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Marulan South Limestone Mine | SSD 7009

Environment Management Strategy

Prepared for Boral Cement Limited | 1 November 2023

Marulan South Limestone Mine

SSD 7009 | ENVIRONMENT MANAGEMENT STRATEGY

Prepared for Boral Cement Limited
1 November 2023

PR163

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1 INTRODUCTION

1.1 Background

Boral Cement Limited (Boral) owns and operates the Marulan South Limestone Mine (the mine), an open cut mine in Marulan South, New South Wales (NSW). Limestone mining north of Bungonia Gorge began around 1830 with major developments emerging in the 1920s to supply limestone for cement manufacturing and steel making.

The mine was opened in 1929 to supply limestone for cement, manufacturing and steel making. By 1953 two main pits (northern mine pit and southern mine pit) were well established and by the early 1970s the facets of the business included limestone for cement, steel making, agriculture, glass making, lime manufacturing, quicklime and hydrated lime.

The mine produces up to 3.38 million tonnes (Mt) of limestone based products per year for the cement, steel, agricultural, construction and commercial markets.

Due to changes in the NSW *Mining Act 1992* (Mining Act) and the NSW *Environmental Planning & Assessment Act 1979* (EP&A Act), a State significant development (SSD) consent under the EP&A Act was required to move mining operations beyond the area covered by the mining operations plan (MOP).

Two approvals are required for the mine:

- a consent for the development (SSD 7009) under Part 4, Division 4.7 of the EP&A Act; and
- controlled action approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for impacts on listed threatened species and communities (sections 18 and 18A of the Act).

An environmental impact statement (EIS) was prepared to accompany the application for SSD 7009 and addresses the requirements of State agencies under the EP&A Act and the Commonwealth Department of Agriculture, Water and the Environment. A response to submissions (RTS) report was subsequently prepared to consider and respond to agency and public submissions and provide clarification of development components where relevant.

Development consent (the consent) was granted by the Department of Planning, Industry and Environment (DPIE) on 19 August 2021, to continue mining limestone at a rate of up to 4 million tonnes per annum (Mtpa) for up to 30 years (the Project).

To satisfy Condition of Consent (CoC) D5(i), the EIS, RTS, development consent and other publicly available information related to the assessment and determination of SSD 7009 can be accessed on DPIE's Major Projects Planning Portal (https://www.planningportal.nsw.gov.au/major-projects/project/9691).

The consent requires the preparation and implementation of management plans, strategies, protocols and procedures detailing environmental commitments, controls and performance objectives at the mine throughout its operational life. An environmental management strategy (EMS) is required under CoC D1.

This EMS incorporates the relevant management measures in the EIS, RTS and conditions of consent relating to environmental management**.** This EMS will be a dynamic document which will be updated as required over the life of mining operations until 31 August 2051.

This EMS has been prepared by Element Environment on behalf of Boral.

1.2 Overview of operations

1.2.1 Site description

The mine is in Marulan South, 10 km south-east of Marulan village and 35 km east of Goulburn. It is in the Goulburn Mulwaree Local Government Area (LGA).

The mine is separated from the Bungonia National Park (NP) and State Conservation Area to the south by Bungonia Creek and is separated from the Shoalhaven River and Morton NP to the east by Barbers Creek.

The mine and surrounds are characterised by rolling hills of pasture interspersed with forest to the west, contrasting with the heavily wooded, deep gorges that begin abruptly to the east of the mine, forming part of the Great Escarpment and catchment of the Shoalhaven River.

Access is via Marulan South Road, which connects the mine and Boral's Peppertree Quarry with the Hume Highway approximately 9 km to the north-west. Boral's private rail line connects the mine and Peppertree Quarry with the Main Southern Railway approximately 6 km to the north.

The Project site (site) covers historical and proposed future areas of disturbance and comprises two geographically separate areas:

- the existing mine including the proposed 30-year mine footprint and associated infrastructure; and
- the proposed Marulan Creek dam to be on Marulan Creek, within Boral landholdings approximately 2.5 km north of the mine entrance.

The site covers an area of 846.4 ha. The existing pre-SSD disturbance footprint is 341.5 ha with 256.5 ha of new disturbance associated with the proposed 30-year mine plan.

Most of the site is zoned RU1 – Primary Production under the Goulburn Mulwaree Local Environmental Plan (LEP) 2009. Mining and extractive industries are permissible in this zone with consent. The remaining area is zoned E3 – Environmental Management. Mining and extractive industries are prohibited in this zone. However, as agriculture is permitted in the E3 zone with consent, mining is also permitted in this zone under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (now the Resources and Energy SEPP 2022) with consent.

1.2.2 Overview of existing mining

The mine is on a high-grade limestone resource. Subject to market demand the mine has typically produced up to 3.38 Mt of limestone and up to 200,000 t of shale per annum.

The mine produces a range of limestone products for internal and external customers in the Southern Highlands/Tablelands, the Illawarra and metropolitan Sydney markets for use primarily in cement and lime manufacture, steel making, agriculture and other commercial uses. Products are despatched by road and rail, with the majority despatched by rail.

Historically limestone mining was focused on the approximately 200-300 m wide Eastern Limestone and was split between a north pit and a south pit. A limestone wall (the 'centre ridge') rising almost to the original land surface, divided the two pits.

The north and south pits were joined in 2016/2017 by mining the centre ridge to form a single contiguous pit, approximately 2 kilometres (km) in length. However, the north pit/south pit naming remains important as mining locations continue to be reported with respect to one or other of the old pits.

Limestone and shale are extracted using open-cut hard rock drill and blast techniques. Limestone is loaded using front end loaders and hauled either to stockpiles or the processing plant using haul trucks. Oversized material is stockpiled and reduced in size using a hydraulic hammer attached to an excavator.

Limestone processing facilities including primary and secondary crushing, screening, conveying and stockpiling plant and equipment are in the northern end of the north pit. Kiln stone grade limestone is also processed on site through the existing lime plant comprising kiln stone stockpiles, rotary lime kiln, hydration plant and associated auxiliary conveying, processing, storage, despatch plant and equipment. Overburden from stripping operations is emplaced in the Western Overburden Emplacement (WOE), west of the open cut pits.

1.2.3 Overview of approved project

Consent was granted for a 30-year mine plan accessing approximately 120 Mt of limestone to a depth of 335 m. The mine footprint focuses on an expansion of the pit westwards to mine the Middle Limestone and to mine deeper into the Eastern Limestone.

As the Middle Limestone lies approximately 70-150 m west of the Eastern Limestone, the 30-year mine plan avoids mining where practical the interburden between these two limestone units thereby creating a smaller second, north-south oriented west pit with a ridge remaining between.

The north pit will also be expanded southwards, encompassing part of the south pit, leaving the remainder of the south pit for overburden emplacement and a visual barrier.

Limestone will be extracted at up to 4 Mtpa for 30 years until 31 August 2051. Clay shale will also continue to be extracted at up to 200,000 tonnes per annum (tpa). The limestone will be processed to create limestone and lime products including limestone aggregates and sand, hydrated lime and quick lime.

Existing infrastructure is being retained along with the following changes:

- relocation of a section of high voltage power line to accommodate a proposed overburden emplacement;
- realignment of a section of Marulan South Road, to accommodate a proposed overburden emplacement;
- relocation of the processing infrastructure and the stockpile and reclaim area at the northern end of the north pit to allow the northward expansion of the pit;
- development of a shared Road Sales Stockpile Area including a weighbridge and wheel wash to service both the mine and Peppertree Quarry; and
- construction of a 118 million litre (ML) in-stream water supply dam on Marulan Creek.

Boral will transport up to 600,000 tpa of limestone and hard rock products along Marulan South Road to the Hume Highway, as well as 120,000 tpa of limestone products to the agricultural lime manufacturing facility.

The Project provides continued direct employment for 118 people on the mine site and 73 offsite. It will operate 24-hours per day, 7 days per week. Blasting will continue to be restricted to daylight hours on weekdays, excluding public holidays.

Figure 1.1 and Figure 1.2 provide an overview of the approved project.

Figure 1.1 Project overview

Figure 1.2 The Project

1.3 Environmental management framework

The mine operates in accordance with the Boral integrated Health Safety, Environment and Quality Management System (HSEQ MS) which establishes a strategic platform for regulatory compliance and continual improvement in environmental management. This framework is documented in *GRP-HSEQ-1-01 Management System Framework and Operational Control*. The Boral HSEQ MS is aligned with the international standard ISO-14001.

1.3.1 Environmental management strategy

CoC D1 requires the preparation of an environmental management strategy (EMS) for the mine. The EMS provides the mine's strategic framework for environmental management.

1.3.2 Alignment with other plans

This document outlines the overarching strategy of which the other environmental management plans – air quality and greenhouse gas, traffic, water, groundwater, Aboriginal heritage, historic heritage, noise, blasting, bushfire management and biodiversity and rehabilitation form a part of.

1.4 Purpose and objectives

This EMS applies to all activities approved under SSD 7009, including maintenance activities and associated service and support functions.

The performance of environmental management at the mine will be managed through an EMS that is implemented across all of Boral's businesses. This EMS is tailored specifically to the mine and integrates the management plans and monitoring programs that have been prepared in accordance with relevant conditions of SSD 7009.

This EMS has been prepared to comply with CoC D1, which is described in Section 0

The EMS is structured around the plan-do-check-review framework and continual improvement objectives outlined in the international environmental management standard ISO-14001.

1.5 Document structure

The structure of this EMS is outlined in Table 1.1.

Table 1.1 Structure of the EMS

Section	Content
1	Provides an overview of the Project and objectives of the EMS.
2	Outlines statutory requirements associated with the development consent and consultation regarding the EMS.
3	Outlines implementation components of the EMS.
4	Includes checking and review components of the EMS.
Appendix A	Boral Environment Policy
Appendix B	Development Consent (SSD 7009)
Appendix C	EPBC Act Approval (EPBC 2015/7521)
Appendix D	Noise management plan
Appendix E	Blast management plan
Appendix F	Air quality and greenhouse gas management plan
Appendix G	Water management plan (including groundwater management plan)

Appendix H	Biodiversity management plan
Appendix I	Aboriginal cultural heritage management plan
Appendix J	Historic heritage management plan
Appendix K	Contaminated materials protocol
Appendix L	Bushfire management plan
Appendix M	Rehabilitation strategy
Appendix N	Traffic management plan
Appendix O	Emergency response procedure
Appendix P	Pollution Incident Response Management Plan

2 POLICY AND PLANNING

The success of the EMS requires detailed understanding and planning towards the mine's environmental impacts and controls, regulatory compliance requirements, internal corporate obligations, and community expectations. This Section outlines the planning aspects of the EMS.

2.1 Environmental policy

The context for environmental management at the mine is guided by the Corporate Environmental Policy of Boral Limited, regulatory compliance, growing community awareness/expectations and the proximity of the site to other local industry.

The Boral Limited Corporate Environmental Policy (see Appendix A) underpins the way in which the environment is managed across all of Boral's operations internationally. Boral is committed to pursuing industry specific best practice in environmental performance, complying with environmental legislation and open, constructive engagement with communities surrounding its operations.

The Boral Environmental Policy (November 2016) provides the foundation for the environmental objectives and the commitment that all employees and contractors undertake their duties in consideration of:

- efficient use of energy (including appropriate use of alternative fuels);
- conservation of water;
- minimisation and recycling of wastes;
- prevention of pollution;
- effective use of virgin and recovered resources and supplemental materials;
- open and constructive engagement with communities surrounding Boral
- operations;
- reducing the greenhouse gas emissions from Boral processes, operations and facilities;
- protecting and, where possible, enhancing biodiversity values at and around
- Boral facilities; and
- complying with environmental legislation, regulations, standards and codes of practice relevant to the particular business as the absolute minimum requirement in each of the communities in which Boral operate.

It is a Boral Corporate requirement that the Environmental Policy is clearly displayed in prominent locations at all operations and is included in training and induction programs undertaken by all employees and contractors.

Local communities are increasingly becoming more aware of the environmental performance of industry and have resulting high expectations. Marulan South is no different, and in light of this, community relations activities for the mine will seek to meet these expectations and earn a social licence to operate from the local community.

It is also recognised that the mine is in a semi-rural environment adjacent to other local industry. Peppertree Quarry is north of the mine, and Aglime Fertiliser's processing plant to the north west. The environmental performance of the mine will be monitored, assessed and managed in light of these cumulative impacts.

2.2 Aspects and impacts

Key Boral documents *GRP-HSEQ-1-03 Hazard Identification and Risk Management* and *GRP-HSEQ-8-01 Environmental Aspects and Impacts* will be implemented at the mine. The aspects

and impacts register is subject to scheduled reviews and updates (if required) to reflect any operational changes.

2.3 Development consent

This EMS has been prepared in accordance with the development consent. Table 2.1 presents the consent conditions relevant to the EMS and identifies where each condition has been addressed in this strategy. The development consent is in Appendix B.

Table 2.1 EMS requirements

Condition		Condition requirement	Section reference
D1		The Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Planning Secretary. This strategy must:	This strategy
	(a)	provide the strategic framework for environmental management of the development;	1.3
	(b)	identify the statutory approvals that apply to the development;	2.2, 2.3
	(c)	set out the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;	3.1
	(d)	set out the procedures to be implemented to:	
	(i)	keep the local community and relevant agencies informed about the operation and environmental performance of the development;	3.3, 4.3.2, 4.4, 4.5
	(ii)	receive record, handle and respond to complaints;	3.3.4, 3.3.5
	(iii)	resolve any disputes that may arise during the course of the development;	3.3.4, 3.3.5
	(iv)	respond to any non-compliance and any incident;	4.4
	(v)	respond to emergencies; and	3.6
	(e)	include:	
	(i)	references to any strategies, plans and programs approved under the conditions of this consent; and	1.3.2, 1.6
	(ii)	a clear plan depicting all the monitoring to be carried out under the conditions of this consent.	4.1
D2	The Environmental Management Strategy must be approved by the Planning Secretary within 3 months from the date of this consent, unless otherwise agreed by the Planning Secretary.		Noted
D3	The Applicant must implement the Environmental Management Strategy as approved by the Planning Secretary.		Noted

2.4 Statutory requirements

Key Boral document: *GRP-HSEQ-1-04 Legal Compliance and Other Requirements* will be implemented at the mine.

Operators need to know and understand the statutory requirements that apply to their operations. Boral maintains subscriptions to a number of on-line legal resources which are accessible for all employees through links available on the company's intranet.

The mine operates under the compliance requirements of a statutory approval and a NSW EPA environment protection licence. The following key statutory instruments apply to the mine.

2.4.1 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Approval from the Minister for the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required for any action that would result in a significant impact on matters of national environmental significance.

EPBC Act approval was sought in 2015 and granted in October 2021 ((EPBC 2015/7521) (refer to Appendix C). Conditions were applied in reference to native vegetation clearing (White Box-Yellow Box-Blakelys Red Gum Grassy Woodland and Derived Native Grassland and Koala/Large-eared Pied Bat habitat) and offsetting of approved clearing of the above vegetation/habitat).

2.4.2 The operations will need to be able to demonstrate compliance against the EPBC Act approval. Commonwealth *National Greenhouse and Energy Reporting Act 2007*

The Commonwealth *National Greenhouse and Energy Reporting Act 2007* (NGER Act) provides a single national framework for the reporting and dissemination of information about the greenhouse gas emissions, greenhouse gas projects, and energy use and production of corporations. It makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds.

Boral triggers the threshold for reporting under the NGER Act, and reports energy use and greenhouse gas emissions from its operations, including the mine.

2.4.3 NSW *Environmental Planning and Assessment Act 1979*

The Project was declared a State significant development (SSD) under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 8(1) of State Environmental Planning Policy (State and Regional Development) 2011 (now the Planning Systems SEPP).

Secretary's environmental assessment requirements were issued for the Project by the equivalent to the current NSW Department of Planning, Industry and Environment (DPIE) on 10 June 2015 with the development application and environmental impact assessment submitted on 20 March 2019.

Development consent was granted by DPIE on 19 August 2021.

The mine will be subject to the provisions of the EP&A Act for any future changes or modifications to the operations. Additionally, the operations will need to be able to demonstrate compliance against the CoC under the provisions of the EP&A Act.

2.4.4 NSW Protection of the Environment Operations Act 1997

The objectives of the NSW *Protection of Environment Operations Act 1997* (POEO Act) are to protect, restore and enhance the quality of the environment. Some of the mechanisms that can be applied, under the POEO Act, to achieve these objectives include reduction of pollution at source, monitoring and reporting of environmental quality.

Based on annual production volumes, the mine has been determined to be a 'scheduled activity' under Schedule 1 of the POEO Act which requires site operations to be the subject of an environmental protection licence (EPL No. 944).

The EPL is issued for the scheduled activities of cement or lime works and mining for minerals. The EPL will be varied in accordance with the consent prior to the commencement of operations under the consent.

2.4.5 NSW Water Management Act 2000

The NSW *Water Act 1912* (Water Act) and NSW *Water Management Act* 2000 (WM Act) regulate the management of water by granting licences, approvals for taking and using water, and trading groundwater and surface water. The WM Act applies to those areas where a water sharing plan has commenced. Alternatively, if a water sharing plan has not yet commenced, the Water Act applies. The WM Act is progressively replacing the Water Act as relevant water sharing plans are introduced across the State.

Water sharing plans (WSPs) have commenced for most of NSW. Licensing of monitoring bores continues under the Water Act until a regulation for aquifer interference gives a mechanism to approve these activities. Licensing of reinjection into groundwater systems is also still currently managed under the Water Act.

Surface water

The project is in the area of the Greater Metropolitan Region Unregulated Area WSP and the following three surface water sources within the WSP:

- Bungonia Creek Management Zone (commenced July 2011);
- Barbers Creek Management Zone (commenced July 2011); and
- Shoalhaven River Gorge Management Zone (commenced July 2011).

Boral's existing entitlements in these WALs are summarised in Table 2.2. Total water entitlements in the management zones and their access rules are summarised in Table 2.2.

Table 2.2 Surface water entitlements and access rules

WAL No	Works Approval	Water Source	Management Zone	Entitlement (ML)
Unregulated River				
WAL25207	10WA102352	Shoalhaven River Water Source	Barbers Creek Management Zone	76
WAL25373	10WA102377	Shoalhaven River Water Source	Barbers Creek Management Zone	10
Total Unregulated River				86
Domestic and stock				
WAL25352	10WA102352	Shoalhaven River Water Source	Barbers Creek Management Zone	1
Aquifer				
WAL24697	10WA116141 and 10WA116142	Goulburn Fractured Rock Groundwater Source		12
WAL41976		Goulburn Fractured Rock Groundwater Source		838
Total Aquifer				850

The proposed Marulan Creek dam will be in the Barbers Creek Management Zone. The surface water assessment identified a total annual surface water entitlement of up to 183 ML/year would be required. As summarised in Table 2.2, water licence trading is permitted in the Barbers Creek Management Zone, and sufficient surface water entitlements exist for the Marulan Creek dam.

Prior to construction of the Marulan Creek Dam, Boral would seek to acquire additional entitlements in the Barbers Creek Management Zone to account for water extracted from the dam.

Groundwater

Groundwater in the Project site is managed under the Goulburn Fractured Rock Groundwater Source zone of the 2011 Greater Metropolitan Region Groundwater Sources Water Sharing Plan (the plan).

Groundwater extraction requires an authorisation under the plan via a water access licence or some form of exemption. Boral holds entitlement to extract 12 ML/year (WAL24697) from two bores (10WA116142) for water supply on site. Boral also owns groundwater Water Access Licence 41976 for 838 ML, which was issued in September 2017.

2.4.6 State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (Drinking Water SEPP) aims to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal.

The mine is in Sydney's drinking water catchment. Under clause 10 of the SEPP, a consent authority must not grant consent to the carrying out of development on land in the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality.

It is considered that the Project can be managed to provide at least a neutral effect on water quality in the Shoalhaven River catchment

2.4.7 NSW *Biodiversity Conservation Act 2016*

The NSW *Biodiversity Conservation Act 2016* (BC Act) replaced the *NSW Threatened Species Conservation Act 1995*, *NSW Native Vegetation Act 2003* and the flora and fauna provisions of the NP&W Act.

As the Project is SSD, it is required to consider biodiversity impacts in accordance with the Biodiversity Offset Scheme of the BC Act, that requires impacts to first be avoided and then mitigated before being offset in accordance with the scheme. The preliminary biodiversity offset strategy is summarised below

The ecosystem credits required to offset vegetation and habitat impacts are summarised in Table 2.3.

Table 2.3 Ecosystem credit requirements

PCT	Required credits
PCT 1334 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (SR670)	1,038
PCT 778 Coast Grey Box – stringybark dry woodland on slopes of the Shoalhaven Gorges -Southern Sydney Basin (SR534)	885
PCT 1150 - Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges, north east South Eastern Highlands Bioregion (SR624)	260
731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion (SR524)	325

PCT 1334 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (SR670) - Non-EEC water dependent	0
Total	**1,470**

The species credits required to offset impacts on threatened fauna and flora are summarised in Table 2.4.

Table 2.4 Species credit requirements

Species credit species	Required credits
Solanum celatum	2
Koala	2,454
Large-eared Pied Bat	3,836

As required by the SEARs, a biodiversity offset strategy has been prepared for the Project. Boral has investigated offsetting opportunities in the Bungonia subregion and adjacent subregions and has purchased a 1,000 ha property and a 360 ha property in the Bungonia subregion for this purpose. The details of the properties have been withheld for confidentiality reasons.

The biodiversity values identified on the properties satisfy the following liabilities:

- PCT 778 Coast Grey Box stringybark dry woodland on slopes of the Shoalhaven Gorges - Southern Sydney Basin (SR534);
- PCT 1334 Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (SR670) and subsequent EPBC listed White Box Yellow Box Blakely's Red Gum Grassy Woodland;
- the EPBC Act offset requirement for the Koala and Large-eared Pied Bat; and
- partially satisfy the Koala and Large-eared Pied Bat BC Act offset liability.

The properties have been surveyed by Niche Environment and Heritage Pty Ltd and biodiversity credits have been calculated.

The remaining BC Act credit liability will be paid into the BCT Fund.

2.4.8 NSW *Contaminated Land Management Act 1997*

The phase 1 and 2 environmental assessment of the mine concluded there is no duty to report contamination to the EPA under Section 60 of the NSW *Contaminated Land Management Act 1997* (CLM Act).

If previously unidentified contamination is identified during construction or operation of the Project, additional assessment will be undertaken, and depending on the conclusions of the assessment, the contaminated area may be required to be notified to the EPA under Section 60 the CLM Act, and potentially remediated if required by the regulatory authority.

2.4.9 Other statutory requirements

Other Statutory instruments to which operations require compliance management are:

- NSW *Dangerous Goods (Road and Rail Transport) Act 2008*.
- NSW *Local Government Act 1993*.
- NSW *Work Health and Safety (Mines and Petroleum Sites) Act 2013*.
- NSW *Mining Act 1992*.
- NSW *Pesticides Act 1999*.

- NSW *Biosecurity Act 2015*.
- NSW *Soil Conservation Act 1938.*
- NSW *Roads Act 1993.*
- NSW *Work Health and Safety Act 2011.*

2.5 Objectives, targets and improvement programs

As part of a continual improvement process under key Boral document: GRP-HSEQ-1-05 Objectives, Targets and Improvement Plans, the environmental performance of every Boral site is measured with respect to progress and achievements on objectives, targets and program milestones.

A number of objectives and associated performance criteria has been developed for the mine and are outlined in the management plans.

3 IMPLEMENTATION AND MAINTENANCE

The implementation of the EMS will be the responsibility of a number of key internal stakeholders to ensure there is an appropriate level of resources, training and engagement in meeting the objectives outlined in Section 1.4.

3.1 Roles and responsibilities

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-2-01 Organisational Roles, Responsibilities and Resources.*

Overall responsibility for environmental management and performance of the mine is placed on the site manager. The site manager will be accountable for ensuring appropriate resources and training is made available to achieve compliance with the consent, relevant legislation, and implement and maintain the EMS to minimise on-site and near-site environmental impacts associated with the mine.

An environmental coordinator will be based at the mine to coordinate the implementation of the CoC together with EMS implementation and management. The environmental coordinator will:

- be responsible for environmental controls being employed during operations, responding to environmental incidents that occur on site, and coordinating resources to resolve them.
- be responsible for carrying out and/or coordinating the monitoring and reporting requirements of this EMS.
- take the lead and be the primary contact with government agencies and community relations as well as site environmental training.
- toolbox employees daily on aspects of the operation that might have specific environmental impacts on that day.

Mine employees will be responsible for good housekeeping and maintaining the areas in which they work. This includes alerting the environmental coordinator to adverse environmental impacts as a result of mine operations and responding to incidents such as spills and repairing environmental controls.

3.2 Environmental training and awareness

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-1-06 Training, Competency and Awareness.*

Environmental training and awareness is undertaken in a number of ways.

All employees and contractors working on site are required to be inducted to site annually, which covers both the safety and environmental requirements of the site.

Site specific environmental training occurs in relation to standard operating procedures or safe work method statements where environmental management is required.

Training will be given to all employees relative to the specific conditions stipulated in the consent.

Environmental awareness occurs through regular onsite briefing notes, displays and updates on the internal visual monitors.

The on-site environmental coordinator identifies training needs and provides periodic site-specific environmental awareness training and induction sessions to employees and contractors, as needed.

The mine production manager, technical manager and environmental coordinator provide environmental information through the regular toolbox talks.

Boral environmental alerts, which provide outcomes and learnings of industry sector issues are frequently posted on bulletin boards and become the topic of toolbox-talk sessions.

In accordance with the HSEQMS and corporate divisional requirements a regular report on environmental compliance and performance is prepared by the site environmental coordinator. The report is presented to the mine management team for review and action where necessary.

The Boral state and group environmental advisors are also provided with a regular overview of any significant matters which may be escalated to Board level.

3.3 Stakeholder communication and engagement

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-1-05 Communication and Consultation.*

A key commitment in the Boral Environment Policy (Appendix A) is that all operations will be undertaken through open and constructive relationships with local communities and government agencies.

In support of the policy, the HSEQ Management System requires that “All Site/Operation Managers have a responsibility to communicate on a range of topics including site performance to ensure employee, community and other stakeholder involvement and engagement in our HSEQ Management System strategies and to meet legislative requirements”.

3.3.1 Government agencies

As with all of Boral NSW operations, open and frequent dialogue will be maintained with DPIE and other government agencies including the resources regulator.

Regulatory authorities such as NSW EPA and DPIE will be informed of key operational activities in addition to the annual reporting required through annual returns, annual reviews and website publishing of environmental monitoring data.

3.3.2 Community

The mine has actively engaged with the local community throughout its life. Ongoing communication and engagement with the community will include:

- Representation on the community consultation committee (CCC) – see below.
- Membership of the Marulan Chamber of Commerce.
- Regular publishing of community newsletters.
- Active participation in local community events.
- Facilitation of site inspections and one on one consultation.
- Active engagement with key regulators, government and non-government organisations.
- Maintenance of an environmental and community complaints line and register.
- Actively managing and resolving community issues as they arise.

The site manager and environmental coordinator will be available to respond to any stakeholder enquiry or complaint. Signage at the mine entrance provides relevant contact details for general enquiries and environmental complaints.

Members of the public are also invited by appointment to inspect the mine and operations.

Copies of all approvals, management plans, licences, strategies, procedures, monitoring, complaints, and annual regulatory reports are all readily available on-site and on Boral's website should copies be required.

A stakeholder engagement plan, available on the website, outlines Boral's commitment to events and involvement in the community.

Community consultative committee

As required by CoC A24, a CCC will be established prior to commencement of development under the consent. The CCC will be established in accordance with DPIE's (2019) *Community Consultative Committee Guidelines: State Significant Projects*. The CCC will continue to operate during the life of the development, or other timeframe agreed by the Planning Secretary.

In accordance with CoC A25, the mine and adjoining Peppertree Quarry will form a combined CCC.

3.3.3 Access to information

Boral will, during the life of the mine, operate a phone line for general inquiries, complaints and concerns. This line will also be used as the blasting hotline.

Information regarding the environmental performance of the operations can be requested and sent to the caller by email, fax or mail.

In recognition of Part D Condition D17 of the consent, copies of all documentation required by the consent will be made available on the company website www.boral.com.au/locations/boral-marulan-south-operations.

3.3.4 Community complaints

Complaints about the environmental performance of the mine will be received through a complaint phone line which will be posted on the mine's website and regular newsletters. Complaints will also be received via the website and sent to the environmental coordinator and site manager. Initial contact with a complainant will be made within 24 hours (or as soon as is reasonably practical) of the complaint being received by the environmental coordinator or site manager.

The environmental coordinator will record each complaint in the sites complaint register and follow internal reporting processes through line management. The complainant will also be followed up to communicate what measures were put in place to deal with the complaint and prevent a recurrence.

The details of each complaint will be recorded including the:

- Date and time of the complaint.
- Method by which the complaint was made.
- Personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect.
- Nature of the complaint.
- Action taken by Boral in relation to the complaint, including any follow-up contact with the complainant; and if no action was taken, the reasons why no action was taken.

A summary of the complaints received will be tabled at each CCC meeting, placed on the website and included in the annual review.

3.3.5 Dispute resolution

If an environmental complaint or other matter of concern associated with the mine is unable to be satisfactorily resolved, a meeting with the senior operations, environmental and business managers will be convened.

The meeting will assess whether all practical actions have been taken to resolve the matter. All relevant stakeholders will be advised in writing of the meeting outcomes and on any further actions able to be taken to resolve the matter.

Boral will always endeavour to resolve disputes with neighbours and members of the local community without the need for third party intervention. However, if a matter cannot be resolved directly with Boral, landowners can refer the matter to the Planning Secretary for resolution. The decision made by the Planning Secretary once this process is followed, will be final.

3.4 Document control

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-2-04 Document Control and Records Management.*

The site manager, technical manager and environmental coordinator will have the joint responsibility of managing the EMS in accordance with the HSEQ MS Document Control Standard. All referenced documentation will be kept on-site and will be made readily available to anyone requesting a copy.

Revised versions of the EMS will be communicated to relevant internal and external stakeholders with all obsolete versions kept on-site to be destroyed.

3.5 Operational control

Documentation in relation to operations includes but is not limited to management plans, standard operating procedures, safe work method statements and checklists.

The Boral HSEQ system has several documents which outline the minimal operating requirements for environment management.

These Boral HSEQ standards include:

- *GRP-HSEQ-8-02 Water Management.*
- *GRP-HSEQ-8-03 Land Management.*
- *GRP-HSEQ-8-04 Waste Management.*
- *GRP-HSEQ-8-05 Noise Management.*
- *GRP-HSEQ-8-06 Air Quality Management.*
- *GRP-HSEQ-8-07 Spill Management.*
- *GRP-HSEQ-8-08 Ecosystems and Biodiversity Conservation Management.*
- *GRP-HSEQ-8-09 Culture and Heritage Protection Management.*

The operational standards are incorporated in the corresponding environmental management sub-plans, which are in the appendices of this EMS and incorporate the environmental management measures to which Boral committed in the EIS and response to submissions report and to comply with the consent.

3.6 Emergency response and preparedness

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-3-03 Emergency Preparedness and Response*.

As part of the EMS, an emergency response procedure (Appendix O) is in place to address emergencies that occur on site. Potential environmental emergencies have been identified along with associated risks and control measures to be implemented. All site employees, contractors and visitors will be educated on the emergency response procedure during the site induction.

Key emergency controllers will be trained in their specific role, and emergency drills will be carried out at least once per year.

As a means of preventing potential incidents and emergency situations, environmental hazard reporting will be promoted and encouraged amongst the workforce. Identified hazards will be entered into the incident reporting database with agreed controls and timeframes for completion and signed off by a site supervisor.

A more specific pollution incident response management plan (PIRMP) will be implemented at the mine and will include (Appendix P):

- Identifying and risk assessing the likelihood of hazards.
- Actions for preventing and responding to incidents.
- A site-specific inventory of all potential pollutants.
- Equipment to be used in an incident response.
- A plan to minimise environmental and human harm by the implementation of actions to be taken during or immediately after a pollution incident.
- Consideration of how an incident may impact neighbours.
- Communicating an incident to authorities and neighbours.
- Staff training on their roles and responsibilities under the PIRMP.
- Annual testing and review of the PIRMP.

The environmental coordinator ensures all employees and contractors with direct responsibilities associated with the PIRMP have a clear understanding of their roles and responsibilities by conducting periodic training and simulated incident drills. The PIRMP is reviewed at least once every 12-months.

4 CHECKING AND REVIEW

The effectiveness in the implementation of the EMS is assessed through environmental performance monitoring and periodic audit assessments of regulatory compliance.

4.1 Monitoring program

This section will be implemented with reference to key Boral document: *GRP-HSEQ-MP-4-01 Monitoring and Review.*

An environmental monitoring program has been prepared that consolidates the statutory compliance requirements with development consent and EPL monitoring conditions. The site-based environmental coordinator has the responsibility to ensure all monitoring and reporting is completed in accordance with statuary requirements and EMS objectives. Monitoring is summarised below.

Results from the monitoring will be reported monthly to the management team, on a regular basis to the CCC and placed on the website as part of the EPL requirements.

4.1.1 Air quality

Stack testing

Emissions from the kiln stack and lime hydration plant stack will be tested annually. The kiln stack is to be sampled for nitrogen oxides and solid particles and the lime hydration plant stack is to be sampled for solid particles. In addition, discharge parameters including diameter, volumetric flow rate, velocity and temperature are to be measured.

Meteorology

The site operates a 10 m tall automatic weather station to assist with the environmental management of site operations (Figure 4.1). The on-site weather station continuously measures the parameters in Table 4.1. The weather station is to be relocated in the future to a suitable position west of the current location due to the progression of the Project and the establishment of the WOE.

Table 4.1 Meteorological monitoring

Parameter	Unit of measure	Sampling frequency	Averaging period
Temperature	°C	Continuous	1-hour
Relative humidity	%	Continuous	1-hour
Wind speed	m/s	Continuous	15-minute
Wind direction	Degrees	Continuous	15-minute
Standard deviation of wind direction	Degrees	Continuous	15-minute
Rainfall	mm	Continuous	15-minute

Ambient air quality

The air quality monitors operated as part of the mine air quality monitoring network include three high volume air samplers (HVAS) measuring either TSP, PM_{10} and $PM_{2.5}$ and are shared with the Peppertree Quarry. In addition to this the mine also operates three dust deposition gauges.

The monitors are located as summarised in Table 4.2 and shown on Figure 4.2.

Table 4.2 Ambient air quality monitoring

Monitoring site ID	Type	Averaging period	Sampling period
Limestone Mine			
Sub Station	Dust Gauge	1-month	30 +/- 2 days
Freddie's Hill	Dust Gauge	1-month	30 +/- 2 days
Store Paddock	Dust Gauge	1-month	30 +/- 2 days
RT Dust 2	Real-time dust	10-minute	Continuous
Shared Limestone Mine and Peppertree Quarry			
HVAS – $PM_{2.5}$	HVAS – $PM_{2.5}$	24-hour	Every six days
HVAS – PM_{10}	HVAS - PM_{10}	24-hour	Every six days
HVAS - TSP	HVAS - TSP	24-hour	Every six days
Peppertree Quarry			
D1	Dust Gauge	1-month	30 +/- 2 days
D2	Dust Gauge	1-month	30 +/- 2 days
D3	Dust Gauge	1-month	30 +/- 2 days
RT Dust 1	Real-time dust	10-minute	Continuous

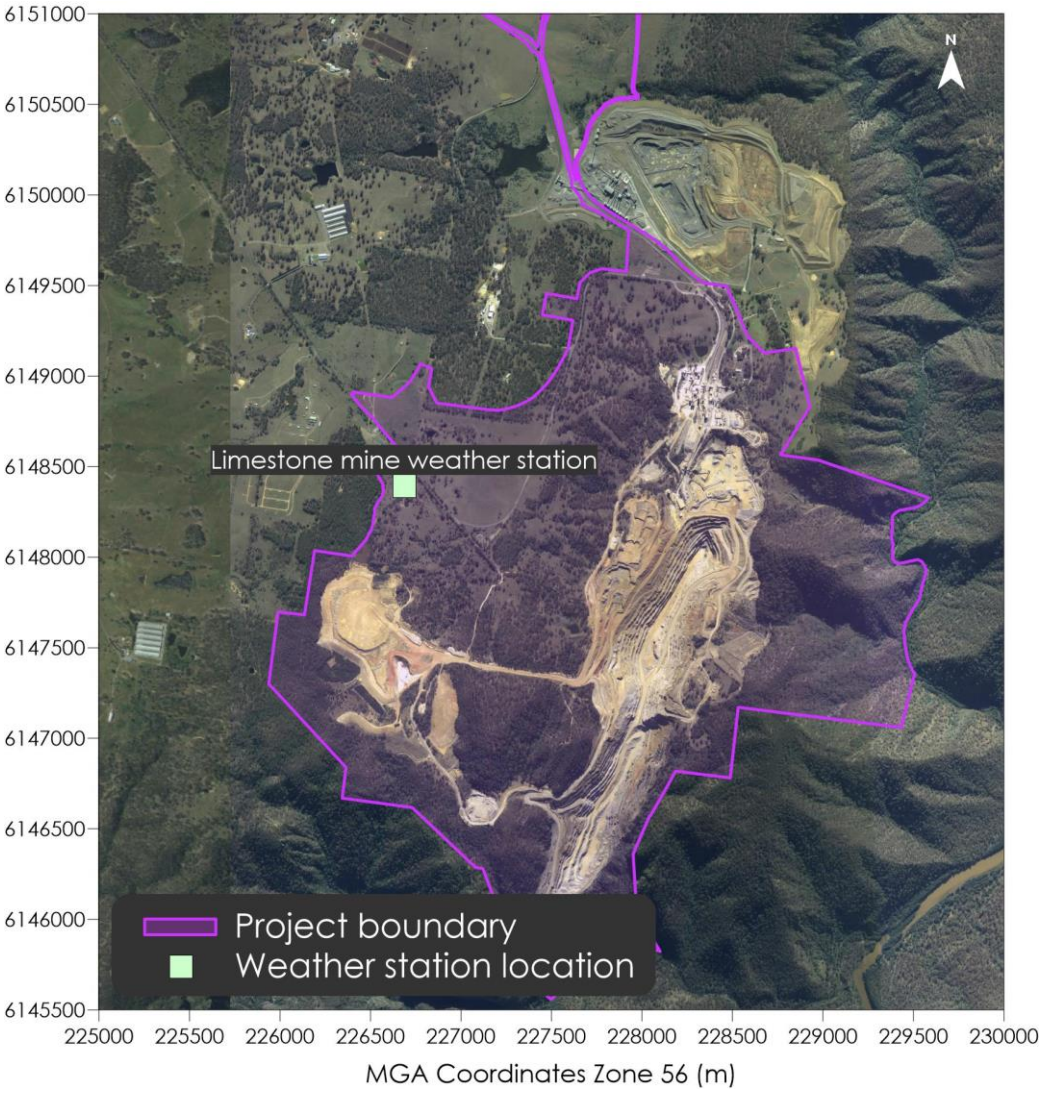

Figure 4.1 On-site weather station location

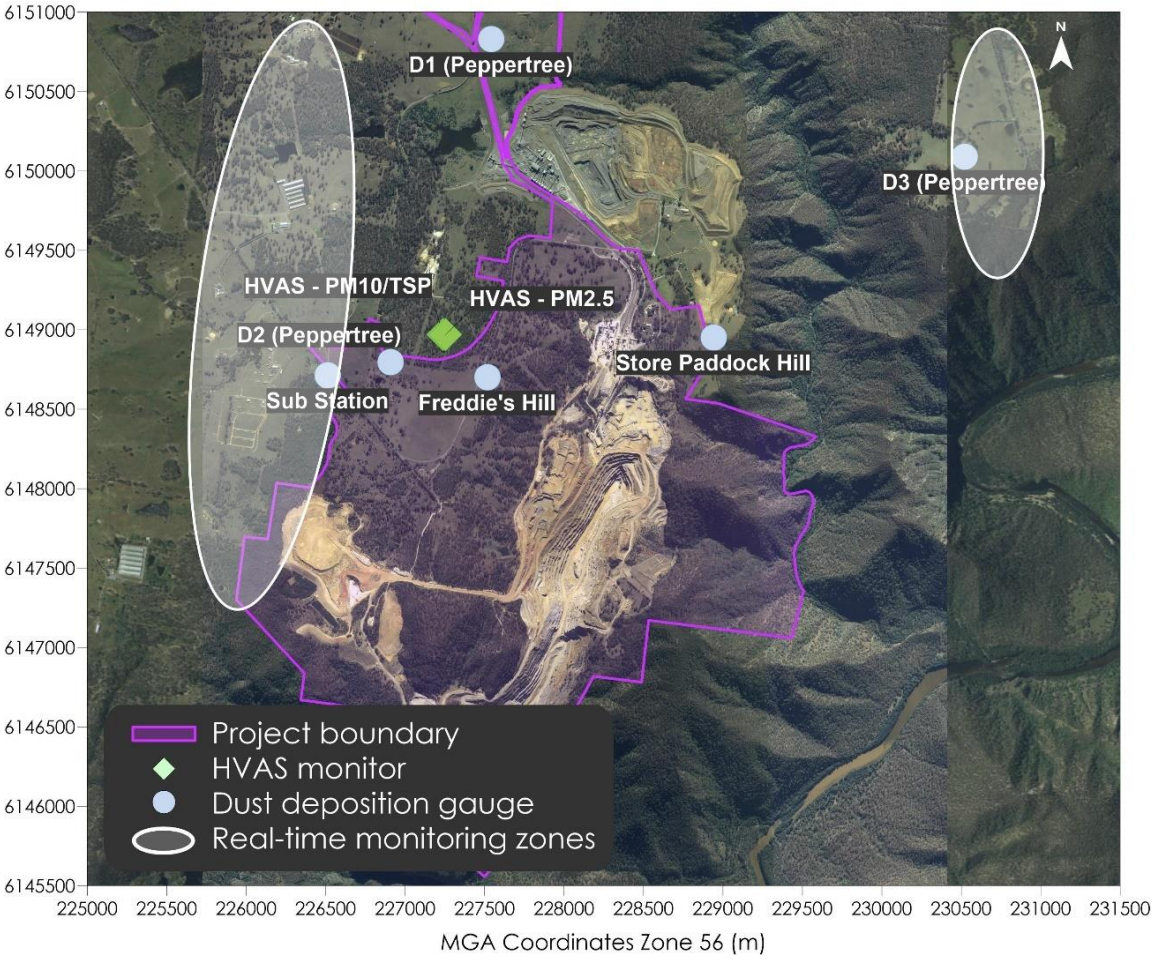

Figure 4.2 Ambient air quality monitoring network

4.1.2 Biodiversity

Biodiversity monitoring will be undertaken to:

- assess the effectiveness of the management measures presented in chapters 4 and 5 of Appendix H;
- assess progress against the performance indicators presented in Chapter 6 of Appendix H; and
- identify improvements that could be implemented to improve biodiversity outcomes.

Monitoring methods relevant to remnant vegetation are provided in Chapter 7 of Appendix H. The monitoring methods relevant to rehabilitation areas are provided in the rehabilitation strategy and currently include the use of ecosystem function analysis methodology.

4.1.3 Blasting

All blasts at the mine are monitored. Currently the mine has a blast monitor located near the mine managers residence, situated to the west of Marulan South Road (refer to Figure 4.3). An additional blast monitor will be installed to the north west of the mine.

In addition to the two mine specific blast monitors, additional monitoring from the Peppertree Quarry blast monitoring system is also available. This system measures blasts at five locations which are described in Table 4.3 and shown in Figure 4.3.

The blast monitoring system for the mine is proposed to be like the Peppertree Quarry blast monitoring system which comprises remote monitors that are in continuous operation with results being able to be reviewed online through a restricted access website.

Table 4.3 Blast monitoring locations

Monitoring Station	Entry Address	Station Description	Managed by
Blast Monitor	Marulan South Road	Adjacent to limestone mine managers house	Marulan South Limestone
B1	Long Point Road 1.8km from closest blast	Residence on opposite side of Barbers Creek gorge	Peppertree Quarry
B2	Rail Line 970m from closest blast	At the points to the north of the site	Peppertree Quarry
B3	Gas Pipeline 680m from closest blast	Adjacent to ramp up to the TLO	Peppertree Quarry
B4	643 Marulan South Road 1.6km from closest blast	Limestone mine managers house	Peppertree Quarry
B5	Turkey Farm 950m from closest blast	Adjacent to high voltage corridor and boundary fence	Peppertree Quarry

Figure 4.3 Blast and noise monitoring locations (Figure 6.1 of Appendix E)

4.1.4 Noise

Noise monitoring will comprise the following components:

- a permanent real time noise monitoring terminal (NMT) capable of facilitating adaptive management of noise within the mine;
- an operator attended monitoring program capable of determining compliance with the noise criteria; and
- a permanent real-time meteorological monitoring program capable of detecting and forecasting noise enhancing meteorological conditions.

The NMT will be installed at a location between the potentially most affected receiver identified in the EIS (R9) and the WOE as shown in Figure 4.3. Operator attended noise monitoring will be undertaken by an independent, suitably qualified acoustic consultant. Operator attended noise monitoring shall be conducted at suitable publicly accessible locations representative of receivers R6, R8, R9, R12 and R17.

Operator attended noise monitoring will be on a quarterly basis as a minimum. Monitoring will be undertaken during the daytime, evening and night time at each of the nominated representative receiver locations.

A summary of the unattended/permanent and operator attended noise monitoring locations is provided in Table 4.4.

Table 4.4 Noise monitoring locations

ID	Description	Type of Monitoring	Frequency of Monitoring	Criteria dB $L_{Aeq(15min)}$			Criteria dB $L_{AF(max)}$
				Day	**Evening**	**Night**	**Night**
NMT	Noise Monitoring Terminal	Unattended	Continuous	451	411	411	571
R6	Residential Receiver	Operator attended	Quarterly	40	35	35	52
R8	Residential Receiver	Operator attended	Quarterly	40	35	35	52
R9	Residential Receiver	Operator attended	Quarterly	40	36	36	52
R12	Residential Receiver	Operator attended	Quarterly	40	35	35	52
R17	Residential Receiver	Operator attended	Quarterly	40	35	35	52

4.1.5 Rehabilitation

Boral has currently adopted the ecosystem function analysis (EFA) monitoring methodology to assess rehabilitation progress. EFA is a transect-based monitoring method that measures for:

- landscape function analysis;
- vegetation dynamics;
- habitat complexity; and
- disturbance.

EFA involves the periodic measurement of landscape and vegetation parameters along transects established in rehabilitated areas. The data collected is converted into indices for comparison

against measurements made at nearby analogue (or reference) sites established in undisturbed target communities. Repeated EFA measurements should demonstrate development of rehabilitation towards rehabilitation completion criteria over time.

The domain rehabilitation objectives and completion criteria are in Table 6.1 of Appendix M.

4.1.6 Traffic and transport

Boral records all loads of product that depart the site via train and truck on the site road and rail weighbridge systems. The programs on the weighbridges record the following:

- Product code and description.
- Dispatch time and date.
- Quantity in tonnes.
- Customer.
- Mode of transport.

An annual summary of these records (product description, quantity in tonnes and modes of transport) will be included in the Annual Review.

Product dispatches will be monitored to prevent an exceedance of the hourly and daily limits prescribed in the consent.

4.1.7 Water quality

Ambient water quality

The ambient water quality parameters in Table 4.5 will be monitored at the sites in

Table 4.6 and Figure 4.4. Monitoring may cease in Barbers Creek and the Shoalhaven River once the NOE and WOE and all externally draining sections of the SOE are completed and rehabilitation has been established. However, ongoing quarterly monitoring will continue in Main Gully and Bungonia Creek for the duration of the Project.

Table 4.5 Ambient water quality monitoring parameters

Parameter		
pH	Sodium Adsorption Ratio	Electrical Conductivity @ 25°C
Total Dissolved Solids	Suspended Solids	Total hardness as $CaCO_3$
Bromide	Hydroxide Alkalinity as $CaCO_3$	Carbonate Alkalinity as $CaCO_3$
Bicarbonate Alkalinity as $CaCO_3$	Total Alkalinity as $CaCO_3$	Sulphate as SO_4
Chloride	Calcium	Magnesium
Sodium	Potassium	Fluoride
Arsenic (dissolved & total)	Aluminium (dissolved & total)	Barium (dissolved & total)
Copper (dissolved & total)	Iron (dissolved & total)	Lead (dissolved & total)
Manganese (dissolved & total)	Molybdenum (dissolved & total)	Nickel (dissolved & total)
Strontium (dissolved & total)	Zinc (dissolved & total)	Silicon as SiO_2
Nitrate + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N
Total Phosphorus as P		
Total Anions	Total Cations	Ionic Balance
Total Organic Carbon	Dissolved Oxygen	Biochemical Oxygen Demand

Table 4.6 Ambient water quality monitoring sites

Site	Description	Easting	Northing	Frequency
U1	Tangarang Creek upstream of Dam 1	226950	6149970	Quarterly
T1	Tangarang Creek downstream of Dam 1	228730	6150550	Quarterly
Marulan Up	Marulan Creek upstream of track crossing	225825	6151504	Quarterly
Marulan Down	Marulan Creek downstream of track crossing	228002	6151977	Quarterly
Barbers Up	Barbers Creek upstream	229518	6148416	Quarterly
Barbers Dn	Barbers Creek downstream	229542	6147306	Quarterly
Bungonia Up	Bungonia Creek upstream of mine	227294	6145485	Quarterly
Bungonia Dn	Bungonia Creek downstream of mine	228445	6145589	Quarterly
SR1	Shoalhaven River site 1	229183	6145620	Quarterly
SR2	Shoalhaven River site 2	229940	6146335	Quarterly
SR3	Shoalhaven River site 3	231172	6146891	Quarterly

Discharge

Excess runoff collected in sediment basins may be discharged from the locations detailed in Table 4.7. The following parameters will be monitored:

- Oil and grease
- pH
- Total Suspended Solids
- Turbidity

Table 4.7 Discharge monitoring

Receiving Water	Discharge Structure	Proposed Monitoring	Easting	Northing
Main Gully	Sediment Basin S2	Daily samples collected at the automated water sampler downstream of S2 during any discharge offsite	227325	6146075
North-eastern tributary of Tangarang Creek	Sediment Basin N2	Daily samples collected during any discharge offsite	227420	6149425
Eastern tributary of Tangarang Creek	Sediment Basin W1	Daily samples collected during any discharge offsite	226700	6148850

Water balance

Following the construction of the mine water dams, elevation-storage curves will be determined by “as constructed” survey and staff gauges will be installed within the reservoir to allow for the monitoring of water levels. The estimated location of the staff gauges is detailed in Table 4.8 and will be updated following installation.

Table 4.8 Water storage monitoring

Dam	Description	Easting	Northing
Kiln Dam	Expansion of the Kiln Dam as part of the NOE	228255	6149110
Eastern Gully Dam	New dam to be constructed to the east of the processing facility	228830	6148950
Central Dam	New dam constructed as part of the expansion of the WOE	227185	6147610
Main Mine Dam 2	Existing water supply dam	227360	6147600

Key water transfer and use (processing and dust suppression) will be monitored by the flowmeters summarised in Table 4.9. Monthly and total flow will be recorded at least monthly.

Table 4.9 Flowmeter locations

Flowmeter ID	Description	Easting	Northing
TBA	Tallong Weir to Marulan pipeline	228515	6149125
TBA	Eastern Gully Dam supply pipeline	228745	6148945
TBA	Kiln Dam supply pipeline	228500	6149100
TBA	Central Dam dust suppression supply	227080	6147500
TBA	North Pit Sump dust suppression supply	228150	6148250
TBA	Processing Plant Supply	228515	6149125
TBA	Sediment Basin N1 to Kiln Dam	228225	6149250
TBA	Sediment Basin N2 to Kiln Dam	227500	6149430
TBA	Sediment Basin W1 to Central Dam	226715	6148685
TBA	Sediment Basin W2 to Central Dam	226575	6147280

Stream and riparian health

Inspections will be conducted quarterly of Marulan, Barbers and Bungonia Creek to assess any potential changes in the stream or vegetation health. The inspections will be carried out by the environmental coordinator and include site notes and photographs. Inspections will be conducted at the surface water quality monitoring sites:

- Marulan Up
- Marulan Dn
- Barbers Up
- Barbers Dn
- Bungonia Up
- Bungonia Dn

Channel stability will be monitored via regular photographic records, as collected as part of stream and riparian vegetation monitoring inspections.

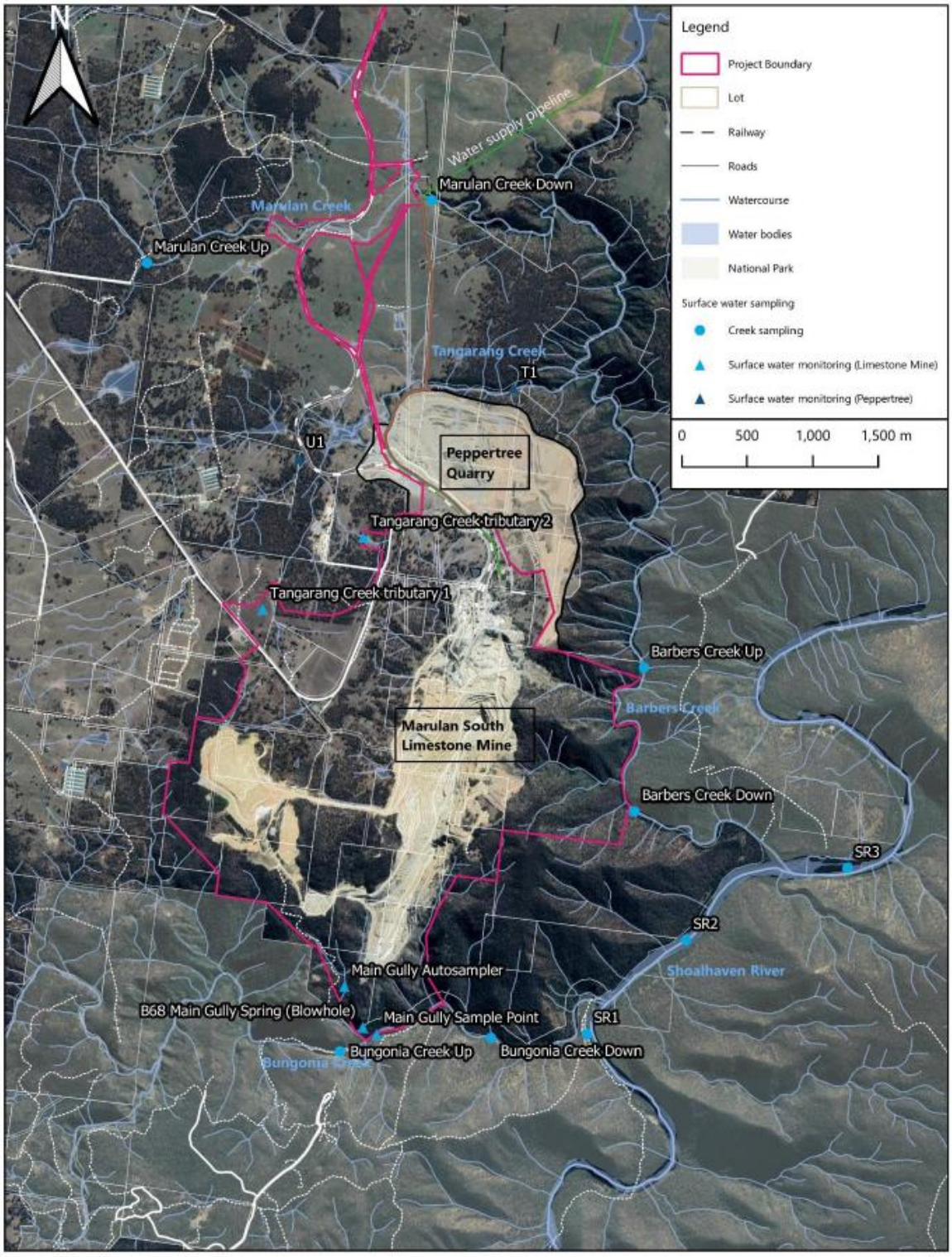

Figure 4.4 Water quality monitoring sites (Figure 3.1 of Appendix G)

4.1.8 Groundwater

Groundwater monitoring requirements are summarised below and in Table 4.10. Monitoring locations are shown on Figure 4.5.

Mine monitoring bores

Standing groundwater levels will be measured in all the mine monitoring bores with a decontaminated electronic water level meter and recorded to the top of the bore casing.

Manual level gauging and pressure logger sensor downloads will occur as part of each quarterly monitoring round. Data loggers will also be installed in the proposed monitoring bores.

The two shallow bores located along the Main Gully drainage line (MW3S and MW4S) monitor the potential interaction between groundwater and surface water associated with climatic conditions.

Groundwater users

The existing and additional monitoring bores proposed in Section 4 will monitor the regional groundwater levels and potential drawdown towards the groundwater users situated to the west and south-west of the mine.

The groundwater monitoring network will be adjusted to include any privately registered bores that may fall within the two-metre drawdown prediction on completion of model validations using the monitoring data. In addition, Boral may consider monitoring particularly concerned landholders or those in relatively close proximity and according to groundwater level trends observed in the monitoring bores.

Groundwater quality

Field measurement/observations of parameters, including pH, electrical conductivity, temperature, redox potential, colour, odour and sediment load will be recorded. The water quality analytical suite, to be analysed by a NATA accredited laboratory, includes the following parameters:

- pH, electrical conductivity and total dissolved solids (calc.);
- sodium adsorption ratio (SAR);
- total hardness;
- anions - fluoride, bromide, sulphate, chloride;
- alkalinity - hydroxide, carbonate, bicarbonate and total alkalinity;
- cations – calcium, magnesium, sodium, potassium;
- total and dissolved metals - aluminium, arsenic, beryllium, barium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, strontium, vanadium, zinc, boron, iron;
- dissolved and total recoverable mercury;
- dissolved silica; and
- suspended solids and oil and grease (WP16 only as required by EPL944 and to be replaced by the proposed groundwater monitoring WB07).

In addition, nitrates and total nitrogen will be analysed for groundwater monitoring bores MW5 and MW8. This is to detect any diffuse contamination associated with general mining activities, such as chemicals used for rock blasting seeping into underlying groundwater.

Groundwater quality samples will be collected from the mine monitoring bores bi-annually, after the wet season (March/April) and after the dry season (August/Sept).

Project water supply and groundwater production bores

Groundwater abstraction from production bores is measured through installed flow meters. The monthly production rates will be calculated from the flow meter readings and reported in the annual review and used to inform the water balance

Table 4.10 Summary of groundwater monitoring requirements

Bore ID	East	North	Purpose	Groundwater level monitoring frequency	Groundwater quality monitoring frequency	GW level trigger value		GW Q (EC) trigger [uS/cm]		GW Q (pH) trigger		Metals	Other site specific triggers
						5th %	95th %	5th %	95th %	5th %	95th %		
Marulan South monitoring bores													
MW3S	226618	6148365	GW Level and quality	Download logger and manual dip quarterly	bi-annually	599.9	602.13	1208	1452	7.4	7.9	Three exceedances of appropriate ANZECC guidelines based on beneficial use	None
MW3D	226608	6148370	GW Level and quality	Download logger and manual dip quarterly	bi-annually	600	602.2	1096	1375	7.4	8.1		None
MW4S	226718	6147140	GW Level and quality	Download logger and manual dip quarterly	bi-annually	564.25	565.78	1490	1728	7.3	7.8		dissolved Fe [mg/l]
MW4D	226717	6147129	GW Level and quality	Download logger and manual dip quarterly	bi-annually	547.02	548.89	1076	1384	7.7	8.8		None
MW5	227826	6148352	GW Level and quality	Download logger and manual dip quarterly	bi-annually ^			765	1386	6.5	11.5		None
MW6	228482	6147186	GW Level and quality	Download logger and manual dip quarterly	bi-annually	468	468.2	1039	2315	7.1	7.9		None
MW7	227525	6147816	GW Level and quality	Download logger and manual dip quarterly	bi-annually	bore dry, no sufficient baseline data available							
WB07	228001	6148555	Water supply GW Level and quality	Download logger and manual dip quarterly	bi-annually ^^	TBC (trigger levels derived after two years of monitoring)							
MW8	227447	6146019	GW Level and quality	Download logger and manual dip quarterly	bi-annually ^								
MW9	227570	6149019	GW Level and quality	Download logger and manual dip quarterly	bi-annually								

*** Peppertree monitoring bores: groundwater level data reported on in annual report**													
PQ01S	228788	6149365	To include data in annual review and 3-year model validation										
PQ01D	228783	6149375											
PQ03	228288	6149608											
PQ04S	227607	6149951											
PQ04D	227626	6149947											
PQ05	227423	6149780											
PQ06	227796	6150247											
**** Monitoring groundwater towards private bores at Marulan South monitoring bores**													
MW3D	226608	6148370	GW Level and quality	Download logger and manual dip quarterly	bi-annually	Review groundwater level data against 5th percentile and drawdown >2m due to mine influence. Assess groundwater quality against 95th percentile and beneficial use.							
MW9	227570	6149019	GW Level and quality	Download logger and manual dip quarterly	bi-annually								
MW4D	226717	6147129	GW Level and quality	Download logger and manual dip quarterly	bi-annually								
***** Monitoring groundwater seepage as spring flow at "Blow hole" through surface water monitoring plan**													
Blowhole' Sampling Point	227432	6145617	Spring flow and water quality	Quarterly	bi-annually								
Groundwater take													
Incidental, passive, and consumptive groundwater take:			> 100 % of Water Access Licences units for each applicable water source affected by the Project										

Notes: ^ nitrates and total nitrogen will be analysed for groundwater monitoring bores MW5 and MW8. This is to detect any diffuse contamination associated with general quarrying mining activities, such as chemicals used for rock blasting, seeping into underlying groundwater.

^^ suspended solids and oil and grease (historical from WP16 only as required by EPL944 and to be replaced by the proposed groundwater monitoring WB07.

* Groundwater monitoring data from the Peppertree Quarry groundwater monitoring network will be used to evaluate groundwater levels in the annual groundwater review. This relates especially to the four monitoring bores closest to the Marulan South mine complex, namely PQ01, PQ03, PQ04 and PQ05. All Peppertree piezometers were installed into granitic bedrock that Boral quarries at Peppertree.

** The groundwater monitoring network will be adjusted to include any privately registered bores that may fall within the two-metre drawdown prediction on completion of model validations using the monitoring data from these monitoring bores.

*** Monitoring and trigger information WMP.

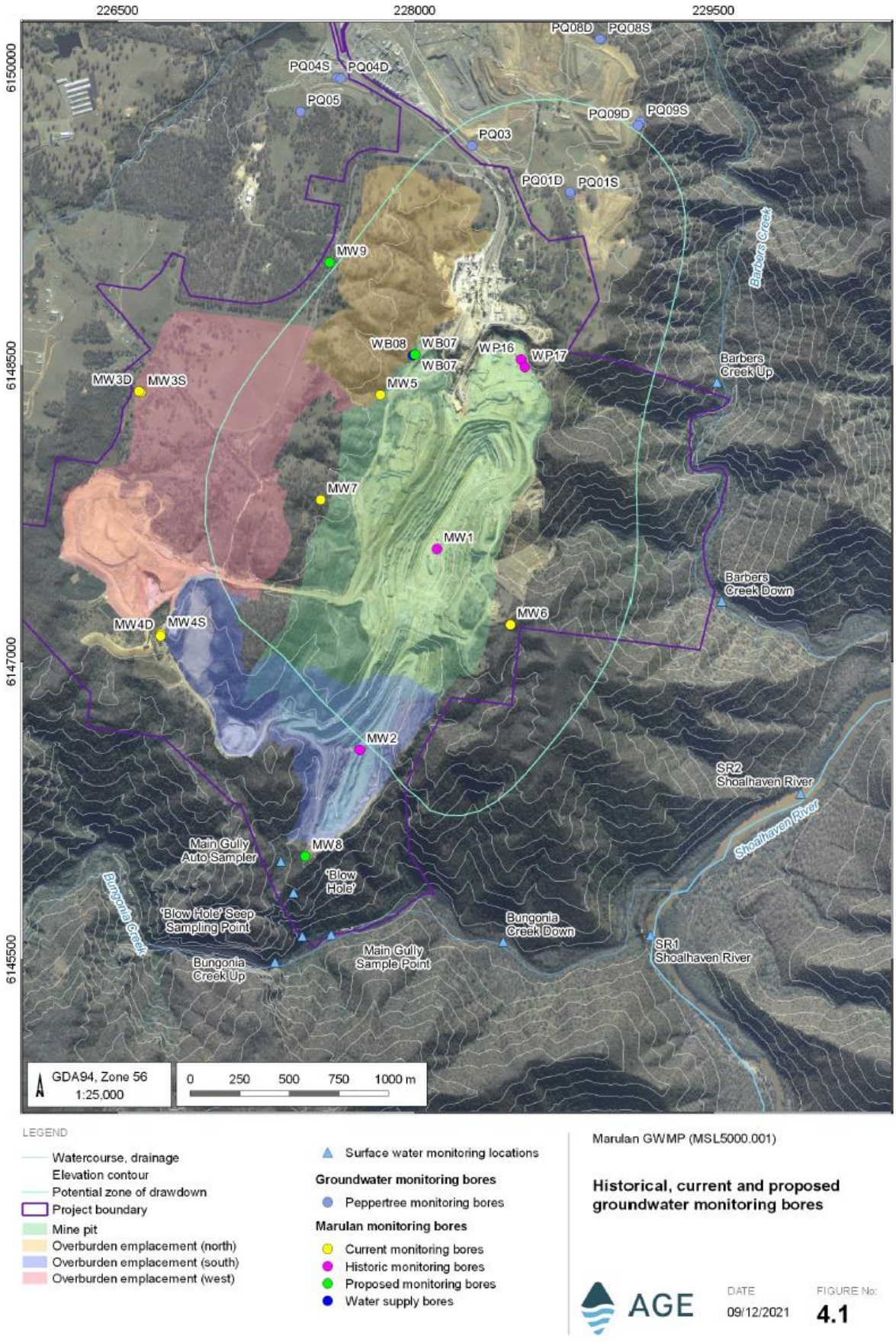

Figure 4.5 Historical, current and proposed monitoring bores (Figure 4.1 of Appendix A of Appendix G)

4.2 Cumulative impacts

Boral is committed to reducing cumulative impacts created by the collective operation of local industry including the mine, Boral's Peppertree Quarry and Aglime Fertilisers processing facility.

Effective management of cumulative impacts of noise and dust will be achieved by continuous improvement of mine practices to minimise the individual contribution of the mine. The analysis of mine monitoring programs will also be compared to those for the adjacent Peppertree Quarry to better understand what works could be undertaken in conjunction with these operations to reduce cumulative impacts. Measures taken to reduce cumulative impacts will be reported in the annual review.

4.3 Auditing and inspections

This section will be implemented with reference to key Boral document: *GRP-HSEQ-3-03 Performance Assessments and Audits.*

4.3.1 Internal audits and inspections

The mine is subject to Boral corporate and business level compliance governance programs that include the auditing of site based conformance with the HSEQ Management System and regulatory compliance requirements.

The site manager and environmental coordinator will conduct or coordinate scheduled site environmental inspections on key operational activities with findings being documented onto specific checklists.

Non-compliances identified during the audits and inspections will be reported to the relevant regulatory authorities, where required and registered onto the Boral Safety Information Management System (SIMS) from which electronic alerts are directed to senior business managers for action and tracking towards re-establishing compliance.

Alerts not actioned within specified timelines are progressively escalated through senior managers and ultimately to the CEO if corrective actions have not been appropriately implemented.

4.3.2 External audits

In accordance with Condition D13 (Part D) of the consent, an independent environmental audit will be engaged in the first year of operation then every 3 years thereafter.

Independent auditors will be suitably qualified and experienced and their appointment will be endorsed by the Planning Secretary. The audits and subsequent reporting will be in accordance with DPIE (2020) *Independent Audit – Post Approval Requirements.*

4.4 Management of non-compliances and incidents

This section will be implemented with reference to key Boral document: *GRP-HSEQ-3-02 Incident Reporting, Investigation and Action Management.*

Boral has a comprehensive incident management protocol in place for notification, investigation and reporting of actual and near miss incidents, including those associated with the environment or the community. This protocol will be implemented at the mine.

If an exceedance of the goals/limits/performance criteria in the consent is detected, or an incident causing (or threatening to cause) material harm to the environment is identified, the process outlined below will be followed.

4.4.1 Non-compliances

Non-compliances will be reported to the DPIE and EPA within seven days of becoming aware of the noncompliance, in accordance with Part D, Condition D10 of the consent.

The notification must be in writing through the Department's Major Projects Website and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

4.4.2 Incidents

Incidents will be immediately reported to DPIE in accordance with Part D, Condition D9 of the consent. The notification will be in writing through DPIE's Major Projects Website and will identify the development (including the development application number and name) and set out the location and nature of the incident.

An incident is defined in the consent as "An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance".

Under Part 5.7A of the POEO Act, the PIRMP also requires immediate reporting of incidents. The PIRMP outlines incidents that have the potential to cause material harm and therefore the actions to prevent and manage such incidents.

The POEO Act requires:

- Identifying and risk assessing the likelihood of hazards.
- Actions for preventing and responding to incidents.
- A site specific inventory of all potential pollutants.
- Equipment to be used in an incident response.
- Plan to minimise environmental and human harm by the implementation of actions to be taken during or immediately after a pollution incident.
- Consideration of how an incident may impact neighbours.
- Immediate reporting and ongoing communication of an incident to regulatory authorities and neighbours.
- Staff training on their roles and responsibilities under the PIRMP.
- Annual testing and review of the PIRMP.

The site manager (or nominated Boral authority) has the responsibility of ensuring all PIRMP reviews, revisions, training, testing and internal and external notifications are undertaken in compliance with POEO Act requirements.

The DPIE and EPA representatives will be advised of incidents as per the detail in the PIRMP.

Boral also maintains a safety and environmental incident reporting system. Any incidents relating to air quality will be entered into this system. All logged incidents are dealt with internally and, if necessary, through a NSW regulatory authority. Following reporting, all incidents are investigated and appropriate management recommendations are implemented.

4.5 Annual review

By the end of July each year after the commencement of development, or other timeframe agreed by the Planning Secretary, a report will be submitted to DPIE in accordance with Part D, conditions D11 and D12 reviewing the environmental performance of the development, to the satisfaction of the Planning Secretary.

4.6 Management review

The Boral HSEQ MS is reviewed on a regular basis.

This EMS is reviewed as required in response to:

- Changes to site activities or processes (including environmental controls, rehabilitation, incidents and non-compliances).
- Changes in environmental requirements through legislation, policy or best practice guidelines.
- An independent environmental audit.
- Recommendations or directives from DPIE or other regulatory authorities.
- Changes to the Boral HSEQ MS standards as part of its continual improvement objectives.

This EMS is to be reviewed in accordance with Part D, Condition D7 of the consent which requires a review within 3 months of:

a. the submission of an incident report under Condition D9;
b. the submission of an annual review under Condition D11;
c. the submission of an independent environmental review under Condition D12;
d. the approval of any modification of the conditions of this approval (unless the conditions require otherwise); or
e. notification of a change in project stage under Condition A15.

5 REFERENCES

This EMS has been prepared with consideration to:

- Boral integrated Health Safety, Environment and Quality Management System (HSEQ MS) as outlined in GRP-HSEQ-1-01 Management System Framework and Operational Control.
- ISO-14001.

APPENDIX A

Boral Environmental Policy

APPENDIX B

Development Consent (SSD 7009)

APPENDIX C

EPBC Act Approval (EPBC 2015/7521)

APPENDIX D

Noise Management Plan

APPENDIX E

Blast Management Plan

APPENDIX F

Air Quality and Greenhouse Gas Management Plan

APPENDIX G

Water Management Plan (including Groundwater Management Plan)

APPENDIX H

Biodiversity Management Plan

APPENDIX I

Aboriginal Cultural Heritage Management Plan

APPENDIX J

Historic Heritage Management Plan

APPENDIX K

Contaminated Materials Protocol

APPENDIX L

Bushfire Management Plan

APPENDIX M

Rehabilitation Strategy

APPENDIX N

Traffic Management Plan

APPENDIX O

Emergency Response Procedure

APPENDIX P

Pollution Incident Response Management Plan

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