



Boral Cement Limited

Berrima Works

Water Management Plan

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1. INTRODUCTION

The objective of the Water Management Plan is to provide a water management system for the operation of the Berrima 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 Berrima Works has relied on the Wingecarribee River to supply process water. To improve the sustainability and conserve natural resources, two large dams (Lake Breed and Lake Quality) were constructed on land adjacent to the site to collect stormwater run off, preventing uncontrolled discharges to the environment and providing a supply of process water for use on site. There is also additional water storage capacity in the shale quarry. This system has allowed the Works to significantly reduce its dependence on the Wingecarribee River and only use the river as a backup during periods of extended dry weather when the dams are low.

This Water Management Plan identifies the controls and management techniques with respect to the operation of the Berrima Cement Works. The Plan also allocates responsibilities and accountabilities for managing operational water issues.

The Plan forms part of the Berrima Works Operational Environmental Management Plan. The Plan also enables compliance with the consent conditions contained in the Development Consents for the Kiln 6 Upgrade Project and Cement Mill 7 Project.

2. OBJECTIVES OF THE WATER MANAGEMENT PLAN

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

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3. DEFINITIONS

DA	Development Approval - a consent issued by the Department of Planning, detailing site-specific construction and operational conditions that Boral Cement must comply with
DoP&E	NSW Department of Planning and Environment
EMS	Environmental Management System
EPL	The site-specific Environment Protection Licence (No 1698) issued and managed by the Office of Environment and Heritage
EPA	NSW Environmental Protection Authority
OEMP	Operation Environmental Management Plan

4. ENVIRONMENT MANAGEMENT STRUCTURE AND RESPONSIBILITIES

The current environmental management structure at the Berrima Cement Works is shown in ***Operations Environmental Management Plan_Berrima Works (CMT-ENV-002)***.

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

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<i>Employees</i>	<p>Responsible for ensuring that the environmental standards for their work are achieved. This includes:</p> <ul style="list-style-type: none"> ✓ 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.
<i>Team Leaders / Front Line Supervisors</i>	<p>Responsible for the prevention of poor environmental performance arising from work methods and the working environment. This includes:</p> <ul style="list-style-type: none"> ✓ 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 Site HSE Advisor; and ✓ Initiating corrective actions to prevent similar incidents reoccurring.
<i>Production Manager</i>	<p>Responsibility for ensuring that the environmental objectives are achieved. This includes:</p> <ul style="list-style-type: none"> ✓ 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 Development Approvals, Environmental Protection Licence 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; and ✓ Ensuring the proper management of waste and chemical products to ensure that they cannot contaminate stormwater runoff or affect dam water quality. ✓ Monitoring the flow of water over the Wingecarribee River weir and ceasing the recovery of water when water stops flowing over the weir
<i>HSE Advisor</i>	<p>Responsible for ensuring the effectiveness of the EMS. This includes:</p> <ul style="list-style-type: none"> ✓ Ensuring the EMS is established, implemented and maintained;



	<ul style="list-style-type: none"> ✓ Ensuring personnel are aware of the requirements of the Licence, Development Approvals and other regulatory documents relating to plant operation and its environmental performance; ✓ Reporting on the performance of EMS and need for improvements; ✓ Reporting non-compliances with Licence, Development Approvals 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 EMS 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;
<i>Business Analyst</i>	<p>Responsibility for ensuring the recording and reporting of site water use. This includes:</p> <ul style="list-style-type: none"> ✓ Establishing procedures for the recording of site water use and water sources; ✓ Reporting water use for management review.
<i>Site Operations Manager</i>	<p>Responsible for ensuring the operation of the works' environmental management system. This includes:</p> <ul style="list-style-type: none"> ✓ Implementing Boral environmental policy on site; ✓ Ensuring site environment performance objectives and targets are established, monitored and achieved; ✓ Defining responsibilities for the EMS; ✓ Ensuring the availability of resources; ✓ Communicating the importance of the EMS and meeting the statutory and regulatory requirements; ✓ Conducting management reviews of the EMS; ✓ 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 LICENCES AND APPROVALS

The site is subject to a number of conditions arising from Development Consents for various projects approved by the NSW Department of Planning and Environment and also specified in the site Licence (EPL No. 1698) from the EPA.

The relevant Development Consents are:

- Upgrade of Kiln 6 (DA No. 401-11-2002-i);
- Non-Standard Fuels (MOD-2-1-2004-i); and
- Cement Mill 7 (DA No. 85-4-2005-i).

Boral Cement Limited is committed to operating the plant and equipment in accordance with the DA and Licence conditions.

6. DESCRIPTION OF OPERATIONS

At Berrima cement is produced by the dry process in No. 6 Kiln (see Figure 1 for process schematics). Previous kilns have been demolished. The sequence of operations at Berrima with respect to their water use potential is described below.

Operation	Description	Potential for Water Use
Unloading of limestone	Limestone/limestone-yellow shale mixture from Marulan Quarry is transported to the works by rail. The limestone is unloaded and taken by conveyor belt to the preblend heaps.	Water is not used in this operation
Quarrying	Blue shale is excavated using a bulldozer.	Water is used for the suppression of fugitive dust emissions
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.	Water is used for the suppression of fugitive dust emissions
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.	Water is not used in this operation
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.	Water is not used in this operation
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	Water is not used in this operation

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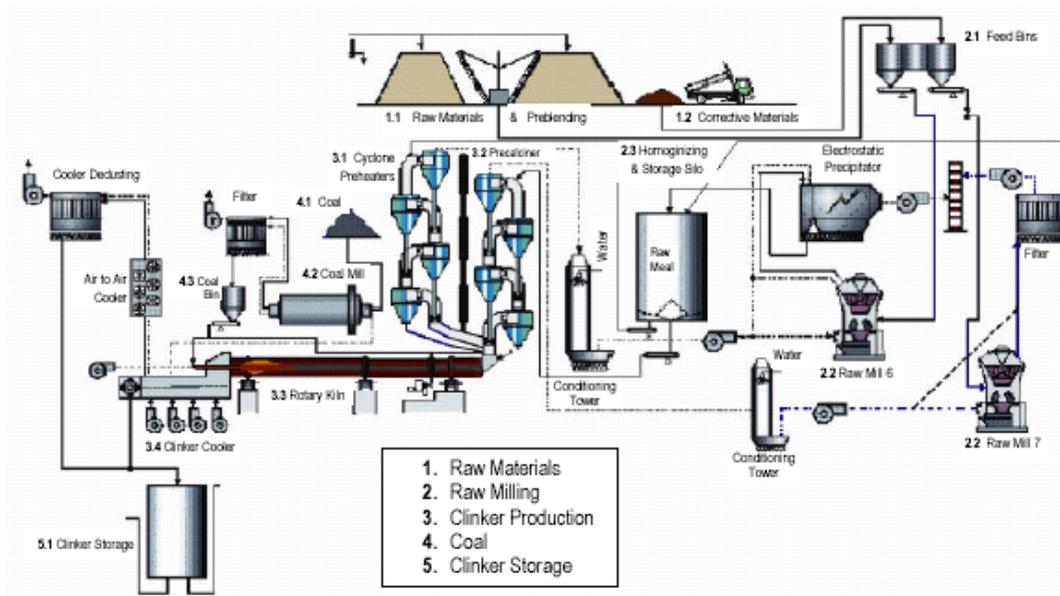
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WATER MANAGEMENT PLAN**



	other is being reclaimed.	
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.	Water is not used in this operation
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.	Water is not used in this operation
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.	Water is used for control of hot air from the kiln
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.	Water is not used in this operation
Burning	The raw meal is fed to the preheater tower. As the raw meal is heated in the preheater tower and kiln, carbon dioxide (CO ₂) 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.	Water is used for process cooling
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.	Water is used for process cooling in this operation
Clinker transfer to storage	Clinker is transferred from the clinker cooler to storage in bucket conveyors. The transfer system is enclosed.	Water is not used in this operation
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.	Water is used for process cooling
Clinker and 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.	Water is used for the suppression of fugitive dust emissions from internal roads

Figure 1: Berrima Works Clinker Manufacture Schematics

Production of Clinker by the DRY Process



7. SITE WATER USAGE

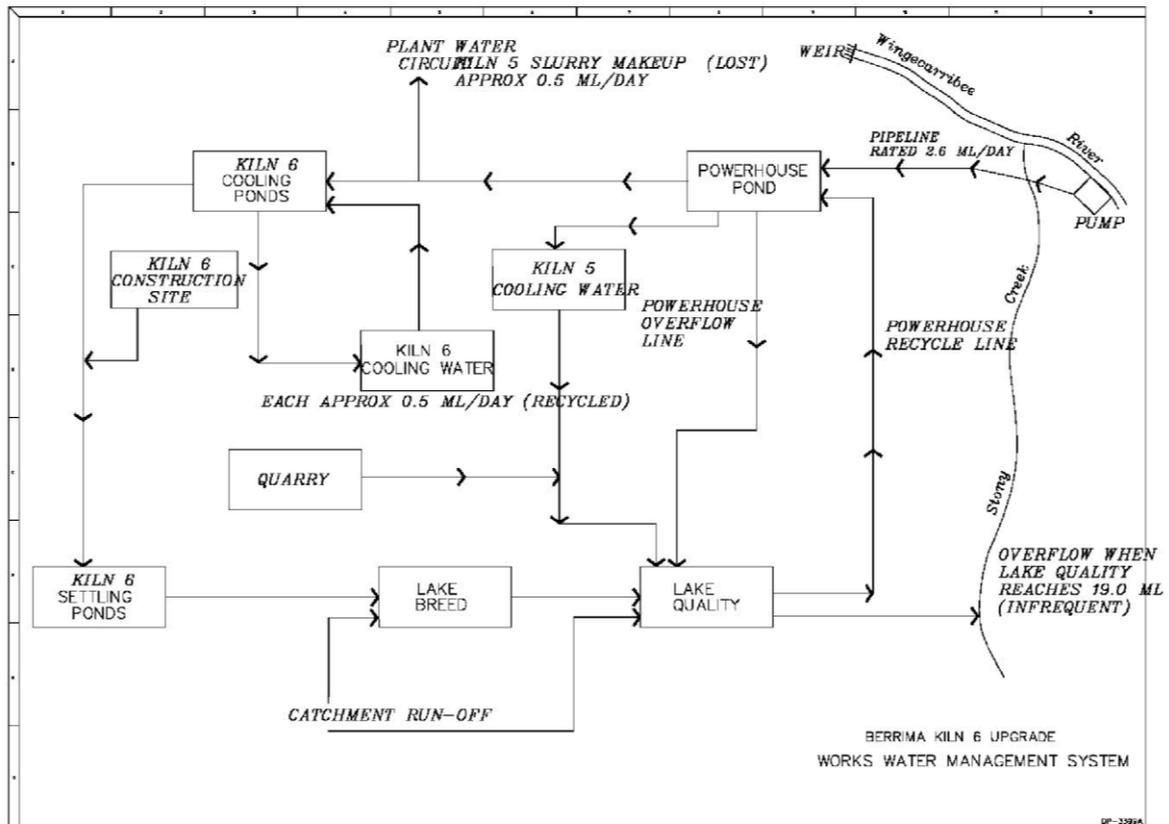
Water for process use is pumped from Lake Quality to the Power House Pond. Water is treated using a commercial biocide before being pumped into the Works water circuit. The water supply and circulation system is shown in Figure 2.

The treated process water is used for:

- Process cooling water – process cooling water is used 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.

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Figure 2: Berrima Works Water Supply and Utilisation



8. PROCESS WATER SOURCES

8.1 Current Sources of Process Water

The upgrade of Kiln 6 and the demolition of Kiln 5 have resulted in a potential significant reduction in the quantity of water drawn from the Wingecarribee River.

Process water requirements are currently drawn from stormwater collected from the local catchment comprising the Works site and surrounding land and stored in the two settlement dams, Lake Breed and Lake Quality. The capacities on the dams are 15 ML and 19 ML respectively. Lake Breed discharges into Lake Quality which in turn discharges to Wingecarribee River.

It is the practice on site to use the pumps to transfer water from Lake Quality to Lake Breed to maximise the process water storage available and minimise the requirement to pump water from the Wingecarribee River.

In emergency and when the dams are at a low level, process water supplies can still be pumped from the Wingecarribee River (as long as water still flows over the weir).

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8.2 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 significantly reduced.

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

- treated wastewater from Bowral sewage treatment plant – sufficient to meet works' water requirements;
- treated wastewater from Berrima sewage treatment plant – insufficient to meet works' water requirements; and
- water from the Medway coal mine – sufficient to meet works' water requirements.

Engineering studies, including budget cost estimates, have been completed for each. These studies have identified their use is currently not economical.

9. STORMWATER MANAGEMENT

Stormwater from the site is collected and either discharged directly into Lake Quality or via the collection ponds into Lake Breed. Lake Breed discharges into Lake Quality. Lake Quality overflow discharges into Stony Creek that flows north into the Wingecarribee River.

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:

- Solid (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 by the use of settling ponds and weirs. Existing emergency procedures are used to contain and clean up oil and other liquid spills and leaks.

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10. MONITORING

10.1 Methodology

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) accredited to carry out the tests required.

10.2 Monitoring Schedule

10.2.1 *Monthly and Quarterly Monitoring*

The water in Lake Breed and Lake Quality are sampled and tested monthly and the water in the Wingecarribee River is sampled and tested three monthly for:

- Biological Oxygen Demand (BOD);
- Oil and Grease;
- Total suspended solids;
- pH;
- Chemical 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.

All this testing is done voluntarily; there are no Licence or DA requirements for it.

10.2.2 *Overflow Monitoring*

During periods of discharges from Lake Quality to the water course, according to the requirements of the EPL each discharge event is sampled and the water tested for:

- Biochemical oxygen demand (BOD);
- Oil and Grease;
- Total suspended solids; and

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- pH.

Kiln 6 DA requires the water overflow to be additionally tested for:

- Chemical oxygen demand (COD);
- Total Phosphorus;
- Boron;
- Chloride;
- Fluoride;
- Cyanide;
- Sulphate; and
- Metals (Aluminium, Barium, Calcium, Copper, Lead, Magnesium, Manganese, Nickel, Potassium, Sodium, Total Iron, Zinc).

There are no specific limits on discharged water quality in either DA or EPL.

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

11. IMPLEMENTATION AND TRAINING

Boral Cement Limited 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 is to 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 serious water pollution occurs.

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

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12. REPORTING AND RECORD KEEPING

12.1 Incident Reporting

Pursuant to the POELA Act 2011, Boral Cement must notify **the** EPA, NSW Fire & Rescue, Wingecarribee Council, WorkCover and the NSW Department of Health of any incident with actual or potential material on-site or off-site impacts on people or the biophysical environment immediately after the occurrence of the incident. Refer to site SOP CMT-ENV-009 Berrima Pollution Incident Notification. The Director General has also to be informed of material incidents as soon as practicable as per Development Approval requirements.

Boral Cement Limited has to provide written details of the incident to the EPA and the Director General within seven days of the date on which the incident occurred.

Boral Cement Limited has to meet any requirements of the Director General to address the cause or impact of any incident.

12.2 Annual Reporting

Plant performance with respect to water management is reported annually in the Annual Return to EPA and Annual Environmental Management Report to DoP&E within two months of the Licence anniversary date.

12.3 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.
- SiteSafe 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**.

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