled and tested three monthly for (there are no DA or EPL requirements for this testing) . Tested parameters are:

- biological oxygen demand (BOD);
- oil and grease;
- total suspended solids;
- pH;
- oxygen demand (COD);
- total phosphorus;
- metals (aluminium, barium, calcium, copper, lead, magnesium, manganese, nickel, potassium, sodium, total iron, zinc);

- boron;
- chloride;
- cyanide;
- fluoride;
- sulphate; and
- total coliforms, thermotolerant (faecal) coliforms, enterococcus.

10.2.2 Overflow Monitoring

Water quality is monitored (Grab sample)s are taken at EPL Monitoring Point 9 in accordance with Condition M2.3 of the EPL during discharges from Lake Quality to Stony Creek. The water is tested for:

- biochemical oxygen demand (BOD);
- oil and grease;
- total suspended solids; and
- pH.

As per requirements of the NSW *Protection of Environment Legislation Amendment Act 2011* (POELA) Act, the site 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 with an aim to upload by the 10th working day of the next month. The summary report is updated with sampling data the month after there is an overflow from Lake Quality.

11. IMPLEMENTATION AND TRAINING

Boral Cement is committed to ensuring our employees are aware of potential environmental impact of its operations. All employees are trained in environmental awareness.

Through delivery of an appropriate training program, staff will understand the following issues:

- the potential for emissions/discharges from the various operations and the relevant operating and licence limits;
- process water requirements and need for consumption reductions;
- the control technologies used to minimise potential for contamination of stormwater;
- action to be taken when Lake Quality discharges to the environment as per licence requirements; and
- the cleanup and notification procedures if water pollution occurs.

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

12. REPORTING AND RECORD KEEPING

12 .1 Incident Reporting

Incidents and non-conformances are managed in accordance with the emergency plan and pollution incident response management plan (attached to the OEMP) and safety management system (the system is on the Boral Cement intranet). See Section 6 of OEMP.

12.2 Pollution complaints

Boral Cement will record water pollution related complaints in accordance with Condition M6 of the EPL and the complaints and dispute resolution procedure in Section 5.3 of the OEMP.

12.3 Annual Reporting

Boral Cement has various reporting and record keeping requirements defined in the DAs and the EPL. Condition 7.3 of the MOD 9 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.

12.4 Record Keeping

Record keeping is undertaken in accordance with Site Procedure **SP05-01-01** ***Document Control – Electronic Data***.

- Boral Cement maintains a document storage 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.

All records are to be retained for the time periods required by statutory timeframes and/or Boral policies (refer Boral Group SOP No **GRP-OHS-007** ***Document Control and Records Management***).

13. LEGAL REFERENCES

For the current list of Federal and State legislation relevant to this Management Plan refer to Boral Cement's Corporate SOP No. **CEM-ENV-004** ***Environmental Legal Requirements***.