4.0 Project Description

*This chapter describes the Project in detail including the project objectives, the activities for which Concept and Project Approval are sought, details of the construction and operational phases of the Project and incorporated environmental controls. Rehabilitation works proposed as part of the Project are also outlined with further detail provided in the Rehabilitation Plan (RP) included as **Appendix D** to this EA.*

4.1 Existing Development

4.1.1 Overview

The Project Site currently operates as a quarry and brick making facility involving clay and shale extraction to obtain raw materials for the production of bricks at the on-site brick making facility. Key features of the site are shown on **Figures 2** and **4** and include:

- Gate house office (**Figure 2**);
- Administration area/sales office (**Figure 2**);
- Staff and visitor car parks providing 41 staff parking spaces and 11 visitor spaces (**Figure 2**);
- Brick making facility (**Figure 2**);
- Brick product storage area – located directly to the east of the brick making facility and used for the storage of packaged bricks as well as loading and unloading (**Figure 2**);
- Pits 1, 2 and 3 – Pit 1 is currently used for water storage, Pit 2 is currently being back-filled and rehabilitated and Pit 3 is currently actively used for quarrying (**Figures 2** and **4**);
- Raw material stockpiles – used for the storage of extracted materials to be used for brick making (**Figures 2** and **4**);
- Overburden and unusable material stockpiles – located across the western portion of the site. Some of these stockpiles have been rehabilitated whilst others are still active and used during current operations for the storage of material which is not suitable for use in brick making (**Figure 4**);
- Five sediment basins – including Pit 1. Pit 1 is used for the storage of stormwater runoff from across the site for reuse in various site activities. Two sediment basins located in the north of the site also contain general stormwater runoff from the site. The remaining sediment basin to the north of Pit 3 contains roof water from the brick making facility (**Figure 2**);
- Heavy vehicle storage area;
- Truck wash;
- A diesel tank and fill point; and
- Internal road/access network.

Martin Road provides the primary access to the site, adjoining the north-eastern corner of the site. Internal site access is facilitated via a sealed access road extending from Martin Road to the site office, sales office and brick making facility. Access to the brick making facility is restricted with a secure, manned gate house adjoining the visitor car park.

Certain areas of the site not used for quarrying and brick making operations are leased to other users for the purposes of dairying and stock agistment. In association with these uses, the site also accommodates a range of farm buildings including a working dairy.

Quarrying activities have previously been focused in the western portion of the site in Pits 1 and 2 which have now been completed. Pit 1 is used as the main water storage on the site, capturing stormwater runoff for reuse in various site activities. Rehabilitation and backfilling of Pit 2 has commenced, with the rebuilding of the western wall of the pit. Currently, quarrying activities are occurring in Pit 3, to the south-east of the brick making facility and storage area (refer to **Figure 2**).

The approximate areas of the pits on site are detailed below:

- Pit 1 – Approximately 9.1 hectares
- Pit 2 – Approximately 5.6 hectares
- Pit 3 – Approximately 8.9 hectares

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Proposed Operations

Environmental Assessment

Boral Quarry and Brick Making Facility, Badgerys Creek

Figure 4

Approximate areas of stockpiles are summarised below (and detailed in the RP included as **Appendix D**):

- Raw material stockpile – 86,400m²
- Eastern stockpile – 22,500m²
- South-Eastern stockpile – 4,725m²
- Southern stockpile – 6,250m²
- Central stockpile – 45,900m²
- Western stockpile – 25,000m²

The remaining site area is occupied by the brick making facility, storage yard, gate house, administration office, internal access roads, ancillary buildings and vacant pasture land.

Existing pits range in depth and size however excavation on the site to date has generally been limited to a depth of approximately 35 m to the base of the Bringelly Shale. At this depth a hard sandstone unit known as Minchinbury Sandstone is encountered. Boral has advised that although significant resource is known to exist beneath the Minchinbury Sandstone, quarrying activities would continue at the site to date have not exploited this resource. Quarrying below this depth may occur at some point in the future if economically viable, however it is not anticipated that this would form part of operations over the next twenty years.

Quarrying activities at the site currently yield approximately 361,000 tpa of clay and shale for brick making purposes. Raw material is stored in layered stockpiles to the south of the brick making facility and supplementary material including coal wash fines (7,000 tpa) and off-site sources of clay, shale and non-clay materials (20,000 tpa) are trucked to the site as required.

Unusable material extracted from the pits is currently stored in the central stockpile (refer to **Figure 2**). With the exception of the central and eastern stockpiles, all other stockpiles on the site are no longer in use. The western stockpile, located to the west of Pit 2 has been rehabilitated and is now vegetated with local native grasses and trees. The South and South-Eastern stockpiles have been partially stabilised through natural revegetation.

The brick making facility is located generally in the centre of the site and comprises a large, single storey factory building accommodating various plant and equipment as described in **Section 4.2**.

4.2 The Project

4.2.1 Overview

Concept and concurrent Project Approval is sought for the continuation of operations on the site beyond September 2010. Operations would involve continued extraction of raw materials and continued brick making activities with some increase in total volumes extracted and throughput of the brick making facility. The Project can be summarised as follows:

- Extraction of raw materials from the site in the order of 420,000 tpa, of which 10% would be comprised of clay and 90% shale, involving:
  - Extraction from Pit 3 to an approximate depth of 35 m; and
  - Establishment of Pits 4 (14.21 ha) and 5 (19.5 ha) and extraction in these pits to a depth of approximately 35 m.
- Excavation of 3,000,000 tonnes of overburden in total over the life of the project and retention on site;
- Brick production in the order of 252,000 tpa;
- Import of raw materials required for brick making in the order of 20,000 tpa;
- Associated handling, packaging, storage and transport of bricks;
- Associated construction of bunds and stockpiles; and
- Maintenance and rehabilitation works.

The Project is appropriately separated into three key components: Quarry activities, brick making activities and ancillary activities/works such as stockpiles and stormwater management systems. These key project

components are described in further detail in the following sections, with **Table 4** providing a summary of the differences between current and proposed operations.

Table 4: Summary of key differences between proposed and existing operations

Project Element	Current Operation	Proposed Operation
Hours of operation	Quarry – Mon-Sat 7am-6pm for 2-3 months per year Brick making facility – 24 hours a day, seven days a week. Storage yard, deliveries and dispatch – Mon-Fri 6am-6pm/Sat 6am-12pm	Quarry – Mon-Sat 7am-6pm for 2-3 months per year Brick making facility – 24 hours a day, seven days a week. Storage yard, deliveries and dispatch – Mon-Fri 6am-10pm/Sat 6am-6pm
Extraction volume	361,000 tpa	420,000 tpa
Extraction location	Previous extraction in pits 1 and 2 in the western portion of the site. Current extraction in Pit 3, in the south of the site.	Continued extraction in Pit 3. Future extraction in Pits 4 and 5 to the north of Pit 3 and the far northern portion of the site.
Depth of extraction	35 m	35 m
Brick production	200,000 tpa	252,000 tpa
Water management	Pit 1 main water storage, 3 sedimentation basins and 2 small dams. Nil discharge.	Pits 1, 3, 4 and 5 maintained for water storage.
Truck movements	16 movements per hour	12 movements per hour
Disposal of overburden	Central stockpile	Pit 2
Receipt of raw materials	20,000 tpa	20,000 tpa
Total reserve extracted	NA	8,400,000 tonnes
Total overburden	NA	3,000,000 tonnes

4.2.2 Quarrying Activities

Quarrying on the site is expected to progress on the site in the following manner (as shown on **Figure 4**):

- Continued quarrying of Pit 3 (existing) including the lateral progression of the pit towards the east as shown in **Figure 4**. It is anticipated that extraction from Pit 3 would continue until approximately 2016 (refer to Table 5).
- Establishment of proposed Pit 4 would commence in approximately 2014. It is anticipated that extraction from Pit 4 would continue until approximately 2022 (refer to Table 5).
- Establishment of proposed Pit 5 would commence in approximately 2020. It is anticipated that extraction from the Pit 5 would continue until approximately 2028 (refer to Table 5).

The existing and proposed pit life spans are shown in the table below.

Table 5: Existing and Proposed Pit Lifespans and approximate area

Location	Proposed Start Date (Year)	Proposed End Date (Year)	Approximate pit areas (hectares)
Pit 3	Commenced	2016	8.9
Pit 4	2014	2022	14.21
Pit 5	2020	2028	19.5

Approval is currently sought for extraction on the site over the next 20 years, however it is important that options for future quarrying beyond this time be preserved. For the purposes of this application, the Project is defined as activities on the site over a twenty year period, beyond which environmental, land use and market conditions would be reviewed and the feasibility of continued quarrying/brick making activities on the site would be re-assessed.

The process of quarrying would be largely as per current operations with some increase in the volume of material extracted, in the order of 420,000 tpa. Quarrying activities would continue on a campaign basis, occurring for approximately two to three months each year. Three months of extraction generally provides sufficient raw material for 12 months of brick making. The availability of raw material for extraction, forecast market demand and brick plant output determine the duration of quarrying works.

Angles of extraction within the pits would be in accordance with existing operations on the site, based upon Boral's established practices and procedures in consideration of local geology and water drainage. Average batter slopes for Pit 1 are in the order of 1H:2V (approximately 60 degrees to the horizontal). The crest of the batters varied in slope, being in many instances cut back at 1H:1V. The batter slopes of Pit 2 are of similar configuration to Pit 1. It is proposed that future extraction in Pits 3, 4 and 5 be carried out in a similar manner.

A geotechnical assessment was prepared in 2005 assessing the batter slope stability of Pits 1 and 2 on the site. The assessment concluded that the batter slopes of pits 1 and 2 were acceptable. Boral's operations would be carried out in accordance with the applicable safety legislation including:

- The *Occupational Health and Safety Act 2000*
- The *Occupational Health and Safety Regulation 2001*
- The *Occupational Health and Safety Amendment (Application to Mining Workplaces and Coal Workplaces) Regulation 2008*
- The *Mine Health and Safety Act 2004*
- The *Mine Health and Safety Regulation 2007*

Quarrying at the site over the next twenty years is expected to involve the completion of extraction in existing Pit 3 and the establishment of two new pits as described above and shown in **Figure 4**. The establishment of a new pit involves the following works:

- Exploratory core drilling to a depth of 35 m below ground surface (bgs) across a 50 m square grid;
- Assessment of cores for suitability for brick making;
- If the core is suitable, the area is fenced off and appropriate signage placed around the area; and
- Removal of overburden and topsoil, using removed material to create bunding around the area.

New stormwater drainage systems and/or drainage pathways would be established in conjunction with the establishment of new quarry areas (where required) and would be incorporated into the existing SWMP for the site. The establishment of Pit 4 would result in the loss of an existing sediment basin which currently stores water draining from the roof of the brick making facility. Prior to the loss of this pond, roof water from the brick making facility would be diverted to Pit 1. Stormwater management is discussed further in relation to the Project in **Chapter 10**.

The process of extracting raw materials once the area has been established for quarrying involves:

- Breaking up raw materials using a bulldozer with ripping attachment;

- Collection of raw materials with an excavator and placement into a 40 tonne dump truck. Around two to three dump trucks are used during a single quarry campaign;
- Transport and deposit of raw materials to the Raw Materials Stockpile area to the south of the brick making facility;
- Transport and deposit of unusable material to either the Central Stockpile or to an open void (Pit 2); and
- Creation of new stormwater drainage systems and/or drainage pathways (where required) to be incorporated into and consistent with the existing SWMP for the site.

Upon cessation of quarrying in the nominated areas, Boral would rehabilitate the Project Site in accordance with the RP included as **Appendix D** to this EA. These works would include progressive rehabilitation of stockpiles, planting and fencing of riparian areas and completion of rehabilitation works to Pit 2.

4.2.3 Brick Production

Brick production at the existing brick making facility is planned to continue largely as per existing operations with some increase of throughput to 252,000 tpa.

The primary machinery and equipment involved in the process include:

- Clay preparation equipment (crushing and grinding);
- Brick forming and handling equipment;
- Gas-fired kiln;
- Brick dryer;
- Brick unloading machine (Dehacker); and
- Compressor building.

The brick making process is generally described as follows:

- The as-mined clay material is crushed from -500 mm to -1 mm through a four stage crushing process. This includes a profiled roll crusher, a wet pan and two sets of high-speed smooth rolls. Water is added at the wet pan to take the material from 6-10% moisture content to 12-14% moisture content.
- To make bricks, the crushed raw material has more water added to bring the mixture to 14-15% and is then extruded. Various sands, frits and clay suspensions are applied to the column to add aesthetic appeal. The extruded column is cut into brick sized units and fed into drying racks on trays. The drying racks pass through an eight-laned drying chamber over the course of three days during which the moisture content is reduced to <1%. The dry bricks are stacked 16-rows high onto a refractory decked kiln car.
- The bricks are fired using kiln cars stacked with dry stock, which are fed into the entrance of a gas-fired tunnel kiln at the rate of one half car every 20-30 minutes. One kiln car holds approximately 6000 bricks (or 10 brick stacks) stacked with gaps between them to allow the hot air to circulate between them and fire evenly. The stock is then raised to above 1000^{o}C and cooled back to room temperature in less than two days. Waste heat is drawn from the initially produced heat and is used in the dryer to dry the bricks.
- The fired stock is unloaded from the kiln car and split into brick packs by the Dehacker which also packages them before being driven along a conveyor to be transported to the storage yard for dispatch. All equipment is housed within the brick making facility with the exception of the unloading conveyor.

Proposed additions and alterations to the brick making facility have been approved by LCC to enable an increase in the efficiency of the existing brick making process. The proposed additions and alterations include a dust collector, air receiver and brick dipping tanks. The additions and alterations are aimed at reducing dust in the brick making process and reducing the incidence of cracking in bricks, hence yielding a higher quantity and quality of product for export.

As detailed above, the proposed operations would produce bricks at a rate of some 252,000 tpa. The existing facility has sufficient capacity to produce bricks at this rate without the need for upgrade.

4.2.4 Deliveries and Dispatch

Raw materials required for brick making are received on site at volumes of approximately 20,000 tonnes per annum.

Packaging of the bricks is undertaken by the Dehacker within the brick making facility. The dehacker was installed at the plant to improve efficiencies in the packing and transportation of bricks. It allows for a greater number of

bricks to be transported per truckload, thereby reducing the number of truck movements needed to dispatch the same amount of product.

The Dehacker unpacks the bricks into individual units and then repacks them into pallet size packs for transport to customers, strapping them together with plastic belly strap. Once the belly strap is attached, the complete brick packs travel along a driven roller conveyor where they are picked up by forklift and transported to the storage yard. The unloading conveyor is external to the brick making facility.

The brick product storage yard is located to the north-east of the brick making facility and covers an approximate area of 41,500 m^2. Forklifts transport the bricks from the brick making facility to the yard, and load the bricks from the yard on to trucks for transport off site. The storage yard is shown in **Figure 2**.

Deliveries and dispatch occur by truck with approximately 60 pick-ups/deliveries per day during the week and 12 on a Saturday. Further details of truck movements associated with the Project Site and an assessment of the potential impacts of this are provided in **Chapter 13**.

4.2.5 Stockpiles

Stockpile areas within the Project Site are shown on **Figures 2** and **4** and include:

- Raw material stockpiles situated in the centre of the site which provide the feedstock for the brick making process;
- Overburden stockpiles which contain upper level excavated materials that is not suitable for brick making;
- Unusable material stockpiles which contain deeper level excavated material that is not currently suitable for brick making but may be suitable in the future if upgrades were made to the clay preparation equipment; and
- Rehabilitated stockpiles in the far west and along the southern boundary of the site.

It is proposed that project operations would continue to utilise the existing raw materials stockpiles for the temporary storage of raw materials, however the use of the existing overburden and unusable material stockpiles would be phased out under future operations, with this material being trucked to Pit 2 to continue the rehabilitation of this void. Existing stockpiles would be revegetated in accordance with the RP included as **Appendix D** to this EA and would remain as part of the final landform on the site.

4.2.6 Stormwater Management

In accordance with the SWMP (ERM 2002) prepared for the site, surface run-off flows via roads and open grassed drains from parts of the site to Pit 1 during periods of peak rainfall. Rainfall also contributes directly to water stored in Pit 1. Surface water detained in Pit 1 is reused for dust suppression activities across the site.

Roof water from the brick making facility is captured and piped to Sediment Basin 3 to the east of the brick storage area.

Existing site drainage and proposed surface water management is detailed in **Chapter 10** of this EA. Water balance modelling has been undertaken to assess the potential impacts of the project on surface water flows on the site and recommendations are made as to the management of these impacts.

Water use on the site includes:

- Dust suppression – water from Pit 1;
- Brick making process – potable water and recycled water (detailed below); and
- Offices and amenities – potable water.

The current operation uses some 30 ML pa of water. This may increase to up to 40 ML pa under the proposed project.

Boral currently sources 12 ML pa of water stripped from oily water wastes processed by Worth Recycling for use as forming water at the Brick Making Facility. The remaining 18 ML pa comprises water sourced from Pit 1 and potable water. Future opportunities for recycling are currently being investigated which, pending appropriate approval may be utilised for dust suppression and brick making activities. The flow diagram below illustrates water inflow and outflow for the site.

	Inflow	
Direct rainfall onto pit surfaces	Initial system storage	Rainfall/runoff within catchment
	Outflow	
Evaporation from pit surfaces	Controlled extraction for dust suppression or to manage storage levels	

4.2.7 Infrastructure and Servicing

The site is currently serviced with natural gas, electricity and reticulated water and sewerage. Existing infrastructure and services are expected to be sufficient to accommodate the continued and expanded operation of the quarry and brick making facility without the need for upgrade.

4.2.8 Hours of Operation

The proposal includes an extension to the operating hours of the storage yard and dispatch activities to allow greater opportunity for the avoidance of truck movements during peak times. Existing and proposed operating hours are summarised in **Table 6**.

Table 6: Current and Proposed Hours of Operation

Site Facility	Current Hours of Operation	Proposed Hours of Operation
Quarry	Monday to Saturday, 7 am to 6 pm for 2 to 3 months per year.	Monday to Saturday, 7 am to 6 pm for 2 to 3 months per year.
Brick making facility	24 hours a day, seven days per week.	24 hours a day, seven days per week.
Storage yard including deliveries and dispatch	Monday to Friday, 6 am to 6 pm. Saturday 6 am to 12 pm.	Monday to Friday, 6 am to 10 pm. Saturday 6 am to 6 pm.

4.2.9 Workforce

There are currently 56 people employed in the brick making facility and 20 in the administration/sales office. Up to ten contractors work two to four months per annum on a campaign basis to complete the quarrying activities. The existing workforce on the site is expected to be sufficient to accommodate the continued operations despite the expansion in throughput of the quarry and brick making facility.

4.3 Rehabilitation

4.3.1 Overview

The long term rehabilitation of the Project Site is of key importance to the proposal in order to adequately manage environmental issues such as dust and sedimentation and erosion and to allow for the productive use of the land in the longer term for an appropriate land use. As such, a RP has been prepared for the site which aims to promote an integrated approach to quarry rehabilitation and management (**Appendix D**).

Significant clay and shale resource is known to exist on the site below the 35 m depth of the existing pits, with investigations undertaken in 1993 finding Bringelly Shale, which is the major source of raw materials for Sydney's brick making industry at a depth of 51 m on-site.

Due to the presence of a hard sandstone layer at approximately 35 m in depth and the extent of a more readily accessible resource remaining on the site, it has not been economically viable for the resource below 35 m to be extracted from the site to date. However, at some point in the future the extraction of this resource may become

viable and indeed necessary to continue the supply of these raw materials in the Sydney region. It is therefore imperative that options for future extraction below 35 m depth be preserved on the site and that rehabilitation works on the site reflect this.

Rehabilitation works proposed are therefore focussed on the management of erosion and sedimentation and the liberation of wind-borne dust during the life of the quarry. This primarily involves the improvement of riparian areas and the stabilisation of existing stockpiles through revegetation and avoidance of the creation of new or larger stockpiles through the placement of overburden and unusable material into Pit 2. Over the twenty year life of the approval sought, Pit 2 would be filled and rehabilitated to as close as possible to natural ground level.

The rehabilitation works proposed have been designed to ensure that:

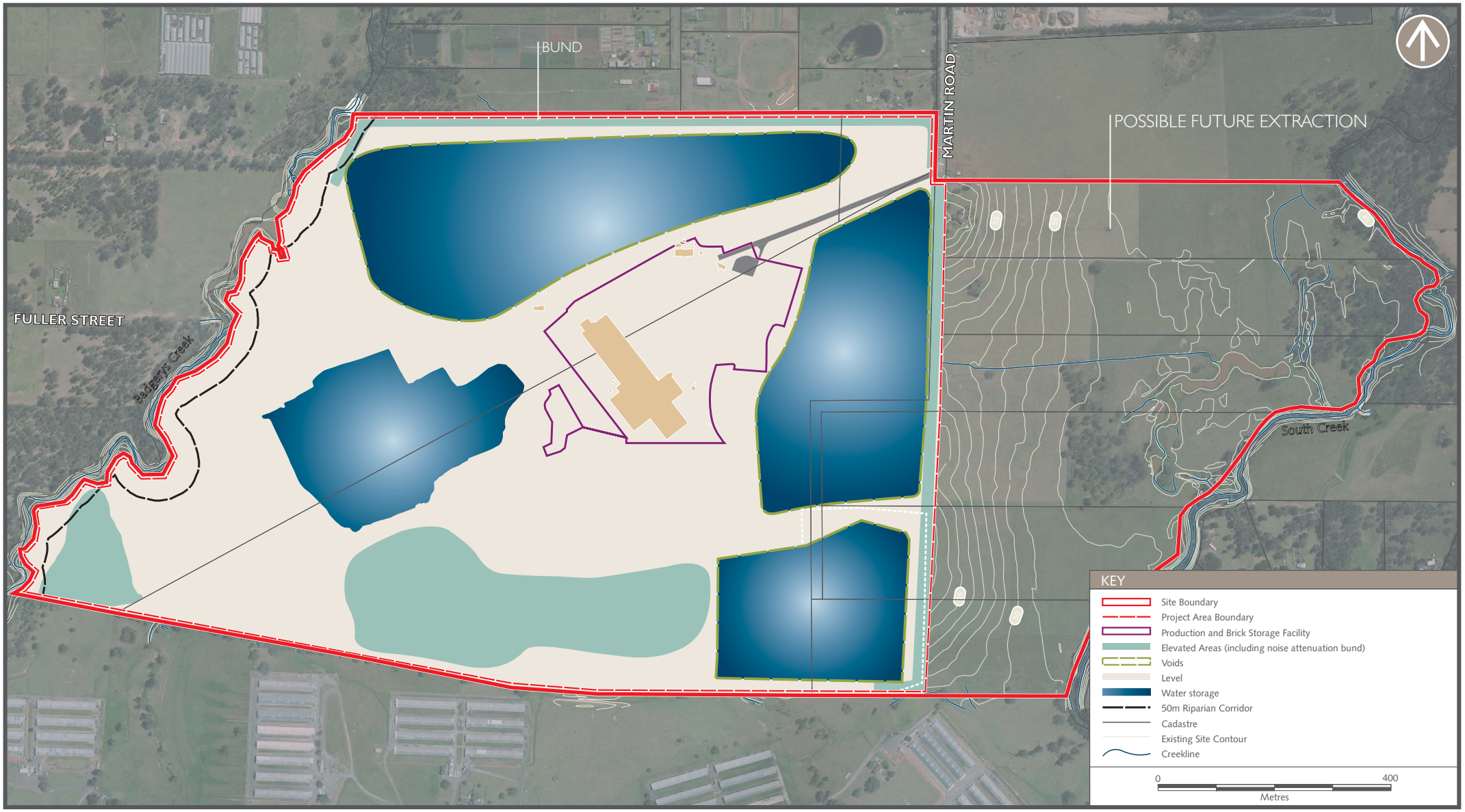
- Options for the extraction of the full resource existing on the site are preserved into the future;
- Options for the redevelopment of the site for future industrial use are maximised in line with the Metropolitan Strategy;
- The impacts of the continued operations at the quarry and brick making facility in terms of air quality, water quality and visual amenity are minimised;
- The continued operation of the quarry and brick making facility can integrate with existing surrounding land use and evolving future land use and development in the context of the SWGC.

4.3.2 Pits

The proposed rehabilitation works and final landform are summarised in **Table 7** and shown in **Figure 5**.

Table 7: Proposed Rehabilitation Works

Pit	Rehabilitation/Management	Final Landform
1	Fencing or bunding in conjunction with planting of the bund and appropriate warning signs to alleviate the potential danger to people and stock.	Pit 1 would be used as part of the water management system and would remain as a final void.
2	Pit 2 would receive unusable material from Pit 3 and dumping in the central stockpile would cease. Unusable material from Pits 4 and 5 would also be dumped in Pit 2 resulting in a floor level a few metres above original ground surface levels.	Pit 2 would be returned to near natural ground level.
3	Pit 3 is expected to continue being excavated for approximately six years (up to 2016). Upon completion of quarrying, Pit 3 would be retained as an open void with potential for water retention. Fencing or bunding in conjunction with planting and appropriate warning signs to alleviate the potential danger to people and stock. Topsoil from Pit 3 would be used in the rehabilitation of the stockpile areas.	Pit 3 may potentially be used as part of the water management system and would remain as a final void.
4	Pit 4 is proposed for quarrying in approximately four years (from 2014). Upon completion of quarrying, Pit 4 would be retained as an open void with potential for water retention. Fencing or bunding in conjunction with planting and appropriate warning signs to alleviate the potential danger to people and stock. Topsoil from Pit 4 would be used in the rehabilitation of the stockpile areas.	Pit 4 may potentially be used as part of the water management system and would remain as a final void.



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Conceptual Final Landform - 2030

Environmental Assessment

Boral Quarry and Brickworks, Badgerys Creek

Figure 5

Pit	Rehabilitation/Management	Final Landform
5	Pit 5 is proposed for quarrying from 2020. Upon completion of quarrying, Pit 5 would be retained as an open void with potential for water retention. Fencing or bunding in conjunction with planting and appropriate warning signs to alleviate the potential danger to people and stock. Topsoil from Pit 5 would be collected for rehabilitation of stockpile areas and Pit 2. Buffer of 50m to be preserved from Badgerys Creek.	Pit 5 may potentially be used as part of the water management system and would remain as a final void.

4.3.3 Stockpiles

Proposed stockpile management, rehabilitation works and final landform is summarised in **Table 8** below and shown in **Figure 5**.

Table 8: Proposed stockpile rehabilitation works

Stockpile	Rehabilitation/Management	Final Landform
Raw materials stockpile	The Brown Shale section of the Stockpile would be rehabilitated as soon as possible to aid dust suppression, if it is considered that the material is unlikely to be used. The Raw Material Stockpile and brick product storage area would be the final areas to be rehabilitated at or near original ground level.	Level.
Eastern Stockpile	Maintenance to manage erosion in addition to surface preparation and pasture revegetation. It may become cost effective in the future to use raw material from this stockpile.	Elevated.
South Eastern Stockpile	Reshaping and revegetation of the eastern portion. As part of final landform shaping this stockpile is to be subject to earthworks to link it to the stockpile to the east and to the Southern Stockpile the south west.	Elevated.
Southern Stockpile	Bulldoze the stockpile east to fill the void area south of the South Eastern Stockpile. Material may also be bulldozed to the west. This should be undertaken to allow a final slope of 1:3 in this section of the final landform leading to a toe drain to catch runoff. May be rehabilitated in 2010/2011 and has been described in upcoming vegetation works.	Level.
Central Stockpile	Reshaping by bulldozing material to the north to develop a near level surface.	Near level.
Western Stockpile	Rehabilitated in 2006 to prevent runoff and sediment entering the creeks. Maintenance works only.	Elevated.

Details of methods of reshaping, stabilisation, revegetation and weed control are provided in the RP included as **Appendix D** to this EA.

4.3.4 Creeklines

The project includes a rehabilitation program which consists of fencing, planting and weed control for the portion of Badgerys Creek (eastern side of creek for a length of approximately 900 m) and Badgerys Creek Tributary (both sides of the creek for a length of approximately 280 m) which are located on the Project Site with a fenced area of 50m from the top bank of the creek. Details of creek rehabilitation works are included in the RP prepared for the Project Site (**Appendix D**). The riparian areas would be rehabilitated to emulate the local community at a density that would naturally occur.

The eastern side of South Creek would also be fenced to prevent stock access.

4.3.5 Future Land Use

Planning for the end use of the quarry is best done in the last five years of quarry life, however consideration has been given to future use of the Project Site in determining the most appropriate rehabilitation strategy. It is not possible to determine precisely what the most appropriate future land use for the site is, particularly given the substantial landscape changes likely to occur on site over the next ten to twenty years. Future land use would need to take account of market conditions, strategic planning framework as well as surrounding land use (including the SWGC development).

Given the current nature of surrounding land uses and the gradual urbanisation of the area, the options for a final land use or uses include (but are not limited to):

- Light industrial, such as a Business Park.
- Continued quarrying and brickworks.

4.3.6 Final Landform

Figure 5 provides a conceptual final landform plan at 2030 based on the proposed stockpile development, pit infill projects and final void development.

The proposed final landform would consist of four final voids, being Pits1, 3, 4 and 5 as well as elevated areas in the far west (Western Stockpile). Pit 2 would be filled to ground level and a level area would remain in the centre of the site at the location of the brick making facility, storage yard and raw materials stockpiles.

The conceptual final landform has been designed to allow for maximum flexibility in the future use of the Project Site, preserving options for further quarrying of pits below the existing 35 m average depth, if this becomes economically viable beyond the 20 year life of the proposed project.

Geological investigations undertaken on the site as detailed in **Chapter 14** of the EA demonstrate that further clay/shale resource exists below a layer of sandstone at approximately 35 m depth. Whilst it is currently not economically viable to extract this resource due to the practices required to break through the sandstone layer, as finite resources become scarcer into the future, extraction below this depth may become viable. It is therefore of vital importance to Boral's business that opportunities to extract this resource are preserved into the future, as part of the proposed project. In the meantime, these voids would be used to replace existing water storages on the site which would be lost as a result of the establishment of proposed new pits, to ensure that the site continues to operate as a closed system with nil discharge to nearby waterways.

The retention of these voids would not sterilise or preclude the land from being redeveloped for other purposes, in line with land use and planning policy at the time.

The landform also provides for innovative building platforms within the voids for potential industrial uses as identified in the Metropolitan Strategy and elevated and filled areas which may be used for recreation or open space. In addition, the proposed landform allows for a pattern of future development on the Project Site which would facilitate redevelopment of certain areas of the site in conjunction with the potential continuation of quarrying and brick making into the future.

Future land use and development on the Project Site is however, best determined closer to quarry closure when market conditions, surrounding land use and development and relevant policy can be assessed and considered to establish the most appropriate future use of the land. As such, final landform on the Project Site is conceptual only and would be reviewed and further considered in the medium term.

4.4 Environmental Controls

The site is currently subject to environmental management and monitoring measures. Existing measures for soil and water management include:

- Soil and stormwater management measures as detailed in the SWMP for the site included as **Appendix C.** These measures include bunding, silt fences, use of emergency spill kits and stormwater reporting sheets for monitoring purposes. As part of the EA, the SWMP has been reviewed and updated to address the proposed continued operations on the site.
- Dust suppression practices including the use of water trucks along access tracks and working areas during quarrying campaigns and regular dust deposition monitoring.
- Potential impacts, preventative measures, monitoring and reporting requirements, and responsibilities documented in an environmental effects register kept on-site.

The site is subject to an Environment Protection Licence (EPL) issued under the *NSW Protection of the Environment Operations Act 1997* (POEO Act). The POEO Act includes the following requirements in relation to air quality and noise management and monitoring measures:

- Air emissions monitoring from the brick making facility including the kiln exhaust stack and the dryer exhaust stack;
- Load limits for pollutants including coarse particulates (air), fine particulates (air), fluoride (air), nitrogen oxides (air), nitrogen oxides – summer (air) and sulphur oxides (air).
- Noise from the premises (excluding mobile plant) must not exceed:
  - An $LA_{10\ (15\ minute)}$ noise emission criterion of 55 dB(A) (0700 to 2200) Monday to Saturday and 0800 to 2200 Sundays and Public Holidays; and
  - An $LA_{10\ (15\ minute)}$ noise emission criterion of 40 dB(A) at all other times, except as expressly provided by this licence.
- Noise from the operation of mobile plant must not exceed:
  - An $LA_{10\ (15\ minute)}$ noise emission criterion of 50 dB(A) > (0700 to 2200) Monday to Saturday and 0800 to 2200 Sundays and Public Holidays; and
  - An $LA_{10\ (15\ minute)}$ noise emission criterion of 40 dB(A) at all other times, except as expressly provided by this licence
- An emergency response plan must be prepared and implemented for the premises.
- The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

The EPL requires that the Proponent complete an Annual Return including a Statement of Compliance and a Monitoring and Complaints Summary for submission to the DECCW.

In addition, a Pollution Reduction Program has been completed on the premises consisting of the trial use of recycled water procured from the Worth Recycling plant at South Windsor for brick manufacturing at the premises.

A second Pollution Reduction Program consisting of the development of new load limits for coarse particulates and sulphur oxides emissions is also identified on the EPL.

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