

ADN. 52 000 005 550

Water Management Plan

for the

New Berrima Clay/Shale Quarry



Strategic Environmental & Engineering Consulting (SEEC) Pty Ltd



June 2016

Approved by

the Secretary's nominee, Howard Reed, on 9 June 2016



Water Management Plan

for the

New Berrima Clay/Shale Quarry

PA08_0212

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COMMONLY USED ACRONYMS

AHD	Australian Height Datum
AS	Australian Standard
CPESC	Certified Professional in Erosion and Sediment Control
DECC	Department of Environment and Climate Change
DPE	Department of Planning and Environment
DPI-Water	Department of Primary Industries - Water
EC	Electric Conductivity
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ESCPs	Erosion and Sediment Control Plans
NATA	National Association of Testing Authorities
PA	Project Approval
SEEC	Strategic Environmental Engineering Consulting Pty Limited
SEPP	State Environmental Planning Policy
SWMP	Site Water Management Plan
TSS	Total suspended solids

KEY FACTS AND FIGURES

Project Areas	Quarry Site – 51 ha	
(approximate)	Extraction Area Stages 1-4 – 5.5 ha	
	Extraction Area Stages 5-7 – 5.0 ha	
	Surplus Overburden Stockpile Area – 1.5 ha	
	Final Landform Area South – 1.4 ha	
	Total Area of Disturbance - 14 ha	
Annual Production	Maximum 150 000t per year	
Approved Quarry Life	Until 30 June 2045	
Capital Investment	Approximately \$1 million	
Employment	Approximately four full time equivalent positions	
Extraction Equipment	Scraper, bulldozer, haul truck, front-end loader	
Extraction Floor	640m AHD	
Extraction Stages and Resources	Stages 1 to 4 (southern section of extraction area) Approximately 1.6 million tonnes	
	Stages 5 to 7 (northern section of extraction area) Approximately 2.3 million tonnes	
Hours of Operation	Monday to Friday - 7:00am to 5:00pm	
	Saturday - 8:00am to 1:00pm	
	Sundays and Public Holidays – No Operations	
Length of Sealing of Quarry Access Road	Approximately 400m (from Berrima Road)	
Traffic Volumes	Typical day - 0 to 34 truckloads (0 to 68 truck movements)	
(approximate)	Typical transport campaign day – 17 to 34 truckloads (34 to 68 truck movements)	
	Maximum per day - 68 truckloads (136 truck movements)	
Visibility Barrier Dimensions	Central Visibility Barrier - approximately 8m to 12m high, 30m to 45m wide, and 420m long (Area =1.5 ha)	
(approximate)	Northern Visibility Barrier - approximately $8m$ to $9m$ high, $35m$ to $50m$ wide, and $160m$ long (Area = 0.7 ha)	
	Southern Visibility Barrier – up to 4m high, up to 20m wide, and up to $350m \log(Area = 0.7 ha)$	

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1. INTRODUCTION

This *Water Management Plan* (the Plan) has been prepared by Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd in conjunction with R.W. Corkery & Co. Pty Limited on behalf of The Austral Brick Company Pty Ltd (Austral) for the New Berrima Quarry (the Quarry). The Quarry is located approximately 1.5km east of New Berrima in the Southern Highlands of NSW (**Figure 1**).

This Plan has been prepared in satisfaction of *PA Conditions* 3(13) to 3(15), 3(18) and 5(3) of Project Approval (PA) 08_0212¹ and describes the following.

- The consultation undertaken during preparation of this Plan.
- The legal and other requirements associated with management of sediment, erosion and water within the Site.
- The objectives and key performance outcomes for this Plan and the Quarry.
- Roles and responsibilities.
- Competence training and awareness.
- A site water balance.
- An erosion and sediment control plan.
- A surface water monitoring program.
- A groundwater monitoring program.
- Complaints handling and response procedures that will be implemented.
- Corrective and preventative actions that will be implemented should exceedance(s) of the relevant criteria be identified.
- Incident reporting procedures.
- Publication of monitoring information.
- Plan review.

The approved Quarry is fully described in the *Environmental Assessment* dated May 2015 to support a modification to PA 08_0212, and the *Environmental Assessment* dated December 2010 and associated documentation prepared to support the application for PA 08_0212. Key facts and figures about the approved quarry are provided on the previous page and an overview of the approved activities and staged operations are outlined in Section 2.

In addition, a range of other management plans have also been prepared to guide operations within the Quarry. These include the following.

- Environmental Management Strategy.
- Noise Management Plan.
- Transport Management Plan.
- Landscape Management Plan.
- Air Quality Management Plan.
- Aboriginal Cultural Heritage Management Plan.

¹ All conditions in Project Approval 08_0212 are referred to as *PA Condition*

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2. APPROVED ACTIVITIES AND STAGED OPERATIONS

2.1 APPROVED ACTIVITIES

The approved activities at the Quarry (Figure 2) comprise the following.

- Construction of visibility barriers to provide visual screening for the quarry operations.
- Establishment of an extraction area to extract clay/shale using standard ripping, pushing and loading techniques.
- Use of an existing site access road and upgrading of two intersections.
- Transportation of up to 150 000t per year of quarry products via Berrima Road using articulated and rigid trucks not exceeding 19m in length.

The relevant limitations upon the approved activities nominated in Conditions within Project Approval 08_0212 are as follows.

- "The Proponent shall not carry out any development in the extraction area below a level of 640m AHD" *PA Condition 2(6)*.
- "The Proponent shall not extract more than 150 000 tonnes of extractive materials from the site in any calendar year" *PA Condition* 2(7).
- "The Proponent shall not transport more than:
 - a) 150 000 tonnes of product from the site in any calendar year;
 - b) 68 laden trucks from the site in a day; and
 - c) 8 laden trucks from the site in an hour.

The approved quarry life is until 30 June 2045 and the approved hours of operation are outlined in **Table 1**.

Day	Extraction Operations	Clay/Shale Transportation
Monday – Friday	7:00am to 5:00pm	7:00am to 4:00pm
Saturday	8:00am to 1:00pm	8:00am to 1:00pm
Sundays and Public Holidays	None	None

Table 1 – Hours of Operation

THE AUSTRAL BRICK COMPANY PTY LIMITED

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2.2 STAGED OPERATIONS

The sequence of extraction throughout the initial stages of the quarry will reflect the need to complete the construction of a visibility barrier to the north of the southern section of the extraction area (**Figure 2**) using overburden, whilst gaining access to the underlying shale as efficiently as practicable. **Figure 3** displays the staging sequence throughout the life of the Quarry. As the quarry progresses, the sequence of extraction will reflect the need to screen the operations from residences to the north of the Quarry Site. The approximate sequence plan for extraction is as follows.

Year 1	_	Stage 1 extraction to provide material for central visibility barrier construction. Commence extraction of shale in Stage 2.
Years 2 to 4	—	Complete extraction of shale in Stage 2.
Years 5 to 14	-	Complete Stage 3 and 4 of extraction and complete extraction in southern section of extraction area.
Years 15 to 30	-	Commence extraction in Stage 5 to build northern visibility barrier. Complete extraction of Stages 6 and 7 progressively.

3. CONSULTATION

3.1 GOVERNMENT CONSULTATION

The following government agency consultation was undertaken during the preparation of this Plan.

- Correspondence from the Department of Planning and Infrastructure (now Department of Planning and Environment (DPE)) dated 31 July 2012 approved Andrew Macleod of Strategic Environmental Engineering Consulting Pty Limited (SEEC) to prepare this Plan.
- An email was originally sent to the following agencies on 16 August 2012 to alert them to the fact that this Plan was in preparation and requesting any requirements for inclusion in the Plan.
 - NSW Department of Primary Industries (DPI)-Water (formerly NSW Office of Water). No response was received.
 - The Environment Protection Authority (EPA) replied on 24 August 2012 stating the Authority does not review draft management plans during their preparation. Rather, final plans could accompany an application for an environment protection licence.
 - Sydney Catchment Authority (now WaterNSW). No response was received.
- Discussions were held with DPI-Water in December 2015 regarding the approach to groundwater management and monitoring. These discussions related principally to the timing for the requested groundwater monitoring. The agreed position was reflected in the conditional requirements in Mod 1 of PA 08_0212 which is also reflected in this document.

THE AUSTRAL BRICK COMPANY PTY LIMITED *New Berrima Clay/Shale Quarry – PA08_0212*



- A draft version of this Plan was provided to WaterNSW on 4 February 2016. WaterNSW responded to the draft document on 15 February 2016 noting that "the Water Management Report is comprehensive and meets the requirements identified in the planning approval regarding surface water management at the New Berrima Quarry Site" (see **Appendix C**).
- Consultation was undertaken with DPI-Water during the preparation of the Plan with a set of generic requirements provided on 26 November 2015 and a request to review a draft of the Plan. A draft version of this Plan was provided to DPI-Water on 4 February 2016.

DPI-Water provided a comprehensive set of comments regarding the contents of the draft document regarding a range of issues (see **Appendix C**). Each of the issues raised were addressed reflecting the actual risk to both surface water and groundwater from the approved quarry. A range of text amendments and corrections have been incorporated in the final document reflecting the comments provided by DPI-Water.

3.2 COMMUNITY CONSULTATION

Austral will maintain contact with the community through the required Community Consultative Committee (CCC). This committee will be established prior to the commencement of site activities. The CCC will meet at intervals considered appropriate by the committee.

4. LEGAL AND OTHER REQUIREMENTS

Austral was granted PA 08_0212 by the Director-General of Planning and Infrastructure on 7 July 2012 pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Modification 1 of PA 08_0212 was issued on 15 December 2015 to incorporate modifications to the Quarry associated with an alternate extraction area boundary. PA 08_0212 includes the conditions that Austral needs to comply with and sets out the matters that need to be addressed within this plan. Relevant water-related conditions in PA 08_0212 are reproduced in **Table 2** together with a reference to the relevant section(s) where each condition is addressed in this document.

Schedule	Condition	Plan Section
WATER		
3 (Soil & The Pro Act 191	Nater - Note) ponent is required to obtain the necessary water licences for the project under the Water 2 and/or Water Management Act 2000.	12.3
3(13)	The Proponent shall maintain a minimum buffer distance of 730m (measured from the top of bank) between extraction area and Wingecarribee River.	Figure 2
3(14)	The Proponent shall ensure that all surface water discharges from the site comply with section 120 of the POEO Act or, if an EPL has been issued regulating water discharges from the site, the discharge limits (both volume and quality) set for the project in the EPL.	9.4.4.3 11.2
3(15)	The Proponent shall ensure it has sufficient water for all stages of the project, and if necessary, adjust the scale of quarrying operations on site to match its available supply.	9.3
3(16)	The Proponent shall manage on-site sewage to the satisfaction of Council and EPA.	13.1

Table 2 – Project Approval Requirements	s Relating to Water Management
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Table 2 – Project Approval Requirements Relating to Water Management (Cont'd)

		Page 2 of 3
Schedule	Condition	Plan Section
3(17)	The Proponent shall ensure all chemicals and/or petroleum products on site are stored in accordance with Australian Standard AS1940-2004, <i>The Storage and Handling of Flammable and Combustible Liquids</i> , and in appropriately bunded areas with impervious flooring and of sufficient capacity to contain 110% of the largest container stored within the bund. The flooring and bund(s) shall be designed in accordance with:	13.1, 13.2
	 the requirements of relevant Australian Standards; and 	
	• DECC's Storing and Handling Liquids: Environmental Protection – Participants Manual.	
3(18)	The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan must be prepared in consultation with the EPA, SCA and NOW by suitably qualified and experienced persons whose appointment has been approved by the Director-General, and be submitted to the Director-General for approval prior to the construction the amenity bunds on site.	This Document
	In addition to the standard requirements for management plans (see condition 3 of schedule 5),this plan must include a: (a) Site Water Balance that includes details of:	9
	 sources and security of water supply, including contingency planning for future reporting periods; 	9.3
	water use on site;	9.2
	water management on site;	9.4
	 reporting procedures, including comparisons of the site water balance each calendar year; and 	9.3.2
	• describes the measures that will be implemented to minimise clean water use on site;	9.4.7
	(b) Surface Water Management Plan, that includes:	51
	 detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project; 	11.3.1.1
	 a detailed description of the surface water management system on site, including the: clean water diversion systems; erosion and sediment controls; and water storages; 	Appendix A and 9.4
	 a plan for identifying, extracting, handling, and the long-term storage of potentially acid forming material on site; 	Not Applicable
	 detailed plans, including design objectives and performance criteria, for: the water storage dams; reinstatement of drainage lines on the rehabilitated areas of the site; control of water pollution from rehabilitated areas of the site; 	Appendix A and 9.4
	 performance criteria for the following, including trigger levels for investigating any potentially adverse impacts, for the following: the water management system; surface water quality of local water ways; and ecosystem health of local water ways; 	11
	 performance criteria for surface water quality attributes relevant to water quality impacts on biological diversity and aquatic ecological integrity, including salinity, heavy metals, sediment load, pH, hardness and biological oxygen demand; 	5.5
	 a program to monitor the effectiveness of the water management system; surface water flows and quality in local water ways; and ecosystem health of local water ways; 	Appendix A
	 a plan to respond to any exceedances of the performance criteria, and mitigate and/or offset any adverse surface water impacts of the project; and 	14, 16, 17
	(c) Groundwater Management Plan, which includes:	
	 detailed baseline data on groundwater levels, yield and quality in the area, that could be affected by the project; 	12.2

r		Page 3 of 3
Schedule	Condition	Plan Section
3(18) (Conťď)	 groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts; 	Not Yet Applicable
	a program to monitor:	12.2
	- groundwater inflows to the guarrying operations;	
	- the impacts of the project on:	
	 local alluvial aquifers; 	
	 any groundwater bores on privately-owned land that could be affected by the project; 	
	 the seepage/leachate from water storages or backfilled voids on site; and 	
	 groundwater dependent ecosystems; 	
	 a plan to respond to any exceedances of the groundwater assessment criteria; 	Not Yet Applicable
4(1)	As soon as practicable after obtaining monitoring results showing an:	Not Yet
	(a) exceedance of any relevant criteria in schedule 3, the Proponent shall notify affected landowners in writing of the exceedance, and provide regular monitoring results to each of affected landowner until the project is again complying with the relevant criteria.	Applicable
5(3)	The Proponent shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:	5.4
	(a) detailed baseline data;	
	(b) a description of:	4
	 the relevant statutory requirements (including any relevant approval, licence or lease conditions); 	
	 any relevant limits or performance measures/criteria; and 	
	 the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; 	
	(c) a description of the measures that will be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	13
	(d) a program to monitor and report on the:	
	- impacts and environmental performance of the project; and	11.3
	- effectiveness of any management measures (see (c) above);	12.2
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	16, 17
	 (f) a program to investigate and implement ways to improve the environmental performance of the project over time; 	10
	(g) a protocol for managing and reporting any:	14, 15,
	- incidents;	16, 17
	- complaints;	
	 non-compliances with statutory requirements; and 	
	- exceedances of the impact assessment criteria and/or performance criteria; and	
	(h) a protocol for periodic review of the plan.	19
	Note: The Director-General may waive some of these requirements if they are unnecessary	
	or unwarranted for particular management plans.	
5(7)	The Proponent shall notify, at the earliest opportunity, the Director-General and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the any incident for any other incident agencies of with the property of the property of the second with the property of the property o	17
	notify the Director-General and any other relevant agencies as soon as practicable after the	
	Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further report as may be required.	
5(9)	The Proponent shall provide regular reporting on the environmental performance of the	10
5(6)	project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.	ιŏ

Commitment				
Desired Outcome	Action	Timing	Plan Section	
Minimisation of potential impacts on surface water	4.1 Commence extraction on the southern slopes of the hill in the middle of the Quarry Site to minimise the risk of sediment – laden flows to the Wingecarribee River.	Commencement of extraction.	Appendix A	
quality and supply of the	4.2 Ensure early and progressive revegetation of amenity bunds and rehabilitation of completed extraction areas.	Ongoing.	10.2.1.1	
watercourse system, particularly the	4.3 Use of any water sourced from the sedimentation basins for dust suppression within the upslope catchment of a sedimentation basin.	As required.	Not Applicable	
Wingecarribee River.	4.4 Install sediment control fencing around the amenity bunds under construction and other areas of exposed soil until vegetation has been established.	As required.	Appendix A	
	4.5 Construct and operate various surface water management controls such as diversion structures and sedimentation basins.	During six month construction period.	Appendix A	
	 Design operational sedimentation basins including an emergency spillway designed to safely convey the 100- year ARI flow (DECC, 2008). 	During six month construction period.	Appendix A 10.2.1.2	
	 Inspect sedimentation basins fortnightly and within 24 hours following any five-day rain event exceeding 36.2 mm to check their capacity and integrity. 	Ongoing.	10.2.2.	
	 Repair any damaged components of the sedimentation basins as soon as practicable. 	As required.	10.2.2	
	 Discharge sedimentation basins only when water has 50mg/L or less of suspended sediment. 	As required.	9.4.4.3 10.2.2	
	 Discharge waters within five days after the conclusion of a rain event, at or below the required water quality limit of 50mg/L. 	As required.	9.4.4.3 10.2.2	
	 Install a marker in each sedimentation basin showing the boundary between the Storage Zone (i.e. the lower zone) and the Settling Zone (i.e. the upper zone) in the basin. 	During six month construction period.	10.2.1.2	
	 Inspect the level of retained sediment after discharging treated water from any sedimentation basin. If retained sediment exceeds the marked level of the Storage Zone, remove sediment and add to an active stockpile. 	As required.	10.2.1.2	
	 Regularly review the management procedures for the sedimentation basins to ensure ongoing efficient operation and protection of downstream water quality. 	Ongoing.	10.2.3	
	 Armour potential scour points (e.g. channel inlets/outlets and bends) with rock. 	During six month construction period.	Appendix A	
	 Inspect diversion structures monthly and within 24 hours following any rain event that generates flow in the drains to identify areas of erosion, scour or damage. Repair any problem areas and/or take appropriate stabilising action. 	Ongoing.	10.2.2	
	4.6 Develop and implement a (Soil and Water Management Plan (Environmental Management Plan) for the Site, comprising:	Following project approval.		
	- A Surface Water Monitoring and Response Plan;		11	
	- An Erosion and Sediment Control Plan;		Appendix A	
	- A Site Water Balance.		9	

Table 3 – Statement of Commitments Relating to Water Management

5. EXISTING DRAINAGE, CATCHMENTS AND DAMS

5.1 EXISTING CATCHMENTS AND HYDROLOGY

The extraction area occupies the northern extent of a hillcrest position with radial drainage primarily towards the north and east. Although all surface runoff from the Quarry Site ultimately reaches the Wingecarribee River, three small catchments are present within the Quarry Site. These are shown in **Figure 4** and are labelled as Catchments A, B and C respectively.



Figure 4 – Quarry Site Major Catchments and Water Sample Locations

Catchment A drains approximately 27ha within the Project Site boundary. Only a small area within Catchment A drains onto the Quarry Site from upslope; for the most part, the watershed of Catchment A is wholly within the Quarry Site. There are no defined channels within Catchment A, all drainage is via open grassy depressions. Catchment A drains into a man-made lateral drain, the position of which is shown in **Figure 4**. It is assumed this was constructed in the past to reduce waterlogging of the low-lying, flat areas adjacent to the river and so to permit grazing. This drain diverts flow into Catchment B.

Catchment B drains approximately 11.4ha of the Quarry Site via a series of open grassy depressions. There is no run-on to the Quarry Site from external lands in Catchment B. Flows in Catchment A are diverted into Catchment B at the Quarry Site's northern boundary as shown in **Figure 4**.

Catchment C drains approximately 12.7ha of the Quarry Site via a series of open grassy depressions. These join Stony Creek before eventually entering the Wingecarribee River. Approximately 5.8ha upslope of the Quarry Site in Catchment C drains into Catchment A but this area will be diverted by the southern visibility barrier. The proposed Site access road connecting the extraction area with Berrima Road traverses Stony Creek as shown in **Figure 4**.

Although there are first and second order streams marked on the topographic map, all drainage lines are in fact open grassy depressions with no bed or banks.

5.2 EXISTING DAMS

There are five existing farm dams within the Quarry Site and one off site but on the northern boundary of the property (Dam 6). All appear to be structurally sound and capable of holding water. The existing farm dams are numbered on **Figure 4** and their estimated capacities are shown in **Table 4**. The combined capacity of these existing dams exceeds the Harvestable Right Capacity of 8.5ML. However, they were all built before 1999 and have been used for stock purposes and so they do not required a licence. Nevertheless, these dams were included in the assessment to build additional dams (Section 9.4.1.2).

Structure Number	Approximate Surface Area (m ²)	Assumed Capacity (ML)
1	950	1.4
2	460	0.7
3	2,960	4.4
4	670	1.0
5	1,570	2.4
6	3,000	2.5
Total	9,610	12.4

Table 4 –	Existing	Dam	Sizes
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5.3 LAND USE

The entire site, and the immediately-surrounding lands, have been previously disturbed and are presently used for grazing or fodder on improved pastures. The majority of the land is completely cleared with only a few scattered native trees and several rows of exotic species.

5.4 WATER QUALITY

Water samples were collected on 22 August 2008 at WS1, WS2 and WS3 (Figure 4). They were tested for the following parameters.

- pН
- **Electric Conductivity** •
- Total alkalinity
- Chloride
 - Sulphate
- Ion Balance

- Total Nitrogen •
- **Total Phosphorus** •
- Iron •
- **Major Cations**
- Total suspended solids

- The results of laboratory testing are summarised in Table 5. These results form the baseline water monitoring data of the Quarry.

		Sample Point	Sample Point	Sample Point
Parameter	Units	WS1	WS2 (the river)	WS3
pH in water	pH units	7.7	7.5	7.8
Electric Conductivity (EC)	µS/cm	393	102	396
Total alkalinity	mg/L	76	27	89
Chloride	mg/L	60	15	55
Sulphate	mg/L	2	<2	26
Ion Balance				
Anions total	me/L	3.0	0.9	3.6
Cation total	me/L	3.2	0.9	3.8
Percent Difference	%	6.5	-	5.4
Total Nitrogen	mg/L	7.3	0.2	<0.1
Total Phosphorus	mg/L	0.2	0.02	0.03
Iron	mg/L	7.92	0.82	0.45
Major Cations				
Calcium	mg/L	13.6	4.0	34.6
Magnesium	mg/L	7.9	2.9	6.8
Sodium	mg/L	26.9	10	29.5
Potassium	mg/L	27.1	1.2	8.4
Total suspended solids	mg/L	32	11	4

Table 5 – Results of Water Quality Testing (22 August 2008)

The water quality monitoring planned prior to the commencement of site activities would supplement the 2008 data and provide the basis for comparative assessments throughout the operational life of the Quarry.

5.5 AQUATIC HABITAT

There is no aquatic habitat within the Quarry Site nor any groundwater dependent ecosystems within the "Mandurama" property.

5.6 WATERFRONT LANDS

There are no works proposed within 40 m of the Wingecarribee River and, although there are first and second order streams marked on the topographic map, all drainage lines at the site are in fact open grassy depressions with no bed or banks. Therefore, there is no requirement for Controlled Activity Permit(s).

6. OBJECTIVES AND OUTCOMES

Table 6 presents the objectives and key performance outcomes for this Plan and the Quarry.

Objectives		Key Performance Outcomes		
(a)	To ensure compliance with all relevant Project approval and Environment Protection Licence criteria and reasonable community expectations.	(i)	Compliance with all relevant criteria and reasonable community expectations, as determined in consultation with the relevant government agencies.	
(b)	To ensure sufficient water is available during all phases of the life of the Quarry for environmental and operation purposes	(ii)	Sufficient water is available for all Quarry-related purposes, including for environmental and operational purposes.	
(c)	To ensure that appropriate sediment and erosion control measures are implemented and maintained.	(iii)	All water management structures constructed and maintained in accordance with Landcom (2004) and DECC (2008).	
(d)	To ensure that appropriate chemical and hydrocarbon management is implemented and maintained.	(iv)	All chemicals and hydrocarbons are used in accordance with manufactures instructions, Safety Data Sheet requirements and Australian Standards in a manner that ensure risk of water contamination is reduced to an acceptable level.	
(e)	To ensure that water within the Site is used in an efficient and environmentally responsible manner.	(v)	Water resources are managed in a manner that maximises environmental flows and minimised the potential for adverse impacts to water resources.	
(f)	To ensure that an appropriate surface water and groundwater monitoring program is implemented during the life of the Quarry. The groundwater monitoring would commence prior to Stage 3 extraction.	(vi)	Water monitoring programs are sufficiently robust to detect any adverse water quality or quantity impacts associated with the Quarry to allow appropriate adaptive management measures to be implemented.	
(g)	To ensure that appropriate contingency and emergency management plans are in place and regularly reviewed.	(vii)	Contingency and emergency management plans are prepared for all relevant contingencies and regularly reviewed and upgraded.	
(h)	To implement an appropriate incident reporting program, if required.	(viii)	Incidents (if any) reported in an appropriate manner.	
(i)	To ensure that all relevant water-related information is made available in a timely and accessible manner.	(ix)	All water-related information is available in a timely manner on the Quarry website.	

 Table 6 – Water Objectives and Key Performance Outcomes

7. ROLES AND RESPONSIBILITIES

Table 7 presents the roles and responsibilities for the implementation of this Plan.

Roles	Responsibilities			
NSW Manufacturing Manager	Ensure adequate resources are available to enable implementation of the Plan.			
Quarry Manager/Supervisor	Accountable for the overall environmental performance of the New Berrima Quarry operations, including the following outcomes of this Plan.			
	 Implementation of all water management controls outlined in Section 9 implemented. 			
	 Inspection, monitoring and maintenance of all erosion and sediment controls. 			
Environmental	Manage the implementation of the following components of this Plan.			
Officer	 Monitoring as outlined in Sections 11 and 12. 			
(also referred to as the Site Environmental	 Evaluation of compliance as outlined in Section 14 and related follow-up actions. 			
Manager in	Complaints handling and response as outlined in Section 15.			
Appendix A)	Incident reporting as outlined in Section 17.			
	 Coordinate Environmental Monitoring and publishing of data as outlined in Section 18. 			
	Review of this Plan as outlined in Section 19.			
	Conduct environmental component of site induction for all employees and contractors – see Section 8.			
All personnel	Ensure training and awareness induction has been undertaken.			
	Compliance with this Plan.			

Table 7 – Roles and Responsibilities

8. COMPETENCE TRAINING AND AWARENESS

All Company personnel and contractors and their employees will undergo Company and sitespecific inductions, incorporating basic information in relation to the operation of this plan as a component of the site induction program. The following areas will be covered in the induction.

- The importance of appropriate management of water within the Site, including the sensitivity of the downstream receiving environment and Austral's obligations under PA 08_0212, its Environment Protection Licence and its obligations under the *Protection of the Environment Operations Act 1997*.
- The location and significance of the contaminated, dirty and clean water catchments within the Quarry Site.

- The relevant management measures that are to be implemented within each of the identified catchments. These will include:
 - appropriate management and use of all hydrocarbons and chemicals; and
 - the requirement to report all spills and other incidents with the potential to cause pollution to water.
- Emphasis upon using sediment-laden water for dust suppression preferably from within the extraction area sump.

9. SITE WATER BALANCE

9.1 INTRODUCTION

The following site water balance provides an overall description of where all water is sourced, where it is used, how much of it is used and where it ultimately ends up. It identifies the proposed storages and their volumes and whether they are used for dirty water (e.g. sediment basins, pumping dams, sumps) or for clean, useable, water (either as part of the works or for agricultural purposes).

9.2 WATER USES AND DEMAND

9.2.1 On-site Water Demand

There are three demands for water, namely:

- staff requirements and ablutions;
- dust suppression; and
- machinery washdown.

9.2.2 Amenities and Ablutions Supply

The site office and ablutions will be supplied by potable water imported by tanker or 20L bottles, i.e. no water collected on site will be used. Note toilets are portable pump-out toilets.

9.2.3 Dust Suppression

RW Corkery & Co. (2012) identified that $3,400m^2$ of internal roads will need dust suppression and that the daily water demand for that will be 17kL (used on dry days only). Dust suppression will only be required when extraction activities are underway, i.e. it is calculated over 90 days spread over a year. As a worst-case scenario, this equates to 1.53ML per year.

A water cart will be kept on site at all times to enable watering of sections of the Site Access Road as required. An extra allowance of 1ML per year is provided for this purpose so the annual total volume for dust suppression will be 2.53ML.

9.2.4 Washdown

The requirement for washdown water (for machinery washdown) will be minimal but, if required, an additional 2,000L might be required each day that the Quarry is operational, i.e. 90 days per year. This equates to 0.18ML per year.

9.3 SOURCES AND SECURITY OF WATER SUPPLY

9.3.1 Water Supply

Water for dust suppression and washdown will be primarily sourced from the 1.2ML storage volume in Dam 7. It has adequate capacity to supply the amount of water required in most years but, in very dry periods, water will also be supplied from one or more of the other water supply dams (e.g. Dam 1, Dam 4 or Dam 6).

9.3.2 Water Security

Section 5.6.6 of the *Environmental Assessment* provides an assessment of the water supply confidence using a water balance spreadsheet developed by Strategic and Environmental Engineering Consulting (SEEC) Pty. Ltd. The spreadsheet was calibrated using 99.33 years of daily rainfall data from the Bureau of Meteorology's Moss Vale rainfall station. The spreadsheet took into account inherent system losses (e.g. surface wetting) and used a 20% volumetric runoff coefficient for a 2.5ha vegetated catchment to Dam 7. The water demands were set according to the details in Section 9.2. RATES predicted (**Table 8**) the demand will, on average, be met by Dam 7 for 99% of the time. In particularly dry periods water will be sourced from one of the other Water Supply Dams (e.g. Dam 1, Dam 4 or Dam 6) (Section 9.4). The Quarry does not require make-up water.

Volumes of water extracted for use on site will be logged with their date and use and reported in the Quarry's *Annual Review*. The volumes will be compared each year to gauge their consistency or variability.

9.4 WATER MANAGEMENT

9.4.1 Storage

9.4.1.1 Introduction

There will be eleven water storages at the site, although not all will be active at the same time. The storages are summarised in **Figure 5** and in **Table 9**. The use of an individual storage can change depending on the stage of works and so sometimes a storage might be used as a sediment basin while at other times it might be a clean water storage.

Table 8 – Results of Water Use Model (RATES)

SEEC RATES IV Results

Site: New Berrima Rain station: Moss Vale 68045

Total years:	99.33
Total days:	36278
Total no of days when rain fell:	11614
Avg days per year when rain fell:	117
Avg wet day rainfall (mm):	8.16

Avg annual rainfall (mm): 954.57
Max daily rainfall (mm): 422
Longest dry spell (days): 57
Days when rain > S1 initial loss: 6814
Avg days/yr rain > S1 initial loss: 69

Input statistics:	Dam 7		
Capacity (L):	1200000		
Startup % full:	0		
Catchment area (sqm):	25000		
Initial loss per day (mm):		2	
Runoff percentage:	2	20	
Apply use A on wet days (Y/N):		Y	
Apply use B on wet days (Y/N):		Y	
Revert to mains at threshold (Y/N):		N	
Mains reversion threshold (% full):		0	
Overflows into Storage 2 (Y/N):		N	
USAGE stats (L/day):	Da	m 7	
Usage type:	Washdown	Dust	
January	0	0	
February	0	0	
March	0	0	
April	il 2000 28111		
May	0	0	
June	0 0		
July	0	0	
August	t 2000 28111		
September	0	0	
October	0	0	
November	0	0	
December	2000	28111	
Results:	Da	m 7	
% of time demand met:	Ş	99	
% of demand supplied from mains:	0		
Avg Inflow	/ 3.85E+06		
Longest time storage ran dry (days):	45		
Avg annual mains demand (L):	0		
Avg wet day overflow (L):	1.01E+04		
Avg no of overflow events annually:	16		
Avg annual supply from rain in (L):	2.69E+06		
Max daily overflow (L):	1.60E+06		
Annual demand (L):	2.77E+06		
Demand/Inflow	70%		



Figure 5 – Site Water Balance Flow Chart

THE AUSTRAL BRICK COMPANY PTY LIMITED New Berrima Clay/Shale Quarry – PA08_0212

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No.	Establish (Stages 1-4)	Operation (Stages 1-4)	Establish (Stages 5-7)	Operation (Stages 5-7)	Final Landform	Capacity (ML)	Management	Use
1	Dirty	Clean	Clean	Clean	Clean	Existing 1.4ML	Sediment Basin during Stage 1 establishment No management or use when clean	No use when sediment basin
							when orean	when clean
2	Dirty	Dirty	Dirty	Dirty	Clean	Increased to 1.8ML	Water pumped to Extraction Area	No use during operations
								Farm use in final landform
3	Dirty	NA (removed)	NA (removed)	NA (removed)	NA (removed)	Existing 4.5ML	Sediment basin during Stage 1 establishment then decommissioned (moved to 3b)	No use
3b	Dirty	Dirty	Dirty	Dirty	NA (removed)	Min 0.6ML during Stage 1 establishment Then not defined	Sediment basin during Stage 1 establishment Quarry Sump for Stages 2-4 when there will be no overflow - water will be infiltrated or evaporated	No use
4	Dirty	Clean	Dirty	Clean	Clean	1ML except temporarily enlarged to 1.4ML during establishment Stages	Sediment basin during both stages of establishment No management when clean	No use when sediment basin Farm use when clean
5	Clean	Clean	Dirty	Clean	NA (removed)	Existing 2.4ML	Sediment basin when dirty No management when	Farm use when clean
6	Clean	Clean	Clean	Clean	Clean	2 5MI	clean	Farmuse
Ū	olean	Olcan	Olean	Cican	Cican	2.0111	Quarry Site operations	
7	Dirty	Clean	Clean	Clean	NA (removed)	1.2ML	Used for dust suppression and washdown water	Dust Suppression and washdown water
8	NA	NA	NA	Dirty	Clean	Sump during operations, size not defined 1.8ML final	No overflow during works; water will be infiltrated or evaporated Farm dam in final landform	Farm dam for final landform
						landform		
9	NA	NA	Dirty	NA (removed)	NA	0.64ML	Sediment basin during Stage 5-7 establishment then decommissioned	No use
10	Dirty	NA (removed)	NA	NA	NA	0.23ML	Sediment basin during Stage 1-4 establishment then decommissioned	No use
11	Dirty	NA (removed)	NA	NA	NA	1.37ML	Sediment basin during Stage 1-4 establishment then decommissioned	No use

Table 9 – Water	Management	Structures
l able 9 – Water	Management	Structures

9.4.1.2 Harvestable Right

NSW harvestable right legislation permits landholders to build a certain volume of dams without requiring a licence. The total volume is called the harvestable right and there are two factors that determine it for a parcel of land, namely:

- the property's geographical location; and
- the area of the property (ha).

The 100.2ha property was assessed using the harvestable right dam calculator at http://www.water.nsw.gov.au/Water-Licensing/Basic-water-rights/Harvesting-runoff/Calculator/ default.aspx on 13th March 2015. The calculator shows the Property has a

runoff/Calculator/ default.aspx on 13th March 2015. The calculator shows the Property has a harvestable right of 8.5ML. This was exceeded by the existing dams but:

- Dam 1 (1.4ML) will, at one time during the life of the quarry, be a sediment basin for the purpose of maintaining water quality. However, at other times it will remain for agricultural purposes so its volume is included in the harvestable right calculation. Dam 1 will remain in the final landform.
- Dam 2 will be in the Surplus Overburden Storage Area and will be enlarged to 1.8ML. It will collect sediment-laden runoff from the Surplus Overburden Storage Area so that it may be simultaneously pumped by a 100L/s pump to the extraction area where it will drain by gravity to the active sump (either Storage 3b or 8). The dam and pump are sized for the 100 year 24-hour storm event. Because it is in the works area, and its use is to prevent sediment–laden water leaving the site, Dam 2 is exempt from the harvestable right calculation. Dam 2 will remain in the final landform.
- Dam 3 will, for a short time, be used as a sediment basin for the purpose of maintaining water quality. Water detained in it will not be used and so it is exempt from the harvestable right calculation. Dam 3 will quickly be replaced with Storage 3b as the central visibility barrier is built.
- Dam 4 will, at some time during the life of the quarry, be a sediment basin for the purpose of maintaining water quality. However, at other times it will remain for agricultural purposes and so its volume is included in the harvestable right calculation. Note the capacity of Dam 4 will temporarily be increased to 1.4ML when it is used as a sediment basin. However, it will be returned to 1ML at other periods. Dam 4 will remain in the final landform.
- Once the extraction area becomes internally-draining, Storages 3b and 8 will be part of the operational extraction area and water will gravitate to down gradient sumps within these areas. No water will be drawn from these storages during the operational phase and the water will remain in the extraction area and allowed to infiltrate to the regional groundwater table below the proposed base of extraction or evaporated. Therefore, they are exempt from the harvestable right calculation. Storage 8 will be converted to Dam 8 as part of the final landform. At that time, Dam 8 will be part of the harvestable right calculation.

- Dams 9, 10 and 11 will be constructed for the purposes of maintaining water quality (i.e. they will be sediment basins). Water detained in them will not be used but will be released to downstream waters (after treatment, if necessary). Therefore, they are exempt from the harvestable right calculation. None of these dams will remain in the final landform.
- Dam 7 will have a capacity of 1.2ML and be located south of the Extraction Area and be elevated above its southern perimeter. It will be used to supply water and so its volume is part of the harvestable right calculation. Dam 7 will not remain as part of the final landform.
- Dam 5 will for a short time be used as a sediment basin (during the establishment of Stage 5-7 activities) but at all other times during operations it will likely be used for agricultural purposes and dust suppression in particularly dry periods. Therefore, its volume (2.4ML) is part of the harvestable right calculation during operation. However, Dam 5 will not remain as part of the final landform.
- Dam 6 (off the Quarry Site but on the Property (**Figure 2**)) will be unaltered and will continue to be used for agricultural purposes. Therefore, its volume (2.5ML) is part of the harvestable right calculation. Dam 6 will remain as part of the final landform.

In summary, the Water Supply Dams and their capacities that are included within the harvestable right calculation are outlined in **Table 10**.

Identifier	Operational Phase (ML)	Final Landform (ML)
Dam 1	1.4	1.4
Dam 2	0.0	1.8
Dam 4	1.0	1.0
Dam 5	2.4	0.0
Dam 6	2.5	2.5
Dam 7	1.2	0.0
Dam 8	0.0	1.8
Total Volume	8.5	8.5

Table 10 – Water Supply Dams

In total, the combined capacity of the dams supplying water during the operational stages or as part of the final landform will equal 8.5ML, equalling the permissible harvestable right volume. How the dams and storages are used throughout the Project's life is discussed in more detail in the following sections.

9.4.2 Dirty Water

9.4.2.1 Sediment Basins

Where and when applicable, all the existing dams will be used as sediment basins at least once. However, depending on the stage of works, they will be supplemented by a number of other temporary sediment basins. The following four primary stages of work are identified.

- Establishment of Stages 1 4 (Site access road, southern part of the Extraction Area and southern and central visibility barriers).
- Operation of Stages 1 4 (Year 1 15).
- Establishment of Stages 5 7 (northern part of the Extraction Area and northern visibility barrier).
- Operation of Stages 5 7 (Year 15 30).

Table 9 and **Figures 6** to **9** identify which dams and storages will be actively used as sediment basins during the above four stages of works. **Figure 10** shows which dams will remain in the final landform. When an existing dam is no longer required as a sediment basin, it will remain but the other temporary basins (Dams 9, 10 and 11) will be removed. **Table 9** details the size of the dams during the various stages and indicates whether they will be considered clean water or dirty water dams.

All sediment basins except Dam 2 are sized to capture the 5-day, 85th percentile rainfall depth (36.2 mm) (DECC, 2008 and Landcom, 2004). Dam 2 is sized (in conjunction with a pump) to temporarily contain flow derived from storms up to the 1 in 100 year 24 hour storm event so that it can be simultaneously be pumped to the extraction area. Storages 3b and 8 are sumps in the extraction area and do not have a defined size.

Note: The total volume of a sediment basin comprises a sediment retention zone and a water (settling) zone, both sized in accordance with Landcom (2004) and DECC (2008).

9.4.2.2 Extraction Area Sumps

Internal runoff from the extraction area will be collected in Storages 3b and 8. These sumps of undefined size will also collect groundwater seepage that might enter the excavation. They will also accept dirty water runoff from the Surplus Overburden Stockpile area via a pump at Dam 2. Stored water will be either infiltrated to groundwater or evaporated; no re-use is permitted.

9.4.3 Clean Water

Clean water derived from upslope of the extraction area will be diverted around it by clean water Diversion Drain CD1, as shown in **Figures 6** to **9**. CD1 will outlet just downstream of Dam 5 via a level spreader.

As disturbed lands are stabilised (**Appendix A**) the associated sediment basins will be removed or converted to clean water storage (**Table 9**).



Figure 6 – Water Management: Stages 1-4 Establishment



Figure 7 – Water Management: Stages 1-4 Operation
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Figure 9 – Water Management: Stages 5-7 Operation

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Figure 10 – Final Landform

9.4.4 Discharges

9.4.4.1 Discharge Locations

Figure 4 displays the catchments within the Quarry Site and the ephemeral watercourses on site.

Runoff from disturbed areas within the Quarry Site would discharge at two main locations, i.e. at monitoring locations W4 and W5.

Monitoring Location W4 is located in Catchment C near the southwestern corner of the Quarry Site and will discharge runoff from the internal access road and the surplus overburden storage area, i.e. only after the runoff has passed through Dams 1 and 2 (see **Figure 4**).

Monitoring Location W5 is located in Catchment B in the northwestern corner of the Quarry Site although noting an existing diversion drain located at the northern side of the Quarry Site directs runoff from Catchment B towards Location W5.

Two other minor discharge locations (WS6 and WS7) are located near the western boundary of the Quarry Site (see Figure 4). These locations are both located in Catchment B and drain extremely localised areas. It is noteworthy that runoff from both WS6 and WS7 actually reenters the Quarry Site immediately upstream of Location WS5.

Consideration of discharges at Locations WS6 and WS7should only be relevant during the early stages of operations when activities are underway in their catchment.

Long term discharge points will be located at the water quality sampling locations WS4, WS5, WS6 and WS7, refer to **Figure 4** and Section 11.3.

9.4.4.2 Wet Weather Discharges from Sediment Basins

The sediment basins with in the Quarry Site are designed for a 5-day, 85th percentile rainfall depth which is 36.2mm. A rainfall event greater than that will cause a basin to overtop, unless it is built larger than required. Such events are referred to as "wet weather discharges". Water quality testing of such discharges is proposed within 24 hours of the commencement of any discharge from these basins. On average, such discharges can be expected to occur four to six times a year. Their occurrence and duration will be logged and reported in the Site's *Annual Review*.

Basin water quality monitoring will be discontinued when the function of the basin is no longer pollution control.

9.4.4.3 Conditional Discharges from Sediment Basins

Water collected in a sediment basin will be flocculated (if required, Section 10.3.1.3), settled and discharged within five days of the conclusion of a rain event which caused inflow into the basin. These are referred to as "Conditional Discharges" and they will be logged and reported in the Quarry's *Annual Review*.

Before a conditional discharge occurs, the water will be tested to ensure it meets the target water quality parameters given in **Table 11** and/or criteria specified in the EPL for the Quarry. Soil investigations suggest sediment will naturally settle out but if this does not occur in practice flocculation will be required.

Basin water quality monitoring will be discontinued when the function of the basin is no longer pollution control.

Parameter	Target					
рН	Between 6 and 8.5					
Total Suspended Solids (TSS)	Less than or equal to 50 mg/L					
Turbidity (NTU)	At a calibrated value that meets the TSS target. Ultimately this may be used as a field test without the need for laboratory TSS testing.					
Oil and grease	Non visible					
* To be reviewed following the issue of an	EPL.					

9.4.4.4 Volumes of Discharge

The volumes of conditional discharges will be equal to, or less than, the associated sediment basin volume. The volumes of unconditional discharges will depend on the rainfall events that cause them.

9.4.5 Contaminated Water

There is no anticipated need for management of contaminated water.

9.4.6 Water Flow Monitoring

Records of discharge values or flow rates would be collected at the time of any discharge at the licenced discharge points.

9.4.7 Water Use Minimisation Program

Water use will be minimised as much a practicable. Surface water will only be harvested from the harvestable right dams (**Table 10**). Surface water use will be limited to dust suppression and machinery washdown.

10. EROSION AND SEDIMENT CONTROL PLAN

10.1 SOURCES OF EROSION, SEDIMENTATION AND POLLUTION

10.1.1 Sources of Erosion and Sedimentation

10.1.1.1 Establishment Stages

During the establishment stages soils will be exposed to erosion when building:

- The visibility barriers
- The access and haul road(s)
- The sediment basins
- The extraction area
- Diversion drains (e.g. CD1, CD2)

10.1.1.2 Operational Stages

During the operational stages soils will be exposed to erosion in:

- The Surplus Overburden Stockpile Area
- The Extraction Area (including the Product Stockpile Area)

10.1.2 Sources of Pollution and Water Contamination

There will be no sources of pollution and contamination other than sediment-laden water.

It is noted that the Ashfield Shale typically has very low concentrations of pyrite which could cause any acidification. Generation of acid does not occur in Ashfield Shale quarries. Further, the Quarry is in excess of 600m above the elevation at which acid sulphate soils are formed. Hence, generation of acid from this source is not possible.

10.2 EROSION AND SEDIMENT CONTROL MANAGEMENT

10.2.1 Implementation Strategy

Erosion and sediment loss will be mitigated by implementing a series of staged Erosion and Sediment Control Plans (ESCPs) – see **Appendix A**. They are designed to the requirements of Landcom (2004) and DECC (2008). A summary of the implementation strategies is given in the following sections.

10.2.1.1 Erosion Control

Rapid rehabilitation of disturbed areas is the most effective form of erosion control (Landcom, 2004). As such, the following apply:

- Bare soil will be stabilised using vegetation (e.g. grass) to achieve at least 60% cover within 20 days of final shaping and 70% cover within a further two months.
- Operational lands that will not be re-worked within 20 days will be stabilised using vegetation (e.g. grass) to achieve at least 60% cover.
- Stockpiles of waste material will be progressively stabilised using vegetation or similar. This will be conducted as new stockpile areas are opened and old ones are decommissioned.
- Clay and shale material awaiting transport will be stockpiled on the floor of the extraction area. This ensures that any erosion of this material is confined within the extraction area.
- Diversion drains will be stabilised against scour.

10.2.1.2 Sediment Control

The primary measure for sediment control will be the Sediment Basins (Section 9.4.2). They are designed to capture the 85th percentile rainfall, 5-day rainfall depth which is 36.2mm. The sediment basins will be subject to the following design, monitoring and maintenance requirements.

- The design of the sediment basins will include an emergency spillway designed to safely convey the 100-year ARI flow (DECC, 2008).
- Waters will be discharged (after treatment if required) within five days after the conclusion of a rain event that causes flow into it.
- A marker will be installed in each sedimentation basin showing the boundary between the Storage Zone (i.e. the lower zone) and the Settling Zone (i.e. the upper zone) in the basin.
- After discharging treated water from any sedimentation basin, the level of retained sediment will be inspected. If retained sediment exceeds the marked level of the Storage Zone, sediment will be removed and placed within the Extraction Area.
- Any damaged components of the sedimentation basins will be repaired as soon as practicable.

Other minor sediment control measures e.g. rock filter dams, sediment fence, mulch bunds etc. might be adopted throughout the site at the discretion of the Quarry Manager,

10.2.1.3 Flocculation

If adequate setting of suspended solids is not achieved in the sediment basins within five days, flocculation will be required. Flocculation may be achieved using gypsum or another approved flocculent. Flocculent approval would be at the discretion of NSW EPA. All flocculants will be used at their recommended dilution rates and applied evenly to the water to ensure adequate settling. Automatic flocculation is an option.

10.2.2 Erosion and Sediment Control Monitoring

The performance of the erosion and sediment control measures will be measured by regular site inspections following a formal erosion and sediment control inspection checklist. An example of such a list is given in **Appendix B**; it may be altered by the Quarry Manager to suit the site. In summary:

- The sediment basins and erosion and sediment controls will be inspected on a monthly basis and after any rain event exceeding 25mm to check:
 - the integrity of any sediment-control measures, including sediment basins, sediment traps, etc.;
 - for any signs of erosion, particularly in areas that do not drain to a sediment basin or other sediment capture measure; and
 - that any areas subject to stabilisation are establishing an adequate cover of vegetation in a timely manner.
- Necessary repairs to sediment basins or erosion and sediment controls would be undertaken as soon as practicable.
- The management procedures for the sedimentation basins will be regularly reviewed to ensure ongoing efficient operation and protection of downstream water quality.
- Before a conditional discharge the water quality will be tested, treated if necessary and re-tested if necessary to meet the targets given in **Table 11**.

10.2.3 ESCP Review

The ESCPs submitted in **Appendix A** will be reviewed shortly before each establishment or operational stage. At the discretion of the Quarry Manager, and in consultation with a Certified Professional in Erosion and Sediment Control (CPESC), the plans will be revised if necessary. The ESCPs will also be revised during works if conditions, work practices or water quality monitoring dictate.

11. SURFACE WATER MONITORING PROGRAM

11.1 INTRODUCTION

This sub-section provides a description of the surface water monitoring that will be undertaken throughout and following the life of the Quarry. It is noted that the results of the previous water quality monitoring is discussed in Section 5.4 of this document. The approach to monitoring both in terms of parameters analysed and frequency of sampling reflects a realistic risk-based approach for the Quarry and not a generic approach.

11.2 SURFACE WATER IMPACT ASSESSMENT CRITERIA

The aim of the erosion and sediment control plan is to ensure that water leaving the site (other than unconditional discharges) has a water quality no worse than:

- the water quality in the Wingecarribee River (the receiving water); or
- the water quality at water quality monitoring sites WS3 and WS4.

This criteria or objectives are drawn from State Environmental Planning Policy (SEPP) Sydney Drinking Water Catchment (2011).

Criteria likely to be imposed on the Environment Protection Licence for the Quarry are as follows.

- pH = 6.5 to 8.5
- Total Suspended Solids = <50mg/L
- Oil and Grease = not visible

These criteria are considered to be the key parameters required to assess ecosystem health.

11.3 SURFACE WATER MONITORING PROGRAM

11.3.1 Monitoring Parameters, Frequency and Location

11.3.1.1 Baseline Monitoring

Limited opportunity has been available to monitor baseline water quality within the Quarry Site given:

- a) the extraction area is close to local catchment divides and hence runoff is often of short duration;
- b) the bulk of the Quarry Site is well vegetated and consequently has a low coefficient of runoff; and
- c) the dams on site that collect runoff have regularly been observed to be disturbed by stock causing high levels of suspended solids.

Notwithstanding this, and subject to flowing water being present, Austral will undertake sampling of water at monthly intervals from sites WS1, WS2, W3, W4, W5 and W8 from July 2016 until site establishment activities commence. All samples would be analysed for pH, electrical conductivity, suspended solids, turbidity, cations/anions, TP and TN.

It is noted that these analytes are the key analytes to characterise the water quality that could change as a result of the approved quarrying operations.

11.3.1.2 During Establishment Stages

During the establishment stages, water quality will be measured:

- at all sediment basins (following their construction) prior to any required conditional discharge (Section 9.4.4.3 and **Table 11**); and
- opportunistically at the eight site locations identified on **Figure 4** at least four times a year and within 24 hours of any wet weather discharge. Note that WS1 will be removed after Stage 4.

It is noted that WS2 represents an upstream sample location within the Wingecarribee River. A further sampling location (WS8) will be established downstream of the Quarry Site (see **Figure 4**), subject to access being granted. Details of this location will be included within the first revision of this document.

Sediment basin discharges will be tested for the suite of parameters given in **Table 11**. The samples taken from the seven site discharge locations will be tested for the suite of parameters given in **Table 12** together with any other analytes considered relevant from the results of the baseline monitoring. Estimates of discharge flow rates or volumes would be recorded during the collection of samples.

It is noted that the parameters to be tested relate to the nature of the clay/shale where limited opportunities exist for the clay/shale to influence water quality.

рН
Electrical Conductivity
Total suspended solids (TSS)
Turbidity ²
Visible Oil and Grease

Table 12 – Water Quality Parameters for all Water Quality Monitoring Locations

11.3.1.3 During Operational Stages

During operational stages, water quality will continue be monitored at the seven discharge locations identified on **Figure 4**. Samples will be taken opportunistically when there is sufficient rain to cause runoff but at least four times a year. Not all drainage lines might be flowing at one time. The samples will be tested for the following parameters.

 $^{^{2}}$ When there is sufficient data to provide a site-specific correlation between TSS and turbidity, TSS will no longer be required and all three remaining parameters could be measured on site by appropriately trained staff

11.4 SURFACE WATER TRIGGERS

11.4.1 Background Data

WS3 is located at a drainage line just upstream of the site access road. WS2 is located in the north of the site at the end of an intermittent drainage line, where it meets the Wingecarribee River. Both these drainage lines will be unaffected by quarry activities and so will provide background data for comparison with the results of sampling at WS1, WS4, WS5, WS6 and WS7 which all lie on drainage lines that will be affected by quarry activities.

11.4.2 Water Quality Triggers

Results from WS1, WS4, WS5, WS6 and WS7 will be compared with those at WS2 and WS3 to determine if water quality is being adversely affected by the quarry activities. Any decline in water quality will be investigated, reported and, if required, appropriate remedial action will be taken. A management response (Section 17) will be instigated if either of the following occurs:

- If, at one or more of the site discharge monitoring locations WS1, WS4, WS5, WS6 and WS7 there is any exceedance^{3, 4} of a rolling 80th percentile value for location WS2.
- If, at one or more of the site discharge monitoring locations WS1, WS4, WS5, WS6 and WS7 there is an exceedance⁴ of either of the rolling 80th percentile values for locations WS3 and WS4 for more than six monthly sampling events in any one year.

11.5 STRATEGY MONITORING AND AMENDMENT

The results of the water quality monitoring will be collated and summarised within the Quarry's *Annual Review* (Section 18), with a copy also provided to Council, DPI-Water and any other relevant government agency, if requested.

The Water Management Strategy for the quarry will be independently audited every three years with upgrades or amendments made as required ensuring ongoing compliance with relevant environmental protection instruments.

³ If more than one sample is taken at a time the median value will be adopted. More samples reduce the risk of false triggering but there is a cost implication. Additional samples will be taken if there is a trigger activated.

⁴ Doesn't apply to pH – here the trigger will be if the pH is outside the range given in Table 11, unless it is also outside the range at the baseline locations.

12. GROUNDWATER MANAGEMENT

12.1 EXISTING GROUNDWATER ENVIRONMENT

12.1.1 Geology and Hydrogeology

The Quarry Site is underlain by a sequence of shales and laminites belonging to the Ashfield Shale, a Triassic rock unit often outcropping in the Southern Highlands.

Ashfield Shale is highly impermeable and lacks any noticeable groundwater occurrences as a result. There are no groundwater bores recovering any groundwater supplies from within the Ashfield Shale in the Southern Highlands. These observations were verified during the two diamond drilling programs conducted within and surrounding the Quarry Site when defining the clay/shale resource on the "Mandurama" property.

The hydrogeological characteristics of the Ashfield Shale are such that occasional localised and negligible (unmeasurable) inflows of water occur following rainfall. The negligible inflows are attributable to the considerable thickness (4m to 6m) of residual clay that typically lies above the unweathered shale, as is the case on the "Mandurama" property. These inflows are typically manifested in quarries as damp areas on the exposed extraction faces. In reality, the likelihood of identifying (and quantifying) any perched water tables within the Ashfield Shale is likely to be very low within the Quarry Site, particularly above 660m AHD.

12.1.2 Existing Groundwater Levels and Yields

Given the hydrogeological characteristics of the Ashfield Shale, it is confirmed that no data is available on existing groundwater levels and yields.

12.2 GROUNDWATER MONITORING PROGRAM

Austral's proposed approach to monitoring groundwater is presented in *PA Condition 18A* which nominates "*The Proponent shall install 3 pairs of nested piezometers prior to the quarry pit floor reaching 660m AHD in consultation with DPI-Water and to the satisfaction of the Secretary*." Groundwater monitoring will commence within the piezometers prior to the commencement of extraction operations within Stage 3.

This plan will be reviewed and updated within 6 months of the completion of the installation of the piezometers.

Notwithstanding the expected absence of groundwater inflows into the extraction area throughout part or all of the operational life of the Quarry, Austral will routinely monitor and record all groundwater inflows from the walls or floor of the extraction area.

12.3 GROUNDWATER TRIGGER ACTION RESPONSE PLAN

A groundwater trigger action response plan will be developed following the commencement of groundwater monitoring and once there is sufficient data upon which to set site specific triggers.

In the unlikely event extraction operations intercept a substantial groundwater resource that requires on-going dewatering, Austral will inform DPI-Water and arrange for an appropriate licence for the ongoing dewatering activities.

Until such times as there is any meaningful data on water quality or groundwater inflows to the extraction operations, Austral will adopt a trigger comprising two elements.

- 1. Should groundwater be observed to be flowing from exposed extraction faces for longer than 48 hours, water samples would be taken of the inflowing groundwater.
- 2. Should the quality of groundwater sampled record an electric conductivity level >50% above the recorded level at WS2, further investigations would be undertaken to establish the implications of the observed groundwater flows.

13. MITIGATION MEASURES

13.1 SURFACE WATER

Mitigation measures to minimise the impact of quarry operations on surface water relate principally to:

- i) the avoidance or control of sediment-laden runoff; and
- ii) the management of hydrocarbons.

The management of sediment-laden runoff has been comprehensively addressed in Section 9 and **Appendix A**.

The potential for hydrocarbon spillages will be minimal given Austral will not be storing any fuel on site. All diesel used on site will be delivered to site on the day of use. Only small quantities of oils and greases will be stored on a bunded pallet inside a container.

The potential for contamination of surface water by sewage will be negligible given all sewage will be collected in a portaloo and removed off site.

13.2 **GROUNDWATER**

Mitigation measures required to protect the expected limited groundwater resources at depth beneath the extraction area will be comparable with those relevant to surface water, i.e. with respect to contamination from hydrocarbons and/or sewage.

14. EVALUATION OF COMPLIANCE

A water monitoring report will be prepared within 7 days of the receipt of laboratory results relating to any discharge event. This report will include an assessment of the monitoring results against the criteria.

All monitoring reports will be reviewed by the Environmental Officer and a copy included within each *Annual Review*.

In the event that monitoring identifies an exceedance of the criteria outlined in Section 10.2 of this document, Austral will initiate appropriate corrective and preventative actions as discussed in Section 16.

A copy of the investigation report and regular updates on the status of the identified corrective and/or preventative actions will be provided to the NSW Department of Planning & Environment (DPE) and Environment Protection Authority (EPA) and, if required, the complainant, in accordance with the procedures identified in Section 16. In addition, a summary of the report will be included in the subsequent *Annual Review*.

15. COMPLAINTS HANDLING AND RESPONSE

The *Environmental Management Strategy* as required by *PA Condition* 5(1) includes a detailed complaints management procedure. This sub-section records the procedures that will be implemented following receipt of a water-related complaint.

Water-related complaints may be received via one of the following methods.

- Directly via the 24-hour, 7 day per week Community Information Line (1800 635 620) or via the Bowral Brick Plant phone line 4861 3031). This number will be displayed on a sign at the Quarry entrance and on Austral's web site.
- Directly via a dedicated email address nswenvironmental@australbricks.com.au which will be advertised in a similar manner to the Community Information Line.

Indirectly via a local or state government agency. Following receipt of any water-related complaint, Austral will implement the following procedure.

- 3. The complaint will be reviewed by the Environmental Officer or their delegate to determine the nature of the complaint and to confirm it is related to the Quarry's operations.
- 4. Relevant monitoring data will be reviewed, including water monitoring data.
- 5. The Quarry Manager will contact the complainant to further discuss the complaint.
- 6. Should any relevant water monitoring report indicate that there has been no exceedance of relevant criteria, the Environmental Officer will continue to consult with the complainant in relation to managing water-related issues at the Quarry Site.
- 7. Should any relevant water monitoring report indicate that there has been an exceedance of relevant criteria, the Environmental Officer will notify the EPA and DPE in accordance with the procedures identified. In addition, the Environmental Officer will continue to consult with the complainant, as required, until the issue is resolved and compliance has been re-established.

All complaints will be recorded using a pro forma complaints book developed for all sites operated by Austral Bricks throughout NSW.

16. CORRECTIVE AND PREVENTATIVE ACTIONS

In the event that water monitoring identifies an exceedance of the relevant criteria, the exceedance will be reviewed to determine the likely cause(s). The review will seek to determine:

- whether the exceedance of the criteria was directly related to a source associated with the Quarry or if environmental factors contributed to the exceedance;
- the primary cause of the exceedance;
- any contributing factors which led to the exceedance;
- whether appropriate controls were implemented to prevent the exceedance; and
- corrective and preventative measures that may be implemented to prevent a recurrence of the exceedance.

Corrective and/or preventative actions will be assigned to relevant personnel of either Austral or its contractor. Actions will be communicated internally through planning meetings and toolbox talks and outstanding actions will be monitored for their effectiveness upon completion.

17. INCIDENT REPORTING

In the event that routine monitoring establishes that an exceedance of an environmental criterion was directly attributed to activities associated with the Quarry, the exceedance will be reported to DPE and EPA within 24 hours of identifying the exceedance.

Within 7 days of identifying the exceedance, Austral will submit a written report with regular updates on the status of the additional mitigation actions to the DPE and EPA in accordance with the procedures identified in Section 16. In addition, a summary of all incidents will be included in the *Annual Review*.

The Environmental Officer will be responsible for incident reporting.

18. PUBLICATION OF MONITORING INFORMATION

Austral will include a summary of all water monitoring, incident and exceedance investigation reports within each *Annual Review* which in turn will be placed on Austral's website once approved by the relevant government agencies.

The Environmental Officer will be responsible for the compilation of all relevant monitoring information.

19. PLAN REVIEW

In accordance with *PA Condition* 5(5), this Water Management Plan will be reviewed and, if required, revised within 3 months of:

- the submission of an Annual Review under PA Condition 5(4);
- the submission of an incident report under *PA Condition 5(7)*;
- the submission of an audit report under *PA Condition 5(9)*;
- any modification to the conditions of PA08_0212; and
- the completion of the installation of the 3 paired piezometers.

The Environmental Officer will be responsible for the review of this Plan.

20. REFERENCES

DECC (2008). *Managing Urban Stormwater. Soils and Construction.* Volume 2e Mines and Quarries. NSW Department of Environment and Climate Change, Sydney.

Landcom (2004). Managing Urban Stormwater. Soils and Construction. Volume 1.

- **R.W. Corkery & Co. (2012)**. *Water requirement for Berrima Clay/Shale Quarry*. Email transmission to David Mooney, Dept. Planning and Infrastructure. 7th June 2012.
- SEPP (2011). State Environmental Planning Policy. Sydney Drinking Water Catchment.

APPENDIX A - EROSION AND SEDIMENT CONTROL PLAN

Contents:

- ESCP000 Cover sheet, Locality Plan and Drawing Schedule
- ESCP001 General Notes Sheet 1 of 2
- ESCP002 General Notes Sheet 2 of 2
- ESCP003 Sediment Basin Schedule, Background Data and Calculations
- ESCP004 Standard Drawings
- ESCP005 Standard Drawings Continued
- ESCP006 Informative Tables
- ESCP007 Establishment Stages 1 4
- ESCP007 Establishment Stages 5 7

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EROSION AND SEDIMENT CONTROL PLANS

FOR APPROVAL

DECEMBER 2015

DRA	WING	SCHE	DUE

DRAWING NUMBER	DRAWING TITLE
14000289 P01 ESCP000	ESCP – COVER SHEET, LOCALITY PLAN AND DRAWING SCHEDULE
14000289 P01 ESCP001	ESCP – GENERAL NOTES – SHEET 1 OF 2
14000289_P01_ESCP002	ESCP – GENERAL NOTES – SHEET 2 OF 2
14000289_P01_ESCP003	ESCP – SEDIMENT BASIN SCHEDULE, BACKGROUND DATA & CALCULATIONS
14000289_P01_ESCP004	ESCP – STANDARD DRAWINGS
14000289_P01_ESCP005	ESCP – STANDARD DRAWINGS CONTINUED
14000289_P01_ESCP006	ESCP – INFORMATIVE TABLES
14000289_P01_ESCP007	ESCP – ESTABLISHMENT STAGES 1–4
14000289_P01_ESCP008	ESCP – ESTABLISHMENT STAGES 5–7



LOCALITY PLAN

R	V DATE	E DE	ES. D	DRN.	APP.	REVISION DETAILS	DRAWIN	g status	North	CLIENT		PO.Box 1098, Bowral NSW, 2576	PROJECT TITLE
F							DESIGN BY	M. PASSFIELD	7			Suites 7 & 8, 68-70 Station Street	
E							FINAL APPROVAL	m.it.		AUSTRAL BRICKS		(t) D2 4862 1633	NEW BERRIMA SHALE QUARRY
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F									1		JLLC	ental: reception@seccon.su	
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Issue Date: 9 June 2016 Approval Date: 9 June 2016 Review Date: in accordance with Section 19



APPROVED WATER MANAGEMENT PLAN

Report No. 744/09 – Approved 9 June 2016

GENERAL REQUIREMENTS

EROSION AND SEDIMENT CONTROL DESIGN

The details shown on this drawing are primarily for construction stage erosion and sediment control requirements.

This Erosion and Sediment Control Plan (ESCP) has been prepared in accordance with Blue Book Volume 1 (Landcom, 2004) and Volume 2E - Mines and Quarries and project approval conditions.

An erosion hazard assessment has been completed for the proposed works. The predicted soil loss has been determined in accordance with the following

$A = R \times K \times LS \times C \times P$

- Where
 - = Annual soil loss due to erosion (t/ha/yr)
 - = Rainfall erosivity factor
 - = Soil erodibility factor
 - = Topographic factor derived from slope length (SL) and slope gradient (S) LS
 - = Cover and management factor = Erosion control practice factor

The following values have been used:

: 2580 R

- : 0.064
- : Varies (200m MAX.) SL
- : Varies (Typically 5 15% for general surfaces, up to 40% on bunds.)
- LS Varies (Typically 1.19 to 5.96 for general surfaces up to 6.92 on bunds)
- : 1.0 (Construction stage i.e. no soil surface protection or ground cover applied)
- : 1.3 (for general construction areas)

Based on the above data, the potential soil loss rate varies from 25t - 1636 t/ha/yr depending on the works.

DESIGN ASSUMPTIONS AND BACKGROUND INFORMATION

- Volumetric runoff coefficient (CV) = 0.64 (assuming hydrologic group D runoff coefficient low infiltration, high runoff)
- 5-day, 80th %ile rainfall depth = 36.2mm
- Runoff coffeficient (C10) = 0.6 for pervious areas, 0.69 for disturbed areas.

EROSION AND SEDIMENT CONTROL INSTRUCTIONS

DATE DES. DRN. APP.

Issue Date: 9 June 2016

Approval Date: 9 June 2016

Review Date: in accordance with Section 19

A 11/12/15 M.P. M.R. M.P. DRAFT ISSUE - FOR CONSULTATION

REV

Before commencement of clearing, grubbing, topsoil stripping and earthworks in each area/section of works, the site is to be secured and the following erosion and sediment control measures installed in order except for Items 10 to 15 which are to be undertaken progressively as required throughout all stages of works. Clearing, grubbing, stripping and earthworks necessary to install the erosion and sediment controls are permitted but must be kept to an absolute minimiu

- 1. Barrier flagging (or alternative measures) should be in place around the edge of the construction boundary to restrict access and in any additional locations as required to minimise unnecessary disturbance. Refer to the 'Access Control' notes.
- 2. Stabilised site entry/exit points (Standard Drawing SD 6-14) in the locations shown and anywhere where construction vehicles exit a works area onto a public road. Refer to the 'Access Control' notes.
- 3. Ensure sediment fencing is in place downslope of stockpile areas and following Standard Drawing SD 6-8 (Refer to the 'Sediment Fencing' notes below).
- 4. Clean water diversions are to be constructed and stabilised. Refer to plans for details. 5. Sediment basins including the inlet and outlet dissipation structures are to be installed in the
- locations shown refer to the 'Sediment Basin' notes and to the plan for details. 6. Onsite (dirty) water diversions (where applicable) are to be constructed and stabilised/lined refer to plans for details. These might not be required depending on the exact locations of the hasins.
- 7. Stockpile areas are to be established in locations as shown on the plans or as specified by the site manager and in accordance with the 'Stockpiling' notes below.
- 8. Once all of the above measures are complete and stable construction works can proceed in accordance with the engineering plans. Topsoil should be managed in accordance with the 'Topsoil Stripping, Soil Management and Stockpiling' notes.
- 9. Slope lengths across disturbed lands to be maintained at the required intervals during all rainfall events (Refer to the 'Slope Lengths' notes).
- 10.Dust suppression to be carried out when required (Refer to the 'Dust Suppression' notes). 11. Temporary stabilisation of some lands prior to rainfall is to be undertaken in accordance with the
- 'Stabilisation' notes and the 'Rainfall Preparation Procedure' 12. Treatment of dirty water is to be carried out as necessary in accordance with the 'Dirty Water
- Treatment and Discharge Requirements' notes. 13.Monitoring, maintenance and inspections are to be carried out regularly as required, in accordance with the 'Site Inspection and Monitoring and Maintenance' notes.

REVISION DETAILS

14.Undertake progressive stabilisation of lands as final earthworks are complete in each area

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DRAWING STATUS

PRELIMINARY

DESIGN B

SCALE: (on A3 Original)

M. PASSFIELD

N.A.

(rather than waiting until the completion of works).

15. Final stabilisation is to be completed in accordance with the 'Stabilisation' notes and Table 1.

ACCESS CONTROL

- Install barrier fences or suitable administrative controls to define the project works and clearing limits.
- Barrier fencing can simply be made from tape wound around star pickets or stakes. Alternatively, sediment fence, site fence or chain wire fences can be used for this purpose if so desired. Existing fences and/or site flagging can also be used where they are present in the relevant locations
- Stabilised site access points (SD 6-14) are to be provided in all locations where construction vehicles enter and exit the works onto a public roadway.
- Barrier and sediment fencing are to be used to ensure that all vehicles leaving the site pass over a stable access point to minimise bogginess in these areas and minimise sediment tracking onto public roads.
- Barrier fencing is to be used to delineate all 'no go' areas.
- Barrier fencing is to be used at the discretion of the site manager to delineate other 'no go' areas.
- The soil erosion hazard on the site will be kept as low as practicable by minimising land disturbance and staging works. Some ways of doing this are outlined in Table 2.

TOPSOIL STRIPPING, SOIL MANAGEMENT AND STOCKPILING

- Soils are to be stripped and managed in accordance with the following: • Prior to topsoil stripping gypsum is to be spread over the ground surface at a rate of 1 tonne per hectare. The gypsum will be stripped up and premixed with the topsoil.
- As much as possible topsoils are to be stripped when moist (not wet or dry).
- Topsoils are to be stripped separately from the underlying subsoils. Topsoil depths may vary across the project site and care should be taken to avoid stripping underlying soil horizon (subsoils) with the topsoil layer.
- As much as possible subsoils are not to be worked when wet

Stockpile areas are to be established within the locations specified. If additional or alternative locations for stockpiling are required they should be subject to approval prior to establishment. All stockpiles should incorporate clearly defined access controls and comply with the regulations outlined below

All stockpiles must be constructed and maintained in accordance with Standard Drawing SD 4-1 and the following regulations:

- All stockpiles must have sediment fencing or equivalent installed around their bases as per Standard Drawing SD 4-1.
- Stockpiles are not to be positioned within 40m of a drainage reserve/creek.
- Mulched vegetation, topsoil and subsoil (if applicable) are to be stockpiled separately whereever possible
- Stockpiles are to be stabilised to achieve a C-factor of 0.1 (i.e equivalent to 60% grass cover) within 10 days of formation using a temporary soil stabiliser (e.g. Vital P47/stonewall), geotextile, jute matting or equivalent. Also refer to Table 1.
- Topsoil stockpiles should be constructed to no more than 2 meters in height Stockpiles should be battered at a maximum slope of 2:1 wherever possible.
- STABILISATION
- Undertake progressive stabilisation of disturbed ground surfaces as they are completed rather than at the end of the works program (Refer to Table 1).
- Final stabilisation is to achieve the C-factors (ground cover) detailed in Table 1. • Areas to be revegetated are to be topsoiled first using the gypsum treated topsoil stripped
- during the initial stages of works (refer to the Topsoil Stripping, Soil Management and Stockpiling notes). Refer to Standard Drawing (SD 4-2) for instructions regarding topsoil replacement.
- Appropriate seedbed preparation should be carried out when revegetating lands (See Standard Drawing (SD 7-1)).
- Soils are to be treated with a slow release fertiliser to improve fertility. Fertilizer specifications and application rates are to be determined prior to final rehabilitation.
- Wherever possible, re-use cleared/mulched vegetation for either temporary or permanent stabilisation of disturbed areas. If mulch is not available or appropriate then the use of jute mesh, erosion control mattting (ECM), soil stabilisers (e.g. Vital P47/Stonewall) hydomulching or an appropriate approved alternative should be considered for provision of ground cover until vegetation has established.
- Diversion drains and table drains are to be stabilised to achieve the C-factors as detailed in Table 1, using jute matting, geotextile fabric, rock or TRM etc. Subsoil surfaces for all permanent drainage lines and concentrated flow areas and are to have gypsum applied at a rate of 5 tonnes per hectare prior to lining. Refer to the Table 5 for specific sizing and lining details for clean water drain stabilisation. Also refer to Standard Drawings (SD 5-6 and SD 5-7).
- Refer to the Stockpiling notes for stabilisation requirements on stockpiles. Also refer to Table 1

AUSTRAL BRICKS

and Standard Drawing (SD 4-1). Sediment basin overflows and culvert inlets / outlets are to be stabilised in accordance with Table 4 permanent drainage measures are installed, temporary erosion and sediment control structures and water management structures can be removed (e.g. sediment fence and diversion drains). Prior to forecast high winds or site shutdown (> 3 days) and in accordance with the 'Rainfall Preparation Procedure', some areas will be 'locked down' using temporary ground covers such as biodegradable matting, geotextile matting, hydromulch, soil binders (e.g. Vital P47/stonewall) or similar. Refer to the 'Rainfall Preparation Procedure' for details. Highly trafficked areas (i.e. site access/haul roads, site compounds) will be stabilised where feasible with suitable trafficable materials such as DGB, roadbase, gravel or dustex to minimise erosion and provide stability to vehicle movements. 6-8) to minimise the risk of water flowing along them. borne due to wind erosion. (e.g. dustex, dustguard or equivalent) must be identified and approved prior to starting construction works. used in non-trafficked areas to assist with dust control. roadbase, a trafficable soil stabiliser or equivalent to assist with dust control on these surfaces. (the worst case scenario) considering all stages. be undertaken prior to construction to ensure the required volumes can be achieved. If the required sediment basin volumes cannot be provided due to space or topographical restrictions additional basins/sumps are to be provided to supplement the basin volume and/or enhanced erosion control measures are to be carried out. This is to be undertaken by onsite survey in consultation with SEEC or an appropriately qualified soil conservationist (CPESC) prior to any land disturbance taking place once the workforce has mobilised to site. If full sized sediment basin volumes cannot be provided as shown on these ESCPs the plans are to be updated prior to commencina works. appropriate stability and compaction is achieved. Also refer to SD 6-4. sized to have a capacity to pass the 100 year peak flow - Refer to Table 4. spillway outlet. Dissipater to extend onto stable, vegetated lands to ensure sheet flow Gypsum is to be shallow ripped into the basin internal walls, spillway base and walls and dissipater ground surface during construction at a rate of 5t/ha. Environmental Advisor/Manager issued via a Water Discharge Authorisation Form. quality requirements prior to being discharged from site (Refer to the 'Dirty Water Treatment and Discharge Requirements' below for further details). without first being tested and if required, treated. the discharge requirements and discharged within 5-days or less following a rainfall event. area) prior to rainfall. This will help to treat (flocculate) site water. treatment is not being successfully achieved via manual methods (monitor regularly). ESCP GENERAL NOTES NEW BERRIMA SHALE QUARRY SHEET 1 OF 2

PROJECT NO.

14000289

SUB-PR NO.

P01

DRAWING NO.

ESCP001

- Install sediment fences in the locations shown. • Install all sediment fencing in accordance with Standard Drawing SD 6-8. Sediment fences must be firmly trenched into the ground for their entire length. Sediment fences must include small 'returns' at maximum 20m intervals (see Standard Drawing) Dust suppression should be carried out whenever necessary to minimise sediment becoming air • An appropriate water source for dust suppression and/or dust suppressant management system • Temporary stabilisers (e.g. Vital Bon-Matt P47), geotextile, jute matting or equivalent can be • Wherever possible access track running surfaces to be stabilised with crushed rock, aggregate, • The required sediment basin sizes and details are shown on Table 3. • The sediment basin/s have been sized (volumes determined) for the maximum area of disturbance • Sediment basin footprints shown on the plans are indicative only. A detailed survey analysis is to • Sediment basins are to be constructed in accordance with engineering detail to ensure • The sediment basin/s are to be built to incorporate a primary outlet (weir overflow/spillway) • An energy dissipater of equivalent width and lining to the spillway is to be constructed at each Safety controls are to be implemented around the sediment basins as required. • Discharges from sediment basins are only to be carried out following approval from the Any release of water from a sediment basin will need to be tested to comply with the water Note that, if it is pumped into a tanker truck for later use, it cannot be discharged offsite • The sediment basins must be effectively flocculated (if required), settled, tested to comply with · Sediment basins inlets should be preloaded with gypsum (spread out over the inlet flow surface • An automatic flocculation system at the sediment basin/s inlet may be necessary if water

- As surfaces are stabilised (at least 90% of any finished area has at least 70% ground cover) and SEDIMENT FENCING SEDIMENT BASINS (GENERAL REQUIREMENTS ARE CONTINUED ON THE FOLLOWING PAGE)
- DUST SUPPRESSION

- PO.Box 1098, Bowral, NSW. 2576

Suites 7 & 8, 68-70 Station Street

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Report No. 744/09 – Approved 9 June 2016

GENERAL REQUIREMENTS CONTINUED

- A sediment marker is to be installed within sediment basins indicating the sediment volume level.
- Sediment basins are to be desilted prior to reaching the indicated sediment volume levels.
- A site "Basin Management Plan" should be implemented to ensure appropriate sediment basin management.

DIRTY WATER TREATMENT AND DISCHARGE REQUIREMENTS

- Any active discharge of water from the project (i.e. where water is moved offsite via direct action such as pumping rather than flowing off the project as a result of heavy rainfall) is to achieve:
- 50mg/L or less TSS (Total Suspended Sediment) or equivalent NTU based on approved correlation; and
- ••• pH 6.5 to 8.5; and
- <10mg/L oil and grease and no visible trace.
 Flocculation can be achieved by using gypsum at a rate of approximately 30 kg/100 m3 of stormwater. Alternative flocculating agents can only be used if approval by EPA has been granted. Refer to
- manufacturers guidelines for dosage details.
 Ensure the flocculant/coagulant is thoroughly mixed/diluted with water prior to spreading evenly over the entire pond surface for proper treatment of water. Dirty water from the basins can be used for mixing the flocculant/coagulant.

SLOPE LENGTHS

- Ideally slope lengths should be restricted to maximum 40m intervals across all disturbed lands during
 rainfall. This will reduce the amount of sediment reaching a basin and so extend the de-silting period.
- Diversion bunds/drains, low flow earth banks (Standard Drawing SD 5-5) or sandbags/equivalent can be installed prior to rainfall event to achieve this.

RAINFALL PREPARATION PROCEDURE

- The weather forecast is to be monitored regularly (at least daily and hourly when rainfall is imminent) by the site environmental manager (or their representative).
- Prior to forecast rainfall (> 60% chance of 10mm or more over 24 hours), the following will occur:
 ••• The site environment manager (or their representative) is to inspect (and record the
 - condition of, and any action required) the condition of all erosion and sediment controls;
 Slope breaks will be pushed up or cut in across large, exposed areas to slow down flows and minimise erosion. Also refer to the 'Slope Lengths' notes;
 - Disturbed lands on the southern visibility barrier that do not drain to SB1 will be 'locked down' as much as is feasible and practical. This will be achieved using temporary ground covers such as biodegradable matting, geotextile matting, hydromulch, soil binders (e.g. Vital P47/stonewall) or similar.

SITE INSPECTION, MONITORING AND MAINTENANCE

- Regular site inspections are to be conducted by the site environment manager (or their representative) and records of all such inspections are to be made available for review. Inspections are to be undertaken:
 - ••• At least weekly during normal construction hours; and
 - ••• Prior to forecast significant (>20mm) rainfall (see above); and
- ••• Daily during rain events (if safe to do so); and
- Within 24 hours of the cessation of a rain event that causes runoff (if safe to do so).
 Additional erosion and sediment controls will be installed as necessary to ensure satisfactory
- outcomes in keeping with the project conditions and best-practice Blue Book guidelines.
 Sediment or rocks tracked from the site will be removed from public roads as soon as possible (e.g.
- with street sweepers).
 After rainfall, sediment accumulated in trapping devices (e.g. filter dams, sediment fence) will be
- After familar, secure factorial accumulate in frapping devices (e.g. fifter dams, secure fracts) with be removed to a secure location where it can't wash or blow offsite (preferably to an active stockpile).
 Weather conditions will be monitored onsite and daily rainfall will be recorded.
- Safe storage areas for wastes, fuels, excess concrete and other potential contaminants are to be delineated by the site manager in accordance with the project requirements.
- Adequate supplies of erosion control measures (e.g. geofabric rolls, jute matting, polymer soil binders) are to be maintained in the site compound for rapid deployment as required.
- Adequate supplies of flocculant (and flocculating equipment) are to be available as required.
- Dust suppression is to be undertaken as required to minimise the risk of offsite dust impacts. Refer
 to the Dust Suppression notes for details.

ORDER OF WORKS

STAGES 1 TO 4 ESTABLISHMENT

Install the following measures in order, except for items 22 and 23 which should be progressively implemented during works.

- 1. Construct site sheds and stabilised access.
- 2. Construct clean water diversion drain CD2 and stabilise it and its outlet.
- Pump out Storage 1 (which will initially be used as a sediment basin) and construct a new spillway (if necessary); stabilise the disturbed lands.
- If necessary construct dirty water drains to ensure all disturbed areas within Catchment 1 drain to Storage 1.
- Construct new Storage 7 which will initially be used as a sediment basin. Construct its spillway and stabilise the disturbed lands.
- 6. Pump out and enlarge Storage 2. Construct the spillway and stabilise the disturbed lands.
- 7. If necessary construct dirty water drains to ensure all disturbed areas within Catchment 2 drain to Storage 2.
- Delineate the alignment of the haul road with barrier fences to restrict access refer to Table 2 and to the Barrier Fence Notes.
- Strip the topsoil from the haul road alignment. Stockpile it to the requirements of the Stockpiling Notes. Stockpiles should be located within dirty water catchments.
- 10.Construct the haul road to provide access to the site of the central visibility barrier, stabilise the disturbed lands.
- 11. Construct new storages 10 and 11 which will be sediment basins; stabilise the disturbed lands.
- 12.If necessary construct dirty water drains to ensure all disturbed areas within Catchments 10 and 11 drain to Storages 10 and 11.
- 13.Pump out Storage 4 (which will initially be used as a sediment basin) and construct a new spillway (if necessary); stabilise the disturbed lands.
- 14. If necessary construct dirty water drains to ensure all disturbed areas within Catchment 4 drain to Storage 4.
- 15.When all sediment basins and their associated drains and spillways are complete, general earthworks may begin. Ensure all dirty water drains to a sediment basin.
- 16.Delineate the extent of works with barrier fences to restrict access refer to Table 2 and to the Barrier Fence Notes.
- 17.Strip the topsoil from the visibility barriers and extraction area. Stockpile it to the requirements of the Stockpiling Notes.
- 18.Build the central visibility barrier.
- 19.Build the southern visibility barrier. This barrier requires special treatment as the southern face and the western part of the northern face will not be able to drain to Storage 1. In this location soil binder will be kept on hand and will be applied to all disturbed surfaces that don't drain to Storage 1 if rain is forecast (more than 60% chance of more than 10mm).
- 20. Ensure all dirty water drains to a sediment basin. For small areas (<2,500 m2) that can't, drain to a sediment capture device e.g. sediment fence, rock filter dam, sediment sump.
- 21. Progressively stabilise all disturbed surfaces to the requirements of Table 1.
- 22. Manage the sediment basins to the requirements of the Dirty Water Discharge Notes.
- Once the disturbed lands are stabilised (Table 1) Storages 1, 4 and 7 will be converted to clean water storages.
- Once the disturbed lands are stabilised (Table 1) Sediment Basins 10 and 11 and any associated catch drains will be removed and the lands stabilised.

STAGES 1 TO 4 OPERATION

- 1. The only dirty water storages in this stage are St
- 2. Storage 2 will be pumped to Storage 3b during rain
- 3. Storage 3b has no outlet stored water will be e
- During this period ensure diversion drains are stated adequately stabilised (Table 1).

STAGES 5 TO 7 ESTABLISHMENT

- This stage involves the expansion of the extraction visibility barrier will be relocated to form a new new
- 2. Install clean water diversion CD3 at Storage 4 whi
- Pump out Storage 4.
- Install Storage 9 which will be a sediment basin; si
 Ensure clean water drain CD1 outlets downstream while works occur.
- 6. Pump out Storage 5.
- Delineate the alignment of the northern visibility refer to Table 2 and to the Barrier Fence Notes.
- Build the new northern visibility barrier before st footprint. This will form Storage 8.
- 9. Stabilise the barrier according to Table 1.
- 10.When the catchment to Storage 5 is stabilised it n 11. Strip the topsoil in the Extraction Area footprint
- When the extraction area is internally draining to storage and Storage 9 may be removed; stabilise at 13.Progressively stabilise all disturbed surfaces to t
- 14.Manage the sediment basins to the requirements o

STAGES 5 TO 7 OPERATION

- The only dirty water storages in this stage are St
- 2. Storage 2 will be pumped to Storages 3b or 8 duri
- 3. Storages 3b and 8 have no outlet stored water
- During this period ensure diversion drains are sta adequately stabilised (Table 1).

POST QUARRY

- 1. Post Quarry works will be to:
- a. Remove the Surplus Overburden Stockpile by Area.
- b. Rehabilitate the former Surplus Overburden
- c. Remove the northern visibility barrier and sta
- d. Rehabilitate the Extraction Area, although it
- 2. No new Sediment basins or water storages will be
 - a. Storage 2 will be used in the same manner as stabilised. At that time it will be converted by
 - b. Storage 5 will be managed as a sediment basi northern visibility barrier; refer to the Dirty works begin. Once its catchment is stabilised
- 3. Progressively stabilise all disturbed surfaces to
 - 4. Manage the sediment basins to the requirements of

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ſ	REV	DATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWI	NG STATUS	North	CLIENT		PO.Box 1098. Bowrol. NSW, 2576	PROJECT TITLE
- [DESIGN BY	M. PASSFIELD				Suites 7 & 8, 68-70 Station Street	
- [DRAWN BY	M.R.				Bowral NSW 2576.	
- E							FINAL APPROVAL			AUSTRAL BRICKS		(f) 02 4862 1633	NEW BERRIMA SHALE QUARRY
- [SCALE:	N A			CFFC	(f) 02 4862 3088	
- E							(on A3 Original)	N.A.				email: reception@seer.com.au	
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- E								MINARY				WWW.SEEC.COM.AU	
- [A 11	1/12/15	M.P.	M.R.	M.P.	DRAFT ISSUE - FOR CONSULTATION							
P	lot Date:	: Wednes	day, 16	Decen	nber 20	015 9:37:29 AM CAD File Name: J:\14000289 New Berrima	Shale Quarry\Drawing	Is/14000289_P01_ESC	P000_REV A.dwg				

Issue Date: 9 June 2016 Approval Date: 9 June 2016

Review Date: in accordance with Section 19

THE AUSTRAL BRICK COMPANY PTY LIMITED New Berrima Clay/Shale Quarry – PA08_0212

	PROJECT NO. 14000289	SUB-PR NO. P01	drawing no. ESCP002	REV	iis drawii					
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it acl	was during oper to a clean wate	ation until i er dam.	ts catchment is		his drawin					
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abi vil	lise the land the	re. Ilv-draining	to Storage 8		ains th					
Sto	ockpile area.				e prop					
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Dle	and that any ar	eas of reha	Dilifation are							
wil	l be evaporated	or will perc	olate into the gro	ound.						
ng	rainfall. Storage	2 is design	ned not to overflo	ow.						
tor	age 2 and Stora	ges 3b and	8.							
of I	he Dirty Water I	Discharge N	otes.							
the requirements of Table 1.										
Storage 8, Storage 4 may revert to a clean water any disturbed lands.										
an	d stockpile it acc	ording to t	he stockpiling not	es.						
nav	revert to a clea	an water st	orace.							
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ble	and that any ar	eas of reha	bilitation are							
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nfa	age z and Storaj Ill. Storage 2 is d	ge oo. designed no	t to overflow.							
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APPROVED WATER MANAGEMENT PLAN

Report No. 744/09 – Approved 9 June 2016

									POST CONS	TRUCTION	
		DU (D	JRING CONSTRUCTION - TEMPC Juring periods of inactivity wh	DRARY STABILISAT	ION bld)		LANDS		TIMEFRAMES	TREATMENT METHODS -	REMARKS
	LANDS	STABILISATION REQUIREMENT	TIMEFRAMES	EATMENT METHODS - PRODUCTS	REMARKS			REQUIREMENT		Refer to the drain specification	ions detailed on the plan for specific lining/stabilisat requirements.
	High Risk Areas - Batters, stee slopes (~ 30%), works in and/area vaterways, surfa	C-factor = 0.1 Ind (60% grass cover or ces equivalent ground cover ⁽¹⁾)	Applies after 10 working days of inactivity (even though works might continue later)	Soil binder (i.e. Vital /stonewall or equivalent M)	- Stabilise all exposed soils by spraying sur with Vital P4.7/stonewall or equivalent ¹¹ . - Vital dilution rate = 1:10 (Vital:Water). - Application rate = 1:1 / m ² of diluted Vital i - Re-apply/maintain as necessary to ensure required cover is provided.	urfaces Il mixture. re the				Example t Temporary lining - Geotextile (i.e. Bidim A24 or equivalent ⁽¹⁾)	reatment methods are shown below. - Complete any subsoil treatment before laying th matting. - Install matting in accordance with SD 5-7. - Re-apply/maintain as necessary to ensure the required cover is provided.
	All lands (includin waterways and stockpiles)	ng C-factor = 0.15 (50% grass cover or equivalent ground cover ^{[11}]	Applies after 20 working days of inactivity (even though works might continue later) Geoti	extile, jute matting, black Lastic or equivalent ¹¹ Soil binder (i.e. Vital 'stonewall or equivalent ¹⁰) extile, jute matting, black Lastic or equivalent ¹⁰	 - Cover all exposed soils. - Re-apply/maintain as necessary to ensure required cover is provided. - Spray all stockpile surfaces with Vital PA/7stonewall or equivalent ¹⁰. - Vital dilution rate = 1:10 (Vital:Water). - Application rate = 1:10 / m² of diluted Vital in Re-apply/maintain as necessary lapprox. - Cover all exposed soils. - Re-apply/maintain as necessary to ensure sectors and the sectors of th	re the Il mixture. . every 3-6 to ensure re the				Jute mesh, seeding and soil binder (i.e. Vital P47/stonewal or equivalent ¹⁸) – Low flows to moderate	 Complete subsoit treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place topsoil to a depth of at least 75mm. Complete any fertilisation and seeding before lay the matting. Install matting in accordance with SD 5-7. Spray all surfaces with Vital P47/stonewall or equivalent¹¹. Vital dilution rate = 1:10 (Vital:Water). Application rate = 11. / m² of diluted Vital mixtur Re-apply/maintain as necessary to ensure the
	Disturbed lands : southern visibili barrier that do n drain to SB1	n C-factor = 0.1 y (60% grass cover or equivalent ground cover ^[1]	Before rainfall P47,	Soil binder (i.e. Vital /stonewall or equivalent M)	required cover is provided. - Spray all stockpile surfaces with Vital P47/stonewall or equivalent ¹⁰ . - Vital dilution rate = 1:10 (Vital:Water). - Application rate = 1:1 / m ² of diluted Vital - Re-apply/maintain as necessary (approx. e months without suitable vegetation cover) to the required cover is provided.	ıl mixture. . every 3-6 to ensure	Waterways, drainage lines and concentrated flow areas	C-factor = 0.05 (70% grass cover or equivalent ground cover ⁽¹⁾)	Applies after 10 working days from completion of formation and before they are allowed to carry concentrated flows	Jute matting (~350gsm) and seeding or equivalent ¹⁰ – Low to moderate flows	 Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/hal. Place topsoil to a depth of at least 75mm. Complete any fertilisation and seeding before lay the matting. Install matting in accordance with SD 5-7. Re-apply/maintain as necessary to ensure the required cover is permanently maintained.
TABL LAND USE	E 2 LIMITATIONS	All site workers should clear	NSTRUCTION REMARKS	Sediment Numb ere 2	TABLE 3 – SEDIMENT BAS Basin Soil Storage Zone (m3) Set 100 175 Set	SIN SIZING TABLE ettling Zone (m3) Total volume (m3) 1,300 1,400 (existing) 1,625 1,800				Turf reinforcement matting (TRM) (e.g. TerraNat or equivalent ¹⁰) – Moderate flows	 Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place topsoil to a depth of at least 75mm. Complete any fertilisation and seeding before la the matting. Install matting in accordance with SD 5-7. Re-apply/maintain as necessary to ensure the required cover is permanently maintained.
ccess areas	any essential construction activity as shown on the engineering plans Limited to a maximum width of 5 metres	sediment fencing (downslope) or similar materials. The site manager will determine and mark the location zones on site. They can vary in position so as to best existing vegetation and protect downstream areas wh considerate of the needs of efficient works activities. workers will clearly recognise these boundaries		e 10	500 280 20 150 60 200	900 1,400 1,970 2,250 1,180 1,200 490 640 170 230 1,200 1,400				Rock Lining - High flows	 Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Install geotextile underlay (if specified) in accordance with SD 5-7. Install rock armouring (to the depth and size as specified on the plan). Re-apply/maintain as necessary to ensure the required cover is provided.
emaining lands, cluding revegetation eas	Entry prohibited except for essential management works	Thinning of growth might be reduction or weed removal. the agreed scope must be a commencement.	necessary, for example, for fire All thinning activities additional to pproved by RMS prior to				Stockpiles	C-factor = 0.10 (60% grass cover or equivalent ground cover ⁽¹¹⁾)	Applies after 10 working days from completion of formation	Seeding and soil binder (i.e. Vifal P&7/stonewall or equivalent ⁽¹⁾)	 Apply seed to all stockpile surfaces (Note: seed may not be required if existing seedbed is present - Spray all stockpile surfaces with Vital PA7/stonewall or equivalent¹⁰, Vital dilution rate = 1:10 (Vital:Water), Application rate = 1:10 of diluted Vital inxtuu - Re-apply/maintain as necessary to ensure the required cover is permanently maintained.
				<u> TABLE 5 – CLE</u>	AN WATER DIVERSIONS					Geotextile, jute matting, black plastic or equivalent ^[1]	- Cover all exposed soils. - Re-apply/maintain as necessary to ensure the
Sodia and Brite	TABLE 4 - SPILLWAY S	IZINGS**	1						1		I PRIME PLI LOVEL IS INCOME.
Sediment Basin Number 1	TABLE 4 - SPILLWAY S Base Width (m) Sto 3	IZINGS** pe% Lining setentle for first 5 there grass 100 mm rock over there grass 100 mm rock over	Drain Number	Base width	(m) Depth (m) 0.75	Grade % Lining 1-1.5 Grass					 Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of 5tonnes/ha). Place gypsum treated topsoil to a depth of at lease
Sediment Basin Number 1 2 4	Base Width (m) Sto 3 4 5 10	IZINGS** pe% Uning for the second sec	Drain Number CD1a CD1b Cd1c CD2	Base width (1 1.5 2 0.5	(m) Depth (m) 0.75 0.75 0.75 0.75 0.75	Grade % Lining 1-1.5 Grass 4 Grass 8 Mesh reinforced turf 1.5-2 Grass		C-factor = 0.10 / 0.05	C-factor = 0.1 applies after 10 working days from completion	Topsoil, seeding and soil binder (i.e. Vital P47/stoneval or equivalent ^[1])	 required cover is provided. Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place gypsum freated topsoil to a depth of at I 75mm. Apply any fertilisers required. Apply seed to all surfaces (Note: seeding may n be required if existing seedbed is present). Spray all surfaces with Vital P47/stonewall or equivalent¹. Vital diurion rate = 110 (Vital:Water).
Sediment Basin Number 1 2 4 5 7	TABLE 4 - SPILLWAY S Base Width (m.) Slo 3 4 5 10 5 5	IZINGS** pe% Lining 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over sententle for first 5 m thence grass 100 mm rock over	Drain Number CD1a CD1b Cd1c CD2 CD3 Note: all side slope	Base width 1 1.5 2 0.5 0.5 sat 1V:3H.	Depth (m) Image: Constraint of the second seco	Grade %Lining1-1.5Grass4Grass8Mesh reinforced turf1.5-2Grass4Grass	General Surfaces	C-factor = 0.10 / 0.05 (60% / 70% grass cover or equivalent ground cover ¹⁰¹)	C-factor = 0.1 applies after 10 working days from completion of formation and C-factor = 0.05 applies within a further 60 days	Topsoil, seeding and soil binder (i.e. Vital P47/stonewal or equivalent ^[1])	 Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place gypsum freated topsoil to a depth of at 1 75mm. Apply any fertilisers required. Apply seed to all surfaces (Note: seeding may n be required if existing seedbed is present). Spray all surfaces with Vital P47/stonewall or equivalent ¹¹. Vital dilution rate = 110 (Vital:Water). Application rate = 11. / m² of diluted Vital mixtu - Re-apply/meintain as necessary to ensure the required over is permanently maintained. Refer to SD 7-1.
Sediment Basin Number 1 2 4 5 7 9 10	TABLE 4 - SPILLWAY S Base Width (m) Sto 3	IZINGS** pe% Lining figure the form of the second s	Drain Number CD1a CD1b Cd1c CD2 CD3 Note: all side slope	Base width 1 1.5 2 0.5 0.5 ss at 1V:3H.	Depth (m) 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	Grade %Lining1-1.5Grass4Grass8Mesh reinforced turf1.5-2Grass4Grass	General Surfaces	C-factor = 0.10 / 0.05 (60% / 70% grass cover or equivalent ground cover ^[1])	C-factor = 0.1 applies after 10 working days from completion of formation and C-factor = 0.05 applies within a further 60 days	Topsoil, seeding and soil binder (i.e. Vital P47/stonewal or equivalent ^[1]) Hydromulch or equivalent ^[1]	 Refer to SD 7-1. Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place gypsum treated topsoil to a depth of at 175mm. Apply any fertilisers required. Apply seed to all surfaces (Note: seeding may n be required if existing seedbed is present). Spray all surfaces with Vital P47/stonewall or equivatent ¹⁰. Vital dilution rate = 1.10 (Vital:Water). Apply maint as necessary to ensure the required cover is permanently maintained. Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place topsoil to a depth of at least 75mm. Apply/maintain as necessary to ensure the required cover is permanently maintained.
Sediment Basin Number 1 2 4 5 7 9 10 10 11	TABLE 4 - SPILLWAY S Bese Width (m) Slo 3 4 5 10 5 3.5 2 2 2 2	IZINGS** pe% Lining 100 mm rock over 5 gentextle for first 5 m thence grass 100 m for first 5 m thence grass 100 m for first 5 m thence grass	Drain Number CD1a CD1b Cd1c CD2 CD3 Note: all side slope	Base width 1 2 0.5 sat 1V:3H.	Depth (m)	Grade %Lining1-1.5Grass4Grass8Mesh reinforced turf1.5-2Grass4Grass	General Surfaces [1] – Equivalent cover/	C-factor = 0.10 / 0.05 (60% / 70% grass cover or equivalent ground cover ^[1]) product must achieve the equiva	C-factor = 0.1 applies after 10 working days from completion of formation and C-factor = 0.05 applies within a further 60 days	Topsoil, seeding and soil binder (i.e. Vital P47/stoneval or equivalent ^[1]) Hydromulch or equivalent ^[1] rch/documentation to verify th	 required over is provide. Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of 5tonnes/ha). Place gypsum freated topsoil to a depth of at 1 75mm. Apply any fertilisers required. Apply any fertilisers required. Spray all surfaces (Nofre: seeding may rule be required if existing seedbed is present). Spray all surfaces with Vital P47/stonewall or equivalent ⁽¹¹⁾. Application rate = 110 (Vital:Water). Application rate = 110 (Vital:Water). Reapply/meintain as necessary to ensure the required cover is permanently maintained. Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of 5tonnes/ha). Place topsoil to a depth of at least 75mm. Apply hydromulch to soil surfaces. Re-apply/maintain as necessary to ensure the required cover is permanently maintained.
Sediment Basin Number 1 2 4 5 7 9 10 11	TABLE 4 - SPILLWAY S Base Width (m) Sto 3 4 5 10 5 3.5 2 2 kment height above spillway must be 1.2	JZINGS** pe% Lining 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm rock over 5 gnotextile for first 5 m 100 mm	Drain Number CD1a CD1b Cd1c CD2 CD3 Note: all side slope	Base width 1 1.5 2 0.5 0.5 ss at 1V:3H.	Depth (m)	Grade %Lining1-1.5Grass4Grass8Mesh reinforced turf1.5-2Grass4Grass	General Surfaces [1] – Equivalent cover/	C-factor = 0.10 / 0.05 (60% / 70% grass cover or equivalent ground cover ^[8]) product must achieve the equiva	C-factor = 0.1 applies after 10 vorking days from completion of formation and C-factor = 0.05 applies within a further 60 days alent C-factor with proven reasea	Topsoil, seeding and soil binder (i.e. Vital P47/stonewal or equivalent ^[1]) Hydromulch or equivalent ^[1] rch/documentation to verify th	 Refer to SD 7-1. Complete subsoil treatment (i.e. gypsum lightly ripped into surgrade at a rate of Stonnes/ha). Place gypsum freated topsoil to a depth of at 1 75mm. Apply seed to all surfaces (Note: seeding may r to the surgrade seeding to the set of the set

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Issue Date: 9 June 2016 Approval Date: 9 June 2016 Review Date: in accordance with Section 19

THE AUSTRAL BRICK COMPANY PTY LIMITED New Berrima Clay/Shale Quarry – PA08_0212

DATE													
DES. (
DRN. AF	TABLE	A3 FROM LANDCOM (2004) "1	'HE BLUE	BOOK"									
P. DRAFT 2015 9-3				<u>[k]</u>	Moi	b)		ų			Notes 1 Whether vegetation	n is required and its type if s	o, will affect the technique used. Biodegradable
R ISSUE - FOR CONS 7:41 AM CAD	Gass	Jype	iuitable for Piltable for	(sritnom) əti i ngisət	el construction of the second se	tekative Cost Bracket	⁽⁹⁾ toeqmi leubicet	;-lactor (9 <33%; 610m);	; -factor <33%, >15m ; factor <33%, <6m	; -factor 33-50%, 6-15r	mulches, RECPs: protection. Howen vegetative growth. grasses. Should t RECPs or biodegr reinforce grasses.	and hydraulic soil stabilisers ver, their effectiveness is les Mostlechniques are used the client specify shrubs (pri adable mulches should be i (tuft) permanently. They are	can all be used on their own of provide schot term swhen used in isotation than when used with to help establish vegetative growth using sown many panders at thesetorks, therm thicker muches, used. Non biodegradable RECP's are used to not suitable for use with individual shubs. They can not suitable for use with individual shubs.
SULTATIC	BIODEGRADABLE MUI	LCHES II	A S	•	Ø	9	8	2 2	0 0	2 2	work synergistical. therefore, increase	ly with the established grass e its resistance to erosion by	to increase its resistance to shear stress and, concentrated flow.
DN	Straw (anchored)	4.5 tonnes per hectare	Grass	1 to 6	o < 5days	Low	loderate	0.17 0.17	0.20 0.2(0.20 0.20	2 Products might or suitable for sheet f	might not be suitable for use flow conditions, although son	 in areas of concentrated flow. All products are ne would be over designed in such cases.
LS 140002	Wood Chip Wood Chip	16 tonnes per hectare 27 tonnes per hectare	Grass/Shrubs Shrubs	1 to 6 N	o <5days	Low M	loderate loderate	2010 2010 2010 2010	0.05	No data No data			
28g N	Wood Chip	56 tonnes per hectare	Shrubs	1 to 6	o < 5days	Low M	loderate	0.02 0.02	0.02 0.02	0.02 0.02	3 Whether or not a p hydraulic soil stabi	product is readily available is iliser techniques use produc	critical to the selection process. Many RECP and ts that might be "off the shelf" and available from
ew Rer	Hydromulching Bonded Fibre	 5 tonnes mulch + 300 littes binder per hectare 5 tonnes fibre per hectare 	Grass Grass	1 to 6 N	o < 5days o < 5days	Low Low M	ow Ioderate	0.00 0.03	0.07 0.05	8 0.06 0.10 1 0.06 0.10	might also be avai	Biodegradable mulches ca ilable on site after initial clear	n be affected by seasonal variation, although they ing and grubbing. Temporary seeding might also be
rima 5	Blown compost, bonde	Minimum 50 mm blanket	Grass/Shrubs	6 to 18 N	o <5days	Medium	MO	0.00 0.03	0.07 0.00	3 0.06 0.10			
DESIGN DRAWN FINAL SCALL (on A	Riodedradable	NTROL PRODUCTS (RECPs) ¹⁴	Grass	6 to 12 Ve	ss < 5daws	1 Ow	oderate	0.10 0.20	0.40 0.20	0.40 0.60	4 For any given tech	mique, cost can vary greatly	depending on geographic location, size of project
BY APPROV 3 Origin PR		Coconut fibre mesh (~400 gsm)	Grass	24 Ye	as < 5 days	Low M	loderate	0.10 0.20	0.40 0.20	0.40 0.60	giving accurate ins	quirements. In addition, cost stalled costs is not possible.	s can vary over time. Because of these factors, However, if a product is relatively inexpensive to
		Coconut fibre mesh (~700 gsm or more)	Grass	48 Yı	es < 5days	Medium	loderate	0.10 0.10	0.20 0.10	0.15 0.20	and install remote	all close to its point of manuf from it.	acture, it will still be relatively inexpensive to purchase
		Curled wood fibre	Grass	6 to 12 Y. 6 to 18 Ye	es < 5days ss < 5days	Medium N Medium M	loderate 'oderate	0.01 0.05	0.10 0.10	0.15 0.20			
STATU M. PAS M.R. N		Jute matting (~600 gsm)	Shrubs	12 to 24 Ye	ss < 5days	Medium	loderate	0.00 0.03	0.07 0.05	0.06 0.10	5 This criterion relate they are resumed.	es to the impact that a particu on an area that was tempora.	lar practice might have on construction activities once ity stabilised.
s sfield A. AR		Coconut fibre matting (~450 gsm)	Grass	12 to 18 Y	es < 5 days	Medium N.	loderate	0.00 0.03	0.07 0.00	0.06 0.10	6 The performance c	of an erosion control techniqu	ue is quantified by assigning it with a C-factor
	Photodegradable	lcoconut nore matung (~s∪∪ gsm) Mesh (< 5 mm openings)	Grass	18 to 24+ Y 1 to 6 Ye	es < 5 days	Low M	loderate loderate	0.01 0.05	0.10 0.10	0.15 0.20	Appendix A). The disturbed soils. T	e C-factor will vary from close The C-factor strongly affects th	s to zero for full cover, to 1.0 for no cover on highly he soil loss calculation (RUSLE) and users need to be
	Non Biodegradable TRMs, all categories.	Plastic fibres with netting	Grass	> 48 Yr	es < 5days	High H.	igh	0.00 0.05	0.10 0.05	0.05 0.10	careful in specifyit not apply to conce	ng its value, particularly when intrated flow:	values <0.01 are quoted. Note that the C-factor does
rth B RFV		Composite with biodegradable	Grass/Shrubs	> 12 Yu	es < 5days	High H	hgi	0.00 0.03	0.07 0.00	0.06 0.10	Values for the C-fa dramatically with th	actor are given for various sli iem. The values given are c	pes gradients and lengths and show that it can chang ompiled from existing data and from interence
A.dwa	HYDRAULIC SOIL STA	ABILISERS ¹⁴ Polymers/Polyacrylamide (rate depends on type)	Grass	1 to 6	o < 5days	Low	MC	0.01 0.05	0.10 0.10	No data	between products accurate in all resp	: of a similar nature. They arv bects. Overall, accurate C-fa rica (DEC/D*c in nonfrontico) wit	e given as a guide only and do not profess to be ctors are only available for manufactured products, here actionships independent testing has been
CI		Bitumen emulsion (12,000 l/ha)	Grass	1 10 6 N	o < 5days	Low Lc	MC	0.01 0.05	0.10 0.10	No data	undertaken. Unfor	thurately, very little data is av	allable for the "Tower cost" options such as uto coll etchilicore - Whoreview possible the
JENT	TEMPORARY SEEDIN	G Barriel	RI B	t of of a	x Educe	and 1		0.05 0.05	010	No data	For the RECP's in	uid be contacted for their late particular, the C-factors given	incom securers. Whenever procedure, up st data on acceptable C-factors. In here are for the product as installed with no
		Perennial	NA	> 12 N	o < 5days	Low L(ow to moderate	0.05 0.05	0.10 0.10	No data	vegetation. Note RECP's. Indeed, I	however that lower C-factors non biodegradable RECP's	can be expected if vegetation is promoted with many are designed to work synergistically with turf and mus
AUS	INSTANT TURF M		X								be used with it. 7 For information on	trade names and suppliers (of these products, please phone the office of
TRAL		Kikuyu Reinforced turf (pregrown)	Grass	>12 Y	es < 5 days es 5 - 15 days	High H	ow igh	<0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	<0.01 <0.01		Australasian Chapl	ter of the International Erosio	n Control Association on 1800 354 322 or (+61 2) 4677
_ BI													
RICKS	TABLE	D1 FROM LANDCOM (2004) "T	HE BLUE (300K"									
5	Table D1 Erosio	n Control Products for Stabilising Disturb	ed Lands		* (note	that this table ha	as been updated from	n latle L'1 ir Lan	dcom (2UU3).				-
			ш	ffect en veget:	tion	2	ontrolling erosion	and pollution			Structural Perform	iance	
	croston control prac (generic type) [1]	Type	enhances germination of grass seeds	ontrols grov veeds grov	ances reinfo with of root-ho stock abili	hiding soil surface	ts reduces fil is runoff so	tters or stol traps seep. diment seep.	as reinfor age steel	ses resists waves	stable in low stable (<2 m/sec) meder channel (2.5 m/	e in stable in high rate (5.7 m/sec) stabilis sec) channel flows paveme	Constraints es ills
S	ORGANIC PRODUCTS (c	an be recycled) 16 torres oer hertare					m		_	_			Might need anchoning
• • • E	Composed Coarse Mulch Composed Coarse Mulch	27 . Unit as per inclusio 26 : onnes per hectare		~ ~ ~		n en en) m m						
Ē	Composted sol conditions Manufactured solic	r 10 CL pern ² (max) 15 CL pern ² (max)	19:10		6 CI			0 0	00	00	0 0	00	Product needs incorporation into existing soil
C	Ennded Fibre	$2.0tannes$ multih $\pm 300litres$ binder per hertare $5tannes$ fibre per hertare	05 05	c +	1	m m	+ 6	1 1 1		c	0 0 0	-	
PC Su Bc (f) en W	Eonded, Blown Compos: ROLLED EROSION CONTI	Mir 50 mm cover ROL PRODUCTS (RECPs)	1.11	67	3	en .	m	3	0	0	0	0	Ensure RECP's have intimate contact with subscils
DB ax 1098, iftes 7 & 8, wral NSW 1 02 4862 02 4862 02 4862 inail: recepti WW.SEEC.C	Elodegradeble ECB's	Jute mesh Coconut fikre mesh (400gsm) Oucurut fikre mesh (700gsm)	1 N 1 N 1 N			0 0 0			000	000	0		ugous sregarainony, are wentancored and reack side in conditions of concentrared flow
, Bowrol, 68-70 Sto 2576. 1433 3088 on@seec OWLAU		Culled wood fibre in plastic mess Jute matting (~350 gom)	11 02			67 M	0 0		00	00			Nets might trap fauna Allows woos greath
NSW, 257 ation Stree 2.com.au		Jute mating (~600 gem) Coconut fibre mating (~400 gem)		m ← 0	0 - 0	m m r	0 0 0			000	си сч с		Not for grass growth Allows were growth M. 4. 4.
76 et	Fhotodegradatle ECB's	Commut lifte matting (~901.gsm) Mesh (< 5 mm openings) Sunar findt weinth ornwmen (~1 linem)		r 0 0		F. (N)	n + +			- 0 -			Rut for grass growth: Little moisture retention Little moisture retention met introholient nan fran sume
Rojec	Non Biodegradable TRM's	Elastic fibres with netting Lyth performance 3D welded fibres	4 13 13			4 00 00	- 14 14				3 3		Soli-filled and vegetated Soli-filled and vegetated
T TITLE		Medium performance CD welded or woven fibres High performance 3C woven fibres	(N. (N.)		0.00	с, м	NN		0 0	cv m	с м с м	0.0	Soli-filled and vegetated Soli-filled and vegetated
N B	HYDRAULIC SOIL STABI	Mod. porform: composited with degradable materix LISERS Polymers/Palvarialaridia (rate deners): an twee)				m .c	~ ~				m -		Soli filled and vegetated Deeds water cumberfit amplication
ERF	TEMPORARY SEEDING	eugmensreugacionamo (ae depense on cyte). Ritumen amulsion (12,100 Vra)	2 50			N C							revers water supply fict approach. Freinnmental concarns
RIMA		Annual Petennia	υu	1	0 0	m m	5 5	2 0 2 0	00	0 0	0	00	Minimum 28 davs to es:aplish Needs water supply
SH/		kikuyu Reintsrsed turif (pregrowr)			0.0	с , м	~ ~	2 0		0 -	2		Needs water supply Needs water supply
ALE	OTHER PRODUCTS Straw (anchored)	4.5 tonnes per hectare	ere u			ma	m c	2		o c			
QU/	Georgantile Sectiment: farces							2 0		: 0 5		. u u	Reserves are were non-server See general nota for PECP's atove if used in crannels
ARR	Earth-filled georextile tube: Floating sedment barrie's			00	00			. e		0 - 0	0 0		Low profile
Y	Grout, injected mats Capion Matthesses Art culated concrete mats			+ 0 0		n m m		000		v m m	0 8 8 6 8 8	0 7 0	Rigid structure



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Issue Date: 9 June 2016 Approval Date: 9 June 2016 Review Date: in accordance with Section 19

THE AUSTRAL BRICK COMPANY PTY LIMITED New Berrima Clay/Shale Quarry – PA08_0212

REV D	ATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWIN	g status	North	CLIENT		PO Box 1098 Bowral NSW, 2576	PROJECT TITLE
						DESIGN BY	M. PASSFIELD				Suites 7 & 8, 68-70 Station Street	
						DRAWN BY	M.R.				Bowral NSW 2576.	
						FINAL APPROVAL			AUSTRAL BRICKS		(f) 02 4862 1633	NEW BERRIMA SHALE QUARRY
						SCALE:	N A	7		CFFC	(1) 02 4862 3068	
						(on A3 Original)	N.A.				empil: recention@seec.com.nu	
							111 L A D \ /	7		JLLU		
							MINARY				WWW.SEEC.COM.AU	
A 11/	12/15	M.P.	M.R.	M.P.	DRAFT ISSUE - FOR CONSULTATION							
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THE AUSTRAL BRICK COMPANY PTY LIMITED New Berrima Clay/Shale Quarry – PA08_0212
APPENDIX B - DRAFT EROSION AND SEDIMENT CONTROL CHECKLIST

New Berrima Shale Quarry		Date:	
Inspected by:			
Signature:			

Instructions:

- This checklist is to be completed by the Quarry Manager (or approved representative) at the time of making the site inspection.
- A tick (✓) should be placed in the applicable Yes/No box as appropriate.
- Where an item is not applicable, the notation **N/A** should be placed in the **Comments and Actions** box.
- Where a non-conformance is identified (a tick in a shaded box), a brief explanation is to be provided in the corresponding Comments and Actions box.
- The completed checklist and details of any corrective actions will be placed in the project file.

Weather conditions (tick appropriate box):							
Fine 🗆	Light rain	Heavy rain		Lig	ht wind	Strong	g wind □
Maximum 5-day rainfall depth since last inspection.							mm
General		Yes	No	Comme	ents & A	ctions	
Is the site is in a generally tidy condition?							
Is all equipment, materials, etc. contained within work area boundary?							
Are there any obvious signs of construction- related disturbance outside of construction area(s)?							
Is the weather station active and is data recorded since last inspection?							
Soil Disturbance and Erosion Control							
Have required erosion control measures been correctly installed and are they functional? Check that there are/is:							
■ no gap	s in silt fences/barrie	ers					
 correct require 	ground cover to ach d C-Factors	nieve					
 any areas of disturbed land that do not flow to sediment basins/traps? 							

THE AUSTRAL BRICK COMPANY PTY LIMITED

New Berrima Clay/Shale Quarry – PA08_0212

Report No. 744/09 – Approved 9 June 2016

General	Yes	No	Comments & Actions
Are there any obvious signs of uncontrolled drainage leaving the site?			
Are any materials, temporary structures/works in drainage lines?			
Where required, are drainage outlets provided with energy dissipaters to minimise erosion?			
Have works been scheduled to minimise areas exposed at any one time?			
Are areas where activities have ceased being stabilised and rehabilitated?			
Are these areas being rehabilitated in a timely manner? (Refer to the SWMP)			
Is there dirt on adjacent public roads?			
Are diversion banks stable?			
Sediment Control			
Are all dirty water diversion drains functional, unblocked, and connected to their correct sediment basin (refer to the SWMP)?			
Are the sediment basin inlets/outlets stable?			
Are any sediment fences in place and intact? Do they conform to SD 6-8 (refer to the SWMP)			
Are all other sediment traps operational and below capacity?			
Stockpile Management			
Do stockpiles appear adequately maintained and managed (measures in place to prevent dust and soil run-off)?			
Are there separate stockpiles for different materials?			

APPROVED WATER MANAGEMENT PLAN

Report No. 744/09 – Approved 9 June 2016

New Berrima Clay/Shale Quarry – PA08_0212

General	Yes	No	Comments & Actions
Are topsoil stockpiles less than 2 m in height?			
Are stockpiles located at least 5m from concentrated water flow and on slopes less than 10%?			
Are there are diversion banks on the upper sides of stockpiles?			
Storage Maintenance			
Water Supply dams			
Are the various volume markers clearly visible?			
Is the top water level at or above the maximum permissible water storage level?			
Are the inlets and outlets stable?			
Are pump records being kept and up to date?			
Sediment Basins			
Are the volume markers clearly visible?			
Is the top water level at or above the maximum permissible water storage level?			
If yes, has it rained in the last five days?			The basin should be empty
Is the sediment level above the maximum sediment storage level?			
If there have been any discharges since the last inspection, was there a rainfall event that exceeded 32.7 mm in any five day period?			The discharge was unauthorised. Investigate why and report as necessary.
Are the inlets and outlets stable?			

THE AUSTRAL BRICK COMPANY PTY LIMITED

New Berrima Clay/Shale Quarry – PA08_0212

Report No. 744/09 - Approved 9 June 2016

General	Yes	No	Comments & Actions
 Are records being kept and are they up to date? Pumps Flocculation Water Quality Parameters 			
Onsite Wastewater			
Are there any foul odours at the treatment system?			
Is there any sign of concentrated runoff at the Ecomax mound?			
Has the active Ecomax cell been switched in the last 6 months?			
Air Quality			
Is dust suppression equipment readily accessible?			
Are there any obvious signs of dust deposition outside of construction area(s)?			
Is spoil evident on public roads?			
Are the haul roads being kept damp (if required)?			
Is the air quality monitoring equipment (if installed) operating correctly			
Has there been spraying for dust control?			
Is there stabilisation of stockpiles or erection of dust screens?			
Do trucks removing material from the site have their loads covered?			

APPROVED WATER MANAGEMENT PLAN

Report No. 744/09 – Approved 9 June 2016

New Berrima Clay/Shale Quarry – PA08_0212

General	Yes	No	Comments & Actions
Waste Management and Minimisation			
Are waste receptacles accessible and clearly marked with regard to waste type?			
Is all recyclable material separated as per the waste management plan (records available)?			
Are records of the type, amounts, date, transport, and disposal site of waste kept in a Waste Management Register?			

HAZARDS IDENTIFIED	Signed off and Date

- □ Attached copies of any Site Instructions issued.
- **□** Results of the Inspection will be discussed at Site Meetings.
- □ Results of the Inspections will be discussed with the Quarry Manager (or delegate).
- Provide a copy of this page (with "Corrective Actions Required", including NIL Actions) to Head Office. If required send further copy of page once all corrective actions have been signed off.

Quarry Manager (or delegate) for the project ______ Signature & Date __/_/__

Acknowledged as sighted, Manufacturing Manager_____ Signature & Date __/_/__

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APPENDIX C - CORRESPONDENCE FROM GOVERNMENT AGENCIES

RW Corkery - Brooklyn

From:	Ravi Sundaram <ravi.sundaram@waternsw.com.au></ravi.sundaram@waternsw.com.au>	
Sent:	Monday, 15 February 2016 12:00 PM	
To:	Rob Corkery	
Cc:	Peter Dupen	
Subject:	RE: 744_New Berrima Quarry Water Management Plan	

Hi Rob

Thank you for providing WaterNSW a copy of the above Water Management Plan. The Plan is comprehensive and addresses the key issue namely of ensuring a neutral or beneficial effect on the water quality in Wingecaribee River. I note that:

- There is sufficient buffer between the Quarry site and the Wingecaribee River (at least 730m).
- Detailed Erosion and Sediment Control plans (attached as appendices) have been prepared for the various stages of the quarry operations and the erosion and sediment control measures proposed to be implemented are adequate.
- The sediment basins are designed for a 5-day 85th percentile rainfall depth (which is 36.2 mm) in accordance with the Blue Book Volume 2 guidelines for Quarry sites.
- The surface water monitoring program 9samling sites, parameters and triggers) proposed is adequate.
- There is no baseline groundwater monitoring data and 3 pairs of nested groundwater piezometers are required to be installed in consultation with DPI Water prior to the quarry pit floor reaching 660m AHD.
- The Annual Review reports will report about the surface water monitoring and performance against the requirements of the approval regarding surface water management at the quarry site.

So to sum up, the Water Management Report is comprehensive and meets the requirements identified in the planning approval regarding surface water management at the New Berrima Quarry site.

Please call or email me if you have any queries regarding the above.

Regards.

Ravi

Ravi Sundaram Mining Catchment Specialist



Phone: 02 47242455 Mobile: 0428 226 157 Email: <u>Ravi.Sundaram@waternsw.com.au</u>



Contact: Janne Grose Phone: 02 8838 7505 Email: janne.grose@dpi.nsw.gov.au

Our ref: V15/416#81 and ER20270 OUT16/9221

Robert W Corkery RW Corkery & Co. Pty Limited PO Box 239 BROOKLYN NSW 2083 22 February 2016

Dear Mr Corkery

Re: New Berrima Shale Quarry – MP08-0212 - draft Water Management Plan

Thank you for your email of 4 February 2016 seeking DPI Water's comments on the draft Water Management Plan (WMP) for the New Berrima Quarry (MP08_0212).

DPI Water considers that a number of issues should be addressed before the WMP is finalised. DPI Water provides the following key recommendations with further detailed comments in Attachment A.

- The WMP should address the requirement of Condition of Approval 18(b) for the WMP to include: detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project. No baseline data is provided in the WMP on surface water flows.
- Additional baseline water quality monitoring should be undertaken across all seven water quality sampling points (WS1, WS2, WS3, WS4, WS5, WS6 and WS7)
- Additional water quality sampling point locations should be added to the monitoring
 program (baseline and ongoing monitoring). The water quality monitoring should
 include additional sampling points on the Wingecarribee River, located upstream
 and downstream of the quarry so as to demonstrate if the quarry is impacting on
 the water quality of the river, or not, particularly as the WMP notes that all surface
 water runoff from the site ultimately reaches the river.
- Water quality monitoring of the river should be undertaken on a monthly basis.
- Turbidity should be included as an additional baseline water quality parameter
- Water quality target values should be derived from the ANZECC guidelines for freshwater ecosystems
- The WMP should address the requirement of Condition 18(b) to include performance criteria (including trigger levels) for investigations ecosystem health of local waterways

Template Ref: LPM061 – Version 1.0, July 2015

Level 11, 10 Valentine Avenue, PARRAMATTA NSW 2150 | Locked Bag 5123, PARRAMATTA NSW 2124 | e water.enquiries@dpi.nsw.gov.au | www.water.nsw.gov.au

- The WMP should address the requirement of Condition 18(b) to monitor the surface water flows and the ecosystem health of local waterways (for example Stoney Creek and the Wingecarribee River)
- The WMP should be amended to reflect the fact that groundwater monitoring is not "throughout the life of the Quarry" but begins prior to Stage 3 quarrying.
- Quarry operators should routinely monitor for groundwater inflows from the floor and walls and should record all instances. A report of groundwater inflows together with a suitable analysis and groundwater management assessment should be included in the "Annual Review" (as per Section 18 of the WMP
- Until sufficient site-specific baseline data is available, the Proponent should adapt conservative groundwater analyte values for a Trigger Action Response Plan which is to be consistent with other similar quarrying activities elsewhere in NSW and be prepared in consultation with DPI Water
- If the quarrying operations intercept a groundwater resource such that on-going dewatering is required, then DPI Water should be advised immediately. The Proponent would require an appropriate groundwater license allocation for the Sydney Basin Nepean Source, Nepean Management Zone 1, before any significant (>3 ML per annum) dewatering is permitted
- An amended WMP must be submitted for review by DPI Water once installation of the groundwater monitoring bores has occurred. At that time, the WMP should include a map showing the location of the monitoring bores, a tabulation of the bore locations in 3 dimensions together with their borelogs and construction details, an interpretation of the hydrogeological setting of the site, plus a description of the groundwater level monitoring and sampling program, as well as the future development of an appropriate Groundwater Trigger Action Response Plan related to on-site analyte measurements

For further information please contact Janne Grose, Water Regulation Officer at DPI Water (Parramatta office) on **t**: (02) 8838 7505; **e**: janne.grose@dpi.nsw.gov.au: Yours sincerely.

Brender Eletha

Brendan Fletcher A/Manager Assessments, DPI

CC: Carl Dumpleton - Department of Planning and Environment

3

ATTACHMENT A

New Berrima Shale Quarry Mod 1 - draft Water Management Plan

The Department of Primary Industries, Water (DPI Water) provides the following comments on the draft Water Management Plan (WMP).

3 Consultation

The draft WMP should detail consultation undertaken in developing the WMP. Details should be included of the consultant's email of 9 November 2015 which sought the DPI Water's requirements on the preparation of the draft WMP and the DPI Water's subsequent reply of 26 November 2015.

Surface Water

<u>Table 2 – Project Approval Requirements relating to Water Management</u> Table 2 identifies where the project approval requirements are addressed in the WMP. It indicates certain parts of the Condition of Approval 18 are addressed in Sections 10.3.2 and 12.4 but these sections are not included in the draft WMP. It is recommended Table 2 is amended to include the relevant sections.

Condition of Approval 18(b) requires the Surface Water Management Plan (SWMP) to include:

• detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project (Table 2, see page 7)

No baseline data is provided in the WMP on surface water flows and no explanation is provided other than the WMP notes that the first and second order streams that are marked on the topographic map are all open grassy depressions with no bed or banks (see Section 5.1, page 11). Clarification is required as to whether Stoney Creek is a watercourse and why baseline data on surface water flows in Stoney Creek and the Wingecarribee River is not provided in the WMP, especially as the WMP notes that all surface runoff from the quarry site reaches the Wingecarribee River (see Section 5.1, page 10).

Condition of Approval 18(b) requires the SWMP to include:

• performance criteria including trigger levels for investigating any potential adverse impacts on ecosystem health of local waterways

• a program to monitor ecosystem health of local waterways (Table 2, see page 7) The WMP has not provided details on how the above requirements of the Condition of Approval are proposed to be addressed. The WMP should clarify if any monitoring of ecosystem health of Stoney Creek and the Wingecarribee River is proposed to be undertaken (including baseline and during the quarry operations), and if not it should justify why.

Condition of Approval 18(b) requires the SWMP to include:

• performance criteria for surface water quality attributes relevant to water quality impacts on biological diversity and aquatic ecological integrity, including salinity, heavy metals, sediment load, pH, hardness and biological oxygen demand (see Table 2, page 7)

The WMP has not provided details on how the above requirements of Condition of Approval are proposed to be addressed. Based on this condition it is unclear why heavy metals, hardness and biological oxygen demand are not proposed to be monitored

Table 3 – Statement of Commitments relating to Water Management

Table 3 identifies where the Statement of Commitments (which relate to water management) are addressed in the WMP. The table indicates certain Commitments are addressed in Sections 10.3.1; 10.3.1.2 and 10.3.2; but these sections are not included in the WMP. It is recommended Table 3 is amended to include the relevant sections.

4

5.2 Existing Dams

Section 5.2 notes the six existing dams on the property were constructed before 1999 and have been used for stock purposes so did not require a licence but notes "nevertheless these dams were included in the assessment to build additional dams". As additional dams are proposed to be constructed, the existing dams must be included in the assessment of Harvestable Rights.

5.4 Water Quality

Condition of Approval 18(b) requires "*detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project*" (see Table 2, page 7). The baseline water quality data provided in the WMP is not adequate. It is unclear how the project would detect any variation or change and measure/predict impacts if one occurred.

Section 5.4 notes water samples were collected on 22 August 2008 (page 12). It appears the baseline water quality monitoring was undertaken during one day and no additional baseline monitoring has been undertaken since 2008. It is unclear if any further baseline monitoring is proposed prior to extraction commencing at the site. The baseline data is not representative - there is no data to compare it to and additional baseline monitoring needs to be undertaken.

The baseline water quality samples were collected from sites WS1, WS2 and WS3 (see section 5.4, page 12). The WMP does not address why baseline sampling has not been undertaken at the long term discharge points (WS4, WS5, WS6 and WS7) (see pages 12 and 29 and Figure 3). Baseline monitoring should be conducted across all sites.

Table 5 identifies that the sample point WS2 is located on the Wingecarribee River. Additional sampling points are required to be established on the river, particularly as Condition of Approval 18 requires the SWMP to monitor for the effectiveness of the water management system (see table 2, page 7). It is recommended water quality monitoring (baseline and ongoing monitoring) is also undertaken on the river upstream and downstream of the quarry so as to determine if the project is impacting the river water quality, or not. It is recommended the monitoring on the river is undertaken on a monthly basis

The baseline water quality parameters should also include Turbidity monitoring. The baseline monitoring included additional water quality parameters (see Table 5, page 12) to what is now proposed to be monitored during the establishment and operational stages of the project (see Section 11.3.1.1 and Table 11 and Section 11.3.1.2, page 34). It is recommended the WMP explains why some of the baseline parameters (including major cations, total nitrogen, total phosphorus, iron, sulphate and ion balance) are not proposed to be monitored during the establishment and operational stages of the project.

Table 7 - Roles and Responsibilities

Table 7 indicates the Quarry Manager and Site Supervisor will be accountable for the following outcomes of the WMP "*implementation of noise controls outlined in Section 9*". Section 9 of the WMP relates to the Site Water Balance. It is recommended Table 7 is amended to remove reference to implementation of "noise controls".

Table 7 notes the Environmental Officer will be responsible for 'Incident Reporting' while Section 17 notes the Quarry Supervisor will undertake this responsibility. It is recommended the WMP clarifies this.

It is recommended Table 7 is amended to add the following responsibility:

• the inspection, monitoring and maintenance of the erosion and sediment controls. The table also needs to identify who will undertake this. Appendix A indicates the 'site environmental manager' will undertake this but Table 7 does not include a site environmental manager. 5

9.4.3 Clean Water

Section 9.4.3 refers to Clean water diversion drain CD1 and notes it is shown on Figures 5 to 8. It is suggested Figures 6-8 are amended to label CD1 (similar to Figure 5) and all the figures are amended to identify what CD1 means.

Figures 5, 6, 7 and 8 - Water Management

Figure 5-8 all show a brown area on the northern catchment boundary. It is unclear what the brown area is, and it is recommended the figures clarify this.

Figures 7, 8 and 9 appear to show a stand of trees/ or vegetation to the north of the proposed limit of extraction. It is recommended the WMP clarifies what this is and why other trees which are shown on the aerial photographs have not been marked.

9.4.4.1.1 Short term discharge points

The WMP indicates short term discharge points will be located on all sediment basins (page 29). It is suggested this section defines what is meant by a short term discharge point.

9.4.4.1.2 Long term discharge points

The WMP indicates long term discharge points will be located at the water quality sampling locations WS4, WS5, WS6 and WS7 (page 29). It is suggested this section defines what is meant by a long term discharge point.

9.4.4.2 - Unconditional Discharges

Section 9.4.4.2 indicates the sediment basins will overtop if a rainfall event greater than a 5 day, 85th percentile rainfall depth of 36.2mm occurs (page 29) and that such events will be considered as 'unconditional discharges' and water quality testing of such discharges is not required. It is recommended the WMP explains why water quality testing is not required for unconditional discharges especially as it indicates that such discharges are expected to occur 4-6 times/year.

9.4.4.3 - Conditional Discharges

The WMP notes before a conditional discharge occurs the water will be tested to ensure it meets target water quality parameters as listed in table 11 for pH, TSS, turbidity and Oil and grease (page 29). It is recommended Section 9.4.4.3 includes a brief explanation of the proposed water quality parameters, particularly as the baseline monitoring includes additional parameters.

Section 9.4.4.3 indicates water trapped in the sediment basin will be discharged within 5 days of the conclusion of a rain event which caused inflow into the basin (page 29). It is suggested monitoring at the seven site discharge locations also includes monitoring prior to discharge.

The comment provided in Table 11 under the water quality target for Turbidity is not correct (page 29) Turbidity and TSS are different and need to have their own separate target value. The water quality targets need to be in accordance with the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines for freshwater ecosystems.

9.4.6 Water Flow Monitoring

Section 9.4.6 states "there is no requirement to monitor water flow rates" (page 30) but Condition of Approval 18 (b) requires the SWMP to include:

- detailed baseline data on surface water flows and quality in the water-bodies that could be affected by the project
- a program to monitor surface water flows (see Table 2, page 7)

The WMP needs to address why it is not proposed to monitor surface water flows

11.3.1.1 Surface Water Monitoring During Establishment Stages

The WMP notes that during the establishment stages of the project that all sediment basins (prior to a conditional discharge) and the seven site discharge locations will be tested as per the water quality parameters listed in table 11 for pH, TSS, turbidity and Oil and grease (see pages 29 and 33). The WMP also indicates during the operation stages the seven site discharge locations are to be monitored for pH, Electrical Conductivity, TSS or turbidity. It is unclear why Electrical Conductivity is not proposed to be monitored during the establishment stages and why it is not proposed to monitor Oil and Grease during the operational stages.

11.3.1.2 Surface Water Monitoring During Operational Stages

The WMP notes during operational stages water quality sampling will include pH, Electrical Conductivity TSS or turbidity (see Table 12, page 34). It is unclear why oil and grease are not proposed to be monitored during the operational stage but are to be sampled during the establishment stage. Nor is it clear why all the baseline water quality parameters as listed in Section 5.4 are not proposed to be monitored or why heavy metals, hardness and biological oxygen demand as per the Condition of Approval 18(b) are not proposed to be monitored (see Table 2, page 7). It is suggested the WMP explains this.

11.4.2 Water Quality Triggers

Footnote (4) refers to Table 9, but there is no Table 9 included in the WMP.

17 Incident reporting

Section 17 of the WMP notes the Quarry Supervisor will undertake 'Incident Reporting' while Table 7 notes the Environmental Officer will be responsible. It is recommended the WMP clarifies this.

Appendix A

Table 2 in Appendix A indicates the Site Manager will determine and mark the location of limitations of access during construction on the site. It is recommended Table 7 in the WMP is amended to include this.

Table 5 in Appendix A lists Clean Water diversion drains CD1a, CD1b, CD1c, CD2 and CD3. It is suggested Figure 5-9 in the WMP are amended to show the location of these diversion drains similar to the ESCP Establishment Stages 1-4 and 5-7 drawings in Appendix A.

It is suggested a larger font size is used for Table A3, Table D1, the ESCP Standard Drawings so they can be read

The ESCP Establishment Stages 1-4 and Stages 5-7 drawings show a brown are on the northern catchment boundary and it is suggested the figure or key identifies what this is. The drawings also show what looks like a blue rake at the end of CD1c and CD2 and it is recommended the key identifies what this is.

ESCP Establishment Stages 5-7 shows what appears to be a clump of trees located to the west of the proposed visibility barrier. It is recommended the key identifies what this is

Groundwater Comments

The methodology of dealing with groundwater issues at a later stage of quarry development, and of assessing groundwater matters needs some strengthening. It is recommended that the following specific matters would improve and correct the WMP.

Table 6 - Water Objectives and Key Performance Outcomes

Objective (f) in Table 6 should be amended to reflect the fact that groundwater monitoring is not "throughout the life of the Quarry" but begins prior to Stage 3 quarrying (see page 13).

8 - Competence Training and Awareness

Section 8 should be amended to insert a requirement:-

• Quarry operators should routinely monitor for groundwater inflows from the floor and walls and should record all instances. A report of groundwater inflows together with a suitable analysis and groundwater management assessment should be included in the "Annual Review" (as per Section 18 of the WMP).

12.1.2 - Existing Groundwater Levels and Yields

For clarity of expression, the sentence should be altered to add the words 'at the site' to the end of the sentence so it reads as follows:

Given the hydrogeological characteristics of the Ashfield Shale, it is confirmed that no data is available on existing groundwater levels and yields *at the site*.

12.2 - Groundwater Trigger Action Response Plan

For Section 12.2, the provisions should be adjusted to reflect the following:-Until sufficient site-specific baseline data is available, the Proponent shall adapt conservative groundwater analyte values for a Trigger Action Response Plan which is to be consistent with other similar quarrying activities elsewhere in NSW and be prepared in consultation with DPI Water.

Section 13.2 - Groundwater

The sentence should be modified to reflect the groundwater source and a wider sense of contamination, and read as follows:

Mitigation measures required to protect the limited-groundwater resources at depth beneath the extraction area in the underlying Hawkesbury Sandstone formation would be comparable with those relevant to surface water, i.e. with respect to hydrocarbons and sewage contamination events.

16 - Corrective and Preventative Actions

Section 16 needs to be amended to insert a requirement:-

 If the quarrying operations intercept a groundwater resource such that on-going dewatering is required, then DPI Water is to be advised immediately. The Proponent would require an appropriate groundwater license allocation for the Sydney Basin Nepean Source, Nepean Management Zone 1, before any significant (>3 ML per annum) dewatering is permitted.

An amended WMP must be submitted for review by DPI Water once installation of the groundwater monitoring bores has occurred. At that time, the WMP should include a map showing the location of the monitoring bores, a tabulation of the bore locations in 3 dimensions together with their borelogs and construction details, an interpretation of the hydrogeological setting of the site, plus a description of the groundwater level monitoring and sampling program, as well as the future development of an appropriate Groundwater Trigger Action Response Plan related to on-site analyte measurements.

End Attachment A

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