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Peppertree Quarry Modification 4

ENVIRONMENTAL ASSESSMENT

Prepared for Boral Quarries | April 2016

PEPPERTREE QUARRY MODIFICATION 4

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Prepared for Boral Resources (NSW) Pty Ltd
April 2016

REPORT STATUS - FINAL

Job number - PR25 Peppertree Quarry

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EXECUTIVE SUMMARY

Introduction

Boral Resources (NSW) Pty Ltd (Boral) is seeking to modify the current Peppertree Quarry Project Approval (PA 06_0074) under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), to provide for the following (hereafter referred to as the Project or the modification):

- Extension of daily in-pit operating hours at the Quarry by 6 hours; and
- Establishment of a new overburden emplacement area.

The modification proposed above will constitute Modification 4 to the current Project Approval. The Minister for Planning is the consent authority for the Project.

PACT has prepared this Environmental Assessment (EA) on behalf of Boral to assess the potential environmental and community impacts associated with the proposed modifications to the current Project Approval.

Justification for the Proposed Modification

The Quarry's granodiorite resource is overlain by weathered granite, which is not suitable for aggregate production, and is removed as overburden. When developing the first bench of the Quarry, some of this weathered granite inevitably mixes with the targeted granodiorite. The out-of-pit processing equipment has been designed to remove (scalp) up to 15% of this finer weathered material from the raw feed. However, as the quarry has developed, the level of weathered material required to be scalped for product quality is around 30% of raw feed fed into the in-pit crusher. Therefore, the in-pit crusher cannot produce enough raw feed for the out-of-pit plant to meet market demand and approved production limits within the currently approved 12 hour.

The building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgery's Creek Airport, new rail lines, and major road construction and upgrading. A number of these major infrastructure projects have already commenced while others are imminent, creating a significant demand for hard rock aggregates from the main construction material suppliers. Boral is, and will be supplying a number of these projects with concrete and asphalt, that includes aggregates and sand from Peppertree Quarry on rail through terminals at St Peter's and Enfield. Given the importance of these projects to the New South Wales economy, the additional in-pit operating hours are crucial for the uninterrupted supply of concrete and asphalt to these, and other projects, as well as future demand in the Sydney market.

Boral needs to increase in-pit operating hours by 6 hours per day, 7 days a week in order to account for the increased scalping of overburden material in the early phases of pit development and to meet annual production volumes up to the approved limit of 3.5 million tonnes per annum. This need has now become more urgent due to rapid growth in the Sydney construction materials market.

Overburden emplacement at the Quarry is currently approved within noise bunds located along the northern and eastern boundaries of the site, an emplacement area to the east of the approved quarry pit and a western emplacement area and noise bund to the west of the Quarry across Boral's private railway line. Remaining overburden was proposed to be emplaced within the south pit of Boral's adjoining Limestone Mine.

The noise bunds were completed during construction of the Quarry, the Eastern Overburden Emplacement will reach capacity in early 2016 and the Western Overburden Emplacement will be completed by mid to late 2016. Mine planning for the Limestone Mine has ruled out emplacement within the south pit. The Limestone Mine, under its forthcoming development application, is seeking to hold 5 million m^3 (approximately 13 Mt) of overburden for the Quarry, however, this will not be approved until early 2017. As an interim measure, Boral is seeking to place approximately 1 million m^3

of overburden within a new overburden emplacement, to the south of the approved 30 year Quarry pit. This new overburden emplacement area will be needed in mid-2016 and will take approximately 12 months to establish.

The proposed new overburden emplacement will be located within the south-eastern extent of the future hard rock (granodiorite) resource, which extends south from the existing Quarry pit, to the northern end of the Limestone Mine's north pit. A significant granodiorite resource also exists on Boral's lands to the north of the existing Quarry pit, extending northwards from Tangarang Creek. The proposed Southern Overburden Emplacement will not sterilise resource as Boral will relocate this southern emplacement in the future if the southern granodiorite resource needs to be accessed. Although the Southern Overburden Emplacement may be relocated in the future, this is unlikely to be required for at least the next 25 years.

Description of the Proposed Modification

Extension of in-pit operating hours

Boral is proposing to extend the in-pit operating hours to 5am - 11pm (any day of the week).

Worst case operational noise modelling has informed which in-pit activities may need to be restricted, to achieve compliance with the project specific noise levels for the site.

Restrictions that may need to be applied to in-pit activities during the extended operating hours i.e. 5am – 7am and 7pm – 11pm include:

- The operation of the mobile in-pit crusher at or below RL555; and
- The operation of other mobile plant including excavators, front end loaders and trucks, at or below RL570.

These possible restrictions to in-pit activities during extended operating hours have been identified through conservative, worst case operational noise modelling. Compliance with the project specific noise management levels (refer to **Section 6.2.1**) during extended in-pit operating hours, will be demonstrated through ongoing quarterly compliance noise monitoring.

The conveying of crushed rock out of the pit (defined in the Project Approval as an in-pit activity), will take place from 5am - 11pm in order to increase feed volumes to the processing plant that is approved to operate 24 hours, 7 days a week.

Blasting will continue within the current approved hours of 9am - 5pm Monday to Saturday.

New Overburden Emplacement Area

The proposed new Southern Overburden Emplacement has been designed as an extension to the existing Eastern Overburden Emplacement and is located entirely within both Boral owned land and the Quarry's development consent boundary.

Prior to the emplacement of overburden, the toe of the Southern Overburden Emplacement will be identified on site, stormwater management and erosion control infrastructure installed and trees and shrubs removed. No topsoil will be stripped from the Southern Overburden Emplacement footprint in accordance with the *Peppertree Quarry Aboriginal Heritage Management Plan*.

Overburden stripped from the pit will be transported by trucks along the most direct haul route possible, to the proposed Southern Overburden Emplacement area where it will be spread and shaped by dozer. Overburden will be initially placed in the southern section of the overburden emplacement area and will progressively move northward toward the existing Eastern Overburden Emplacement.

The Southern Overburden Emplacement will be landscaped and rehabilitated in accordance with the existing *Peppertree Quarry Landscape and Rehabilitation Management Plan*.

Overburden removal and emplacement will continue within the current approved hours of 7am - 7pm Monday to Sunday.

Environmental Impact Assessment

Specialist technical investigations were undertaken to assess key environmental issues associated with the proposed modification and were identified by the *Background Scoping Document* (PACT, August 2015), the project team, and a thorough government agency and community consultation process. For those environmental issues identified as low risk, further specialist technical investigations are not required, as the modification will not result in any additional impacts on these low risk environmental issues than that already assessed in the *Marulan South Quarry Environmental Assessment Report* (ERM, October 2006) and subsequent approved modifications.

The potential environmental impacts of the proposed modification have been identified and thoroughly assessed in this EA. A broad overview of the key outcomes of the environmental impact assessment for the modification is outlined in the following pages.

Noise and Vibration

The Noise Impact Assessment considered the potential operational noise impacts of the Project on nearby sensitive residential, commercial and industrial receivers.

Relative to the existing operations, the modification is unlikely to contribute to any significant change in existing operational or cumulative noise levels at identified sensitive receivers. This is supported by the findings of the Noise Impact Assessment, which predicts that there would be no exceedances of the operational noise impact assessment criteria stipulated by the Project Approval and Environment Protection Licence at any identified sensitive receiver as a result of modification. This incorporates both noise emissions of the Quarry along with additional background sources (including the Marulan South Limestone Mine). In order to comply with the operational noise impact assessment criteria, the mobile in-pit crusher must not operate above RL555 during the extended in-pit operating hours and all other noise mitigation measures identified in the Project Approval, previous environmental assessments and the *Peppertree Quarry Noise and Blast Management Plan* must be implemented.

A low frequency noise assessment has been conducted which identified compliance with the appropriate EPA noise criteria. However, the assessment indicated that there is potential risk for low frequency noise from the site. It is therefore recommended that quarterly compliance monitoring, currently undertaken in accordance with the *Peppertree Quarry Noise and Blast Management Plan* must include additional noise monitoring locations R4 and R17 and a more detailed low frequency noise assessment and reporting regime.

Given the results of the Noise Impact Assessment and the demonstrated performance of existing operations via the ongoing noise monitoring regime, it is considered that the continued implementation of the *Peppertree Quarry Noise and Blast Management Plan* as well as recommended additional noise management and monitoring measures, would be adequate to maintain operational noise levels associated with the proposed modification, within the noise impact assessment criteria.

Air Quality

The Air Quality Impact Assessment considered the potential impacts of the modification on nearby sensitive residential receivers.

The Air Quality Impact Assessment concluded that with the implementation of the existing *Peppertree Quarry Air Quality Management Plan* and associated management measures, all relevant air quality criteria would be met at all identified sensitive receivers.

However, it is recommended that the *Peppertree Quarry Air Quality Management Plan* be revised to include a simple procedure to follow in the event of any measured exceedance at the air quality monitors in the network. This would outline the procedure for an investigation to be performed into the potential cause of the elevated reading and to make any necessary recommendations to minimise reoccurrence of the elevated reading.

It is also suggested that an investigation be performed to determine the likely cause of the high level of organic matter (e.g. leaves. pollens etc.) recorded by the D1 Dust gauge and if required to move this monitor to a nearby location less affected by such organic matter.

Biodiversity

The development of the Southern Overburden Emplacement will involve the disturbance of a total of 8.1 hectares of native vegetation and approximately 12.9 hectares of ground disturbance.

The Biodiversity Assessment Report prepared for the modification, concluded that:

- One Threatened Ecological Community (TEC) would be impacted by the Southern Overburden Emplacement, namely 'White Box Yellow Box Blakely's Red Gum Grassy Woodland', which is listed as an EEC under the *NSW Threatened Species Conservation Act 1995* (TSC Act) and Critically Endangered Ecological Community (CEEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In total, the modification would result in the disturbance of approximately 8.1 ha of the EEC/CEEC listed under the TSC Act and EPBC Act. To satisfy the EPBC Act requirements, a Matters of National Environmental Significance (MNES) Assessment of Significance was conducted and concluded that the modification is unlikely to significantly impact the CEEC.
- The modification will not impact threatened flora species;
- Fifteen threatened and migratory fauna listed under the TSC Act and/or EPBC Act are considered to be potentially impacted by the modification. For threatened and migratory species listed under the EPBC Act, an MNES Assessment of Significance for each of these species was completed. Based on the results of the Assessments, a significant impact to any EPBC Act listed threatened or migratory fauna species is considered unlikely.

Additional management measures have been recommended by the Biodiversity Assessment Report to minimise the potential for adverse impacts to adjacent flora and fauna which would arise from the development of the Southern Overburden Emplacement.

A Biodiversity Offset Strategy has been presented within the Biodiversity Assessment Report in order to offset unavoidable impacts to the White Box Yellow Box Blakely's Red Gum Grassy Woodland and potential habitat of threatened fauna species. The proposed offset package would be finalised following notice of approval of the modification.

Heritage

The Quarry is located in an area of Aboriginal heritage sensitivity with a large number of artefacts already uncovered within the approved development consent boundary.

The new Southern Overburden Emplacement is proposed on land that has not been previously assessed for Aboriginal heritage values. This area has not been subject to significant previous surface disturbance and therefore has the potential to support Aboriginal artefacts and other Aboriginal cultural heritage values. As such, an Aboriginal and Historic Heritage Impact Assessment was undertaken for the proposed modification.

As part of the Aboriginal and Historic Heritage Impact Assessment undertaken for the modification. Desktop research and a field survey identified two Aboriginal sites in the study area, namely MQ25 (an artefact scatter previously collected) and MQ120 (a culturally modified tree). Some areas of moderate archaeological potential were also recorded within the study area. Site MQ120 is outside the disturbance area and will not be impacted by the Southern Overburden Emplacement.

It is anticipated that the Southern Overburden Emplacement may result in disturbance to previously unidentified Aboriginal sites through soil compaction during overburden deposition. Buried Aboriginal objects, if they exist, have the potential to be compacted, disturbed and moved a short distance during overburden emplacement, resulting in a loss of context and spatial patterning.

A portion of the identified areas of moderate archaeological sensitivity will be subject to impact as a result of the Southern Overburden Emplacement. However, the type of landscape in which the emplacement area is located (ridgeline) has been previously investigated in excavations for Peppertree Quarry, the Limestone Mine and throughout the wider Southern Tablelands region. These results have found that areas of ridgelines generally contain artefact densities of less than five artefacts per square metre and a low background scatter of artefacts. These areas have been

adequately tested and the information from previous excavations can be extrapolated to the study area, where it is highly likely that similar low density scatters may be present. The study area would therefore not be able to provide information additional to what has been uncovered in the region, particularly the approved Quarry disturbance area, which has been subject to detailed archaeological investigation and which has provided a comprehensive picture of the Aboriginal archaeological landscape. As such, further investigation in the area subject to the modification is not considered warranted.

The potential for unavoidable harm to Aboriginal objects is acknowledged as a result of the proposed Southern Overburden Emplacement. The impacts to Aboriginal heritage in the Southern Tablelands region are not substantial, as the current balance at the Quarry between preservation of some areas of Aboriginal sites and landscapes ensures that harm is only partial across the Quarry area and retains some of the most significant sites identified. It does not represent a total loss of the Aboriginal archaeological records in the area and any unidentified Aboriginal sites that are potentially impacted, are predicted to continue outside the study area.

The only additional heritage management recommendations that have been made in addition to the existing recommendations as contained in the approved *Peppertree Quarry Aboriginal Heritage Management Plan* is for the Aboriginal site MQ120 to be fenced and avoided during the development of the Southern Overburden Emplacement.

No historic heritage evidence was uncovered during the research phase or field survey of the proposed Southern Overburden Emplacement and as such no further significance assessment is required. No areas of archaeological potential, historic views or community heritage value have been identified.

The proposed modification will not impact known historic heritage, as no evidence of historic heritage items were found in the study area.

Surface Water Management

A Surface Water Assessment was undertaken to assess potential water quality and quantity impacts on drainage systems downstream of the proposed Southern Overburden Emplacement.

A water management system has been devised for the proposed Southern Overburden Emplacement area and includes appropriately designed and managed landforms, conveyance systems and sediment basins.

The proposed system would follow the same general principles as have been approved for the existing Quarry as set out in the *Peppertree Quarry Water Management Plan*, including:

- Constructing sediment basins at the locations on the eastern side of the emplacement where runoff would drain to Barbers Creek. These basins would be sized to comply with the requirements for basins that discharge to 'sensitive' receiving environments in accordance with Table 6.1 in *Managing Urban Stormwater: Soils & Construction, Volume 2E – Mines and Quarries* (DECC, 2008);

- Operation of the sediment basins to restore the 'capture capacity' of each basin within 5 days of the end of a storm event either by re-use of the water for dust suppression or irrigation, or transfer of the water to the Quarry pit, from where water would be managed in accordance with the *Peppertree Quarry Water Management Plan*; and

- Sediment control fencing on the western side of the emplacement where runoff will drain to the northern pit of the adjacent Limestone Mine.

All sediment basins associated with the proposed modification will be constructed and operated for the purposes of sediment control and are therefore excluded from the requirements of the harvestable rights order and do not require licensing under the WM Act.

Sediment basins constructed to capture surface runoff are likely to lead to a temporary change in the flow regime in three small creeks on the eastern side of the emplacement during development and

rehabilitation. Once rehabilitation is complete, the flow regime in these creeks is expected to return to conditions similar to current.

The proposed design and operating standard for the proposed sediment basins is consistent with the objective of achieving neutral or beneficial effect of water quality (NorBE) as required under *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*. No adverse impacts are expected on the water quality in Barbers Creek or the Shoalhaven River.

Given this, and the demonstrated performance of existing operations via the implemented water quality monitoring regime, it is considered that the continued implementation of the *Peppertree Quarry Water Management Plan*, *Peppertree Quarry Landscape and Rehabilitation Management Plan* and associated management measures would be adequate to manage potential erosion, sedimentation or water quality impacts which would arise from activities associated with the modification.

Visual Amenity

A Visual Impact Assessment was undertaken to assess potential impacts to visual amenity associated with the modification.

There are two aspects of the proposed modification, of which only the Southern Overburden Emplacement has a physical presence, in terms of visual impacts. The other is the extension of in-pit working hours taking place within the pit, below natural ground level and out of direct sight from any receivers. As such, there will be no significant visibility of this activity. Visible evidence of the extended working hours will be limited to effects on night-time lighting and occur only if that lighting is visible as a more significant 'glow' reflecting off the atmosphere, to an extent different from the existing approved project.

The only perceived in-pit change will be light associated with the primary crusher, excavator, front end loader, and in the short-term, two trucks, operating for longer hours in the early morning (5am - 7am) and at night from 7pm - 11pm. The remainder of the existing lighting including the out-of-pit Processing Plant, which operates as approved 24 hours per day, 7 days per week, will continue to have its existing visual effects. As the modification to the Quarry does not propose changes to the kind or purpose of lighting, there will be minimal difference between the existing lighting from the approved project and that associated with extending the in-pit working hours.

Visual exposure of the existing quarrying operations is low to the adjacent rural land to the south-west, west and north, as the current operations are predominantly below the horizons of view, with the exception of the crest of the approved Eastern Overburden Emplacement, which is of minor visibility to some medium to distant range views.

The visual exposure of the proposed Southern Overburden Emplacement would be to only a slightly larger area than that of the existing approved project. No roads or residences would be significantly exposed to views of the proposed Southern Overburden Emplacement. A consequence of the Southern Overburden Emplacement is that in some views from the landscape to the south, east and south-west, the topography of the intermediate horizon will be slightly changed as the emplacement is developed, increasing the visual exposure of the newly formed emplacement to views. However, the overall visibility of the emplacement area will be minor.

The greatest visual exposure of the overburden emplacement is to off-track informal viewing locations accessed from the Long Point Track (VP21) to its east in the Morton National Park. VP21 is the only viewing location assessed that has a substantial view of the proposed Southern Overburden Emplacement. The existing processing plant and the eastern face of the Eastern Overburden Emplacement are also visible from this location. The proposed Southern Overburden Emplacement will proactively screen existing views of the processing plant area as well as direct views of night time lighting.

Of the 17 residential receivers, only two residential receivers (R10 and R15) were considered to have potential views of some part of the proposed Southern Overburden Emplacement, however these views were determined to be minor.

Relative to the existing operations, the modification is unlikely to significantly impact upon the visual amenity of surrounding residential and commercial receivers, nor recreational users of the Morton National Park to the east.

Additional management measures have been recommended to minimise the potential for adverse visual impacts associated with the proposed Southern Overburden Emplacement and extension of in-pit working hours. The *Peppertree Quarry Landscape and Rehabilitation Management Plan* would be updated to incorporate the findings of the VIA, the recommended additional management strategies associated with the rehabilitation of the proposed Southern Overburden Emplacement and the auditing of night-time lighting associated with extended in-pit operations.

Land Contamination

The potential to encounter or disturb areas of contamination within the footprint of the proposed Southern Overburden Emplacement is considered low given the historical land use of the area prior to the commencement of quarrying operations. Historical land uses comprise previous clearing of original woodland vegetation to facilitate pasture grazing for livestock. As such, the potential for these land uses to result in contamination of soils is unlikely.

Searches of relevant contaminated land registers and detailed site surveys did not identify any evidence of contamination or potentially contaminating activities within the study area.

Boral is unaware of any potential contaminating activities that have been undertaken within the proposed footprint of the Southern Overburden Emplacement. Additionally, establishing the new overburden emplacement would not require excavations and therefore the potential to encounter contaminated soils would be minimised.

As such, no further assessment of contaminated land or land remediation is required.

In the event that previously unidentified contaminated materials are located during development of the Southern Overburden Emplacement, relevant statutory requirements, including potential soil testing and waste classification, would need to be complied with and the material managed and disposed of appropriately.

Land and Rehabilitation

The proposed Southern Overburden Emplacement will be constructed out of the same material as the existing overburden emplacements on the site and will be designed to similar standards. As such, the Southern Overburden Emplacement will be landscaped and rehabilitated in accordance with the approved *Peppertree Quarry Landscape and Rehabilitation Management Plan*, in order to minimise the potential for visual, air quality, biodiversity and erosion and sedimentation impacts arising from unstabilised ground surfaces.

If required, the *Peppertree Quarry Landscape and Rehabilitation Management Plan* would be revised to incorporate the additional Southern Overburden Emplacement and any additional management strategies to ensure temporary stabilisation of exposed surfaces, permanent stabilisation strategies, progressive rehabilitation with groundcover vegetation during overburden emplacement and final rehabilitation as soon as practical after formation of the Southern Overburden Emplacement.

As required by Schedule 5, Condition 7 of the Project Approval, if proposed revisions to the *Peppertree Quarry Landscape and Rehabilitation Management Plan* are required, the amendments would be undertaken within three months of a notice of approval, and submitted to DP&E for endorsement.

Traffic and Transport

Following loading by an excavator within the approved extraction area, overburden material would be transported by trucks via internal haul roads to the Southern Overburden Emplacement area. Trucks would return to the Quarry pit via the internal haul road network.

All activities associated with the extension of in-pit operating hours, would be confined to the Quarry pit.

Therefore, the haulage of overburden material and the movement of all vehicles and machinery associated with the modification and the development of the Southern Overburden Emplacement, would be confined to the Quarry's internal haul road network and within the Quarry consent boundary, thereby avoiding additional vehicle movements on the local road network.

Groundwater

The identification of groundwater resources and potential impacts were previously assessed within the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006). The assessment found that groundwater at the site occurs in discrete fractured zones, the most significant of which is the interface between the overburden and underlying granodiorite. There was no evidence of vertical or lateral movement of groundwater between these zones.

The proposed modification includes the extension of operating hours for in-pit activities. The extension of hours would not result in alteration to the existing quarry operation or degree or depth of land disturbance previously assessed and approved.

The establishment of the new Southern Overburden Emplacement does not require excavations and therefore groundwater will not be impacted.

Additional impacts to groundwater are therefore unlikely to occur as a result of the proposed modification and further assessment of potential groundwater impacts is therefore not required.

Greenhouse Gases

The identification of greenhouse gas emission sources and potential impacts were previously assessed within the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006). The assessment found that while extraction and processing of granodiorite consumes energy, the Quarry would implement strategies to minimise energy consumption and associated emissions. Such strategies included use of conveyors where possible in place of less efficient truck haulage and transport of aggregate by rail rather than road truck.

The hauling of approximately 1 million m^3 of overburden to the proposed Southern Overburden Emplacement instead of to the Limestone Mine's south pit will reduce the haulage distance for each truck by approximately 9km per return trip. This reduction in haulage distance will significantly reduce both fuel consumption and greenhouse gas emissions associated with approved overburden emplacement activities.

The proposed extension of in-pit operating hours, will result in a slight increase in the duration of in-pit activities which consume fuel and generate greenhouse gas emissions. However, this slight increase in greenhouse gas emissions is likely to be offset by in-pit works changing to a truck-less operation in the near future with blasted rock being loaded by excavator, directly into the primary crusher.

The proposed modification will not result in an increase in total production volumes at the Quarry or the means of finished product transportation by rail.

Boral would continue to monitor and report greenhouse gas emissions generated by Quarry operations in accordance with its commitments under the *National Greenhouse and Energy Reporting Act 2007*.

Socio Economic

The potential social impacts of the proposed modification relate largely to impacts on general amenity such as noise, air quality (dust), surface water runoff and visual exposure. These potential social impacts have been thoroughly assessed in the EA and a range of mitigation measures (in addition to those presented in the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006), Project Approval conditions, the Environmental Protection Licence and approved Environmental Management Strategy and Plans) are recommended to minimise potential noise, air quality, surface water and visual impacts so they are not perceived as a nuisance to neighbouring residents and other sensitive receivers.

During consultation around Boral's Marulan South operations, the community have raised concern around the potential impact that overburden emplacements could have on their property values if visible from their residences. As outlined in **Section 6.7**, a thorough investigation has been undertaken by an experienced visual impact specialist, into the potential visual impacts that the proposed modification, particularly the proposed Southern Overburden Emplacement, would have on the views from public view points as well as 17 private residences. The VIA concluded that the only residences that could potentially be exposed to distant views of the proposed Southern Overburden Emplacement are receivers R10 and R15, the most substantial of which was predicted to be from R15. 3D modelling, confirmation by on-site photography and the photomontage (**Figure 18**) show that there would be no perceptible change to the composition of the view from the residential receiver R15. The proposed modification is therefore unlikely to impact on property values of the local community as a result of visual impacts and loss of visual amenity associated with the proposed modification.

As outlined in **Section 3.1**, the building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgerys Creek Airport, new rail lines, and major road construction and upgrading. Boral is, and will be supplying a number of these projects with concrete and asphalt that includes aggregates and sand from the Quarry on rail through terminals at St Peter's and Enfield. Given the importance of these projects to the New South Wales economy, the additional in-pit operating hours and additional overburden emplacement capacity are crucial for the uninterrupted supply of concrete and asphalt to these and other projects, as well as future demand in the Sydney market.

Hazards

The proposed modification would not result in any additional hazardous activities to those already undertaken at the Quarry e.g. blasting, storage of fuel etc.

Existing mitigation measures as previously required by the Project Approval conditions and approved Environmental Management Strategy and Plans, would continue to be implemented in order to minimise the potential for adverse impacts or environmental incidents associated with hazardous activities.

Waste Management

The proposed modification is unlikely to generate any additional types of waste, not currently generated by the approved project.

The main waste source which would result from the development of the Southern Overburden Emplacement is felled trees and shrubs. Cleared vegetation would be used for rehabilitation purposes on the final overburden emplacement embankments or elsewhere on site, where required.

All other waste created through development of the Southern Overburden Emplacement e.g. old livestock fencing, would be reused and/or recycled where possible or disposed of at an appropriately licenced facility.

Conclusion

As outlined in this Environmental Assessment, the proposed modification is unlikely to result in any significant impacts on either the biophysical or social environment with the implementation of:

- Environmental management and mitigation measures outlined in:
  - Existing approved Peppertree Quarry Environmental Management Plans previously required and approved as part of the Project Approval Conditions (PA06_0074);
  - Section 6 of this Environmental Assessment;
- The Biodiversity Offset Strategy;

- Peppertree Quarry Environmental Monitoring Program;
- Requirements of Environment Protection Licence 13088; and
- Project Approval Conditions (PA06_0074).

The existing Environmental Management Plans would be reviewed by Boral following approval of the modification and amended as necessary.

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1 INTRODUCTION

1.1 Overview

Boral Resources (NSW) Pty Ltd (Boral) owns and operates the Peppertree Quarry (the Quarry), a hard rock quarry located in Marulan South, New South Wales.

Boral is seeking to modify the current Project Approval (PA 06_0074) under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), to provide for the following (hereafter referred to as the Project):

- Extend daily in-pit operating hours at the Quarry by 6 hours; and
- Develop a new overburden emplacement area.

The modification proposed above will constitute Modification 4 to the current Project Approval. The Minister for Planning is the consent authority for the Project.

PACT has prepared this Environmental Assessment (EA) on behalf of Boral to assess the potential environmental and community impacts associated with the proposed modifications to the current Project Approval.

1.2 The Applicant

Boral Resources (NSW) Pty Ltd is a wholly owned subsidiary of Boral Limited and is the Applicant for the Project.

Boral is an international building and construction materials group, headquartered in North Sydney, Australia. Boral's competitive position is underpinned by being a market leader in Cement and Construction Materials in Australasia, the BORAL USG Joint Venture plasterboard business in Australia and Asia, and Cladding and Roof Tiles in the USA.

The Boral Construction Material and Cement division employs over 5,000 employees in its quarry, concrete, asphalt, concrete placing and cement operations. The business is a major supplier of products to the dwelling, commercial construction, and roads and engineering markets.

Boral operates over 110 quarries, sand pits and gravel operations, producing products such as concrete aggregates, crushed rock, asphalt and sealing aggregates, road base materials, sand and gravels for the Australian construction materials industry.

2 EXISTING ENVIRONMENT AND QUARRY OPERATIONS

2.1 Site Description and Existing Environment

The Quarry is located in Marulan South, 10 kilometres (km) southeast of Marulan, 35 km east of Goulburn and approximately 175 km south-west of Sydney, within the Goulburn Mulwaree Local Government Area (LGA) in the Southern Tablelands of NSW (**Figure 1**). Access is via Marulan South Road, which connects the Quarry and Boral's Marulan South Limestone Mine with the Hume Highway approximately 9 km to the northwest (**Figure 2**). Boral's private rail line connects the Quarry and Limestone Mine with the Main Southern Railway approximately 6 km to the north (**Figure 2**).

The Quarry is located on Boral owned land approximately 650 hectares (ha) in size, which includes the Quarry site, approximately 70ha in size, additional granodiorite resources to the north and south and surrounding land (**Figures 3** and **4**). The site is zoned RU1 - Primary Production zone under the Goulburn Mulwaree Local Environmental Plan (LEP) 2009 (**Figure 5**). Mining and extractive industries are permissible in this zone with consent.

The Quarry is bordered to the south by the Limestone Mine, to the east by Morton National Park and by rural properties to the north and west. Surrounding land uses include mining, grazing, rural properties including an agricultural lime manufacturing facility, fireworks storage facility, turkey farm and rural residential. The main access for these properties is via Marulan South Road. Rural residential properties are also located to the northeast of the Quarry along Long Point Road. These properties are separated from the Quarry by the deep Barbers Creek gorge. The location of potentially impacted sensitive receivers is outlined in **Table 1**, and is shown in **Figure 2**.

Table 1: Sensitive Receivers

Receiver Number	Receiver Type	Approximate Distance (m) from activities subject of this modification
R1	Residential (private)	4,093
R2 (R6)*	Residential (private)	3,252
R3 (R5)*	Residential (private)	2,385
R4	Residential (private)	2,225
R5	Residential (private)	2,607
R6	Residential (private)	3,222
R7	Residential (private)	2,395
R8 (R16)*	Residential (private)	1,646
R9	Residential (private)	2,339
R10	Residential (private)	3,839
R11	Residential (private)	4,387
R12	Residential (private)	3,792
R13	Residential (private)	3,978

Receiver Number	Receiver Type	Approximate Distance (m) from activities subject of this modification
R14	Residential (private)	2,004
R15	Residential (private)	2,050
R16	Residential (private)	2,040
R17	Residential (private)	1,926
PR	Proposed Residence (private)	2,321
C1	Commercial	912
C2	Commercial	2,340
C3	Commercial	2,208
B1	Residential (Boral owned)	2,152
B2	Residential (Boral owned)	1,516
B3	Residential (Boral owned)	1,582
B4	Residential (Boral owned)	1,206
B5	Residential (Boral owned)	1,775
B6	Residential (Boral owned)	1,408
B7	Residential (Boral owned)	1,635

**Receiver numbers in parentheses represent those used in the Peppertree Quarry Project Approval. As this assessment has considered a number of additional receivers, reference numbers have been revised.*

The site of the former village of Marulan South is located between the Quarry and the Limestone Mine on Boral owned land. The village was established principally to service the mine but has been uninhabited since the late 1990's. The majority of the village's infrastructure has been removed and only a village hall and former bowling club remains. The bowling club has been converted into administration offices for the Limestone Mine.

FIGURE 1
Regional context
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

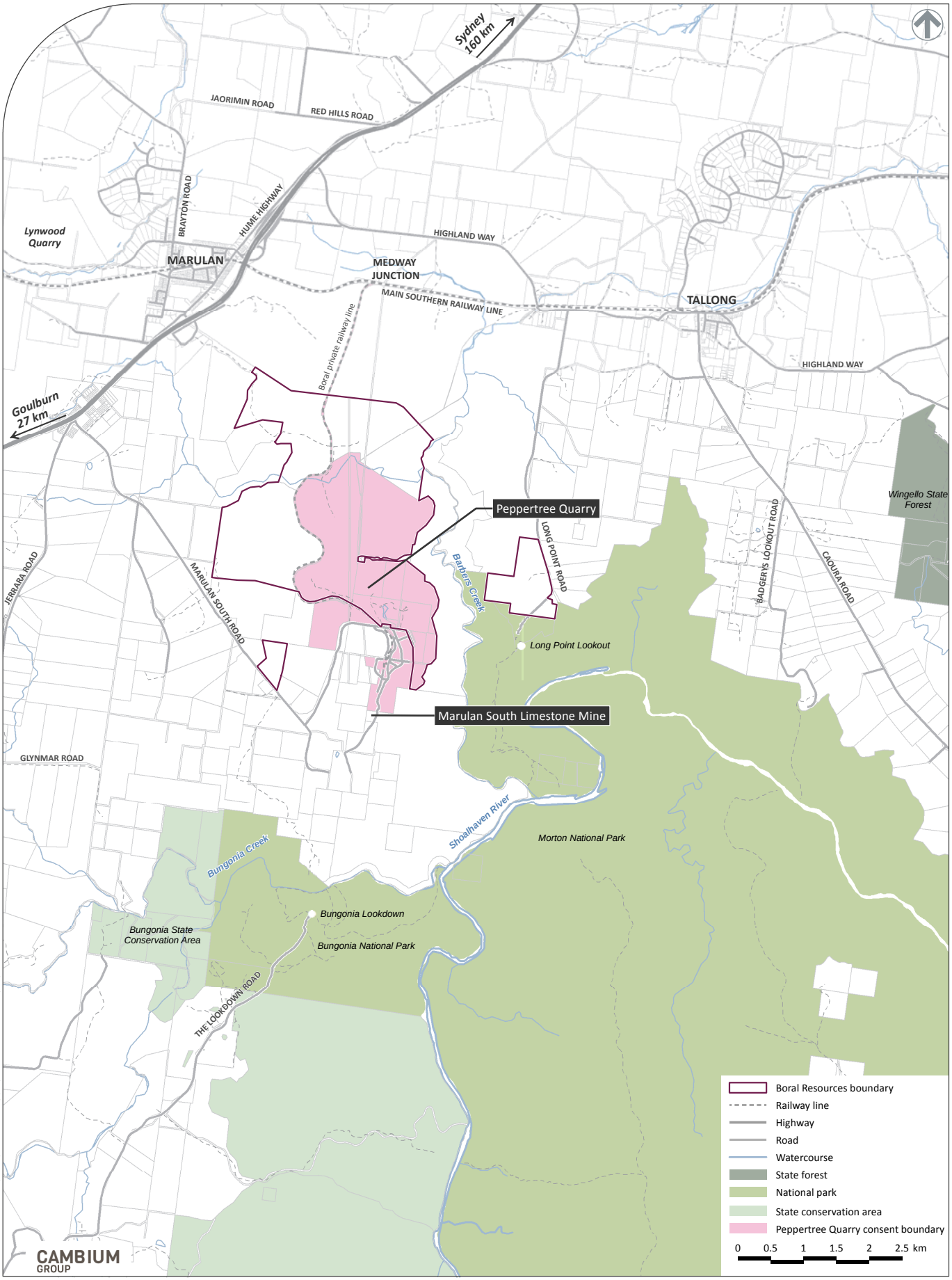

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FIGURE 2
Local context
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

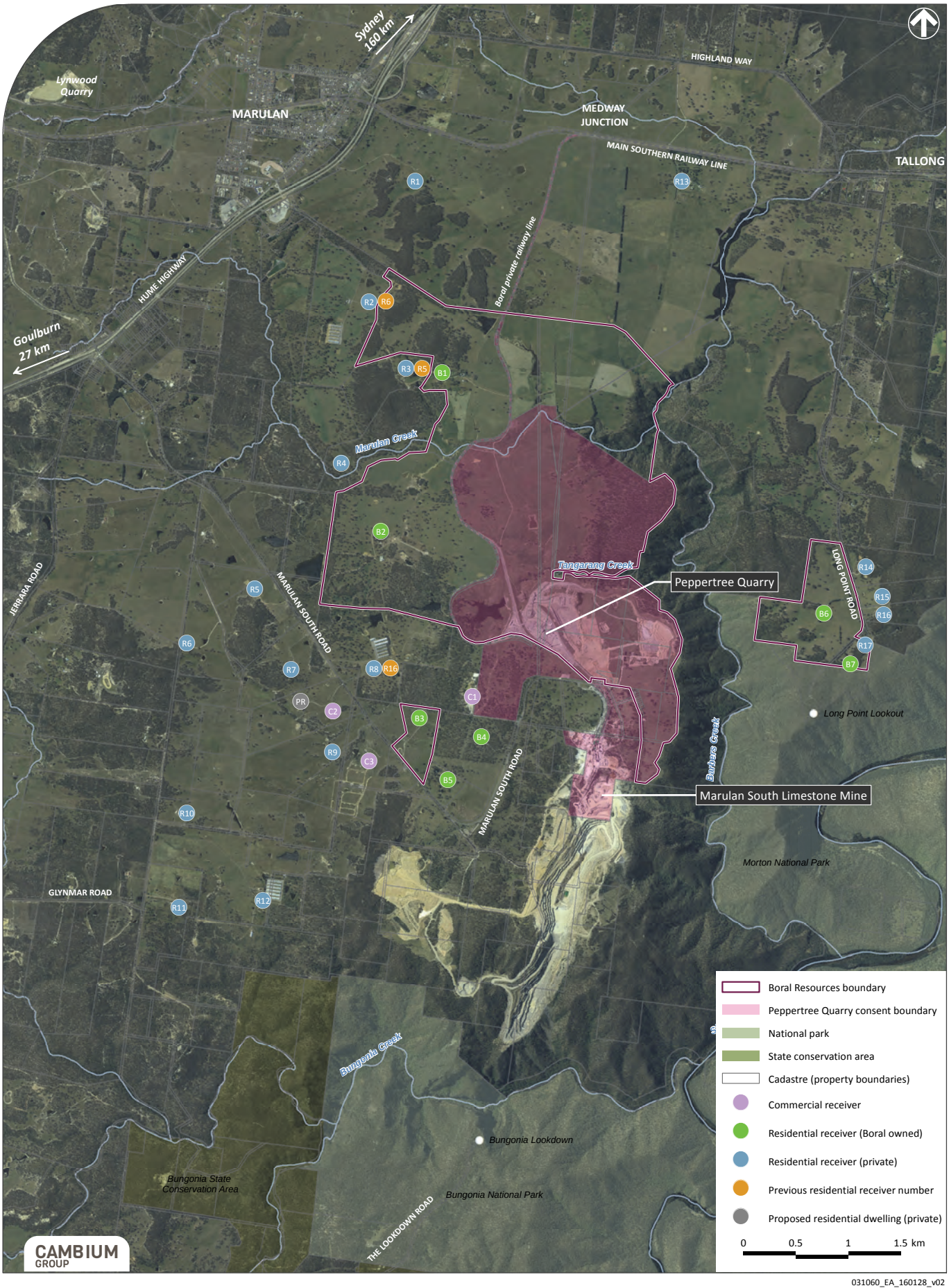

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FIGURE 3
Land ownership
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

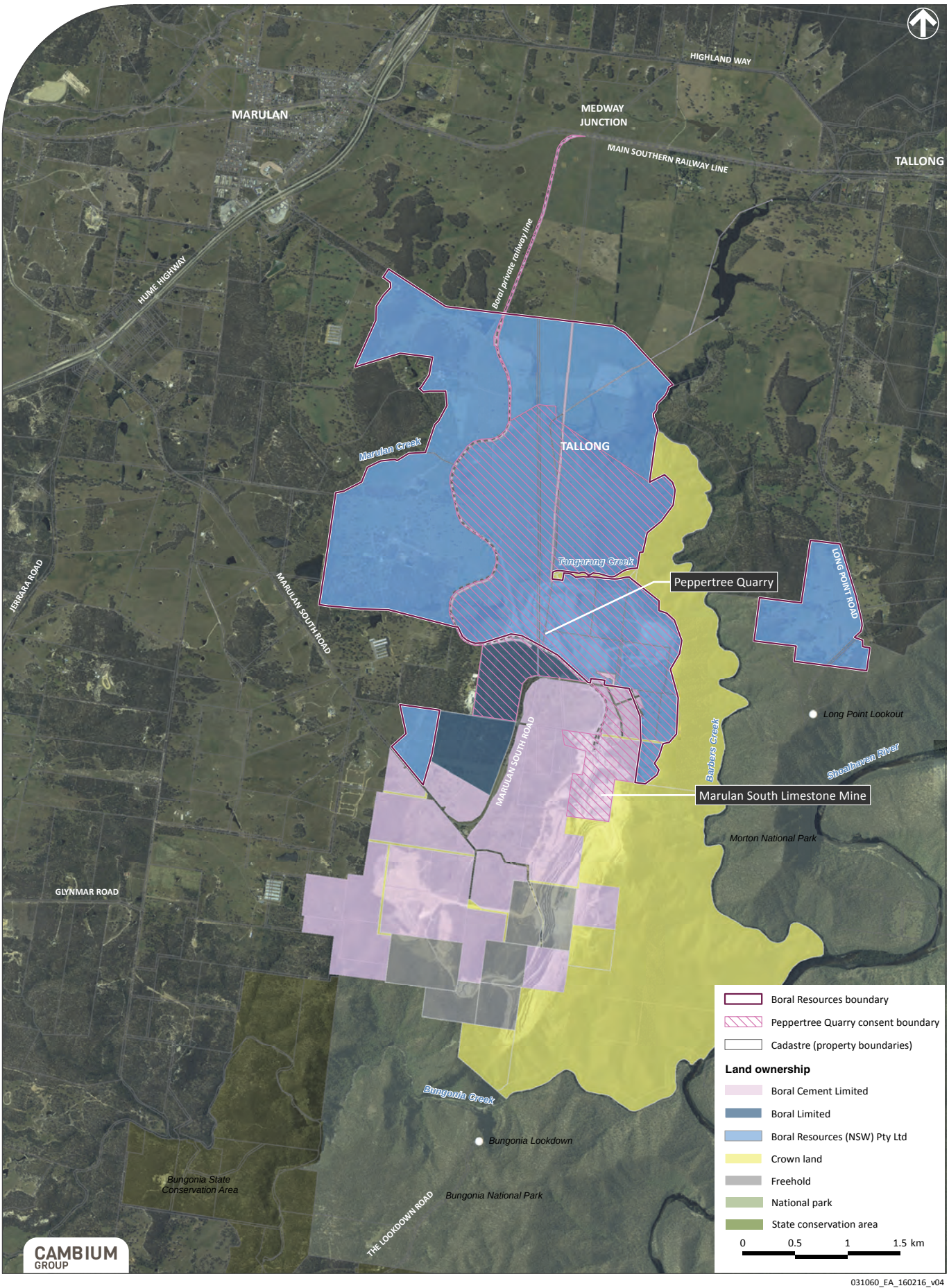

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FIGURE 4
Landuse
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

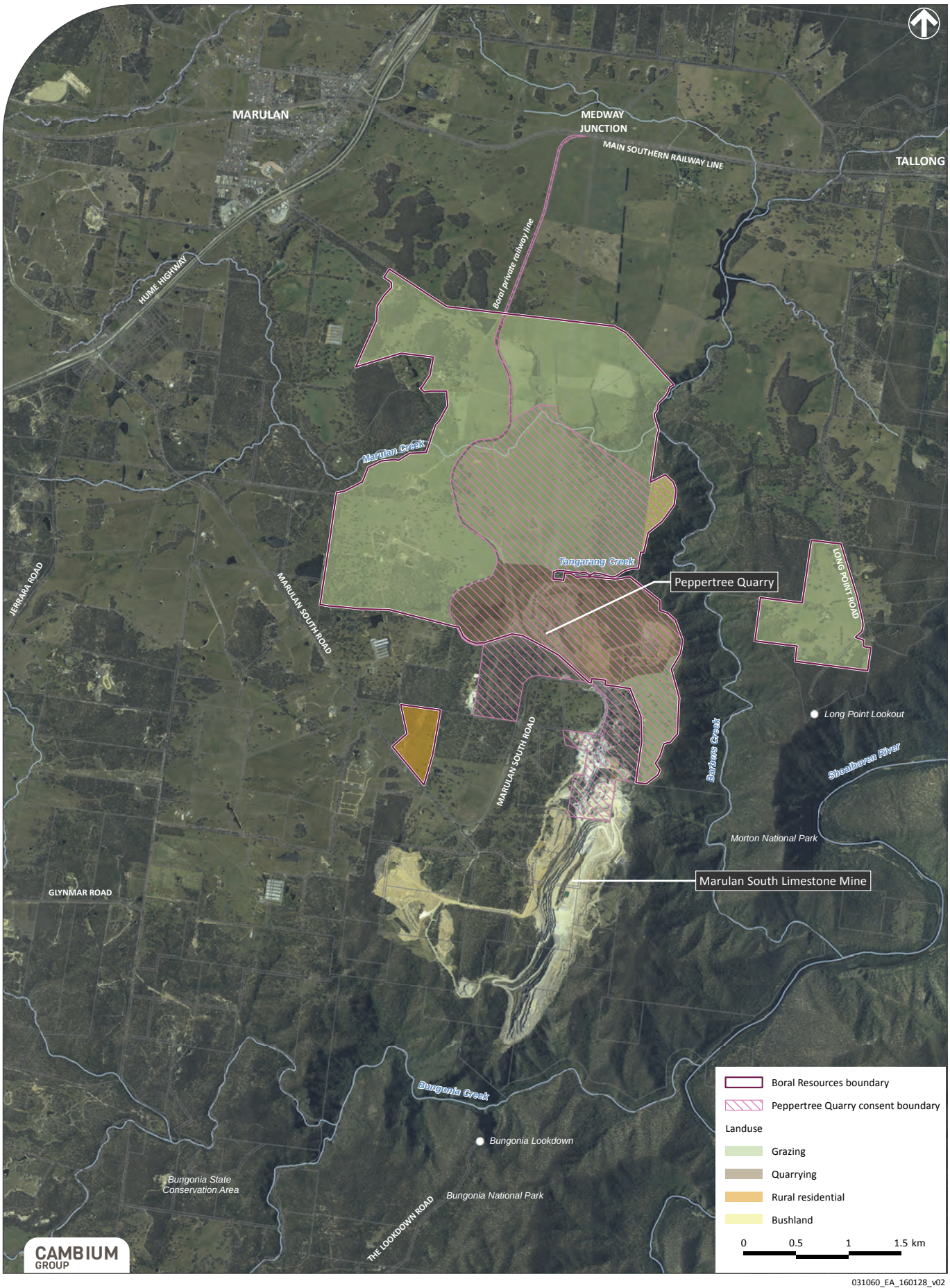

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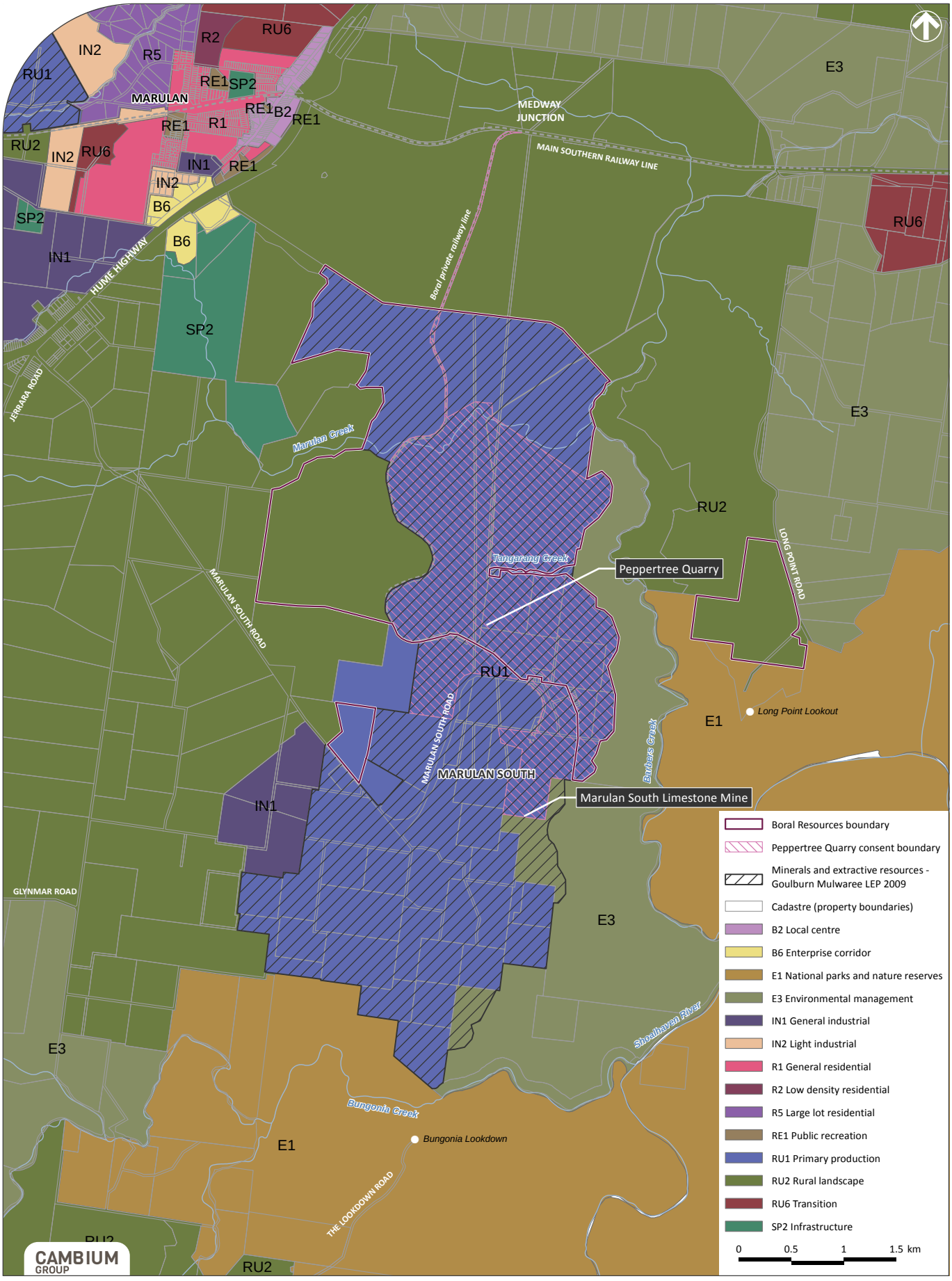
FIGURE 5
Land zoning
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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2.2 Operational History

The greater Sydney Metropolitan area has traditionally been the Australian building and construction sector's major market.

Boral is a leading producer and supplier of building and construction materials in the country. Accordingly, a significant amount of development in Sydney, including many of the city's best known structures, are underpinned by Boral-supplied concrete, cement and asphalt.

Concrete and asphalt are generated using course and fine hard rock aggregates. Since the 1800s, the majority of Sydney's aggregate and sand demand has been supplied from quarries extracting sand and gravel from the Nepean River flood plain near Penrith in Western Sydney.

These quarries, including the Boral Emu Plains site, are now exhausted of their sand and gravel (hard rock) resources.

Boral commenced planning for alternative sources of aggregate in the early 2000s to secure supply to its concrete, asphalt and other operations in Sydney.

This planning led to the establishment of the Peppertree Quarry, as well as the building of a new rail-to-road transfer terminal at Maldon, near Picton, to compliment Boral's other rail terminals at St Peters and Enfield.

2.3 Planning Approval History

Peppertree Quarry obtained planning approval from the Minister for Planning in 2007 under Part 3A of the EP&A Act. Planning approval PA 06_0074 has since been modified three times as outlined in **Table 2.**

Table 2: Planning Approval History

Date of Planning Approval	DA/MOD Number	Details
28 February 2007	PA06_0074	The "Marulan South hard rock quarry and associated infrastructure" project was granted approval by the Minster for Planning under Part 3A of the EP&A Act.
17 March 2009	Modification 1 PA06_0074	Approved under Section 75W of the EP&A Act for the construction of an exploratory test pit to extract a suitable amount of granodiorite to test and model rock behaviour and to assist with the design of plant and equipment for the Quarry.
3 November 2011	Modification 2 PA06_0074	Approved under Section 75W of the EP&A Act for infrastructure and site layout changes including the: ▪ Construction of a new rail loop embankment and overburden emplacement; ▪ Reduction in the water storage dam size; and ▪ Relocation of loading facilities,

Date of Planning Approval	DA/MOD Number	Details
		processing plant and stockpiling.
2 November 2012	Modification 3 PA06_0074	Approved under Section 75W of the EP&A Act for power and rail infrastructure changes including the: ▪ Construction of a High Voltage (HV) line approximately 1km in length; and ▪ Construction of an extension to the existing passing line on Boral's private rail line at Medway Junction.

The consolidated Project Approval for the Quarry, as modified by the above applications, is attached to this document as **Appendix A**.

2.4 Environment Protection Licence

The *Protection of the Environment Operations Act 1997* (PoEO Act) provides for an integrated system of licensing and contains a core list of activities requiring Environment Protection Licences (EPL) from the NSW Environment Protection Authority (EPA). The activities are called 'scheduled activities' and are listed in Schedule 1 of the Act.

The Quarry operates under EPL No. 13088. The existing EPL would be reviewed by Boral following a notice of approval regarding the proposed modification. If variations to the EPL are required as a result of the proposed modification, an application to vary the EPL would be submitted to the EPA.

2.5 Land Ownership

All land associated with this modification is owned by Boral with the exception of an undeveloped, dead-end, Crown road easement which is located across a small section of the proposed location of the Southern Overburden Emplacement (refer to **Figure 3**). Therefore, landowner consent is required from the NSW Department of Primary Industries - Lands.

2.6 Approved Project

The approved quarrying activities are for extraction of 105 million tonnes of granodiorite over 30 years at an initial rate of 1 - 2 million tonnes per annum (Mtpa) and a maximum rate of 3.5 Mtpa. Granodiorite is an intrusive igneous rock suitable for producing a range of quarry products. The hard rock aggregates produced at the site range in size and shape for different purposes. Primarily, production is of concrete and asphalt aggregates, however, road bases, railway ballast, armour rock and gabion can also be produced. Fines (generally <5 mm) produced during crushing of product are blended with limestone sand from Boral's adjacent Limestone Mine to produce a marketable manufactured sand.

Infrastructure at the Quarry includes a processing plant, rail loop and loading facilities, a water storage dams, an in-pit mobile crushing plant, overburden emplacement areas, noise and visual bunding, product stockpiles, and staff facilities. The location of infrastructure at the Quarry is shown on **Figure 7**.

Work to establish the Quarry commenced in July 2011. Production commenced early in 2014 following a lengthy commissioning and proving phase. The Quarry has approval to operate until the end of 2038.

2.6.1 Quarry Activities

Typical quarrying operations involve the stripping of overburden and the extraction of hard rock using open-cut drill and blast techniques.

Overburden is stripped by dozer, loaded onto trucks using excavators and/or front end loaders and transported to the overburden emplacement areas, where it is spread and shaped by dozer.

Traditional drill and blast methods are then used to break up the hard rock. A drill rig stationed on top of each production bench drills a series of holes that are later charged with explosives, detonators and delays. Boral apply standard practice of limiting the maximum instantaneous charge to stay within the relevant noise and vibration criteria.

Blasted rock is then processed on-site using various crushers and screens to obtain the desired product. Material is initially crushed in a primary mobile crusher located within the pit, which is currently fed by an excavator, front end loaders and trucks. In the future in-pit works will avoid the use of trucks, with blasted rock fed directly into the primary mobile crusher by excavator. After passing through the primary crusher, the crushed material is taken from the pit along a series of conveyors to the first set of screens located to the northwest of the pit and material is stockpiled in a surge pile. Material in the surge pile is reclaimed and conveyed to the main processing area where it undergoes further crushing, screening and shaping. Product material is stored in the various covered storage bins prior to being dispatched off-site by train.

2.6.2 Transport of Product

Product from the Quarry is transported entirely by rail except in an emergency where it would be transported by road with the written approval of the Secretary of the NSW Department of Planning and Environment (DP&E). The Quarry has approval to transport up to 3.5 Mtpa of product from the site. At full production the Quarry will operate up to four trains per day which will transport product north to the Sydney market and other customers. In addition, the Limestone Mine currently operates up to six trains per day transporting product north to Berrima and Maldon and east to Port Kembla.

Trains to the Quarry and the Limestone Mine access Boral's private rail line from the Main Southern Railway at the Medway Junction (**Figure 2**). A rail loop has been constructed at the Quarry for separation of rail movements on the rail line between the two Boral sites. Rail loading facilities were also established on the rail loop adjacent to the Quarry's processing plant.

Loading of product from the Quarry onto trains and train movements occur 24 hours, seven days a week. This enables train trips on the Main Southern Railway to be scheduled away from peak commuter times.

2.6.3 Operating Hours and Workforce

The Quarry operates 24 hours, 7 days a week with in-pit activities restricted to the hours of 7am to 7pm. Approved operating hours are outlined in detail in **Table 3**.

Table 3: Approved Operating Hours

Activity	Day	Time
Construction works	Monday-Friday Saturday Sunday and Public Holidays	7.00am to 6.00pm 8.00am to 1.00pm None
Topsoil/overburden removal/emplacement	Any day	7.00am to 7.00pm
Blasting	Monday-Saturday Sunday and Public Holidays	9.00am to 5.00pm None
In-pit activities (including drilling, extraction, processing, and transfer of material out of the pit)	Any day	7.00am to 7.00pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

Employment at the Quarry includes 30 full time persons distributed over 2 - 3 shifts.

2.7 Environmental Management and Monitoring

Boral has prepared and implemented a number of Environmental Management Plans at the Quarry in accordance with the Project Approval Conditions (PA06_0074). These Plans that have been approved by DP&E include the following:

- Noise Management Plan;
- Blast Monitoring Program;
- Air Quality Management Plan;
- Water Management Plan which includes:
  - Site Water Balance;
  - Erosion and Sediment Control Plan;
  - Surface Water Monitoring Program;
  - Ground Water Monitoring Program; and
  - Surface and Ground Water Response Plan;
- Traffic Management Plan;
- Pollution Incident Response Plan;
- Aboriginal Heritage Management Plan; and
- Landscape and Rehabilitation Management Plan.

Boral also maintain a comprehensive environmental monitoring network at and surrounding the Quarry (**Figure 6**). Data captured from these environmental monitors is used by quarry management to monitor compliance with their Project Approval, EPL, and other regulatory requirements.

In accordance with PA06_0074, Boral has also prepared and implemented an Environmental Management Strategy, which is an overarching strategy for implementation of environmental management measures at the Quarry, and an Environmental Monitoring Program, which consolidates all the various monitoring requirements at the Quarry.

The existing Environmental Management Plans would be reviewed by Boral following a notice of approval regarding the Project. If amendments to the above documents are required as a result of the Project they will be undertaken within three months of the notice of approval and submitted to DP&E for endorsement in accordance with Schedule 5, Condition 7 of PA06_0074 (**Appendix A**).

2.8 Environmental Performance

The environmental management and monitoring regime as outlined in **Section 2.7** has been in effect for a number of years and has facilitated the operation of the Quarry in an environmentally responsible manner.

Boral's environmental monitoring program has confirmed compliance with relevant air quality, noise, blasting and surface water quality criteria stipulated in the Project Approval and EPL. Results of historic environmental monitoring is discussed further in **Section 6**.

DP&E Compliance Audit Findings

A recent compliance audit of the Quarry was undertaken by DP&E, the findings of which are detailed in *Boral Peppertree Quarry - Marulan South: Compliance Audit* (DP&E, August 2015).

The compliance audit included an overall review of the performance of the Quarry and implementation of the relevant Project Approval conditions and commitments in the Quarry's various Environmental Assessments and Environmental Management Plans.

The audit did not assess compliance with the Quarry's Environment Protection Licence, and other permits or licences.

The compliance audit of the Project Approval (PA 06_0074) and associated management plans, programs and strategies, demonstrated an adequate level of compliance. However, the audit identified a number of administrative non-compliances or performance improvements, including:

- A failure to submit the Annual Environmental Management Report for 2013 and 2014, as required by Schedule 5, Condition 4 of the Project Approval;
- A failure to fully implement the Ground Water Monitoring Program, as set out in the *Peppertree Quarry Water Management Plan*. The audit identified that a failure to install the required monitoring bores has resulted in no sampling events of groundwater at these locations and consequently no trend analysis of groundwater quality and elevation since commencement of the Quarry has been possible;
- Inability for Boral to demonstrate external lighting certified as compliant with Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting;
- A failure to report failed monitoring events, or exceedances in air quality and surface water monitoring;
- A failure to commission an Independent Environmental Audit of the Quarry within three years of commencement of the operation; and
- A failure to satisfactorily maintain sediment controls at the rear of the overburden emplacement, as required by the *Peppertree Quarry Landscape and Rehabilitation Management Plan*.

The audit identified that where corrective actions were required in order to ensure compliance, that Boral had already commenced or completed implementation of corrective actions.

Implementation of agreed corrective actions would ensure that Boral is fully compliant with the Project Approval and associated environmental management plans, procedures and systems.

An independent environmental audit is to be commissioned by Boral in accordance with the Project Approval. Boral is committed to the implementation of corrective actions for any identified improvement opportunities or non-compliances, which are identified within the independent audit.

Environmental Infringements

Boral recently received an infringement notice from the EPA for a pollution incident that occurred in August 2015.

The incident involved the unintentional release of sediment run-off from Peppertree Quarry into Tangarang Creek, which occurred during a period of significant wet weather, when over 140 mm of rain was received between 24 and 26 August 2015.

The EPA does not believe that there was any long term environmental harm caused by the accidental discharge.

The incident was reported immediately to the EPA upon discovery as well as a plan of corrective actions.

Immediate mitigation was undertaken to stop the run off and there has been ongoing improvements to the Creek and the surrounding area.

Since the incident, Boral has implemented procedural and operational actions to ensure such discharges do not occur again.

The infringement notice was for $15,000, which is at the lower end of such notices by the EPA.

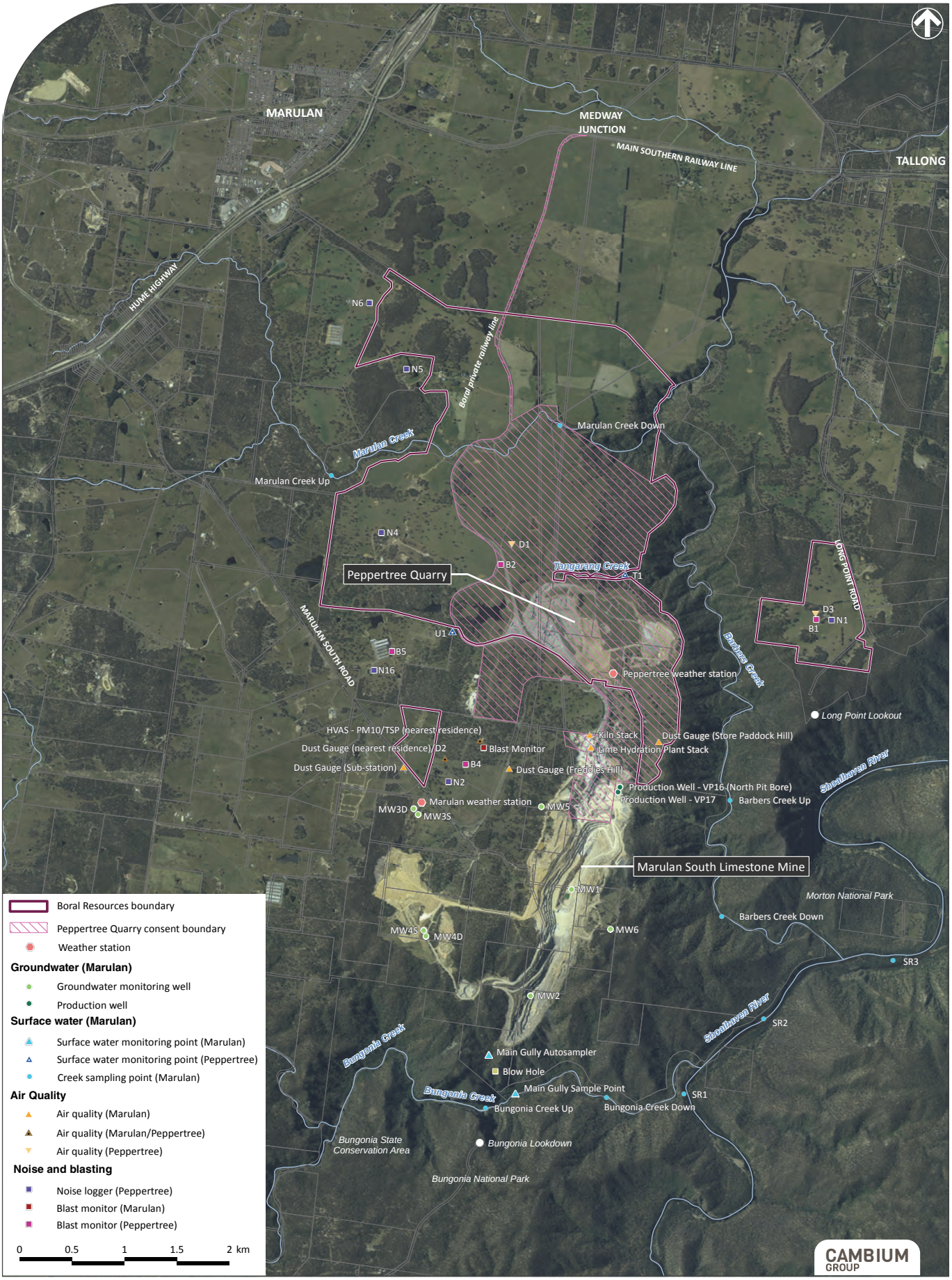
Boral has not received any other environmental infringement notices from the EPA since the start of quarrying activities.

FIGURE 6

Current environmental monitoring locations

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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3 PROPOSED MODIFICATIONS

Boral is seeking to modify the current Project Approval to:

- Extend in-pit operating hours at the Quarry (including transportation of material out of the pit) by 6 hours daily; and
- Develop a new overburden emplacement area.

3.1 Justification for the Proposed Modifications

3.1.1 Extension of in-pit Operating Hours

Peppertree Quarry currently has approval to operate in-pit activities for 12 hours per day between 7am and 7pm. In-pit activities include:

- Drilling;
- Extraction;
- Delivering blast rock to the mobile crusher;
- Crushing of rock; and
- Conveying crushed rock out of the pit.

Further details on approved in-pit activities is provided in **Section 2.6.1**.

The granodiorite resource is overlain by weathered granite, which is not suitable for aggregate production, and is removed as overburden. When developing the first bench of the quarry, some of this weathered granite inevitably mixes with the targeted granodiorite. The out-of-pit processing equipment has been designed to remove (scalp) up to 15% of this finer weathered material from the raw feed. However, as the quarry has developed, the level of weathered material required to be scalped for product quality is around 30% of raw feed fed into the in-pit crusher. Therefore, the in-pit crusher cannot produce enough raw feed for the out-of-pit plant to meet market demand and approved production limits within the currently approved 12 hours.

The building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgery's Creek Airport, new rail lines, and major road construction and upgrading. A number of these major infrastructure projects have already commenced while others are imminent, creating a significant demand for hard rock aggregates from the main construction material suppliers. Boral is, and will be supplying a number of these projects with concrete and asphalt, that includes aggregates and sand from Peppertree Quarry on rail through terminals at St Peter's and Enfield. Given the importance of these projects to the New South Wales economy, the additional in-pit operating hours are crucial for the uninterrupted supply of concrete and asphalt to these, and other projects, as well as future demand in the Sydney market.

Boral needs to increase in-pit operating hours by 6 hours per day, 7 days a week in order to account for the increased scalping of overburden material in the early phases of pit development and to meet annual production volumes up to the approved limit of 3.5 million tonnes per annum. This need has now become more urgent due to rapid growth in the Sydney construction materials market.

A number of alternatives have been explored in order to achieve the in-pit production shortfall. These alternatives are as follows:

- **Improved productivity from existing in-pit crusher** – a lot of focus has been placed on this to ensure the output from the existing in-pit crusher is maximised. An additional operator has been employed to supervise and monitor the crusher's performance, an expert operator has been brought in to review operating standards and a highly experienced process engineer engaged to review process controls. The in-pit crusher is operating as efficiently as it can. The need to scalp weathered granodiorite as mentioned above, is causing the production shortfall. Improvements to the in-pit crusher's productivity cannot meet this production shortfall within the current 12 operating hours.
- **Additional in-pit crusher** – an additional in-pit crusher would need to operate concurrently with the existing one, and would require a load and haul fleet due to space constraints within the developed pit. The crushed material from the additional crusher could not be transported to the out-of-pit surge pile via the existing in-pit conveyor, and would need to utilise trucks. The surge pile cannot be added to with trucked material while operating from the existing in-pit crusher, and this would need to be undertaken at night. This alternative was discounted due to the addition of these new noise sources within the pit during the approved hours, and out-of-pit beyond 7pm and at night.
- **24 hour in-pit crushing** – from an operational perspective, this would be the preferred option as it provides maximum production flexibility. However, it was discounted in order to minimise the exposure of nearby sensitive receivers to night time noise, and that only 6 additional hours per day, 7 days a week were needed to make up the 30% production shortfall due to scalping of weathered granodiorite.
- **Share production shortfall with other quarries in the Boral network** – Boral's hard rock and sand quarries at Dunmore are also on rail and can supply products to the Enfield and St Peters terminals. The stockpile space at the rail terminals is limited, and holding stockpiles for the same products from both Peppertree and Dunmore is not possible in peak demand. Separate stockpiles are essential for product continuity and quality.
- **Proposed modification** – the higher scalping ratio of 30% encountered during early quarry development of the top bench, combined with unprecedented market demand for aggregates and sand in the Sydney market has left a production shortfall of 6 hours per day, 7 days a week for the in-pit crusher. Based on the alternatives explored, and seeking to minimise noise impacts on nearby sensitive receivers, extending in-pit crushing and conveying by 6 hours is the preferred option.

3.1.2 Increased Overburden Emplacement Capacity

Overburden emplacement at the Quarry is currently approved within noise bunds located along the northern and eastern boundaries of the site, an emplacement area to the east of the approved quarry pit and a 'Western Emplacement Area' and noise bund to the west of the Quarry across Boral's private railway line (refer to **Figure 7**). Remaining overburden was proposed to be emplaced within the south pit of Boral's adjoining Limestone Mine.

The noise bunds were completed during construction of the Quarry, the Eastern Overburden Emplacement will reach capacity in early 2016 and the Western Overburden Emplacement will be completed by mid to late 2016. Mine planning for the Limestone Mine has ruled out emplacement within the south pit. The Limestone Mine, under its forthcoming development application, is seeking to hold 5 million m^3 (approximately 13 Mt) of overburden for the Quarry, however, this will not be approved until early 2017. As an interim measure, Boral is seeking to place approximately 1 million m^3 of overburden within a new overburden emplacement, to the south of the approved 30 year quarry pit (refer to **Figure 7**). This new overburden emplacement area will be needed in mid 2016 and will take approximately 12 months to establish.

The proposed new overburden emplacement will be located within the south-eastern extent of the future hard rock (granodiorite) resource, which extends south from the existing Quarry pit, to the northern end of the Limestone Mine's north pit. A significant granodiorite resource

also exists on Boral's lands to the north of the existing Quarry pit, extending northwards from Tangarang Creek. The proposed Southern Overburden Emplacement will not sterilise resource as Boral will relocate this southern emplacement in the future if the southern granodiorite resource needs to be accessed. Although the Southern Overburden Emplacement may be relocated in the future, this is unlikely to be required for at least the next 25 years.

Alternative locations for the Southern Emplacement Area on Boral owned land were considered and discounted on biodiversity, noise or logistical grounds. These alternatives included:

- A patch of Boral owned land (within the Peppertree Quarry consent boundary) boarded by the Western Overburden Emplacement to the north-east, Boral's private railway line to the north, the agricultural lime manufacturing facility to the west, the agricultural lime manufacturing facility's driveway to the south and Marulan South Road to the east. This site was discounted as it:
  - Is located significantly closer to sensitive receivers than the proposed Southern Overburden Emplacement site, with associated noise implications;
  - Supports more native vegetation in better condition and with greater resilience than alternative sites;
  - Requires a longer haulage distance resulting in greater greenhouse gas emissions; and
  - Requires trucks to cross the railway line when hauling loads to and from the pit.
- An area of Boral owned land (within the Peppertree Quarry consent boundary) located immediately north of Tangarang Creek. This site was discounted as it:
  - Is located closer to sensitive receivers than the proposed Southern Overburden Emplacement site, with associated noise implications;
  - Is likely to be of higher Aboriginal heritage significance due to its proximity to a prominent creek – Tangarang Creek;
  - Is logistically more complex as trucks need to drive through the processing plant and cross the Tangarang Dam wall to access the site; and
  - Is the location of an additional approved water supply dam for the Quarry.

The location for the proposed Southern Overburden Emplacement (refer to **Figure 7**) was therefore selected as the preferred location due to the following:

- It is located the furthest from noise sensitive receivers;
- Trucks don't need to cross the railway line, the Tangarang dam wall or drive along Marulan South Road;
- The site supports limited Aboriginal heritage values;
- The historic clearing coupled with the existing and historic grazing within the study area has resulted in most of the native vegetation within the preferred Southern Overburden Emplacement area having low resilience. Although the Threatened Ecological Community (TEC) namely 'White Box Yellow Box Blakely's Red Gum Grassy Woodland' would be impacted by the Southern Overburden Emplacement, only 0.7ha of this vegetation community has high resilience with the remainder having moderate to low resilience, suggesting that it would be unlikely to regenerate naturally; and
- A biodiversity offset area has been identified on Boral owned land approximately 1.4 km north of the preferred Southern Overburden Emplacement. This offset area supports a significantly greater extent of White Box Yellow Box Blakely's Red Gum Grassy Woodland, in significantly superior condition to that which is located within the preferred

Southern Overburden Emplacement area and would achieve the biodiversity offset liability of the Project.

3.2 Description of the Proposed Modifications

3.2.1 Extension of in-pit Operating Hours

Boral is proposing to extend the in-pit operating hours to 5am - 11pm (any day of the week).

Worst case operational noise modelling has informed which in-pit activities may need to be restricted, to achieve compliance with the project specific noise levels for the site.

Restrictions that may need to be applied to in-pit activities during the extended operating hours i.e. 5am – 7am and 7pm – 11pm include:

- The operation of the mobile in-pit crusher at or below RL555; and
- The operation of other mobile plant including excavators, front end loaders and trucks, at or below RL570.

These possible restrictions to in-pit activities during extended operating hours have been identified through conservative, worst case operational noise modelling. Compliance with the project specific noise management levels (refer to **Section 6.2.1**) during extended in-pit operating hours, will be demonstrated through ongoing quarterly compliance noise monitoring.

The conveying of crushed rock out of the pit (defined in the Project Approval as an in-pit activity), will take place from 5am - 11pm in order to increase feed volumes to the processing plant that is approved to operate 24 hours, 7 days a week.

Blasting will continue within the current approved hours of 9am - 5pm Monday to Saturday.

3.2.2 New Southern Overburden Emplacement

The proposed new Southern Overburden Emplacement has been designed as an extension to the existing Eastern Overburden Emplacement and is located entirely within both Boral owned land and the Quarry's development consent boundary.

Prior to the emplacement of overburden, the toe of the Southern Overburden Emplacement will be identified on site, stormwater management and erosion control infrastructure installed and trees and shrubs removed. No topsoil will be stripped from the Southern Overburden Emplacement footprint in accordance with the *Peppertree Quarry Aboriginal Heritage Management Plan*.

Overburden stripped from the pit will be transported by trucks along the most direct haul route possible (refer to **Figure 7**), to the proposed Southern Overburden Emplacement where it will be spread and shaped by dozer. Overburden will be initially placed in the southern section of the overburden emplacement area and will progressively move northward toward the existing Eastern Overburden Emplacement.

The Southern Overburden Emplacement will be landscaped and rehabilitated in accordance with the *Peppertree Quarry Landscape and Rehabilitation Management Plan* as outlined in **Section 6.10**.

Overburden removal and emplacement will continue within the current approved hours of 7am - 7pm Monday to Sunday.

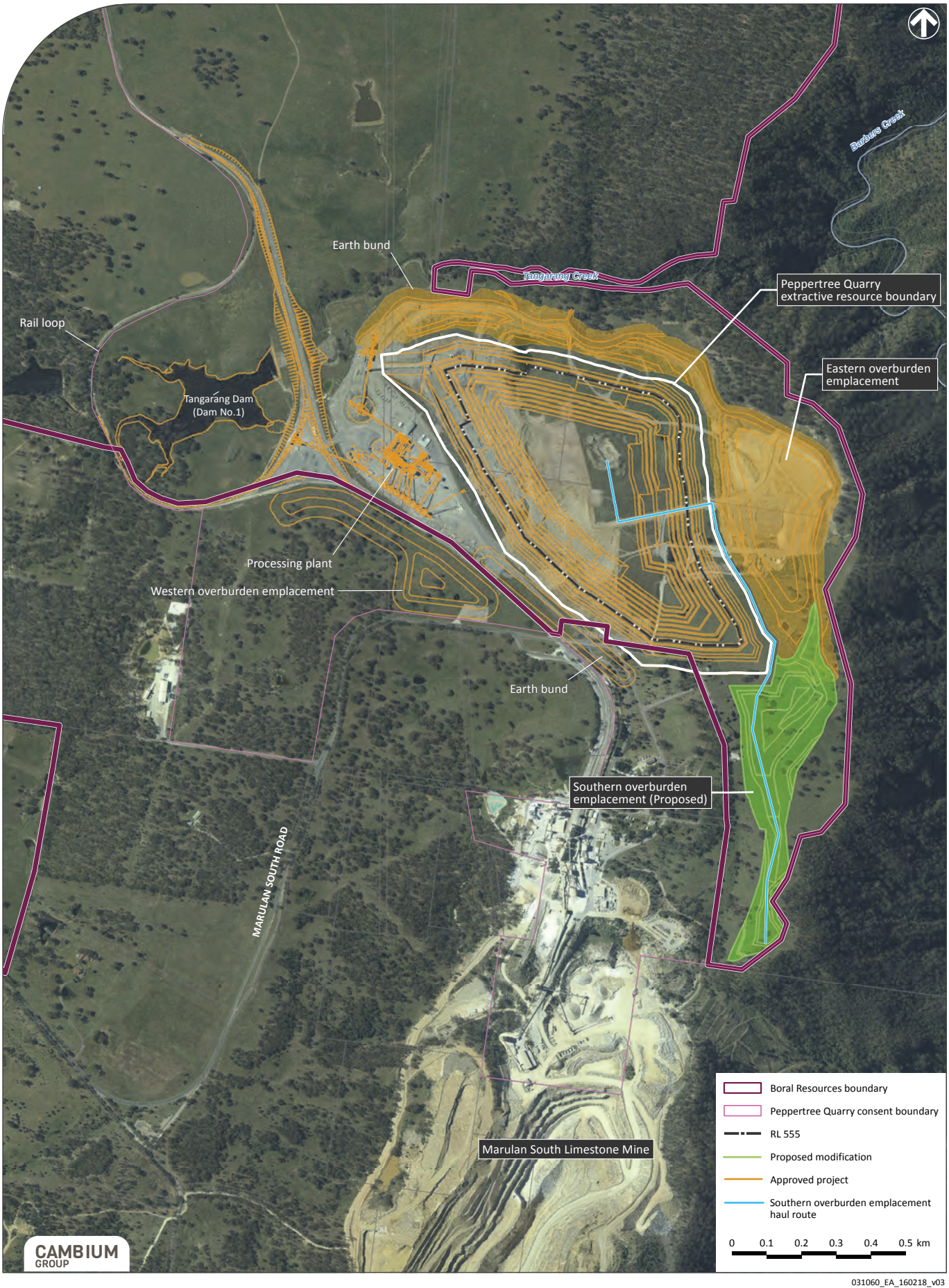
3.3 Comparison against Approved Project

Other than the proposed modifications outlined in **Section 3.2**, there will be no changes to any other aspects of the approved project.

The changes in approved environmental impacts resulting from the proposed modifications are discussed in **Section 6** of this report.

FIGURE 7
The Project
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



CAMBIUM GROUP

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4 LEGISLATIVE PLANNING CONSIDERATIONS

Boral seeks to modify PA06_0074, as described in Section 3, under Section 75W of the EP&A Act.

The following section identifies the applicable Commonwealth and State environment and planning legislation, local planning instruments, and discusses the relevant planning approval process applicable to the modification.

4.1 Commonwealth Legislation

A review of the current Commonwealth legislation that is relevant to the modification is provided in **Table 4**.

Table 4: Summary of Commonwealth Legislation and Relevance to the Project

Planning Provision	Comments	Further Approval Required
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Under the EPBC Act, approval from the Minister for the Environment is required for any action that would result in a significant impact on Matters of National Environmental Significance (MNES). The nine MNES are: ▪ World heritage properties; ▪ National heritage places; ▪ Wetlands of international importance (Ramsar wetlands); ▪ Nationally threatened species and ecological communities; ▪ Migratory species; ▪ Commonwealth marine areas; ▪ The Great Barrier Reef Marine Park; ▪ Nuclear actions (including uranium mining); ▪ A water resource, in relation to coal seam gas development and large coal mining development. A Biodiversity Assessment has been undertaken for the new areas proposed to be disturbed for the Southern Overburden Emplacement, which identified that one Endangered Ecological Community (EEC) would be impacted by the Project, namely 'White Box Yellow Box Blakely's Red Gum Grassy Woodland', which is listed as an EEC under the *NSW Threatened Species Conservation Act 1995* (TSC Act) and Critically Endangered Ecological Community (CEEC) under the Commonwealth EPBC Act. In total, the modification would result in the disturbance of approximately 8.1 ha of the EEC/CEEC listed under the TSC Act and EPBC Act. To satisfy the EPBC Act requirements, a MNES Assessment of Significance was conducted and concluded that the Project is unlikely to significantly impact the CEEC. Additionally, fifteen threatened and migratory fauna listed on the TSC Act and/or EPBC Act are considered to be potentially impacted by the Project. For threatened and migratory species listed under the EPBC Act, a MNES Assessment of Significance was completed for each of these species. The Assessments concluded that the Project is unlikely to result in a significant	No

Planning Provision	Comments	Further Approval Required
	impact on any EPBC Act listed threatened or migratory fauna species. A search of the EPBC Protected Matters Search Tool in February 2016 did not identify any additional MNES which may be impacted by the proposed modification. The proposed modification would therefore not result in a significant impact on a MNES and accordingly, referral of the modification to the Commonwealth is not required,.	
Native Title Act 1993 (NT Act)	The NT Act is administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. The NT Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land.	No
National Greenhouse & Energy Reporting Act 2007 (NGER Act)	The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) provides a single national framework for the reporting and dissemination of information about the greenhouse gas emissions, greenhouse gas projects, and energy use and production of corporations. It makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds. Boral triggers the threshold for reporting under the NGER Act, and reports energy use and greenhouse gas emissions from its operations, including the Quarry. Boral would continue to monitor and report energy use and greenhouse gas emissions associated with the modified Quarry operation in accordance with its obligations under the NGER Act.	No

4.2 Key NSW Legislation

4.2.1 Environmental Planning and Assessment Act 1979

Part 3A was repealed by the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* (Part 3A Repeal Act), which commenced on 1 October 2011. Under the Part 3A Repeal Act, projects deemed to be 'transitional Part 3A projects' will continue to be subject to Part 3A of the EP&A Act (as in force immediately before the repeal and as modified by the Part 3A Repeat Act). Transitional Part 3A projects include certain projects that were the subject of an existing approval under Part 3A.

As the Quarry has a Project Approval that was granted under Part 3A of the EP&A Act, it is a transitional Part 3A project.

Schedule 6A of the EP&A Act provides for the continued use of repealed sections of the Act. As such, the provisions of Part 3A (as in force immediately prior to its repeal) continue to be applicable to the Project.

The repealed Section 75W of the EP&A Act enables the Minister to modify a project approval granted under Part 3A of the EP&A Act. In determining whether changes to a Part

3A project can be modified under Section 75W of the EP&A Act, consideration is given to the Project and any possible change in potential associated environmental impacts.

Based on the scope and scale of the proposed modifications to Project Approval (PA 06_0074), as outlined in **Section 3**, they are not predicted to result in significant environmental consequences beyond the current Project Approval (**Appendix A**) and are proposed to be assessed under Section 75W. Detailed assessments provided in **Section 6** of this EA quantify these potential impacts.

4.3 Other NSW Legislation and Policies

A summary of the other State environment and planning legislation potentially relevant to the modification is provided in **Table 5**.

Table 5: Summary of State Legislation and Relevance to the Project

Planning Provision	Comments	Further Approval Required
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act is administered by the Environment Protection Authority (EPA) and requires licences for environmental protection including waste, air, water and noise pollution control. The Peppertree Quarry Environment Protection Licence (EPL) No. 13088 provides for extractive activities with a production rate of greater than 2 million tonnes extracted, processed, or stored per annum. The proposed modification will not trigger additional scheduled activities under the POEO Act. However, variation/s to the EPL may be required as a result of the Project. The requirement to vary the EPL would be confirmed by Boral via liaison with the EPA following the receipt of the notice of Project Approval.	Possible
Crown Lands Act 1989 (Crown Lands Act)	The Crown Lands Act provides for the administration and management of Crown land in the eastern and central divisions of NSW. Crown land may not be occupied, used, sold, leased, dedicated, reserved, or otherwise dealt with unless authorised by this Act or the *Crown Land (Continued Tenured) Act 1989*. All land associated with this modification is owned by Boral with the exception of an undeveloped, dead-end, Crown road easement registered across a small section of the proposed location of the Southern Overburden Emplacement (refer to **Figure 3**). Therefore, landowner consent is required from the NSW Department of Primary Industries - Lands.	Yes
Water Management Act 2000 (WM Act)	The WM Act is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans (WSP) prepared in accordance with the WM Act include rules for protecting the environment and administrating water licencing and trading. Peppertree Quarry is located within the area of the Greater Metropolitan Region Unregulated Area WSP, and three surface water sources within the WSP as follows:	No

Planning Provision	Comments	Further Approval Required
	▪ Bungonia Creek Management Zone (commenced July 2011); ▪ Barbers Creek Management Zone (commenced July 2011); and ▪ Shoalhaven River Gorge Management Zone (commenced July 2011). Peppertree Quarry is located within the Barbers Creek Management Zone and has a Water Access Licence issued under the WM Act to extract up to 145 megalitres of surface water from Tangarang Creek per year (Licence Number 10SL056926). The Surface Water Assessment has determined that no amendment to the existing Water Access Licence would be required to support the proposed modification.	
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act is the primary piece of legislation for the protection of Aboriginal cultural heritage in New South Wales. The Office of Environment and Heritage (OEH) administer the NPW Act. The NPW Act provides statutory protection for Aboriginal objects by making it illegal to harm Aboriginal objects and Aboriginal places. Under Section 86 of the NPW Act, a person must not harm or desecrate an Aboriginal object or place. In cases where harm to Aboriginal objects or places cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) may be sought under Section 90 of the Act. An AHIP is not required for Part 3A approvals in accordance with Section 75U of the EP&A Act and therefore no further approvals are required for the modification under the NPW Act. An Aboriginal Heritage Impact Assessment has been undertaken to assess the potential impacts associated with the proposed Southern Overburden Emplacement (refer to **Section 6.5**).	No
Threatened Species Conservation Act 1995 (TSC Act)	The TSC Act aims to protect biological diversity of NSW and lists threatened or endangered flora and fauna species and ecological communities. Under the EP&A Act, impacts on threatened species listed under the TSC Act are required to be assessed. The modification will result in an increase in the approved project disturbance area. A Biodiversity Assessment has been undertaken of the disturbance footprint of the proposed southern overburden emplacement area. The assessment identified that approximately 8.1 ha of the Endangered Ecological Community (EEC) 'White Box Yellow Box Blakely's Red Gum Grassy Woodland' listed under the TSC Act would be impacted by the Project. Additionally, eleven threatened fauna listed under the TSC Act are considered to be potentially impacted by the modification. A Biodiversity Offset Strategy has been formulated in accordance with the requirements of the *Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects* (2014) (FBA). The strategy is outlined within the Biodiversity Assessment Report and is required in order to offset unavoidable impacts to the EEC and potential habitat of threatened fauna species. The offset package would be implemented following approval of the proposed modification and prior to any clearing of native vegetation associated with the	Yes

Planning Provision	Comments	Further Approval Required
	Southern Overburden Emplacement.	
Heritage Act 1977 (Heritage Act)	This Act includes provisions relating to the protection and management of heritage items (historic heritage). A Historic Heritage Impact Assessment has been undertaken of the disturbance footprint associated with the proposed Southern Overburden Emplacement. No historic heritage sites were identified and therefore no further approvals are required under the Heritage Act.	No
Native Vegetation Act 2003 (NV Act)	The NV Act provides for the protection from clearing of native vegetation primarily within regional areas of NSW. Clearing of vegetation on land zoned under Council's LEP as RU1 - Primary Production is regulated under the NV Act and may be cleared in accordance with a development consent granted in accordance with this Act. However, under Section 75U of the EP&A Act, Part 3A projects are exempt from an authorisation to clear native vegetation under the NV Act.	No
Roads Act 1993 (Roads Act)	Under Section 138 of the Road Act, consent is required to erect a structure or carry out work in, on or over a public road. For the purposes of the modification, the haulage of overburden material would be confined to the Quarry consent boundary only and would not be taken off site, thereby avoiding the requirement for heavy vehicle movements on the local road network. As such, the proposed modifications do not involve activities referred to in Section 138 of the Act and will therefore not require approval under the Act.	No
Contaminated Lands Management Act, 1997 (CLM Act)	This Act establishes a process for investigating, and where required remediating contaminated lands, that pose a risk to human health and the environment. An EPA Contaminated Land Record search was undertaken in February 2016 and no sites within the Goulburn Mulwaree LGA are situated within proximity to the study area. The site of the proposed Southern Overburden Emplacement was historically, and is currently still used for grazing livestock and Boral is unaware of any historical potentially contaminating activities that could have occurred at the site. In the event that previously unidentified contaminated land is located during construction or operation, requirements of this Act would need to be complied with. No further assessment of contaminated land is therefore required.	No

4.3.1 State Environmental Planning Policies

The relevant State Environmental Planning Policies (SEPP) which need to be considered in relation to the Project are outlined below.

State Environmental Planning Policy No. 44 - Koala Habitat Protection

SEPP No. 44 restricts the granting of development consent for proposals on land identified as core koala habitat without preparation of a plan of management.

The proposed modification will result in an increase in the approved project disturbance area, which requires the clearing of approximately 9.2 ha of native vegetation. A Biodiversity Assessment has been undertaken of the proposed Southern Overburden Emplacement. The assessment concluded that despite the overburden emplacement removing potential Koala foraging habitat, the impact on the species would not be significant, as the modification would not remove core koala habitat and there is an abundance of quality habitat to the east of the Quarry within National Parks and State Conservation Areas. A koala plan of management is therefore not required.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP regulates the permissibility of mining, extractive industries and related development and specifies matters that must be considered in assessing extractive industry developments requiring consent under the EP&A Act.

The proposed modification is not considered exempt or complying development under the SEPP and therefore requires consent. Accordingly, the Minister for Planning is the consent authority for the Project under Section 75W of the Act.

Part 3 of the SEPP identifies matters for consideration by the consent authority in determining an application for consent for the purposes of mining, petroleum production or extractive industries.

The following sections outline the compatibility of activities associated with the modification with Clauses 12 to 17 of Part 3 of the SEPP.

Clause 12

Clause 12 of the SEPP requires consideration of the compatibility of the development with other land uses in the vicinity. Potential impacts of the Quarry on surrounding land uses have been considered in previous Environmental Assessments for the Quarry and this EA. The EA has demonstrated that the proposed modification to the existing Project Approval would not result in a significant impact on existing land uses within the vicinity of the Quarry. Environmental control measures have been proposed to avoid or minimise identified impacts. As highlighted in **Section 5**, a community engagement program has been undertaken by Boral in order to inform the neighbouring landowners of the proposed modifications to Quarry operations and identify any potential impacts on existing uses. Boral also holds regular Community Consultative Committee meetings which provides an avenue for the community to raise any incompatibility issues between the approved Quarry operations and the existing land uses in the vicinity and allows Boral to work with the community to resolve these issues.

Clause 12A of the SEPP requires consent authorities to consider any applicable provisions of the *Voluntary Land Acquisition and Mitigation Policy*, published by the NSW Government in December 2014, before determining an application for consent for the purposes of mining, petroleum production or extractive industry.

The provisions of the *Voluntary Land Acquisition and Mitigation Policy* have been considered in the noise and air quality impact assessments undertaken to assess the proposed modifications (refer to **Appendix B** and **C**).

Clause 13

Clause 13 of the SEPP requires a consent authority, prior to determining a development application, to consider whether the proposed development is likely to:

- Have a significant impact on current or future extraction or recovery of extractive materials (including by limiting access to those resources), and
- Be incompatible with any existing or approved mine or extractive industry in the vicinity.

As outlined in **Section 3.1.2**, the proposed Southern Overburden Emplacement will not result in the long term sterilisation of hard rock resources associated with the Quarry. The proposed modification will also not sterilise any mineral resources or result in any negative impacts on the operations of the adjacent Limestone Mine.

Clause 14

Clause 14 of the SEPP requires that before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:

- That impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable;
- That impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable; and
- That greenhouse gas emissions are minimised to the greatest extent practicable.

The potential impacts of the modification on surface water and groundwater resources are discussed in **Section 6.6** and **6.12** respectively, including management and mitigation measures that would be implemented in order to minimise potential impacts.

The potential impacts of the modification on threatened species and biodiversity are described in **Section 6.4**, and include management and mitigation measures to be implemented in order to minimise potential impacts.

The potential for impacts associated with greenhouse gas emissions is considered in **Section 6.13**.

Clause 15

Clause 15 of the SEPP requires the consent authority, before granting consent, to consider the efficiency of the development in terms of resource recovery and the minimisation of waste associated with the extraction, recovery or processing of extractive materials.

The proposed extension to in-pit operating hours will increase the efficiency of extraction of the hard rock resource and ensure an un-interrupted supply of extracted material to the processing plant.

The proposed Southern Overburden Emplacement located close to the Quarry pit, will also facilitate the efficiency of resource recovery as it eliminates the long haulage distances associated with the previously proposed transport of approximately 1 million m^3 of overburden to the Limestone Mine's south pit.

As outlined in **Section 6.16**, the principles of the waste hierarchy set out by the *Waste Avoidance and Resource Recovery Act 2001* would continue to be upheld during continued operations of the Quarry, following implementation of the proposed modifications.

Clause 16

Clause 16 of the SEPP requires the consent authority to consider the implications of transporting extractive materials associated with the development on public roads.

As outlined in **Section 6.11**, the haulage of overburden material to the proposed Southern Overburden Emplacement would be confined to the Quarry's internal haul road network, thereby avoiding the requirement for heavy vehicle movements on the local road network.

Clause 17

Clause 17 of the SEPP requires that before granting development consent that the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.

The proposed Southern Overburden Emplacement will be landscaped and rehabilitated in accordance with the existing *Peppertree Quarry Landscape and Rehabilitation Management Plan*, which was prepared as a condition of the Project Approval.

State Environmental Planning Policy (Sydney Water Drinking Catchment) 2011

This SEPP aims to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal.

Prior to granting consent to a proposed development, the SEPP requires that a consent authority must be satisfied that the proposed development will have a neutral or beneficial effect on water quality. It is submitted that the modification can be managed to provide a neutral effect on water quality within the Shoalhaven catchment as discussed further in **Section 6.7**.

4.4 Local Environmental Planning Instruments

4.4.1 Goulburn Mulwaree Local Environmental Plan 2009

Local Environmental Plans (LEP) are environmental planning instruments that guide planning decisions for local government areas and allow Councils to manage the way in which land is used through zoning and development consents.

The proposed modification is located within the Goulburn Mulwaree Local Government Area (LGA). Under the provisions of the *Goulburn Mulwaree Local Environmental Plan 2009* (Goulburn Mulwaree LEP), the Peppertree Quarry site is zoned RU1 Primary Production. Extractive industries are permissible in this zone with development consent.

The RU1 zone objectives are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- To encourage diversity in primary industry enterprises and systems appropriate for the area;
- To minimise the fragmentation and alienation of resource lands;
- To minimise conflict between land uses within the zone and with adjoining zones;
- To promote the use of agricultural land for efficient and effective agricultural production;
- To avoid or minimise impacts on the natural environment and protection of environmentally sensitive land;
- To allow the development of non-agricultural land uses which are compatible with the character of the zone;

- To allow the development of processing, service and value-adding industries related to agriculture and primary industry production;
- To protect and enhance the water quality of receiving watercourses and groundwater systems to reduce land degradation; and
- To minimise the visual impact of development on the rural landscape.

The findings of this EA demonstrate that the proposed modification to existing Quarry operations, if implemented in accordance with the additional environmental controls, mitigation and monitoring measures and the biodiversity offset strategy outlined in **Section 6**, can be carried out in a manner which upholds the objectives of the zone and is consistent with other objectives of the Goulburn Mulwaree LEP.

5 CONSULTATION AND STAKEHOLDER ENGAGEMENT

Preparation of the EA involved consultation with the Department of Planning and Environment (DP&E), Goulburn Mulwaree Council, a number of key government agencies, the Aboriginal Management Committee (AMC) and the local community.

Comments obtained through the consultation process assisted in identifying all environmental and social issues associated with the modification and have been considered in:

- The assessment of impacts associated with the proposed modification;
- Selecting the location of and preparing the concept design for the proposed Southern Overburden Emplacement;
- Defining the minimum depth for in-pit activities during the extended operating hours; and
- Developing appropriate safeguards and environmental management measures.

Table 6 provides a summary of the issues that have been raised during stakeholder and community consultation and provides reference to the section of the EA in which these issues have been addressed.

All relevant government stakeholders, Aboriginal stakeholders and the local community will be advised of the public exhibition of the EA. A copy of the EA will be made available for review on the Department of Planning and Environment's website, and at the Goulburn Mulwaree Council office.

Table 6: Summary of Stakeholder Consultation

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
Department of Planning and Environment (DP&E)	Modification Application and Background Scoping Document (BSD) submitted to DP&E on 11 August 2015. Meeting held with DP&E on site on 3 February 2016.	Email correspondence received from DP&E on 17 August 2015 confirming that the Department was satisfied that it was not necessary to issue Secretary's Environmental Assessment Requirements (SEARs) for the Project, subject to implementation of commitments outlined in the Background Scoping Document as well as the following: 1. Explain the rationale for the residential receiver locations in the EA; 2. Describe in detail the in-pit processing activities in the EA, considering that impacts from the proposed changes to the operating hours for the in-pit activities are being assessed; 3. Show potential sensitive receptors with respect to existing and proposed haul roads and/or note the need to identify them in the EA; 4. Note that a summary of the environmental performance of the operation to date will be included in the EA; 5. Describe the options considered and justification for the proposal, to be addressed in more detail in the EA; 6. Describe in more detail in the EA the current and proposed use of the western emplacement area and its relationship to activities under the proposed modification; 7. Include discussion in the EA on the impacts of changes in current and/or proposed use of the western emplacement area on noise sensitive receptors; and 8. Given that the FBA is transitional, the EA should indicate a clear commitment from the proponent to apply the FBA.	1. **Section 2.1**; 2. **Section 2.6**; 3. **Section 2.1**, **Figure 2** and **Figure 7**; 4. **Section 2.8**; 5. **Section 3.1**; 6. **Sections 2** and **3**; 7. **Section 3, 6.2** and **Appendix B**; and 8. **Section 6.4**.
Goulburn Mulwaree Council (GMC)	Boral met with the GMC Mayor and GM on 29 January 2015 and 9 June 2015 and discussed the details of the proposed modification. Boral met with the GMC Mayor,	GMC did not raise any issues with the proposed modification.	N/A

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	two councillors, General Manager and Senior staff at Marulan South on 21 April 2015 and briefly described the proposed modification while undertaking a tour of the adjoining Limestone Mine. A letter of invitation to the community workshop was provided to various members of the GMC on 6 July 2015. BSD emailed to GMC on 2 February 2016.	The GMC advised in a phone call on 19 February 2016 that they did not require any matters to be assessed in the EA, in addition to those already identified in the BSD.	
Office of Environment and Heritage (OEH) including the NSW National Parks and Wildlife Services (NPWS) division	Phone call held with OEH (Queanbeyan) on 17 April 2015 to discuss and agree on the appropriate approach to the biodiversity assessment. A site meeting was held with OEH (Queanbeyan) on 16 June 2015, where the location of the proposed Southern Overburden Emplacement was viewed. Ongoing email and phone consultation occurred with relevant OEH (Queanbeyan) staff between June and July 2015 regarding the approach to the biodiversity assessment.	OEH recommended the Biodiversity Assessment would need to be consistent with the *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014) and *Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects* (2014). Information discussed during the site meeting has been incorporated throughout the Biodiversity Assessment, particularly in regards to impact assessment and offsets strategy. Information received from conversations with OEH was incorporated into respective Assessments of Significance undertaken as part of the Biodiversity Assessment for relevant threatened species matters.	**Section 6.4** and **Appendix D** **Section 6.4** and **Appendix D** **Section 6.4** and **Appendix D**

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	Teleconference held with OEH on 20/08/2015 to discuss the proposed approach to the Aboriginal heritage assessment including the site survey methodology and specifically whether test pit excavations were required.	OEH advised that if the landforms located within the footprint of the proposed Southern Overburden Emplacement are the same or similar to other sites at the Quarry that have been thoroughly investigated through test pit excavations and salvage works, then additional test pit excavations would not be necessary.	**Section 6.5** and **Appendix E**
	BSD was emailed to the NPWS division (as a neighbour) on 28 September 2015. All other correspondence provided to neighbouring residences (as outlined below) has been provided to NPWS.	NPWS advised in a phone call on 21 January 2016 that they had no specific comment on the BSD, but that they would require potential impacts on Barbers Creek to be appropriately managed.	**Section 6.6** and **Appendix F**
Environment Protection Authority (EPA)	BSD emailed to EPA on 28 September 2015.	EPA advised by email on 1 October 2015 that they had reviewed the BSD and deemed that it adequately covered the matters of concern for which the EPA would like assessments conducted. These matters related to surface water management, erosion and sediment control, air quality impacts relating to the Southern Overburden Emplacement, and noise impacts associated with the extended hours of operation. The EPA suggested that the Noise Impact Assessment should consider the presence and/or impact of any low-frequency noise emitted by the extended operating hours of in-pit activities.	Noise, air quality and surface water management are assessed in **Sections 6.2**, **6.3** and **6.7** respectively. **Section 6.2** of this EA, and Section 6 of the Noise Impact Assessment (**Appendix B**) assesses low frequency noise emissions resulting from the proposed modification.
Department of Primary Industries - Water (DPI	Meeting held on-site with DPI Water on 15 December 2015.	DPI Water had no specific comments on the Project and will provide comment during exhibition of the EA.	N/A

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
Water) (a division of NSW Industry)	BSD emailed to DPI Water on 17 December 2015.		
Department of Industry - Division of Resources and Energy (DRE)	BSD emailed to DRE on 28 September 2015.	DRE advised by email on 13 October 2015 that their only issue with the Project is the potential for resource sterilisation associated with the new overburden emplacement. However, DRE noted that the BSD had addressed this potential issue and as such DRE had no concerns with the proposed modifications.	**Section 3.1.2**
Water NSW	BSD emailed to Water NSW on 21 January 2016.	Water NSW advised by email on 4 February 2016 that the matters to be assessed in the Environmental Assessment, as outlined in the BSD, are suitable and they do not require the assessment of any additional issues.	**Section 6.6** and **Appendix F**
Aboriginal Management Committee (AMC)	An introductory letter was sent to all AMC members on 10 June 2015. It provided details of the proposed assessment and survey method and invited the AMC members to provide cultural heritage values for the site. The members of the AMC were provided with 20 days to respond. An archaeological survey of the Project area was undertaken with AMC members on 2 July 2015. The draft Heritage Impact Assessment report was provided to AMC members on 5 February 2016 for review and comment.	No responses were received from the AMC on the proposed Aboriginal heritage assessment and survey method. Comments from the AMC on the draft Heritage Impact Assessment report have been included in Section 2.4 of the Aboriginal heritage assessment.	The findings of the Aboriginal and Historic Heritage Impact Assessment are provided in **Section 6.5**. Section 2.4 of **Appendix E**
Pejar Local Aboriginal Land Council (LALC)	A letter and fact sheet was provided to the Pejar LALC on 12 June 2015 introducing the proposed modification.	No responses were received from the Pejar LALC.	N/A

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	A letter of invitation to the community workshop was provided to the Pejar LALC on 9 July 2015. Letter dated 4 January 2016 provided to the Pejar LALC providing an update on the proposed modification application process, identifying where a summary of key matters raised at the community meeting can be viewed and seeking further comment.		
The Hon Pru Goward MP	A letter and fact sheet was provided to the Hon Pru Goward MP on 5 June 2015 introducing the proposed modification. A meeting was held with the Hon Pru Goward MP on 9 June 2015 to provide a briefing on the proposed modification. A letter of invitation to the community workshop was provided to the Hon Pru Goward MP on 8 July 2015. Letter dated 4 January 2016 provided to the Hon Pru Goward MP providing an update on the proposed modification application process and offering a briefing if required.	A response was received from the MP indicating that heavy vehicle movements and road maintenance would be key concerns of the proposed modification. The MP also emphasised the importance of ongoing communication with stakeholders and the community.	As outlined in **Section 6.11**, the haulage of overburden material to the proposed Southern Overburden Emplacement would be confined to the Quarry's internal haul road network, thereby avoiding the requirement for heavy vehicle movements on the local road network. Boral would continue to liaise with relevant stakeholders and surrounding community throughout the assessment of the modification, following approval, during establishment of the Southern Overburden Emplacement, and during ongoing operations of the

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
			Quarry.
Federal Member for Hume	A letter and fact sheet was provided to the Federal Member for Hume on 5 June 2015 introducing the proposed modification. A letter of invitation to the community workshop was provided to the Federal Member for Hume on 8 July 2015. Letter dated 4 January 2016 provided to Federal Member for Hume providing an update on the proposed modification application process and offering a briefing if required.	No response has been received from the Federal Member for Hume at the time of submission of the application for development consent of the proposed modification.	N/A
Peppertree Quarry Community Consultative Committee (CCC)	A letter and fact sheet was emailed to the members of the CCC on 5 June 2015 introducing the proposed modification. A letter of invitation to the community workshop was provided to the members of the CCC on 6 July 2015. The proposed modifications were presented to the CCC in mid-2015 and early 2016.	No issues associated with the proposed modification have been raised by the CCC.	N/A
Neighbouring residences	A pre-notification letter foreshadowing face to face visits and the proposed modification was distributed to neighbouring	A residence located to the east of the Quarry has raised concern over audible and low frequency noise that is experienced primarily in the mornings and evenings.	**Section 6.2** of this EA and Section 6 of the Noise Impact Assessment (**Appendix B**) assesses operational noise

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	residences on 15 January 2015. This was followed by face to face visits on 22 January 2015 to gather a perception of current operations and the need for a future modification to existing Quarry operations. A letter and fact sheet was delivered to all fenceline and Marulan South Road neighbours on 5 June 2015 providing further details on the proposed modification. A letter of invitation to the community workshop was provided to neighbouring residents on 6 July 2015. Letter dated 6 January 2016 sent to neighbouring residents providing an update on the proposed modification application process, identifying where a summary of key matters raised at the community meeting can be viewed and seeking further comment.		including low frequency noise emissions resulting from the proposed modification.
Local community	The proposed modifications were presented to the local community in a public meeting held at Marulan on 22 July 2015. Boral contributes to the *Focus On Marulan* e-newsletter issued by the	Other than the noise concern identified above, no key or notable comments or concerns associated with the proposed modification, have been raised by the wider local community to date.	N/A

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	Marulan Region Chamber of Commerce each month. Editions which mentioned the proposed modification include May 2015, Jun 2015, Aug 2015, Nov 2015.		
Tallong Apple Festival & Marulan Kite Festival	Boral had a stand at the Tallong Apple Festival on 3 May 2015 and at the Marulan Kite Festival on 31 October 2015. Boral had a display and fact sheets at both events that profiled the proposed modification.	No key or notable comments or concerns were raised by the wider local community at these events.	N/A
Member organisations of the Heritage & Sustainability Project (HASP)	A letter and fact sheet was provided to members of the HASP on 5 June 2015 introducing the proposed modification. A letter of invitation to the community workshop was provided to members of the HASP on 6 July 2015. A presentation on the proposed modification was given to the Marulan Region Chamber of Commerce (which oversees HASP) on 18 June 2015. Letter dated 4 January 2016 provided to HASP providing an update on the proposed modification application process, identifying where a summary of key matters raised at the community meeting can be viewed and	No key or notable comments or concerns were raised by the HASP.	N/A

Stakeholder	Consultation Details	Comments	Response/EA Section Reference
	seeking further comment.		
Goulburn Field Naturalists	A letter and fact sheet was provided to the Goulburn Field Naturalists on 12 June 2015 introducing the proposed modification. A letter of invitation to the community workshop was provided to the Goulburn Field Naturalists on 9 July 2015.	No key or notable comments or concerns were raised by the Goulburn Field Naturalists.	N/A
Media	An advertorial outlining the proposed modification was published in the Goulburn Post on 8 June 2015. A media release presenting the proposed modification was issued by Boral on 20 May 2015. As a result, an article was published in the Goulburn Post on 25 May 2015 outlining the proposed modification. Radio coverage on 2GN/Eagle FM was also received. An advertisement for the community workshop was placed in the Goulburn Post on 10 and 13 July 2015	No responses were received from the various media releases.	N/A

6 ENVIRONMENTAL ASSESSMENT

6.1 Identification of Potential Environmental Impact

A preliminary environmental risk analysis was undertaken on commencement of the environmental assessment process to identify the key potential environmental issues or impacts associated with the proposed modification. The results of the preliminary environmental risk analysis were presented in the Background Scoping Document that was submitted to and endorsed by the Department of Planning and Environment in August 2015. For those environmental issues that achieved a high or medium risk rating, further assessment has been undertaken in the form of specialist technical investigations (refer to **Sections 6.2 - 6.8** and **Appendix B - G**).

For those environmental issues that achieved a low risk rating in the preliminary environmental risk analysis, further specialist technical investigations were not considered necessary. For these issues, it is deemed that the proposed modification would not result in any additional impacts on these low risk environmental issues, than what has already been assessed in the *Marulan South Quarry Environmental Assessment Report* (ERM, October 2006) and within subsequent approved modifications. As such, it is considered that these non-key issues could largely be addressed using existing environmental safeguards and management measures.

This chapter examines the change in the potential impacts of Modification 4 to PA06_0074 as compared to the approved project. It recommends, where required, mitigation and monitoring measures to manage potential impacts.

6.2 Noise and Vibration

By extending approved in-pit operations by 6 hours daily, extraction activities will take place during night time periods, when operational noise criteria are more stringent. However, as the mobile crusher (the largest single noise source during in-pit works) now operates at depth within the pit (RL555), the walls of the pit will provide a substantial buffer to noise emissions, thereby reducing the noise levels experienced by neighbouring residential receivers.

Activities associated with the establishment of the new Southern Overburden Emplacement also have the potential to impact on sensitive receivers, however these activities would be confined to approved daytime hours.

A quantitative Noise Impact Assessment (NIA) (**Appendix B**) was undertaken by Wilkinson Murray Pty Ltd in accordance with recognised standards and guidelines, including:

- NSW Industrial Noise Policy (DECC, 2000) (INP);
- Operational Noise Criteria stipulated in the Project Approval; and
- Noise limits stipulated in Condition L2 of Environment Protection Licence 13088.

6.2.1 Existing Environment

The Quarry is located within a rural area, which is generally characterised by low background noise levels. Noise sources in the local area include natural sources (e.g. birdsong, insects, road noise and livestock), commercial operations such as fireworks manufacturing and turkey farming, industrial operations including the agricultural lime manufacturing facility, Marulan South Road, the Limestone Mine and the Quarry.

Sensitive receivers that may be adversely impacted by noise emissions associated with the proposed modification are identified in **Table 1** of **Section 2.1** and **Figures 2**, **8** and **9**.

Noise Criteria

Noise conditions from Schedule 3 of Consolidated Project Approval (PA06_0074) and how they apply to the identified sensitive receivers, are outlined in the following sections.

Operational Noise Impact Assessment Criteria

Boral is required to ensure that the noise generated by the Project does not exceed the operational noise impact assessment criteria in **Table 7**.

Table 7: Operational Noise Impact Assessment Criteria (Project Approval)

Residential Receiver	Day Shift	Night Shift		
	Day $L_{Aeq,15min}$	Evening $L_{Aeq,15min}$	Night	
			$L_{Aeq,15min}$	$L_{A1,1min}$
B5 (2)*	39	35	35	45
R3 (5)*	35	35	35	45
R2 (6)*	35	35	35	45
R8 (16)*	41	35	35	45
Any other noise-sensitive location	35	35	35	45

**Receiver numbers in parentheses represent those used in the Peppertree Quarry Project Approval. As this assessment has considered a number of additional receivers, reference numbers have been revised.*

Notes:

- The identified "Day" noise criteria apply throughout the period of the site's Day Shift (i.e. 7am to 7pm) on all days, despite the general definitions of Evening and Night otherwise applying to the approval. The identified "Evening" and "Night" criteria apply only during the period of the site's Night Shift (i.e. 7pm to 7am)
- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

As outlined in **Section 2.1**, a total of 17 residential receivers have been identified in proximity to the Project and have been considered in both the Noise and Air Quality Impact Assessments. As the Project Approval only includes specific operational noise impact assessment criteria for three privately owned residences, all other sensitive receivers would be interpreted as 'any other noise-sensitive location' and would be assigned an operational noise impact assessment criteria of 35dBA $L_{Aeq,15minutes}$. The operational noise impact assessment criteria for all identified sensitive receivers are outlined in **Table 8**.

Table 8: Operational Noise Impact Assessment Criteria, $L_{Aeq,15min}$ dBA (All receivers)

Sensitive Receiver	Intrusive Criteria		
	Daytime	Evening	Night
R1	35	35	35
R2	35	35	35
R3	35	35	35
R4	35	35	35
R5	35	35	35
R6	35	35	35
R7	35	35	35
R8	41	35	35

Sensitive Receiver	Intrusive Criteria		
	Daytime	Evening	Night
R9	35	35	35
R10	35	35	35
R11	35	35	35
R12	35	35	35
R13	35	35	35
R14	35	35	35
R15	35	35	35
R16	35	35	35
R17	35	35	35

These operational noise impact assessment criteria are for residential receivers only. Boral owned receivers do not have noise limits as they are not classified as sensitive receivers under the *INP* as Boral purchased the properties as a noise mitigation strategy. There are also no noise limits for commercial properties in the Project Approval.

Note the proposed residential dwelling identified as PR in **Figure 2, 8** and **9**, does not actually exist at this time. However, potential noise impacts have been considered at this proposed residence by modelling predicted noise levels from the proposed modification at existing residential receivers located substantially closer to both the proposed Southern Overburden Emplacement and in-pit activities.

Land Acquisition Criteria

If the noise generated by the Quarry exceeds the criteria specified in **Table 9**, Boral are required, upon receiving a written request for acquisition from the landowner, to acquire the land in accordance with the procedures in Conditions 6-8 of Schedule 4 of the Project Approval.

Table 9: Land Acquisition Criteria

Sensitive Receiver	Day $L_{Aeq,15min}$	Evening / Night $L_{Aeq,15min}$
B5 (2)*	44	44
R3 (5)*	40	40
R2 (6)*	40	40
R8 (16)*	44	44

**Receiver numbers in parentheses represent those used in the Peppertree Quarry Project Approval. As this assessment has considered a number of additional receivers, reference numbers have been revised.*

Note: As B5 (receiver 2 in the Project Approval) has been acquired by Boral, the land acquisition criteria no longer apply to this receiver.

Cumulative Noise (Amenity) Criteria

Boral is required to take all reasonable and feasible measures to ensure that the noise generated by the Quarry combined with the noise generated by other extractive industries (e.g. the Limestone Mine) does not exceed the following amenity criteria on any privately owned land:

- $L_{Aeq,11hour}$ 50dB(A) – Day;
- $L_{Aeq,4hour}$ 45dB(A) – Evening; and
- $L_{Aeq,9hour}$ 40dB(A) – Night.

Sleep Disturbance Criteria

In order to minimise the risk of sleep disturbance from Quarry operations during the night time, sleep disturbance goals have been set. The maximum operational noise impact assessment or sleep disturbance criteria for identified sensitive receivers are presented in **Table 10**, with the $L_{A1,1min}$ noise levels assessed at the exterior of a bedroom window.

Table 10: Sleep Disturbance Criteria, $L_{A1,1min}$ dBA

Sensitive Receiver	Sleep Disturbance Criteria $L_{A1,1min}$ dBA
R1	45
R2	45
R3	45
R4	45
R5	45
R6	45
R7	45
R8	45
R9	45
R10	45
R11	45
R12	45
R13	45
R14	45
R15	45
R16	45
R17	45

Noise Compliance Monitoring

Quarterly attended and unattended noise compliance monitoring is undertaken for Peppertree Quarry. To date there have been no exceedances of the operational noise impact assessment criteria in the Project Approval.

6.2.2 Impact Assessment

Operational Noise Modelling

Operational noise levels at nearby sensitive receivers were calculated using the Environmental Noise Model (ENM), a proprietary computer program from RTA Technology Pty Ltd. This modelling software is recommended by the INP and has been previously accepted by the NSW EPA for use in noise impact assessments. The assessment models the total noise at each receiver from the operation of the Quarry, inclusive of activities associated with the proposed modification. Total predicted operational noise levels are then compared with the operational noise criteria presented in **Table 8**.

To account for the proposed increase of in-pit operational hours, the activities associated with in-pit works, including the in-pit crusher and extraction equipment are assumed to operate from 5am to 11pm. Overburden stripping and emplacement at the proposed Southern Overburden Emplacement will be the same as the current approved operations from 7am to 7pm. All other processing operations at the Peppertree Quarry are assumed to occur in accordance with the current approved operations 24 hours per day, 7 days per week.

For the purposes of undertaking a worst-case assessment of the proposed modification, operational scenarios were developed to represent the potential worst-case noise levels at the surrounding sensitive receivers.

A summary of the noise modelling scenarios is presented in **Table 11**.

Table 11: Operational Noise Scenarios

Operation	Daytime 7am-7pm	Evening & Night Time 7pm-7am
In-pit extraction and processing operations	✓	5am-7am & 7pm-11pm
Overburden operations (Southern Overburden Emplacement)	✓	×
Secondary & Tertiary processing	✓	✓
Rail loading & product transportation	✓	✓

The operational noise modelling scenarios and modelling procedure and assumptions are outlined in detail in Section 5 of the NIA. A key assumption in the modelling of noise emissions from extended in-pit operating hours, is that the mobile crusher would not operate above RL555.

Operational Noise Assessment

Predicted noise levels for the identified operational scenarios are summarised in **Table 12** and **Table 13**.

Table 12: Daytime Noise Predictions – Day Shift (7am – 7pm)

Sensitive Receiver	Predicted Noise levels, $L_{Aeq,15min}$		Operational Noise Limit $L_{Aeq,15min}$
	Calm	Worst-Case Meteorological Conditions	Day Shift
R1	22	28	35
R2	27	31	35
R3	29	34	35
R4	28	34	35
R5	28	35	35
R6	26	31	35
R7	30	35	35
R8	34	38	41
R9	29	34	35
R10	25	31	35
R11	22	27	35
R12	24	30	35
R13	22	29	35
R14	33	34	35
R15	32	33	35
R16	32	33	35
R17	33	34	35

The predicted noise levels for approved daytime Quarry operations, inclusive of activities associated with the proposed Southern Overburden Emplacement, comply with the operational noise impact assessment criteria at all sensitive receivers for both calm and worst-case meteorological conditions.

Table 13: Night Time Noise Predictions – Night Shift (7pm – 7am)

Sensitive Receiver	Predicted Noise Levels, $L_{Aeq,15min}$		Operational Noise Limit $L_{Aeq,15min}$
	Calm	Worst Case Meteorological Conditions	Night Shift
R1	16	25	35
R2	22	28	35
R3	24	31	35
R4	22	33	35

Sensitive Receiver	Predicted Noise Levels, $L_{Aeq,15min}$		Operational Noise Limit $L_{Aeq,15min}$
	Calm	Worst Case Meteorological Conditions	Night Shift
R5	23	33	35
R6	19	29	35
R7	25	33	35
R8	29	35	35
R9	21	28	35
R10	16	25	35
R11	10	21	35
R12	12	21	35
R13	16	26	35
R14	27	28	35
R15	26	28	35
R16	26	28	35
R17	27	28	35

The predicted noise levels for approved night time operations including the proposed extended in-pit operations (5am – 11pm) comply with the operational noise impact assessment criteria at all sensitive receivers for both calm and worst-case meteorological conditions. Predictions under calm meteorological conditions are well below the criteria.

The sensitive receiver located closest to the Quarry that is most likely to be impacted by the proposed modification is R8 (Receiver 16 in the Project Approval). However worst case noise predictions indicate that both day and night time operational noise criteria would be met at R8, with the proposed night time in-pit operations predicted to result in less than a 0.5dB increase in operational noise levels.

Noise contour maps representing the predicted noise levels from the proposed modification under worst-case meteorological conditions are provided in **Figures 8** and **9**.

Sleep Disturbance Assessment

At a distance from Quarry operations, instantaneous changes in noise level are typically small, as the noise experienced by the receiver is due to many low-level noise sources.

From measured noise levels, the maximum L_{A1} noise level at any receiver would be typically less than 8dBA above the $L_{Aeq,15min}$ level, leading to a worst-case $L_{A1,1min}$ of 43dBA at any receiver. This complies with the sleep disturbance criteria specified in **Table 10**.

Land Acquisition Assessment

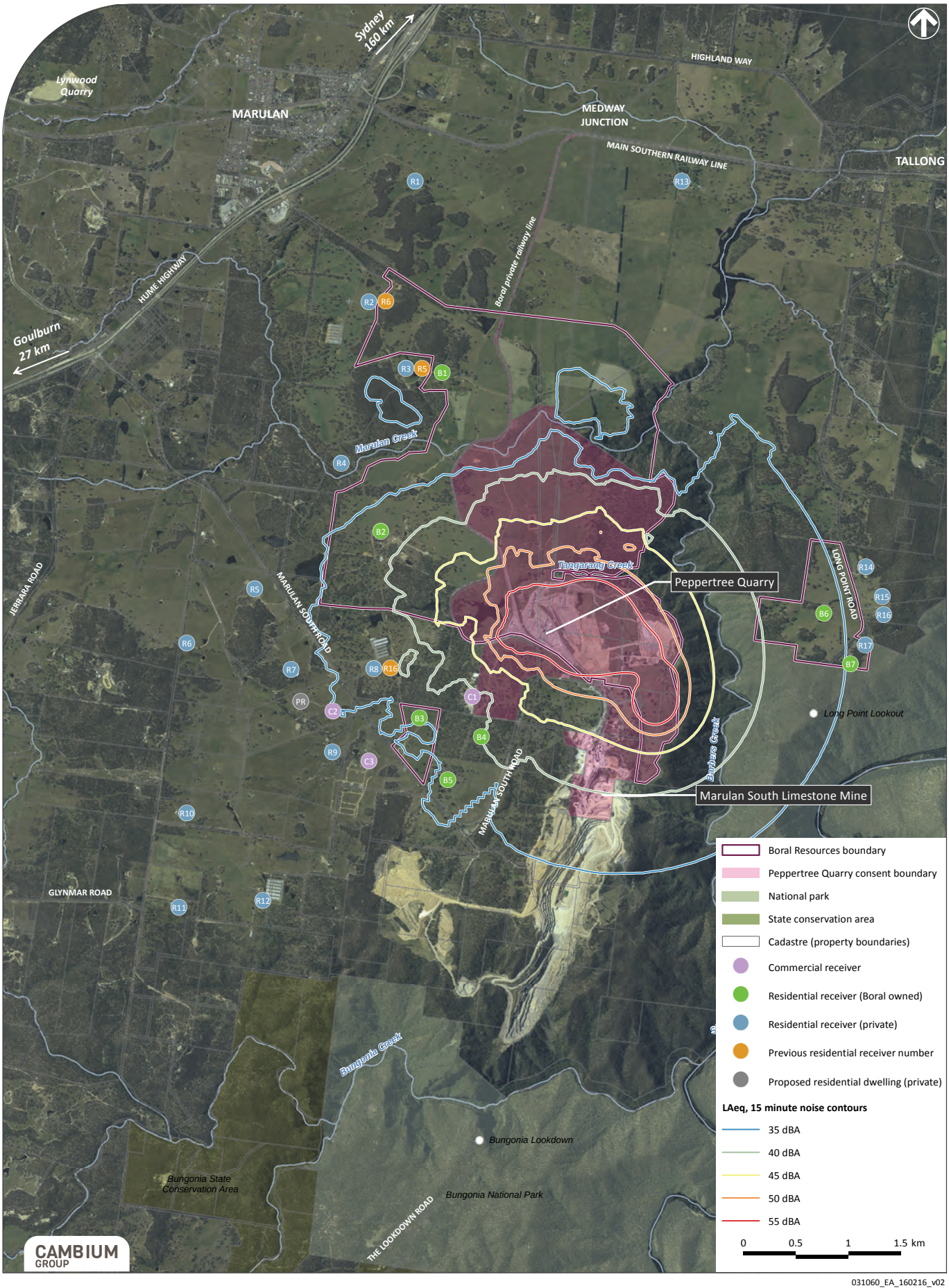
As the land acquisition criteria specified in the Project Approval is higher than the operational noise impact assessment criteria, the predicted daytime and night time noise levels associated with the proposed modification do not exceed the land acquisition criteria at any residence.

FIGURE 8

Daytime noise contours (Adverse meteorological conditions)

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



CAMBIUM GROUP

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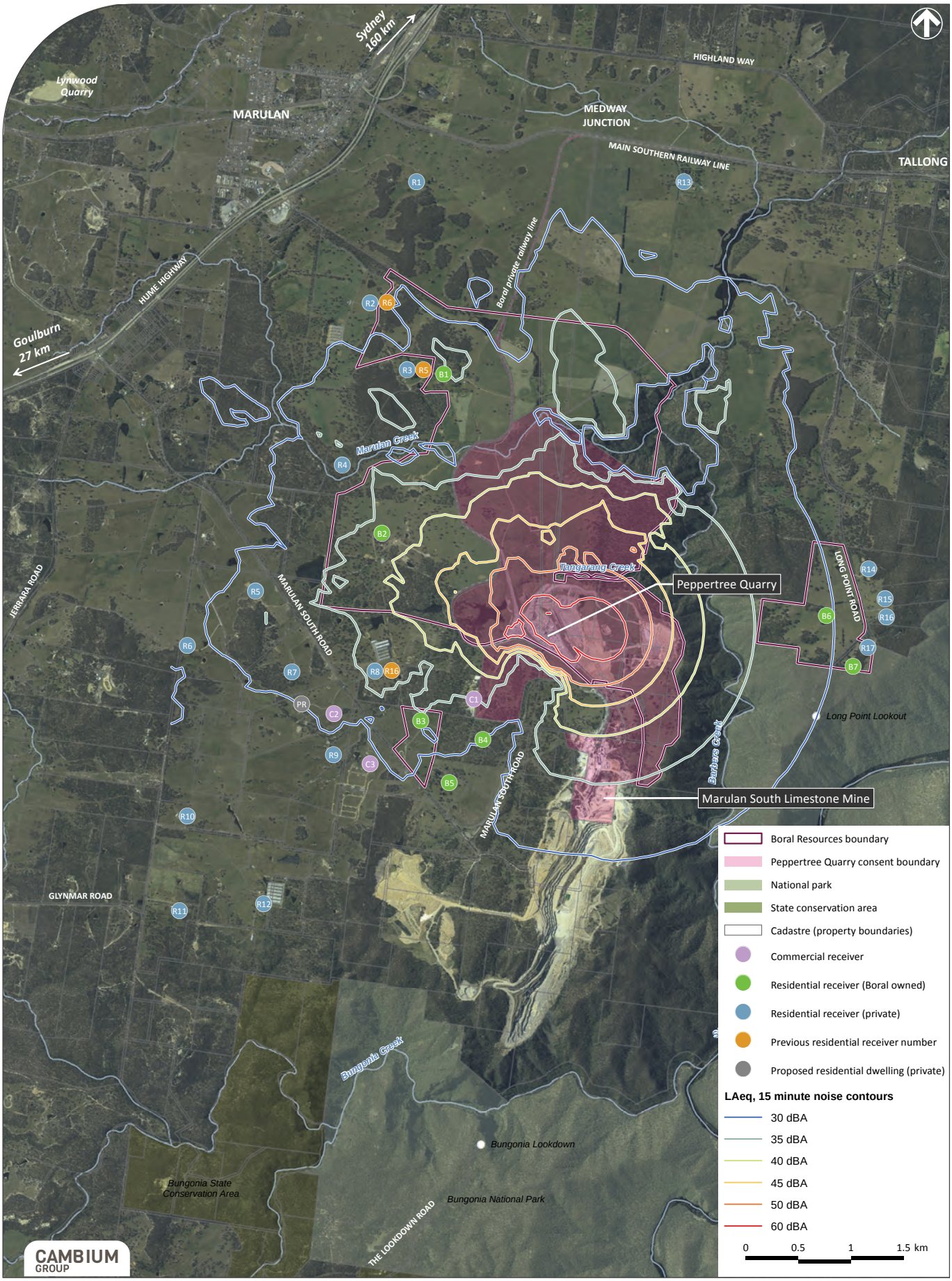
FIGURE 9

Night time and evening noise contours (Adverse meteorological conditions)

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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Cumulative Noise Assessment

In order to assess the potential for cumulative noise impacts on sensitive receivers, predictions of noise levels over the entire daytime, evening or night time periods are required. Cumulative noise levels would comprise of operational noise generated by the Quarry, combined with background sources from the adjacent Limestone Mine, agricultural lime manufacturing facility and agricultural operations.

The predicted noise levels at the sensitive residential receivers from the modified Quarry operations are presented in **Table 14**. By itself, noise levels from the Quarry comply with the amenity criteria at all receivers, but must be considered as part of the overall noise environment.

Table 14: $L_{Aeq,period}$ Predicted Noise Levels – Peppertree Quarry with Proposed Modification

Sensitive Receiver	Day	Evening	Night
R1	25	22	22
R2	28	25	25
R3	31	28	28
R4	31	30	30
R5	32	30	30
R6	28	26	26
R7	32	30	30
R8	35	32	32
R9	31	25	25
R10	28	22	22
R11	24	18	18
R12	27	18	18
R13	26	23	23
R14	31	25	25
R15	30	25	25
R16	30	25	25
R17	31	25	25

The other major industrial noise source in the immediate vicinity of the Quarry is the Limestone Mine. The noise levels for the Limestone Mine, estimated from indicative noise modelling, are presented in **Table 15**.

Table 15: $L_{Aeq,period}$ Predicted Noise Levels – Marulan South Limestone Mine

Receiver	Day	Evening	Night
R1	17	23	23
R2	23	26	26
R3	28	32	32
R4	24	30	30
R5	27	34	34

Receiver	Day	Evening	Night
R6	26	33	33
R7	30	36	36
R8	29	37	37
R9	32	38	38
R10	29	35	35
R11	28	35	35
R12	30	38	38
R13	26	28	28
R14	30	32	32
R15	31	32	32
R16	31	32	32
R17	28	30	30

Predicted cumulative noise levels, associated with simultaneous operation of both the Quarry and the Limestone Mine are presented in **Table 16**.

Table 16: $L_{Aeq,period}$ Predicted Noise Levels – Combined Operations

Receiver	Day Amenity Criteria 50 $L_{Aeq,day}$	Evening Amenity Criteria 45 $L_{Aeq,evening}$	Night Amenity Criteria 40 $L_{Aeq,night}$
R1	26	26	26
R2	29	29	29
R3	33	33	33
R4	32	33	33
R5	33	35	35
R6	30	34	34
R7	34	37	37
R8	36	38	38
R9	35	38	38
R10	32	35	35
R11	29	35	35
R12	32	38	38
R13	29	29	29
R14	34	33	33
R15	34	33	33
R16	34	33	33
R17	33	31	31

The NIA has determined that cumulative noise levels, associated with simultaneous operation of both the Quarry and the Limestone Mine, would be below the amenity criteria for industrial noise during the daytime, evening and night time periods.

Low Frequency Noise Assessment

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level.

The INP recommends correction factors to be applied to the source noise level at the receiver, before comparison with the criteria, to account for the additional annoyance caused by these modifying factors.

The assessment of low frequency noise undertaken as part of the NIA indicated compliance with the EPA criterion for low frequency noise at the most-affected receiver (R8). However, due to the closeness of the predicted noise levels to the low frequency noise criterion, it would appear to be possible for noise sources from the Quarry and the proposed modification, to exceed this criterion.

Boral is committed to ameliorating any low frequency noise issues if they arise for the Quarry. To ensure compliance with relevant low frequency noise criteria, it is proposed that quarterly compliance monitoring currently identified in the *Peppertree Quarry Noise and Blast Management Plan* (ERM, August 2012) be strengthened to include additional noise monitoring locations and a more detailed low frequency noise assessment and reporting regime.

6.2.3 Mitigation Measures

Relative to the existing operations, the proposed modification is unlikely to contribute to any significant change in existing operational or cumulative noise levels at identified sensitive receivers. This is supported by the NIA undertaken to assess the modification, which predicts that there would be no exceedances of the operational noise impact assessment criteria stipulated by the Project Approval and EPL at any identified sensitive receiver as a result of the modification.

A low frequency noise assessment has been conducted which identified compliance with the appropriate EPA noise criteria. However, the assessment indicated that there is potential risk for low frequency noise from the site. It is therefore recommended that in order to comply with the operational noise impact assessment criteria that the following noise mitigation and monitoring measures are implemented:

- The mobile in-pit crusher must not operate above RL555 during the extended in-pit operating hours; and
- Quarterly compliance monitoring currently identified in the *Peppertree Quarry Noise and Blast Management Plan* must be amended to include additional noise monitoring locations R4 and R17 and a more detailed low frequency noise assessment and reporting regime.

Given the results of the NIA and the demonstrated performance of existing operations via the ongoing noise monitoring regime, it is considered that the continued implementation of the *Peppertree Quarry Noise and Blast Management Plan* as well as these additional noise management and monitoring measures, would be adequate to maintain operational noise levels associated with the proposed modification, within the noise impact assessment criteria.

The approved *Peppertree Quarry Noise and Blast Management Plan* would be updated to incorporate the findings of the NIA undertaken as part of this EA, and the recommended additional management strategies.

As required by Schedule 5, Condition 7 of the Project Approval, the proposed revisions to the *Peppertree Quarry Noise and Blast Management Plan* will be undertaken within three months of a notice of approval and submitted to DP&E for endorsement.

6.3 Air Quality

Extended in-pit operating hours and the development of an additional overburden emplacement have the potential to result in additional dust emissions from the Quarry.

An Air Quality Impact Assessment (AQIA) has therefore been undertaken by Todoroski Air Sciences Pty Ltd (**Appendix C**) to assess whether the modified Quarry operations would result in any exceedances of the air quality criteria.

6.3.1 Existing Environment

The existing air quality in the area immediately surrounding the Quarry is influenced by a number of factors, including prevailing meteorological conditions, traffic, topography, agricultural activities and the adjacent Limestone Mine and agricultural lime manufacturing facility.

Emissions from the existing Quarry operations consist mainly of particulate emissions, while emissions of pollutants from quarry machinery and vehicle exhausts are of an insignificant nature.

Local Climate and Meteorological Conditions

Long term climatic data from the Bureau of Meteorology weather station at Goulburn Airport Automatic Weather Station (Site No. 070330) were analysed to characterise the local climate in the proximity of the Quarry. The weather station is located approximately 25km west-southwest of the Quarry. A summary of data from the weather station indicates that:

- January is the hottest month with a mean maximum temperature of 27.8ºC, July is the coldest month with a mean minimum temperature of 0.3 ºC;
- Humidity levels exhibit variability and seasonal fluctuations across the year. Mean 9am humidity levels range from 65% in October and December to 88% in June. Mean 3pm humidity levels vary from 39% in December to 63% in June;
- Rainfall peaks during the summer months and in the month of June. The data shows June is historically the wettest month with an average rainfall of 58.6 mm over 7.3 days and April is the driest month with an average rainfall of 26.5 mm over 4 days; and
- The mean 9am wind speeds range from 12.2 km/h in March to 19.8 km/h in September. The mean 3pm wind speeds vary from 19.8 km/h in March to 26.5 km/h in August.

The wind patterns (analysed from the Automatic Weather Stations at the Quarry and the Limestone Mine for 2014) (refer to **Figure 6** for the location of these stations) indicate that the most common winds are from the west and west-southwest, and the east and east-northeast directions. This pattern of wind is evident in most seasons to various degrees. However, easterlies are less apparent in winter, and westerlies are less apparent in summer. Winds from the north-west are also apparent in each season, particularly autumn and spring.

Local Air Quality

The main sources of air emissions in the wider vicinity of the Quarry include mining and extractive industries, commercial and industrial operations, agricultural activities, emissions from local anthropogenic activities (such as motor vehicle exhaust, dust from unsealed roads, and domestic wood heaters) and various other rural activities.

The Limestone Mine and Quarry operate a network of air quality monitoring stations including two High Volume Air Samplers (HVAS) measuring either Total Suspended Particulates (TSP) or PM_{10} (particulate matter with an aerodynamic diameter of 10µm or less) and six dust deposition gauges (refer to **Figure 6)**. A review of the available ambient monitoring data collected as part of the Limestone Mine's and Quarry's ambient air quality monitoring program between 2011 and 2015 has been undertaken in order to characterise the existing background air quality of the surrounding area. In addition, results have been reviewed from air quality monitors operated by the Lynwood Quarry (Holcim, 2015) located approximately 10km north-west of the Quarry and the NSW EPA monitors at Bargo and Wollongong, located approximately 73km north-east and 87km east-northeast of the Quarry respectively.

The PM_{10}, TSP and dust deposition levels measured at these local and regional air quality monitors are detailed in Section 5.3 of the AQIA and can be summarised as follows:

- Annual average PM_{10} levels at the Marulan/Peppertree and Lynwood HVAS monitoring stations are below the criteria of 30µg/m³, whilst the maximum 24-hour average PM_{10} concentrations were on occasion above the criteria of 50µg/m³ during the monitoring period at the Marulan/Peppertree HVAS monitoring station;
- The monitoring data indicates that levels are typically higher at the Marulan/Peppertree HVAS monitoring station compared to the Lynwood monitoring station. This may be due to the location of the Marulan/Peppertree HVAS monitoring station, which is positioned close to the quarrying activities, thereby influencing the results;
- The AQIA also found that PM_{10} concentrations recorded at the monitoring stations are nominally highest in the spring and summer months, with the warmer weather raising the potential for drier ground conditions, thereby elevating the occurrence of windblown dust, along with bushfires and pollen levels;
- Annual average PM_{10} levels recorded at the NSW EPA Bargo and Wollongong HVAS monitoring stations were below the relevant criterion of 30µg/m³ for all years reviewed, thereby indicting that local air quality at these locations can be considered to be generally good. The recorded maximum 24-hour average PM_{10} concentrations were found to exceed the relevant criterion of 50µg/m³ at times during the review period. Most notable is the recorded maximum 24-hour average at the Bargo monitoring station in October 2013, with a level of 208.9µg/m³. A large-scale bushfire event which occurred nearby at this time was identified as the likely main contributor to this reading;
- Annual average TSP concentrations at the Marulan/Peppertree HVAS monitoring station were below the criterion of 90µg/m³;
- The majority of the Marulan and Peppertree dust gauges recorded annual average insoluble deposition levels below the criterion of 4g/m²/month. The dust gauges that recorded generally higher levels are likely to be influenced by their location relative to the mining and quarrying activities with samples often contaminated with bird droppings and/or insects which can increase the insoluble solid content.

6.3.2 Impact Assessment

Pollutants of Interest

The main emissions from the extension of in-pit operating hours and the proposed Southern Overburden Emplacement will be particulate matter, as is the case from the existing operations. From a human health and nuisance perspective, particles are classified primarily by size, as TSP (total suspended particulates), PM_{10} (particulate matter with an aerodynamic diameter of 10µm or less) and $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). Human health effects of dust tend to be associated with particles with an aerodynamic diameter of 10µm or less (≤ PM_{10}). Emissions of TSP have the potential to result in nuisance impacts due to increased rates of dust deposition in the surrounding area.

Other potential pollutants that will be emitted as a result of the modification include products of fuel combustion from on-site vehicles and mobile/fixed equipment. Given the small scale of these emissions and the relative distances between the Quarry and nearby sensitive receivers, the proposed modification would not be expected to result in a significant increase in ambient concentrations of these pollutants at surrounding sensitive receivers, and therefore these pollutants have not been quantitatively assessed in the AQIA.

There are no anticipated potential sources of odour associated with the proposed modification.

Air Quality Criteria

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality.

The air quality criteria adopted for use in the assessment of fugitive particulate emissions from the activities associated with the proposed modification are summarised in **Table 17**. These criteria are applicable to cumulative impacts, that is, the total exposure level including background.

Table 17: Criteria for Fugitive Particulate Emissions

Pollutant	Averaging Period	Criteria	Source
Particulate Matter as PM_{10}	24-Hours[3]	50 µg/m^3	NSW OEH
	Annual	30 µg/m^3	NSW OEH
Particulate Matter as $PM_{2.5}$	24-Hours	25 µg/m^3	NEPM
	Annual	8 µg/m^3	NEPM
Total Suspended Particulate Matter (TSP)	Annual	90 µg/m^3	NSW OEH
Dust Deposition[1,2]	Incremental	2 g/m^2/month	NSW OEH
	Total	4 g/m^2/month	NSW OEH

Source: NSW DEC, 2005; NEPC, 2003
(1) Dust is assessed as insoluble solids as defined by AS 3580.10.1-1991;
(2) Note that 2 g/m^2/month relates to the incremental contribution to dust deposition from the proposal. Cumulative levels are not to exceed 4 g/m^2/month.
(3) Note that the NEPM permits five days annually above the 24-hour average PM_{10} criterion to allow for bush fires and similar events.
µg/m³ = micrograms per cubic metre; g/m²/month = grams per square metre per month.

Atmospheric Dispersion Modelling Approach

Emissions from activities associated with the proposed modification have been modelled using a combination of The Air Pollution Model (TAPM) and the CALPUFF model (refer to Section 6.2 of the AQIA for further detail on the atmospheric dispersion modelling methodology).

Modelling Scenarios

For the purposes of undertaking a worst-case air quality assessment of the proposed modification an operational scenario was developed to represent the potential worst-case dust levels at the surrounding sensitive receivers.

The operational air quality modelling scenario and modelling procedure and assumptions are outlined in detail in Section 6.3 of the AQIA.

Estimated Dust Emissions

Dust emissions from activities associated with the proposed modification were estimated based on the assumed dust generating activities taking place, relevant emission factors and existing mitigation measures implemented at the Quarry.

The emission factors applied are considered the most applicable and representative for determining dust generation rates for the proposed activities. The emission factors were sourced from both locally developed and United States EPA (US EPA) documentation. Total dust emissions from all significant dust generating activities for the modification are summarised in Section 6.3.1 of the AQIA, while detailed emission inventories and emission estimation calculations are presented in Appendix C of the AQIA. A summary of the key current dust controls applied to the Quarry operations and as outlined in the *Peppertree Quarry Air Quality Management Plan* (ERM, 2012), is presented in Section 6.3.3 of the AQIA.

In addition to the estimated dust emissions from the proposed modification, the adjacent Limestone Mine has been included in the modelling to assess potential for cumulative dust effects.

Other activities in the local area include an agricultural lime production facility. This is a relatively small operation and the background data (HVAS) monitor is located within approximately 300m of the activity. This background data would capture any significant environmental emissions associated with this facility, hence it was not explicitly modelled.

Dispersion Modelling Results

The predicted concentrations of $PM_{2.5}$, PM_{10}, TSP and deposited dust at the nearest sensitive receivers identified as potentially impacted by the modification are discussed in detail in Section 7 of the AQIA and summarised in the following sections. Contour plots of the relevant $PM_{2.5}$, PM_{10}, TSP and deposited dust concentrations are also presented in Appendix D of the AQIA.

$PM_{2.5}$ Concentrations

The incremental maximum 24-hour and cumulative annual average $PM_{2.5}$ concentrations are predicted to be below the relevant ambient air quality criteria at each identified sensitive receiver.

PM_{10} Concentrations

The incremental maximum 24-hour and cumulative annual average PM_{10} concentrations are predicted to be below the relevant ambient air quality criteria at each identified sensitive receiver.

Contour plots of the incremental maximum 24-hour and annual average PM_{10} concentrations are presented in **Figures 10** and **11**.

The NSW EPA contemporaneous assessment method was then applied to examine the potential maximum total (cumulative) 24-hour average PM_{10} impacts arising from the modification (refer to Section 7.2 of the AQIA for a detailed discussion on the assessment of total (cumulative) 24-hour average PM_{10} concentrations).

This analysis focused on the nearest privately-owned sensitive receiver locations surrounding the Quarry (R3, R4, R8, R9, R12 and R17) that would be most likely to experience maximum cumulative impacts due to the modification. All other receivers would be expected to experience levels lower than those assessed.

The contemporaneous assessment predicated that the sensitive receivers located closest to the modified operations, would experience 0 days above the 24-hour average PM_{10} criterion. The Quarry and Limestone Mine combined, would therefore have a relatively small influence at these receiver locations and the cumulative levels would remain within the criteria. Given that these locations show little potential for any significant impact to occur, it can be inferred that there would also be little prospect of any significant impact to occur at all other sensitive receiver locations.

TSP Concentrations

The incremental and cumulative annual average TSP concentrations are predicated to be below the relevant ambient air quality criteria at each identified sensitive receiver.

Dust Deposition

The incremental and cumulative annual average dust deposition rates are predicted to be below the relevant ambient air quality criteria at each identified sensitive receiver. As the predicted maximum incremental dust deposition rate at any sensitive receiver is 0.21 mg/m²/month (2 g/m²/month is the incremental dust deposition criteria), the proposed modification is unlikely to elevate the dust deposition level significantly in the local area to a level which would result in exceedance of the cumulative dust deposition criteria of 4 mg/m²/month.

Dust Impacts on Private Land

An assessment was undertaken to ascertain where potential dust impacts associated with the Project may extend over more than 25% cent of any privately-owned land. Such an assessment can only be conducted approximately, based on the predicted pollutant dispersion contours.

For the proposed modification, the maximum extent of the 24 hour average PM_{10} impact, due to the operation of the Quarry, was greater than the extent of any of the other assessed dust metrics and hence represents the most impacting parameter in every case.

The contour presented in Figure 7.3 of the AQIA defines the maximum 24 hour average PM_{10} level for all years assessed over the lifespan of the Quarry, following implementation of the proposed modification. The contour indicates that the proposed modification to the approved project would not result in any impact of greater than 25 per cent on any privately owned land.

Given the proposed modification would not result in exceedance of relevant air quality criteria at any identified sensitive receivers, or on more than 25% of any privately owned land, the modification does not trigger the thresholds of the *Voluntary Land Acquisition and Mitigation Policy*, and as such the Policy is not applicable in this instance.

6.3.3 Mitigation Measures

Relative to the existing operations, the proposed modification is unlikely to contribute to any significant change in existing dust levels at identified sensitive receivers. This is supported by the AQIA undertaken for the modification, which predicts that there would be no exceedances of NSW EPA air quality criteria at any privately owned receiver due to the modified Quarry operations and background sources (including the Limestone Mine).

Given this, and the demonstrated performance of existing operations via the implemented air quality monitoring regime, it is considered that the continued implementation of the approved *Peppertree Quarry Air Quality Management Plan* and associated management and monitoring measures would be adequate to manage potential air quality impacts from the modified Quarry operations.

However it is recommended that the *Peppertree Quarry Air Quality Management Plan* be revised to include a simple procedure to follow in the event of any measured exceedance at the air quality monitors in the network. This would outline the procedure for an investigation to be performed into the potential cause of the elevated reading and to make any necessary recommendations to minimise reoccurrence of the elevated reading.

It is also suggested that an investigation be performed to determine the likely cause of the high level of organic matter (e.g. leaves. pollens etc.) recorded by the D1 Dust gauge and if required to move this monitor to a nearby location less affected by such organic matter.

As required by Schedule 5, Condition 7 of the Project Approval, any proposed revisions to the *Peppertree Quarry Air Quality Management Plan* would be undertaken within three months of a notice of approval and submitted to DP&E for endorsement.

FIGURE 10

Predicted maximum incremental 24-hour average PM_{10} concentrations

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

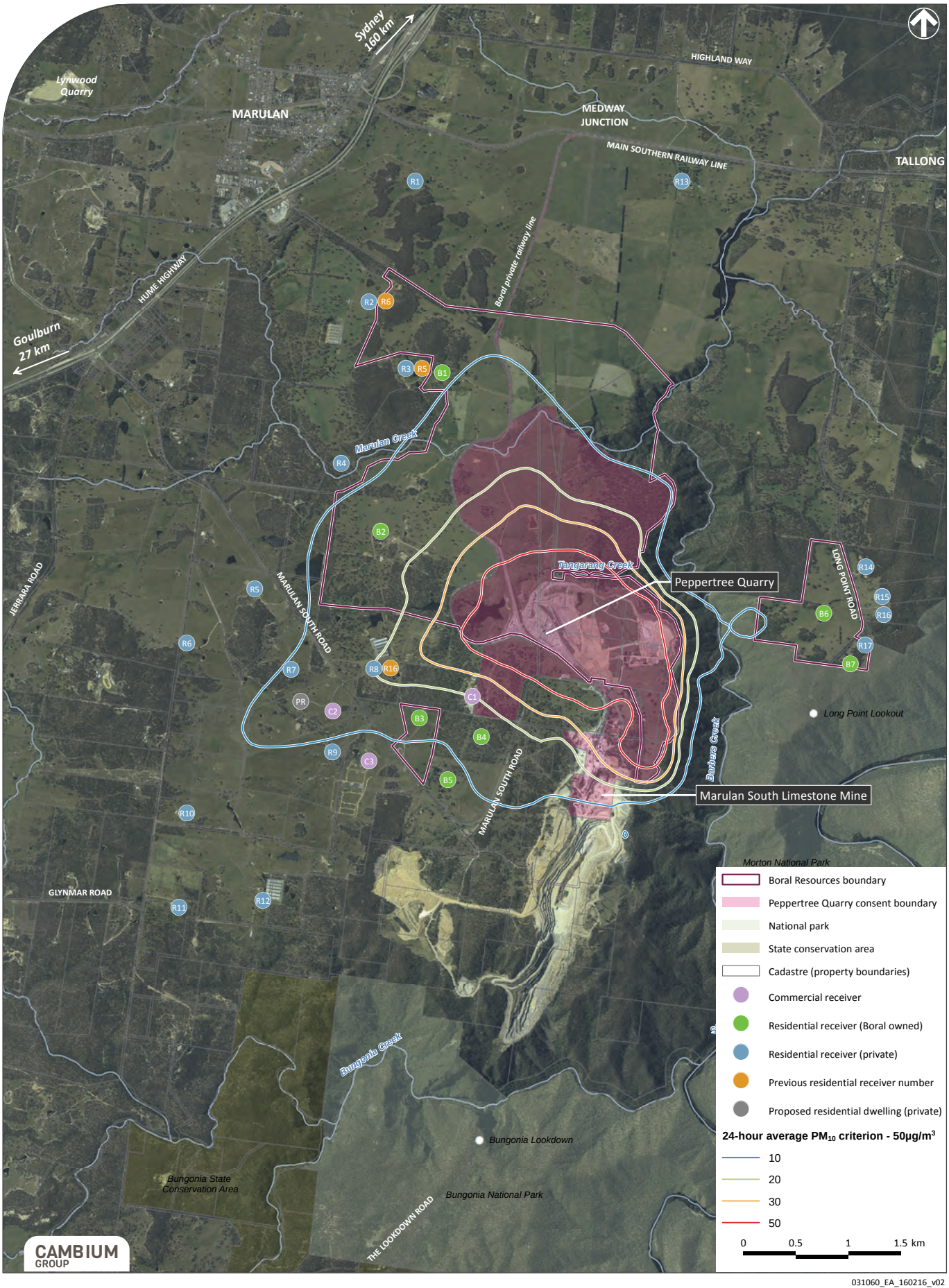

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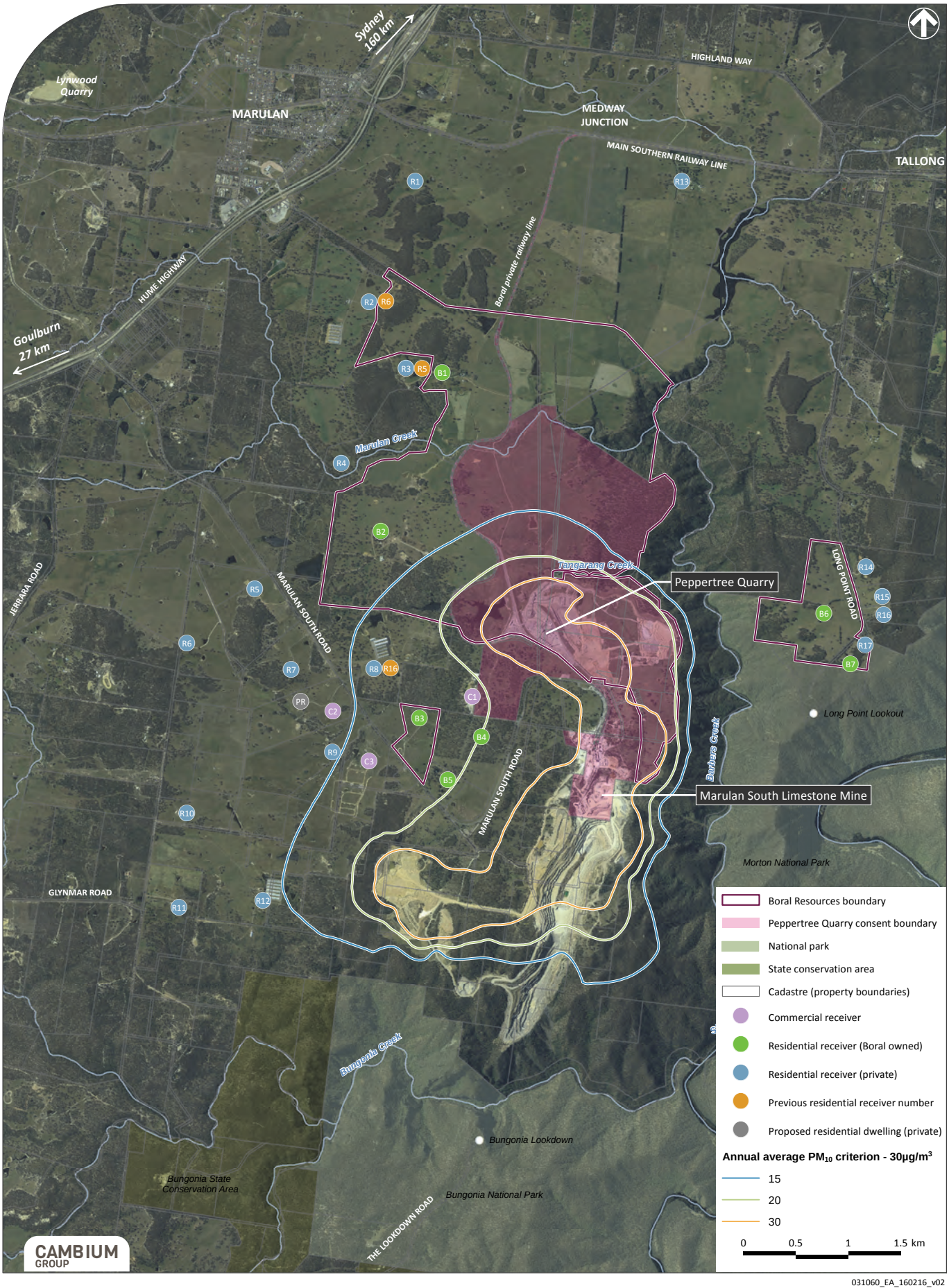
FIGURE 11

Predicted cumulative annual average PM_{10} concentrations

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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6.4 Biodiversity

The proposed Southern Overburden Emplacement will be located on land outside the approved Quarry disturbance footprint and will require vegetation clearing, which has the potential to impact on threatened flora and fauna and/or ecological communities.

A Biodiversity Assessment was undertaken by Niche Environment & Heritage Pty Ltd (**Appendix D**) to assess the potential impacts of the modification on threatened flora, fauna and ecological communities listed under the *NSW* Threatened Species Conservation Act 1995 (TSC Act) and/or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The Biodiversity Assessment was undertaken in accordance with the Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects*, 2014* (FBA), which is the key policy document for assessing and offsetting impacts in NSW. In addition, consideration was given to any Commonwealth requirements for survey and offsetting under the EPBC Act.

The Biodiversity Assessment has focused on potential impacts associated with the proposed Southern Overburden Emplacement, as it was ascertained through specialist investigations that the extension in operating hours of in-pit works is unlikely to result in any additional impacts on biodiversity than the approved quarry operations as extending the operating hours for in-pit works is unlikely to result in any substantial or perceptible change in:

- Noise levels emitted from the Quarry;
- Dust emissions from the Quarry; and
- Light spill from the Quarry.

6.4.1 Existing Environment

The proposed Southern Overburden Emplacement covers an area of approximately 14ha and is located on a highly disturbed and actively grazed paddock, comprised of a mixture of exotic and native grasses, interspersed with scattered native trees. A number of small farm dams also occur in the vicinity.

The study area occurs within the South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) region, and within the Bungonia IBRA subregion. One Mitchell landscape occurs across the study area: Bungonia Tableland and Gorge.

No riparian buffers, State Biodiversity Links or Regional Biodiversity Links occur within the study area.

Database Searches

Database searches of the Atlas of NSW Wildlife and the EPBC Act Protected Matters Search Tool identified a total of 8 Endangered Ecological Communities (EEC), 21 threatened flora species and 52 threatened fauna species that have previously been recorded within 10km of the Quarry and are listed for protection under the TSC Act and/or EPBC Act (refer to Section 4.4.1, Section 5.1.1 and Section 5.2.1 respectively of the Biodiversity Assessment Report for a list of these species). Appendix 1 of the Biodiversity Assessment Report considers the likelihood of these identified flora and fauna species to occur within the study area.

Previous Assessments

Reports on previous biodiversity surveys of the Quarry and Limestone Mine were reviewed and ecological information potentially relevant to the study area included:

- Identification of White Box Yellow Box Blakely's Red Gum Grassy Woodland on both the Quarry and Limestone Mine properties. This EEC is listed under the TSC Act and EPBC Act;
- Records of *Solanum celatum* to the direct east of the proposed Southern Overburden Emplacement on the steep slopes towards Barbers Creek; and
- Identification of three threatened fauna including the Koala (*Phascolarctos cinereus*), Diamond Firetail (*Stagonopleura guttata*) and Varied Sittella (*Daphoenositta chrysoptera*). These species were recorded approximately 1.2km south, 700m north-west and 2.8km south-west of the proposed Southern Overburden Emplacement respectively.

Site Survey

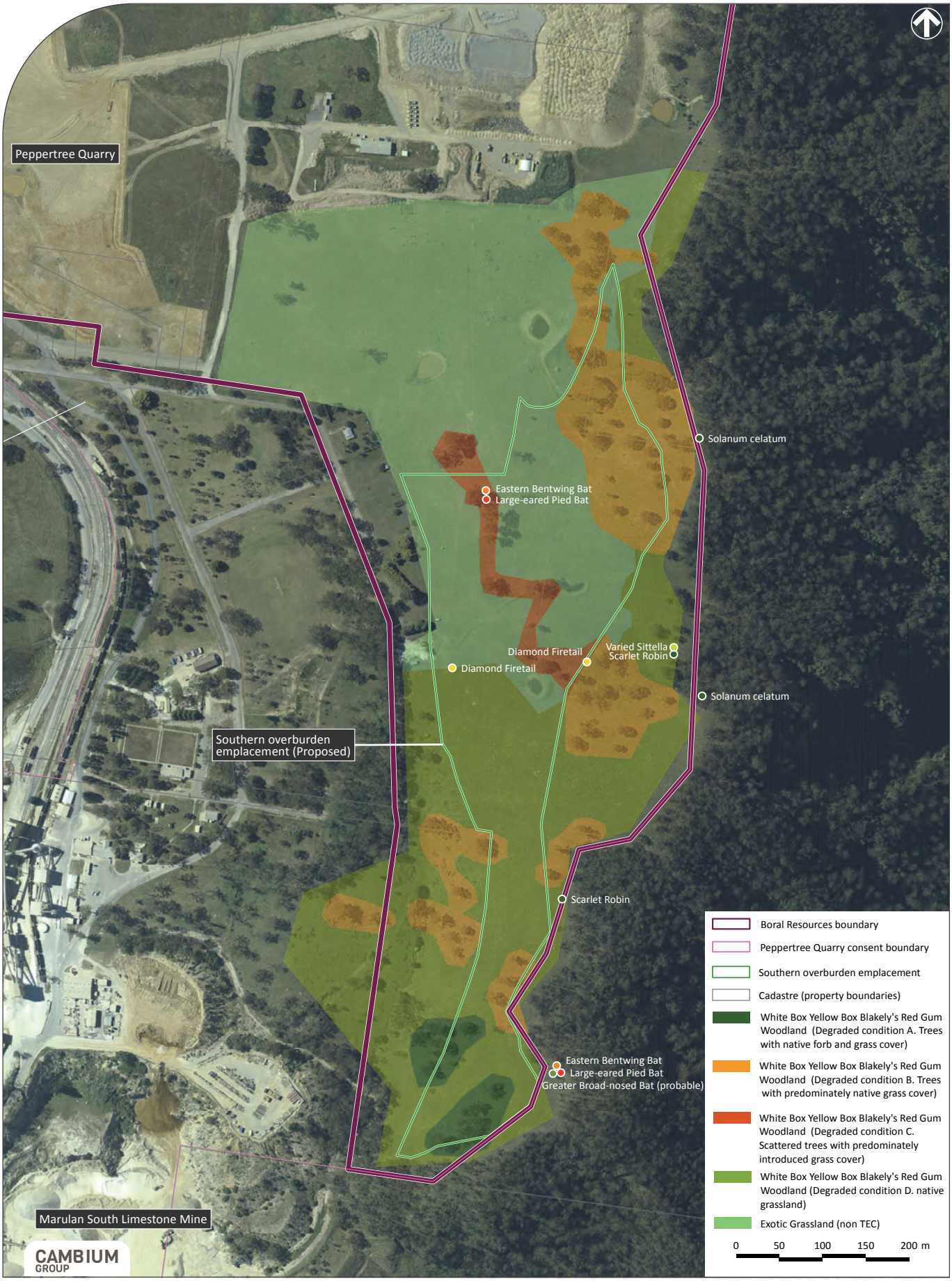
The flora survey of the proposed footprint of the Southern Overburden Emplacement, undertaken from 19 - 21 May 2015, followed the *BioBanking Assessment Methodology* (OEH, 2014) (consistent with the FBA). Results of the flora survey are summarised in the following sections with mapping of vegetation communities presented in **Figure 12**.

FIGURE 12

Vegetation communities and threatened biodiversity

ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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(Source: Niche Environment and Heritage, 2015)

Vegetation Communities

One native vegetation community and one exotic vegetation community were identified within the proposed footprint of the Southern Overburden Emplacement.

Blakely's Red Gum - Yellow Box - Grassy Open Woodland

This vegetation community occupies much of the study area, particularly the flat and gently sloping terrain of the southern and eastern portions of the proposed Southern Overburden Emplacement area. The best condition of this community occurs to the south where grazing intensity is lowest.

Four different condition classes of the community were recorded in the study area (Refer to **Figure 12** of this EA and Table 11 of the Biodiversity Assessment for descriptions of these condition classes). Typically, the best condition of the community consisted of a tree layer ranging in height from 15-25m consisting of Blakely's Red Gum (*Eucalyptus blakelyi)* and Yellow Box (*Eucalyptus melliodora)*. The mid-storey contained Parramatta Wattle (*Acacia parramattensis)*, which depending on disturbance was sparse. The shrub layer consisted of Dolly Bush (*Cassinia aculeate),* Peach Heath *(Lissanthe strigose)* and Viscid Daisy Bush *(Olearia viscidula)*. The ground layer consisted of Berry Saltbush (*Einadia hastate),* Slender Wallaby Grass *(Austrodanthonia racemose), Weeping Grass (Microlaena stipoides),* Red Grass *(Bothriochloa macra),* Bidgey-Widgee *(Acaena novae-zelandiae),* Wattle Mat-rush *(Lomandra filiformis* subsp*. Coriacea),* Twining Fringe Lily *(Thysanotus patersonii),* Oat Speargrass *(Anisopogon avenaceus),* Grey Tussock Grass *(Poa sieberiana),* Speargrass *(Austrostipa scabra),* and Purple Wiregrass (*Aristida ramose)*.

The vegetation community in all condition classes was determined to align with the 'White Box Yellow Box Blakely's Red Gum Woodland' EEC, which is listed under the TSC Act. The community was also deemed to align with listing as a Critically Endangered Community (CEEC) under the EPBC Act.

Exotic Pasture

This entirely disturbed community occupies large portions of the proposed location of the Southern Overburden Emplacement. All native vegetation has been previously cleared from the community, likely associated with historical land uses as grazing for livestock.

The exotic pasture consists predominantly of the following species*:* Mexican Feather Grass *(Nassella tenuissima),* Perennial Rye Grass *(Lolium perenne),* St John's Wort *(Hypericum perforatum),* Ribwart Plantain *(Plantago lanceolate),* Catsear *(Hypochaeris radicata),* Canary Grass *(Phalaris aquatic),* Wild Sorghum *(Sorghum leiocladum),* Sow Thistle *(Sonchus oleraceus),* Prairie Grass *(Bromus catharticus),* Dallis Grass *(Paspalum dilatatum),* Spike Centaury *(Centaurium spicatum),* Milk Thistle *(Lactuca serriola),* Orchard Grass *(Dactylis glomerata),* Yorkshire Fog *(Holcus lanatus),* Sorrell *(Acetosella vulgaris),* Scarlet Pimpernel *(Anagallis arvensis),* Fleabane *(Conyza bonariensis),* Heart Clover *(Medicago Arabica),* Scotch Thistle *(Onopordum acanthium),* and Purpletop Vervain *(Verbena bonariensis).*

Flora

During the field survey, 48 plant species were recorded across 22 families. A list of all flora identified from within the study area is included within Appendix 2 of the Biodiversity Assessment Report.

Weeds

During the field survey, 25 introduced species were recorded, five of which are classed as noxious weeds. The noxious weed species are sporadically distributed throughout the study area, particularly where a high level of previous clearing and soil disturbance has occurred.

The noxious weeds recorded within the study area that are declared under the *Noxious Weeds Act 1993* for the Goulburn Mulwaree LGA Control Area, together with the legal requirements for their control are listed in **Table 18**.

Table 18: Noxious Weeds Recorded in the Study Area

Scientific Name	Common Name	Class	Legal Requirements
Rubus fruticosus species aggregate	Blackberry	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Nassella neesiana	Chilean Needle Grass		
Echium plantagineum	Paterson's Curse		
Nassella trichotoma	Serrated Tussock		
Hypericum perforatum	St. John's Wort		

Note: Class 4 – Locally Controlled Weeds: Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

Apart from declared noxious species, common environmental weed species recorded within the study area include: Prairie Grass (*Bromus cartharticus)*, Spear Thistle (*Cirsium vulgare)*, Flaxleaf Fleabane (*Conyza bonariensis)*, Barley Grass (*Hordeum leporinum)*, Catsear (*Hypochaeris radicata)*, Milk Thistle (*Lactuca serriola)*, Lantana (*Lantana camara)*, Fireweed (*Senecio madagascariensis)*, Blackberry Nightshade (*Solanum nigrum)*, Prickly Sowthistle (*Sonchus asper)*, and Purpletop Varvain (*Verbena bonariensis)*.

All recorded weed species have the potential to spread in response to disturbances of various kinds. Invasion of introduced perennial grasses into native communities is also a key threatening process under the TSC Act.

Threatened Flora

During the field survey, one threatened flora species, *Solanum celatum*, which is listed under the TSC Act, was recorded outside of the study area (refer to **Figure 12**). Approximately 20 plants were recorded within 'Dry Sclerophyll Shrubby Forest' immediately to the east of the study area. However, as the closest plant was approximately 50m from the eastern extent of the proposed Southern Overburden Emplacement, this species would not be impacted by the modification.

No endangered populations of terrestrial flora are listed for the locality.

No Critical Habitat declared under the TSC Act or EPBC Act occurs within the study area.

Based on the results of the database searches, previous assessments and field survey, no threatened flora are likely to be present within the footprint of the Southern Overburden Emplacement for the following reasons:

- The study area has been highly disturbed. Habitat for threatened flora is only marginally likely to occur within White Box Yellow Box Blakely's Red Gum Woodland Condition A vegetation (approximately 0.7 ha). However, given the field survey involved walking over this area and yielded no threatened flora sightings, it is highly unlikely that any threatened flora would be impacted; and
- Many of the species are relatively conspicuous and unlikely to remain undetected during field survey.

Fauna

Available fauna habitat within the proposed study area was relatively limited, consisting of:

- Grassy Woodlands (mostly scattered trees with a mix of native and exotic grasses); and
- Farm dams.

Dry Sclerophyll Woodland (shrub/grass sub formation) habitat occurred to the east of the study area, on the slopes of the Barbers Creek gorge.

Grassy Woodland

Grassy Woodland habitat within the proposed study area consisted predominantly of sparse scattered trees mainly Yellow Box (*Eucalyptus melliodora)* and Blakely's Red Gum (*Eucalyptus blakelyi)*, with areas of more consolidated woodland patches occasionally present. Habitat features were degraded due to historic clearing and grazing.

Trees were predominantly mature (30 – 50cm diameter breast height (Dbh)), however larger trees occasionally occurred reaching a Dbh of 1m. No tree hollows were observed within the study area despite targeted survey. This is attributed to past clearing practices and a lack of recent fire or other disturbance factors that might cause tree hollows. Logs, including hollow logs, were rare throughout the site, being confined to isolated occurrences around the base of larger trees. Logs are generally medium sized reflecting the prevalent tree size structure. No large (> 60cm diameter) hollow logs were recorded, with log diameter typically 10 to 30cm. Logs were typically from fallen branches rather than tree trunks. Rocky outcrops occurred within the eastern and southern margins of the study area but offered limited reptile habitat, due to a general absence of exfoliating rock or scattered surface rock.

Farm Dams

Three dams ranging from approximately 0.05 – 0.15 ha in size occur within the study area. The dams differ in their shape and depth and accordingly, the quantity and diversity of aquatic macrophyte and shallow benthic habitat. In general terms, the dams are typical of farm dams in the area and include small areas of fringing low diversity aquatic macrophyte assemblages within their shallows. Cattle access has degraded existing macrophyte assemblages and water quality. The dams would play a role in water supply for vertebrate fauna and may act as foraging habitat for bats, birds and common frogs.

Previous Disturbance of Habitat

Clearing has previously occurred throughout the study area which is the major source of disturbance. Numerous sources of disturbance continue to operate throughout the study area. Livestock grazing (cattle) occurs throughout the study area. Rabbits and Brown Hares were moderately common throughout most of the study area and Foxes were observed during spotlighting. These introduced predators, coupled with the low abundance of available sheltering habitat (such as hollow logs) would have undoubtedly led to a decreased abundance and diversity of small and medium sized ground dwelling mammals.

Weeds were common throughout the study area in response to levels of grazing or other disturbance factors. There was no evidence of recent bushfire throughout the study area.

Fauna Recorded

A total of 49 fauna species were recorded during field surveys comprising 2 reptiles, 16 mammals, 29 birds and 2 amphibian species. A complete fauna list is provided in Appendix 4 of the Biodiversity Assessment Report.

The suite of fauna recorded were predominantly locally common species tolerant of at least moderate disturbance and lower condition vegetation or degraded habitats. Frogs recorded consisted of common species able to persist in farm dams with limited shallow habitat and fringing vegetation. Similarly, there was low species richness for reptiles and species recorded were common species.

Several species were recorded aurally during survey from adjacent woodland areas to the east of the study area, however would not be expected to utilise the study area (e.g. Superb Lyrebird). Some mobile species recorded would primarily be dependent on the adjacent

woodland areas to the east but would take advantage of parts of the study area to forage (e.g. Common Wallaroo, Large-eared Pied Bat).

Threatened Fauna

Six threatened fauna species were recorded within the study area and surrounds and are outlined in **Table 19**.

Table 19: Threatened fauna species recorded in the study area

Common Name	Scientific Name	TSC Act Status	EPBC Act Status
Diamond Firetail	*Stagonopleura guttata*	V	-
Scarlet Robin	*Petroica boodang*	V	-
Varied Sittella	*Daphoenositta chrysoptera*	V	-
Eastern Bentwing Bat	*Miniopterus schreibersii*	V	-
Greater Broad-nosed Bat	*Scotorepens ruppellii*	V	-
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V

Key: V = species listed as vulnerable under relevant legislation.

All threatened species recorded are listed as vulnerable threatened species under the TSC Act and one (Large-eared Pied Bat) is listed as vulnerable under the EPBC Act.

A number of additional threatened fauna species have the potential to occur within the study area but were not recorded, most likely due to their potential use of the study area or wider locality being limited to sporadic occurrences (e.g. nomadic birds). Such species are tabled in Appendix 2 of the Biodiversity Assessment Report as species with a moderate or higher chance of occurring and include: Gang-gang Cockatoo (*Callocephalon fimbriatum*), Speckled Warbler (*Pyrrholaemus sagittatus*), Rainbow Bee-eater (Merops ornatus), Black-faced Monarch (*Monarcha melanopsis*), Flame Robin (Petroica phoenicea), Rufous Fantail (*Rhipidura rufifrons*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*).

Migratory Species

During the field survey, no migratory species listed under the EPBC Act were recorded. However, a number of listed migratory species have been recorded from the locality and in some cases have the potential to fly over the study area (refer to Appendix 2 of the Biodiversity Assessment Report). Such species include the Cattle Egret (*Bubulcus ibis*), Speckled Warbler (*Pyrrholaemus sagittatus*), Rainbow Bee-eater (Merops ornatus), Black-faced Monarch (*Monarcha melanopsis*), Flame Robin (Petroica phoenicea), and Rufous Fantail (*Rhipidura rufifrons*).

6.4.2 Impact Assessment

The proposed modification would impact biodiversity (including threatened biodiversity) through both direct and indirect impacts associated with the development of the Southern Overburden Emplacement. The majority of impacts on biodiversity would occur as a result of direct impacts through clearing of native vegetation and removal of habitat for flora and fauna. Indirect impacts are also considered within the overall assessment of impacts.

Rehabilitation of the Southern Overburden Emplacement would be undertaken progressively, and completed as soon as practically possible after the emplacement has reached final landform. While rehabilitation of the overburden emplacement would be important in mitigating long-term impacts, for the purposes of the impact assessment, minimal consideration has been given to the likelihood of threatened species re-establishing populations within the rehabilitated emplacement.

Direct Impacts

Native Vegetation

The main impact on biodiversity associated with the modification is the clearing of native vegetation and removal of habitat, including threatened species habitat, within the proposed footprint of the Southern Overburden Emplacement.

Details regarding the areas of vegetation to be disturbed are provided in Table 10 of the Biodiversity Assessment Report.

The proposed Southern Overburden Emplacement would cover an area of approximately 14ha. The extent of clearing of native vegetation communities is conservatively estimated at 9.2ha, with 4.8ha of exotic pasture and existing cleared land also being consumed by the overburden emplacement.

Threatened Ecological Communities

One Threatened Ecological Community (TEC) would be impacted by the modification, namely 'White Box Yellow Box Blakely's Red Gum Grassy Woodland', which is listed as an EEC under the TSC Act and CEEC under the EPBC Act.

In total, the Southern Overburden Emplacement would result in the disturbance of approximately 8.1ha of the EEC/CEEC listed under the TSC Act and EPBC Act.

To satisfy the EPBC Act requirements, a Matter of National Environmental Significance (MNES) Assessment of Significance has been conducted for White Box Yellow Box Blakely's Red Gum Grassy Woodland and is provided in Appendix 5 of the Biodiversity Assessment Report. The Assessment concluded that the proposed modification is unlikely to significantly impact the CEEC.

The TEC has been considered further in the offset strategy developed for the modification as outlined in **Section 6.4.3**.

Threatened Flora

No threatened flora are likely to be impacted by the proposed modification given the lack of habitat and results of the field survey. The population of *Solanum celatum* which was recorded outside of the study area is unlikely to be impacted by the proposed Southern Overburden Emplacement.

It is therefore unlikely that the proposed modification will result in a significant impact to any threatened flora.

Threatened Fauna

Fifteen threatened and migratory fauna are considered to be affected by the modification (affected species) as discussed in Section **Error! Reference source not found.** of the iodiversity Assessment Report.

The Koala is the only 'Species Credit Species' to be potentially affected. A 'Species Credit Species' unlike 'Ecosystem Credit Species', cannot be assumed present based on habitat surrogates. The Koala has been assigned a low (marginally moderate) likelihood of occurrence given previous records in the locality and the study area presenting only marginal habitat given the presence of scattered Eucalypts. The Koala may occasionally move through the study area, however this is unlikely to be occurring on a regular basis given there were no Koala scats or scratches identified on trees within the study area and the targeted survey involving spotlighting and Koala plots did not yield any results. Given the species was not recorded within the proposed footprint of the Southern Overburden Emplacement and the likelihood of occurrence is relatively low, an offset for the species is not proposed under the FBA.

The Large-eared Pied Bat and Eastern Bent-wing Bat are both Species/Ecosystem Credit Species, however, the habitat pertaining to the Species Credit component of the species would be unaffected by the modification, as no breeding habitat for these bat species occurs in the study area. The Large-eared Pied Bat's preferred breeding habitat comprises caves and mine shafts (OEH, 2012), neither of which will be impacted by the Southern Overburden Emplacement. Similarly, caves are the primary roosting habitat for the Eastern Bent-wing Bat, however they also utilise derelict mines, storm-water tunnels, buildings and other man-made structures (OEH, 2012). Given none of these features are located within the study area and impacts to breeding habitat are unlikely, both species have been regarded as Ecosystem Credit Species only, and therefore no further assessment of impact is required based on the FBA and the offsetting of the associated Plant Community Type (PCT) 'White Box Yellow Box Blakely's Red Gum Grassy Woodland'.

No Species Credit Species will therefore be impacted by the proposed modification.

The remaining affected species are Ecosystem Credit Species or in the case of Migratory species, not assessed under the FBA. Most of these species are likely to utilise the foraging habitat of the study area on an intermittent basis. No further assessment of impact is required for the Ecosystem Credit Species based on the requirements of the FBA, and the offsetting of the associated PCT 'White Box Yellow Box Blakely's Red Gum Grassy Woodland'.

For threatened and migratory species listed under the EPBC Act, an EPBC Act Assessment of Significance for each of these species has been completed and is provided in Appendix 5 of the Biodiversity Assessment Report. Based on the results of the Assessments, a significant impact to any EPBC Act listed threatened or migratory fauna species is unlikely.

Avoidance of Direct Impacts

In accordance with the *NSW Biodiversity Offsets Policy for Major Projects* and the FBA, proponents must demonstrate the measures employed to avoid, mitigate and offset impacts of a project on biodiversity values.

The avoidance, management and mitigation measures that Boral has incorporated into the project design or will employ during construction, operation or completion of the Southern Overburden Emplacement in order to reduce impacts on biodiversity values are outlined below. Additionally, a Biodiversity Offset Strategy has been developed for the modification in order to account for residual impacts that cannot be avoided or mitigated.

Site Selection & Design Considerations

Site selection for the Southern Overburden Emplacement has been largely dictated by the availability of Boral owned land, within the development consent boundary, that is not required for other quarry operations, is located as far as possible from neighbouring residences and does not impact on land with higher biodiversity values. As such, the overburden emplacement has been proposed on grazing lands that have been highly modified through historic agricultural practices. The proposed Southern Overburden Emplacement has been designed to avoid/minimise impacts to adjacent areas of higher biodiversity value by:

- Maintaining a suitable buffer to the woodland associated with the neighbouring Barbers Creek Gorge;
- Developing a stormwater management system that will attenuate stormwater and trap sediment during development of the emplacement; and
- Progressive and final revegetation and rehabilitation to create a stable landform that does not result in the sediment laden runoff, fugitive dust emissions, blends well with the adjacent natural landscapes of the Morton National Park and re-establishes a native bushland dominated by White Box Yellow Box Blakely's Red Gum Grassy Woodland species.

Indirect Impacts

Indirect impacts that could occur as a result of the proposed modification include:

- Increased noise and dust from Quarry operations;
- Erosion or sedimentation in the drainage lines downslope;
- Increased dispersal of weed propagules; and
- Increased edge-effects for surrounding vegetated areas of Barbers Creek gorge.

The indirect impacts described above are variable in terms of the distance they may extend from the Southern Overburden Emplacement and in many cases, due to mitigation measures that will be incorporated, indirect impacts will be completely confined within the footprint of the overburden emplacement itself.

Indirect impacts on the biodiversity values of areas surrounding the proposed Southern Overburden Emplacement are outlined in the following sections.

Edge Effects

The establishment of the Southern Overburden Emplacement would result in the creation of new edges adjacent to areas of existing native vegetation, however these edges would be located on disturbed grazing land. The woodland areas which occur approximately 50m from the Quarry boundary to the east and south may be exposed to edge effects, however given the distance from the overburden emplacement, these are likely to be minor.

The new edges could facilitate the establishment and spread of introduced plant species, however appropriate monitoring and control measures would be implemented during and after construction, to counteract weed invasion.

The Southern Overburden Emplacement would be progressively rehabilitated and will eventually be entirely revegetated to a native, open woodland community, which will recreate fauna habitat, and minimise the edge effect created during its development.

Weeds

Weeds have the opportunity to establish themselves in areas of disturbed vegetation. The greatest establishment of weeds are in areas already disturbed or subject to agricultural land use. This is mainly toward the north of the proposed footprint of the Southern Overburden Emplacement and the surrounding land to the north, which is currently grazed. However, it should be noted that weeds were common throughout the entire study area.

The proposed overburden emplacement has the potential to increase or lead to the establishment of weed species where they do not currently exist, through the operation of machinery during development of the emplacement.

Areas more likely to be exposed to weed increases are areas of native vegetation that occur to the east and south of the proposed overburden emplacement, as these areas are in better condition and contain less introduced species. However, weeds will be controlled in accordance with the *Peppertree Quarry Landscape and Rehabilitation Management Plan* and thus indirect impacts from weeds is likely to be minor within the adjacent woodland areas.

Erosion and Sedimentation

Erosion of soils and sedimentation associated with the proposed Southern Overburden Emplacement may involve the following:

- The increase of surface water flow from the study area during rain events into the woodland areas to the east and south may result in erosion downslope; and

- The deposition of soil particulates in drainage lines and within remnant vegetation at the toe of the emplacement.

As outlined in **Section 6.6**, a stormwater management system including sediment basins, will be implemented during development of the Southern Overburden Emplacement to attenuate stormwater runoff and capture sediment.

Dust

As outlined in **Section 6.3**, the AQIA concluded that dust generated by the proposed modification is unlikely to result in exceedances of the relevant air quality criteria and is therefore unlikely to impact on human health.

Through accumulation with existing dust generated from existing Quarry operations, dust generated during development of the Southern Overburden Emplacement has the potential to impact upon the health of plants and vegetation particularly in those areas of dense native woodland immediately adjacent to the site. Research shows that the impacts of dust on vegetation can have both positive and negative impacts, however the impacts of increased levels of dust on animals are unknown (Farmer 1993).

Dust controls and minimisation measures outlined within the *Peppertree Quarry Air Quality Management Plan* would be implemented during the development of the Southern Overburden Emplacement and extended operating hours of the Quarry, in order to limit resultant dust generation and deterioration of local air quality.

Noise

As highlighted in **Section 6.2**, the NIA predicated that the noise from the proposed modification is unlikely to result in exceedances of the relevant noise criteria during the day, evening or night time. The noise assessment of both the extension of in-pit operating hours and the establishment of the Southern Overburden Emplacement has therefore concluded that the proposed modifications to the approved project, will not result in any perceptible changes in noise levels in the surrounding area.

As the development of the Southern Overburden Emplacement will be undertaken immediately south and after completion of the Eastern Overburden Emplacement, fauna inhabiting the adjacent woodlands of Barbers Creek gorge will not be exposed to any greater noise than they are currently exposed to under the approved project.

As such, noise generated from the proposed modification is unlikely to result in additional impacts to adjacent fauna species and their habitat.

Increased Lighting

The emplacement of overburden in the Southern Overburden Emplacement area would occur in accordance with the Project Approval (i.e. 7am – 7pm), and will therefore be undertaken largely within daylight hours without the need for artificial lighting.

Additional night time lighting associated with the modification will therefore be limited to that which is produced from the proposed extension in operating hours of in-pit works. The light that is currently emitted from the existing operations is from the lighting associated with the out-of-pit works, primarily the processing plant and surrounds, which is the main light source from the Quarry.

The light that is likely to be generated by the extended hours of in-pit works, is from selected pieces of machinery including the primary crusher, excavator, front end loader, two trucks and possibly some “daymaker” lighting. These sources will be emitted from a position below ground level and would not result in any direct light spill into surrounding areas, including the heavily vegetated Barbers Creek gorge and Morton National Park to the east.

The light that is likely to be generated by the extended hours of in-pit works, is therefore unlikely to result in a significant or even noticeable change to the light emitted by the

existing night time operations. Lighting from the existing night time operations is far greater in scale, extent and intensity than the extended in-pit operations proposed.

Fire

Historically, arid zone bushfires tend to be associated with a proficient growth of native grasses following large rain events. During summer, following rain events, dry grasses pose a bushfire hazard when placed near a source of ignition. Vehicles driven through long grass with hot exhausts may cause a fire. There is the potential for fires to be started in this way during development of the proposed Southern Overburden Emplacement, particularly during the hotter months. However, this risk would be significantly reduced after the emplacement of the first layer of overburden.

6.4.3 Mitigation Measures

The following management measures have been recommended by the Biodiversity Assessment to minimise the potential for adverse impacts to biodiversity from the establishment of the Southern Overburden Emplacement.

Fencing and Signposting

- Fencing and/or the use of highly visible rope or tape boundaries will be used to delineate the boundary of vegetation clearing at the edge of the Southern Overburden Emplacement; and
- Signposting will be used to inform Quarry personnel and site visitors of areas of conservation value to restrict entry, or to inform behaviour that will reduce incidental interactions with threatened species (e.g. reduced speed limits along access and haul roads to reduce potential for fauna vehicle strikes).

Employee Education & General Environmental Controls

Employees and contractors would be educated on and required to implement the following controls, to avoid or at least minimise potential environmental impacts associated with the development of the Southern Overburden Emplacement:

- The vegetation clearing protocol outlined in the Peppertree Quarry Landscape and Rehabilitation Management Plan;
- Minimise dust generation by minimising the extent and time that bare soil is exposed, and by appropriate dust suppression;
- Procedures to be implemented for the management of hydrocarbon and/or chemical spills, including the requirements for vehicles to carry spill kits;
- Ensure vehicles remain on designated roads and tracks and abide by site speed limits, through use of signposting and driver education during the induction process and in on-going briefings or discussions; and
- Management and removal of all rubbish and waste.

Rehabilitation

The Southern Overburden Emplacement would be progressively rehabilitated in accordance with the *Peppertree Quarry Landscape and Rehabilitation Management Plan*, to create a stable landform that does not result in sediment laden runoff or fugitive dust emissions, blends well with the adjacent natural landscapes of Barbers Creek gorge and Morton National Park, and re-establishes a native bushland dominated by White Box Yellow Box Blakely's Red Gum Grassy Woodland constituent species, which outcompete invasive weed species.

Update of Peppertree Quarry Landscape & Rehabilitation Management Plan

It is advised that the approved *Peppertree Quarry Landscape and Rehabilitation Management Plan* is updated to reflect biodiversity management measures associated with the proposed Southern Overburden Emplacement in order to protect and manage important biodiversity values. Currently, the existing Plan discusses key commitments relating to threatened species management, pest and weed management, fire management and site hygiene practices.

Pest and Weed Management

The existing Plan would be updated to include a section relating to pest and weed management activities associated with the Southern Overburden Emplacement and would include:

- Management protocols for feral animals such as foxes, goats, rabbits and cats within the rehabilitation area; and
- Management protocols for the identification of noxious or important environmental weeds within areas to be cleared (in order to avoid transporting the weeds to the rehabilitation area or other parts of the Quarry).

Fire Management

Fire prevention and suppression will be an important consideration and would be undertaken in accordance with the *Bushfire Management Plan*.

Biodiversity Offset Strategy

The *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014) states that biodiversity offsets provide benefits to biodiversity to compensate for the adverse impacts of an action. Biodiversity offsets assist in achieving long-term conservation outcomes while providing development proponents with the ability to undertake actions that have unavoidable impacts on biodiversity.

To compensate for the unavoidable biodiversity impacts associated with the proposed Southern Overburden Emplacement, a Biodiversity Offset Strategy has been outlined within Section 8 of the Biodiversity Assessment Report. The key component of this Strategy was to identify suitable biodiversity offset sites preferably on Boral owned land or alternatively off-site that supported adequate areas of White Box Yellow Box Blakely's Red Gum Grassy Woodland to meet the required BioBanking Credits.

The FBA identifies the BioBanking Credit Calculator (BBCC) as the appropriate tool for quantifying the precise nature of the offsets required for an unavoidable biodiversity impact. The BBCC determined that a total of 225 Ecosystem Credits would need to be offset for the removal of 8.1ha of White Box Yellow Box Blakely's Red Gum Grassy Woodland

Boral proposes to use an offset area within their landholdings in the vicinity of the Quarry, which has been identified as containing White Box Yellow Box Blakely's Red Gum Woodland. A description of the proposed offset area is as follows:

- Located approximately 1.4km to the north of the study area;
- Is part of an extensive corridor of native vegetation which extends along Barber's Creek into Morton National Park;
- Overall, the vegetation across the offset area (in particular the eastern side) is in relatively good condition, with all stratum layers intact and minimal weeds present;
- Approximately 38.22ha of White Box Yellow Box Blakely's Red Gum Woodland in moderate to good condition was were recorded within the offset area;
- Based on the BBCC, the offset area would generate 291 credits for the management of 38.22ha of White Box Yellow Box Blakely's Red Gum Woodland.

Based on the credit calculations, the proposed offset area meets 129 percent of the offset liability of the Project with a surplus of 66 credits. Boral are in the final stages of determining the precise layout of the offset area, which will meet at least 100 percent of the offset liability for the Project.

The final offset would be formally secured in consultation with OEH and DP&E, following approval of this modification.

6.5 Aboriginal Heritage

The Quarry is located in an area of Aboriginal sensitivity, with a large number of artefacts already uncovered within the approved development consent boundary.

The majority of the new Southern Overburden Emplacement is proposed on land that has not been previously assessed for Aboriginal heritage values and has low to moderate archaeological sensitivity. Although this area has been subject to surface disturbance associated with historic agricultural activities, it has the potential to support Aboriginal artefacts and other Aboriginal cultural heritage values.

An Aboriginal and Historic Heritage Impact Assessment (AHHIA) was undertaken by EMGA Mitchell McLennan Pty Ltd (**Appendix E**) to assess whether the modified Quarry operations would result in any impacts on Aboriginal and historic heritage values. Potential impacts on historic heritage are discussed separately in **Section 6.8**.

6.5.1 Existing Environment

Overview

The Marulan area has both a rich Aboriginal and post-colonial history. The Quarry is located at the boundaries of four traditional Aboriginal groups including:

- The Gandangar;
- The Ngunawal;
- The Wandandian; and
- The Wodi Wodi.

Today, the area is situated in the Pejar Local Aboriginal Land Council (LALC) boundaries.

The Quarry has been subject to previous detailed Aboriginal heritage assessment and excavation programs including historical research, archaeological assessment and artefact analysis. These previous studies at the Quarry and the surrounding area have documented an Aboriginal archaeological record consisting of frequent and sometimes dense stone artefact sites.

The Quarry has an Aboriginal Management Committee (AMC), which provides advice and assistance with regards to Aboriginal heritage matters as governed by the *Peppertree Quarry Aboriginal Heritage Management Plan*.

The terrain of the proposed footprint of the Southern Overburden Emplacement is predominantly flat with some gently undulating areas and steeper areas towards the east, at the heads of drainage lines that form tributaries of Barbers Creek. The study area has experienced moderate disturbance from agricultural practices, clearing of vegetation and the activities of the nearby Limestone Mine. Post deposition factors such as land clearing, cattle grazing and quarrying activities may have disturbed stone artefacts. Disturbance would have resulted in the displacement of Aboriginal objects within the soil but would not fully diminish their archaeological and cultural value. Erosion also has the potential to more significantly displace Aboriginal objects through sheet wash and gully erosion, particularly on slopes and crests near watercourses.

The study area has a number of different landscape factors which influences the potential for Aboriginal sites to be identified. A number of drainage lines exist within the vicinity of the proposed Southern Overburden Emplacement, however all are located adjacent to moderate or steep slopes and the ridgelines of the Barbers Creek gorge. These steeper slope landforms are less likely to contain Aboriginal artefacts, despite their proximity to watercourses. Aboriginal sites from these environments are usually isolated finds, which do not indicate the presence of archaeological deposit. Culturally modified trees, while rare, have been previously identified and may remain if trees of a suitable age have been retained in the landscape.

Previous Investigations at Peppertree Quarry

An Aboriginal Heritage Assessment was completed as part of the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006). The assessment identified 11 sites, comprising predominantly silcrete and quartz flakes and cores, within the Quarry footprint and a proposed water storage dam along Tangarang Creek. A recommendation was made for salvage excavation in areas along Tangarang Creek, which was subsequently completed in 2010.

As part of the requirements of the Project Approval and the *Peppertree Quarry Aboriginal Heritage Management Plan*, ERM undertook a large scale test and salvage excavation in 2010 - 2011 prior to the commencement of quarry activities (*Peppertree Quarry Archaeological Excavation Report* (ERM, 2012)).

The test excavation targeted high risk landforms across the Quarry area and sampled along linear transects. A total of ten test transects covered six landforms within the Tangarang Creek Dam area and another three outside this area. Test pits were located at 5m intervals along each transect. This resulted in the excavation of 103 test pits and a total of 2,089 artefacts recovered.

The areas determined for salvage excavation were based on the results of the test pits. Ten open area trenches were expanded and salvaged. These ten trenches were divided into four hills.

A total of 122m^2 of open excavation was undertaken with 20,956 artefacts excavated. During the open area excavation a number of high density artefact concentrations, hearths and ovens and a human burial were uncovered. The results of the salvage excavation identified seven domiciliary areas around high artefact concentrations, suggesting the varied and long term use of the area for habitation. Flakes dominated the assemblage, with backed artefacts, cores and retouched flakes also present. Seven types of raw material were present, dominated by silcrete, quartz, quartzite and chert. Chalcedony, basalt and granite artefacts were present in low numbers.

The occupation pattern from the excavations demonstrated that the preferred camping area was shallow hill slopes and hill tops associated with Tangarang Creek. Long term and frequent habitation by a large group is suggested by the relatively high technological diversity of artefacts, volume of artefacts and the presence of non-transportable items such as grinding stones. There was also evidence of a lack of initial manufacture stages across the Quarry site and suggests that initial reduction of material may have occurred in another area. Accordingly, the tools located in the Quarry site indicate that they are the result of later stages of tool manufacture and tool maintenance. It was also considered possible that the area was used as a trading or ceremonial location, considering the size and type of artefacts recovered and the location of the Quarry site at the boundaries of four Aboriginal clan groups.

Aboriginal Heritage and Information Management System (AHIMS)

An extensive search of the AHIMS register was conducted as part of the AHHIA on 2 February 2016 for an area approximately 10 km by 10 km and covering the Quarry site. The search area was sufficient to define the pattern of previously recorded sites in the

landscape. The AHIMS search results are summarised in **Table 20** and presented in Appendix B of the AHHIA.

A wide variety of Aboriginal site types and their distribution across multiple landforms are represented in the search results, with a total of 112 Aboriginal sites identified within the search area. The most common Aboriginal site types were isolated finds and open camp sites which made up over 90% of the total sites in the region. A small number of culturally modified trees and stone arrangements were also present, while one rock shelter with art was also identified.

Table 20: AHIMS registered sites in the search area

Site type	Number of sites	Percentage
Isolated find	49	44%
Open camp site	54	48%
Quarry	1	1%
Shelter with art	1	1%
Culturally modified tree	5	4%
Stone arrangement	2	2%
Total	**112**	**100%**

Out of the 112 Aboriginal sites identified, one site, MQ25 (52-4-0297) was recorded within the proposed footprint of the Southern Overburden Emplacement. MQ25 was categorised as an isolated find, which had been previously collected.

A number of sites were also located within the Peppertree Quarry consent boundary (refer to Figure 3.1 in **Appendix E**). Most of these sites have been removed in the previous salvage excavation program with17 remaining conserved *in situ*. None of these remaining Aboriginal sites are located in close proximity to, or have the potential to be impacted by, the proposed Southern Overburden Emplacement.

Aboriginal Survey

An archaeological survey of the study area was undertaken by EMM, Boral and members of the AMC on 2 July 2015.

The survey covered all areas of impact associated with the proposed Southern Overburden Emplacement, which have not been surveyed as part of previous Aboriginal investigations for the Quarry. A total of 10 transects were walked across the study area covering a total length of approximately 4.7 km, and an area of approximately 6,336m^2. The ground was visually inspected in detail with a focus on soil exposures, while all mature trees were inspected for scars of Aboriginal origin and areas of exposed granodiorite were inspected for grooves.

The degree of disturbance across the study area was generally low. The majority of the area comprised of cleared grassed paddocks resulting from historic vegetation clearance, which may have slightly displaced Aboriginal objects within the soil matrix without fully diminishing their archaeological and cultural value.

Aboriginal Sites

One Aboriginal site was identified during the survey (**Figure 13**). The site (MQ120) was a culturally modified tree (scarred tree) identified on a ridge landform (refer to photographs 6.1 – 6.3 of the AHHIA, **Appendix E**).

Site MQ120 is deemed to have moderate integrity. Culturally modified trees are rare in the landscape due to large scale land clearing. The scar itself is of moderate research potential and educational value with one scar visible. The site is of moderate scientific significance.

Archaeological Sensitivity

The area around the Quarry has been shown to contain large numbers of Aboriginal sites and objects. Detailed information on the sub-surface assemblage has been collected in previous large scale excavations. This information was used alongside the field data to ascertain archaeological sensitivity for the proposed footprint of the Southern Overburden Emplacement and guide recommendations for management.

Archaeological sensitivity is divided into three categories; low, moderate and high, based on the likelihood of sub-surface Aboriginal artefacts being present. Low represents no potential for artefacts to be present, while high represents the highest likelihood that subsurface Aboriginal artefacts will be present.

The landscape of the proposed Southern Overburden Emplacement is considered to have areas of moderate and low archaeological sensitivity. As noted in the predictive model (refer to Section 5.3 of the AHHIA, **Appendix E**), the landscape of the study area contains watercourses, moderate and steep slopes, some areas of gentle slopes and a ridgeline overlooking the Barbers Creek gorge. The emplacement area itself is located on a ridge, with different slope gradients throughout.

Generally, ridgelines are considered to be travel routes or areas used for short-term events, with areas near reliable watercourse, such as Tangarang Creek, providing more suitable areas for long term habitation. However, the ridge itself contains an area of gentle slope, which may be suitable as a camping location considering the proximity to watercourses. As a result, areas within the proposed Southern Overburden Emplacement of between 0 and 10 degrees of slope, within 100 m of a watercourse, are considered to be of moderate archaeological sensitivity (refer to **Figure 13**).

6.5.2 Impact Assessment

The creation of the Southern Overburden Emplacement will include the hauling of overburden from the Quarry pit and the progressive deposition of overburden material within the emplacement area. Topsoil would not be stripped within the proposed Southern Overburden Emplacement area. Overburden will be placed within the proposed Southern Overburden Emplacement area following the method currently approved and used in the development of the existing Eastern Overburden Emplacement.

One scarred tree (MQ120) was recorded outside the Southern Overburden Emplacement disturbance footprint and will not be impacted by the Project. One known Aboriginal site (MQ25) is recorded on AHIMs as being located within the proposed footprint of the Southern Overburden Emplacement. However, this site has been previously destroyed through collection (see AHIMS register in the AHHIA, **Appendix E**).

The modification will also impact an area of moderate archaeological sensitivity. The Southern Overburden Emplacement therefore has the potential to result in disturbance to previously unidentified Aboriginal sites through the compaction of topsoil during the emplacement of overburden. Buried Aboriginal objects, if they exist, have the potential to be compacted, disturbed and moved a short distance during overburden emplacement, resulting in a loss of context and spatial patterning.

Recent investigations on the short term impacts of emplacement areas, in cases where the topsoil is not stripped prior to emplacement, indicate that archaeological deposits beneath emplacements would degenerate and devalue over time, as bioturbation causes the stockpile soils to mix with the archaeological deposit (KNC, 2012 and 2013). This loss of a secure context could reduce the scientific value of a site. However, the overall archaeological significance rating and scientific value of the study area is low. Therefore, the

potential degeneration of unidentified archaeological deposits, buried beneath the proposed Southern Overburden Emplacement is unlikely to have a material effect on the scientific (archaeological) value of the study area.

The landscape in which the Southern Overburden Emplacement is proposed (ridgeline) has been previously investigated in excavations for the Quarry, Limestone Mine and throughout the wider Southern Tablelands region. These results have found that areas of ridgelines generally contain artefact densities of less than five artefacts per square metre and a low background scatter of artefacts. These areas have been adequately tested and the information from previous excavations can be extrapolated to the study area, where it is highly likely that similar low density scatters may be present. The study area would therefore not be able to provide information additional to what has been uncovered in the region, particularly the approved Quarry disturbance area, which has been subject to detailed archaeological investigation and which has provided a comprehensive picture of the Aboriginal archaeological landscape.

The proposed Southern Overburden Emplacement is therefore unlikely to result in significant impacts on Aboriginal heritage sites of archaeological significance.

Cumulative Harm

The potential for unavoidable harm to Aboriginal objects is acknowledged as a result of the proposed Southern Overburden Emplacement. The impacts to Aboriginal heritage in the Southern Tablelands region are not substantial, as the current balance at the Quarry between preservation of some areas of Aboriginal sites and landscapes ensures that harm is only partial across the Quarry area and retains some of the most significant sites identified. It does not represent a total loss of the Aboriginal archaeological records in the area and any unidentified Aboriginal sites that are potentially impacted, are predicted to continue outside the study area.

Consultation with the Aboriginal Community

In compliance with Condition 32 of the Project Approval for the Quarry, the *Peppertree Quarry Aboriginal Heritage Management Plan* was prepared and subsequently approved. This Plan details management procedures for Aboriginal heritage within the development area and continuing consultation with the Aboriginal community. This Plan establishes an AMC, comprising representatives of Aboriginal stakeholders previously involved with Aboriginal investigations at the site. Members of the AMC include Pejar LALC, Buru Ngunawal Aboriginal Corporation and Ngunawal Heritage Aboriginal Corporation.

An introductory letter was sent to all AMC members on 10 June 2015. It provided details of the proposed assessment and survey method and invited the AMC members to provide advice on cultural heritage values and participate in the field survey for the site. The members of the AMC were provided with 20 days to respond. No comments were received on the survey method or potential cultural heritage values of the site.

As outlined previously, members of the AMC attended the field survey on 2 July 2015.

The draft AHHIA report was sent to AMC members on 5th February 2015 to provide feedback on the Aboriginal heritage assessment findings and the proposed management measures. No comments relating to the draft report have as yet been received.

6.5.3 Mitigation Measures

The AHHIA recommended the following management measures in addition to those currently being implemented within the approved *Peppertree Quarry Aboriginal Heritage Management Plan*:

- Aboriginal site MQ120 is to be fenced and avoided during the development of the Southern Overburden Emplacement;

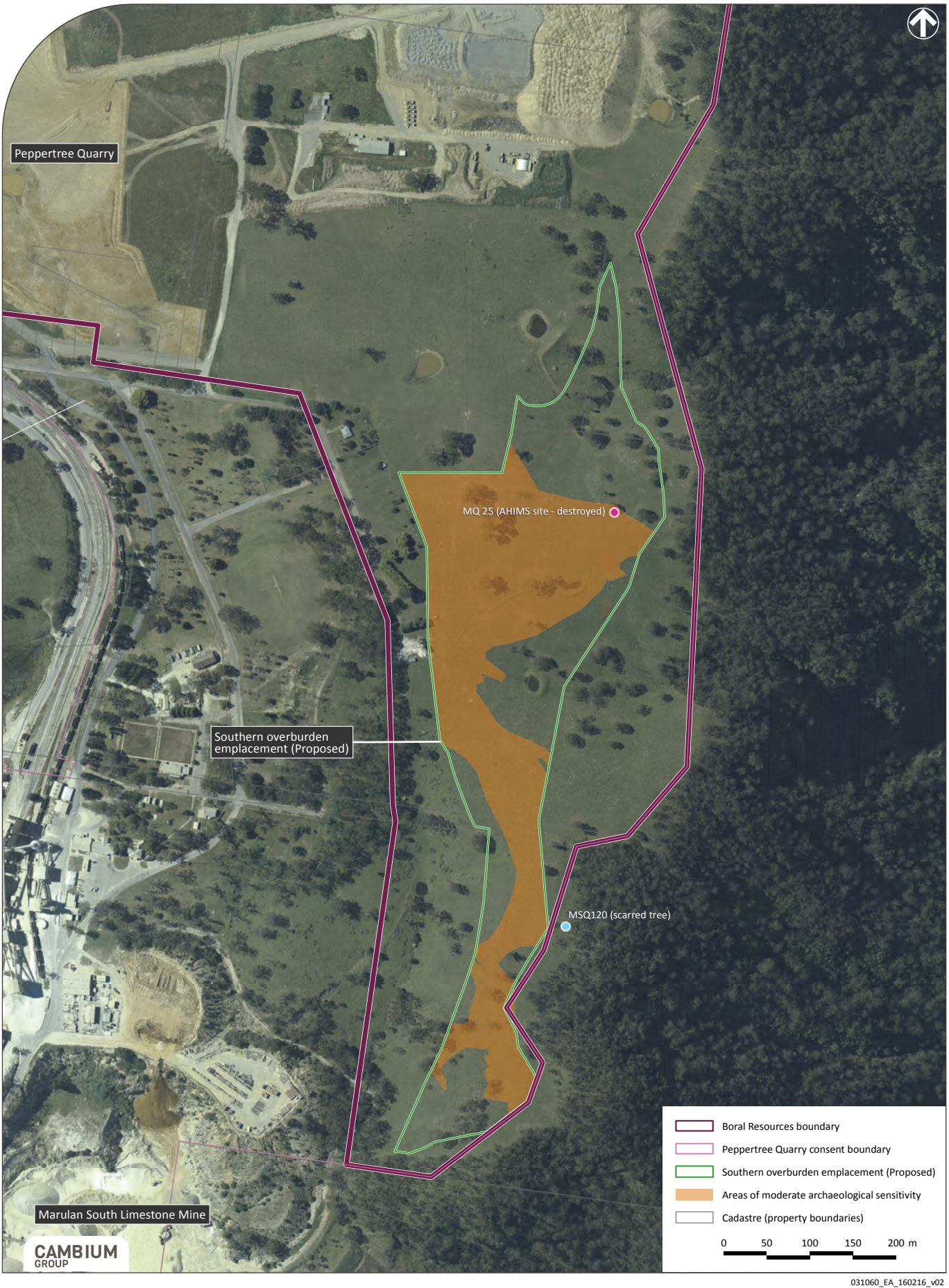
- The existing *Peppertree Quarry Aboriginal Heritage Management Plan* is to be updated to include the results of the AHHIA and the management recommendations.

Incorporation of these recommendations will minimise the potential for the proposed modification to result in impacts to known and unidentified Aboriginal objects or sites.

As required by Schedule 5, Condition 7 of the Project Approval, the proposed revisions to the *Peppertree Quarry Aboriginal Heritage Management Plan* will be undertaken within three months of a notice of approval and submitted to DP&E for endorsement.

FIGURE 13
Aboriginal heritage sites and areas of archaeological sensitivity
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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6.6 Surface Water

The proposed Southern Overburden Emplacement will result in a temporary increase in the extent of exposed soil surfaces. Without appropriate design and control, this overburden emplacement has the potential to contribute additional sediment loads and impact both the quality and quantity of water discharged to tributaries, Barbers Creek and the Shoalhaven River.

A Surface Water Assessment (SWA) has therefore been undertaken by Advisian Pty Ltd (**Appendix F)**, to assess these potential impacts on drainage systems downstream of the proposed Southern Overburden Emplacement.

The SWA also includes a determination of neutral or beneficial effect (NorBE) on water quality, in accordance with the requirements of the *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*.

6.6.1 Existing Environment

The Quarry is located within the Shoalhaven River Catchment in the Southern Tablelands of New South Wales. Barbers Creek is a tributary of the Shoalhaven River (a drinking water supply) and is located immediately to the east of the Quarry. The Quarry is situated toward the edge of a plateau, and adjacent to steep gullies that plunge into the ravine of the Barbers Creek system.

Existing Surface Drainage

The proposed new Southern Overburden Emplacement is located on a ridge above the Barbers Creek gorge.

A series of small catchments ranging in size from approximately 1 ha to 7 ha drain the eastern parts of the ridge into small ephemeral tributaries of Barbers Creek.

The western side of the ridge drains to another ephemeral drainage line that flows in a southerly direction into the north pit of the Limestone Mine. This drainage line has a catchment area of approximately 20 ha.

All drainage lines on either side of the ridge are first order streams as per the Strahler Stream Order system.

Barbers Creek adjacent to the proposed emplacement is a fifth order stream and has a catchment area of approximately 90 km^2.

Existing Quarry Water Management

Surface water within the Quarry site is managed in accordance with the *Peppertree Quarry Water Management Plan* (ERM, 2011). The surface water management system includes a number of sediment basins that capture stormwater runoff from disturbed areas (overburden emplacements, haul roads and processing plant) which is then directed northwards (through pumping or gravity flow) into Tangarang Dam.

The layout of the drainage system for the existing Quarry is outlined within Figure 3.2 of the SWA (**Appendix F**). Select catchments drain to the Quarry pit from where water is either used for dust suppression purposes, or pumped to Tangarang Dam, which acts as a supplementary water supply dam for the Quarry and as required by the Project Approval, provides environmental flow downstream of the dam equivalent to at least 10% of the average daily flow.

Tangarang Dam is located on the main ephemeral creek, Tangarang Creek, which flows along the northern edge of the Quarry site to Barbers Creek approximately 500 m to the east of the Quarry. Upstream of the dam, Tangarang Creek is a fourth order stream with a

catchment area of about 615 ha. Barbers Creek flows into the Shoalhaven River approximately 6.5km downstream of the Quarry and 30km upstream of Tallowa Dam, which supplies water resources to the Sydney and Illawarra drinking water systems.

Other catchments within the Quarry site drain to a series of small sediment dams, mainly located on the outer edge of the northern noise bund, or the eastern side of the Eastern Overburden Emplacement. These dams drain either to Tangarang Creek or Barbers Creek.

Rainfall

The collection of continuous weather records at the Boral's Marulan South operations commenced in 2005. However, the Bureau of Meteorology (BoM) daily rainfall records provide a more comprehensive record of the long term climate of the area. The rainfall statistics from daily rainfall records (1883 - 2014) are summarised in Table 3.1 of the SWA. These records are predominantly sourced from the Bureau of Meteorology (BoM) weather station situated at Marulan (George Street).

The statistics show that average annual rainfall in the vicinity of the Quarry is approximately 696 mm. Peak precipitation occurs in the summer months, with lower rainfall in winter. On average, January and February are the wettest months of the year and August is the driest.

For purposes of the SWA, the key rainfall characteristics are:

- Rainfall intensity (for purposes of the design of water conveyance structures); and
- Five day rainfall as set out in Table 6.1 of *Managing Urban Stormwater: Soils and Construction: Volume 2E Mines and Quarries* (DECC, 2008), for the purposes of designing the runoff storage capacity of sediment basins.

Rainfall Intensity

In 2013, BoM updated rainfall frequency-duration-depth data that was originally published in 1987. For the purposes of assessing the required capacity of structures to convey peak flows, rainfall frequency, duration and depth figures from the 2013 BoM data have been used. Relevant aspects of this data applicable to the design of site water conveyance structures is summarised in Table 3.2 of the SWA.

Five Day Rainfall

For the purposes of determining the required sediment storage capacity, the proposed sediment basins have been provisionally sized to comply with the requirements for capture of fine and dispersive sediments, as set out in Table 6.1 of *Managing Urban Stormwater: Soils and Construction: Volume 2E Mines and Quarries* (DECC, 2008). The Table specifies the adoption of the 95th percentile rainfall as the basis for sizing sediment basins that would overflow into 'sensitive' environments.

Table 3.3 of the SWA lists the 95th percentile rainfall depths for various durations for Mittagong and Goulburn (as set out in Table 6.3 of *Managing Urban Stormwater: Soils & Construction – Volume 1*). The value for Marulan South has been derived on the basis of the relative proximity of the Quarry to Mittagong and Goulburn.

Surface Water Quality

Monitoring Site Locations

Boral maintain a comprehensive environmental monitoring network within and surrounding the Quarry and the Limestone Mine.

Water quality monitoring has occurred at Tangarang Creek since February 2012. Additionally, baseline creek surface water quality monitoring has been undertaken for the Limestone Mine on a monthly basis since July 2014. The location of the existing monitoring

sites are presented in **Figure 6.** Further details of those monitoring sites relevant to this assessment are outlined in Section 3.4.1 of the SWA (**Appendix F**) and include:

- Barbers Creek downstream of the Tangarang Creek confluence; and
- Marulan Creek which is a tributary of Barbers Creek located to the north (upstream) of Tangarang Creek. Marulan Creek provides additional data showing the typical runoff quality from the open grazing land on the plateau to the west of Barbers Creek from which both Marulan Creek and Barbers Creek drain.

In addition, routine monthly monitoring has been undertaken at three locations in the Shoalhaven River (designated SR1, SR2 and SR3).

Creek Water Quality

Section 3.4.2 of the SWA (**Appendix F**) provides a summary of the average data for the key water quality analytes recorded at the monitoring sites relevant to this assessment.

Key water quality statistics from the various monitoring locations are compared to the relevant *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000) default trigger values for ecosystems (refer to Table 3.7 and Table 3.8 in Section 3.4.2 of the SWA, **Appendix F**).

The monitoring results indicate that water quality downstream from the Quarry (two sites in Barbers Creek) is significantly better than the water quality upstream of the Quarry (Marulan Creek). It is therefore considered that there is no evidence that the Quarry is adversely impacting the water quality in Barbers Creek.

6.6.2 Impact Assessment

Water Management System

A water management system has been devised for the proposed Southern Overburden Emplacement area and includes appropriately designed and managed landforms, conveyance systems and sediment basins.

The proposed system would follow the same general principles as have been approved for the existing Quarry as set out in the *Peppertree Quarry Water Management Plan*, including:

- Constructing sediment basins at the locations on the eastern side of the emplacement where runoff would drain to Barbers Creek. These basins would be sized to comply with the requirements for basins that discharge to 'sensitive' receiving environments in accordance with Table 6.1 in *Managing Urban Stormwater: Soils & Construction, Volume 2E – Mines and Quarries* (DECC, 2008);
- Operation of the sediment basins to restore the 'capture capacity' of each basin within 5 days of the end of a storm event either by re-use of the water for dust suppression or irrigation, or transfer of the water to the Quarry pit, from where water would be managed in accordance with the *Peppertree Quarry Water Management Plan*; and
- Sediment control fencing on the western side of the emplacement where runoff will drain to the northern pit of the adjacent Limestone Mine.

Proposed Southern Overburden Emplacement Area Drainage Scheme

The proposed drainage arrangements for the Southern Overburden Emplacement follow the same principles as currently employed at the Eastern Overburden Emplacement, which is nearing completion. As shown in **Figure 14**, runoff would be directed as follows:

- Catchments A, B and C would drain eastwards to three small sediment basins that would overflow to existing drainage lines that drain to Barbers Creek;

- Catchments D and E would drain overland to an existing drainage line that drains towards the north pit of the Limestone Mine; and
- Catchment F would drain overland towards the Quarry pit.

Table 20 summarises the catchment areas and the provisional sizing of the sediment basins in accordance with the requirements of *Managing Urban Stormwater: Soils & Construction, Volume 2E – Mines and Quarries*. The required capacity of each basin is based on the 5 day rainfall of 52.8 mm (refer to Table 3.3 of the SWA) and a volumetric runoff coefficient of 0.72 based on the data in Table F2 of *Managing Urban Stormwater: Soils & Construction – Volume 1* (Landcom, 2004). The required basin volume specified in **Table 21** includes an allowance for 50% additional storage for sediment. For the purposes of providing indicative water storage areas, an average depth of 2 m has been assumed for the sediment basins in Catchments A, C, D and E, and an average depth of 3 m has been assumed for the sediment basin capturing surface runoff from Catchment B.

Table 21: Sediment Basin Capacity Requirements

Catchment	Catchment Area (ha)	Basin Volume (Megalitres)	Average Depth (m)	Water Area (m^2)
A	1.7	0.8	2.0	400
B	3.8	1.8	3.0	600
C	1.2	0.6	2.0	280
D	1.6	-	-	-
E	2.8	-	-	-
F	1.7	-	-	-

As shown in **Figure 14**, the western side of the proposed Southern Overburden Emplacement (Catchments D and E) would drain to a drainage line that currently discharges to the north pit of the Limestone Mine. Because this drainage line discharges into the north pit, there is no necessity for sediment basins at this location. However, a sediment fence would be provided along the toe of the Southern Overburden Emplacement and runoff would be allowed to drain as overland flow through the existing grass between the emplacement and the drainage line.

Catchment F would drain overland towards the Quarry pit (consistent with the existing drainage arrangements for the Quarry.

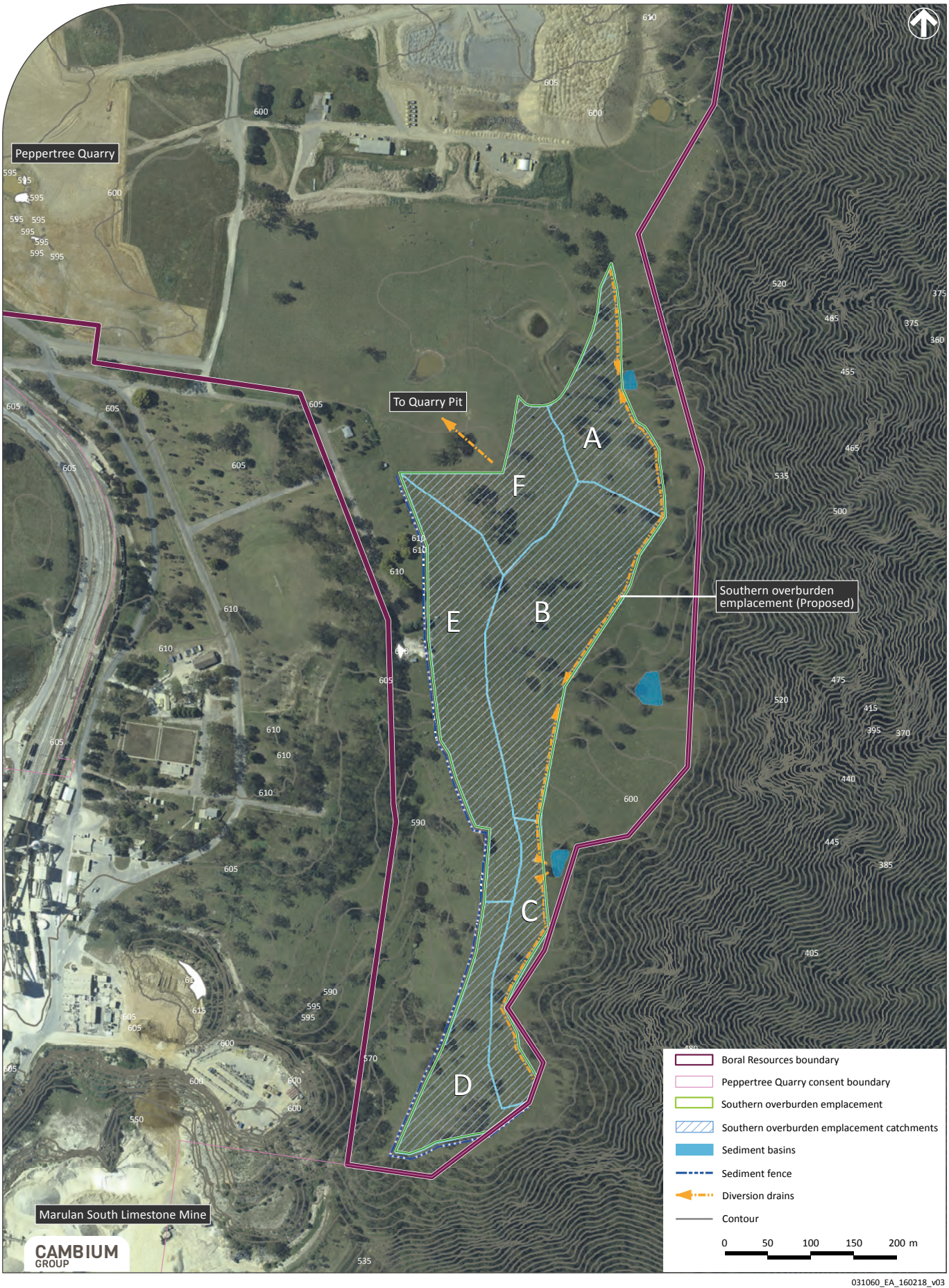
Runoff Diversion Channels and Spillways

All diversion channels and sediment basin spillways will be designed to be stable when carrying runoff from the 1 in 100 year Average Recurrence Interval (ARI) storm for the time of concentration of each catchment (as specified in Table 6.1 of *Managing Urban Stormwater: Soils & Construction, Volume 2E – Mines and Quarries).*

Because of the natural topography of the proposed alignment of the diversion drains (**Figure 14**), channel slopes range from 2.5% to 15% in places. Due to the relatively steep grades in some sections, scour protection and energy dissipation structures may be required in some locations. The channel cross sections and the areas requiring scour protection would be determined during detailed design, in accordance with the requirements of *Managing Urban Stormwater: Soils & Construction – Volume 1* and would be included in the revision of the *Peppertree Quarry Water Management Plan*.

FIGURE 14
Proposed surface water management concept
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



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Sediment Basin Operation

As required in *Managing Urban Stormwater: Soils & Construction, Volume 2E – Mines and Quarries,* the sediment basins along the eastern side of the Southern Overburden Emplacement will be operated so as to ensure that the runoff capture capacity of each basin is restored within 5 days of the end of a storm.

The runoff capture capacity of the basins will be restored by either:

- Re-use of water for dust suppression or irrigation to assist with vegetation establishment; or
- Transfer to the Quarry pit via a pipe laid under the emplacement.

The majority of slopes on the outside of the Northern Noise Bund and Eastern Overburden Emplacement are now fully rehabilitated and no longer require active management of the associated sediment basins. As such, the volume of water directed into the Quarry surface water management system from the proposed sediment basins surrounding the Southern Overburden Emplacement (in addition to Catchment F, if required) would be within the operating bounds of the existing Quarry surface water management system, as set out in the *Peppertree Quarry Water Management Plan.*

Land Disturbance

Land disturbance prior to the placement of overburden would be undertaken in accordance with the procedures set out in the *Peppertree Quarry Water Management Plan* and the *Peppertree Quarry Landscape and Rehabilitation Management Plan.* Principally this would involve progressive strategies, including:

- Disturbance of the minimum area necessary for the proposed phase of work;
- Installation of sediment fencing down-slope of any proposed disturbance;
- Construction of diversion channels and sediment basins; and
- Pre-clearance surveys and vegetation clearing in accordance with the procedures set out in the *Peppertree Quarry Landscape and Rehabilitation Management Plan*.

Rehabilitation

Rehabilitation of the proposed Southern Overburden Emplacement would be undertaken progressively as each section of the emplacement is completed. The rehabilitation would be undertaken in accordance with the *Peppertree Quarry Landscape and Rehabilitation Management Plan*.

Decommission of Sediment Basins

Once vegetation rehabilitation has achieved the required surface cover to reduce the erosion rate to negligible, active management of the sediment basins would no longer be required. Sediment basins could either be retained and allowed to overflow after rainfall, or demolished and the storage area rehabilitated.

Because of the risk of further erosion as a result of runoff flowing through the area of the former sediment basins, retention of the sediment basins is preferred.

Surface Water Impacts

Surface Water Flow

The steep slopes and exposed surface of the emplacement can be expected to result in increased rates of runoff compared to the existing conditions. However, the flow downstream of the sediment basins will be moderated by the volume captured in the basins. As indicated in Table 6.2 of *Managing Urban Stormwater: Soils & Construction, Volume 2E*

– *Mines and Quarries,* sediment basins designed to capture runoff from the 95th percentile 5 day rainfall can be expected to overflow 2 to 3 times per year. Therefore, whilst ever the proposed sediment basins are actively managed, the flow regime in the small tributaries draining towards Barbers Creek can be expected to experience a more ephemeral flow regime than under current conditions.

Once the emplacement area is fully rehabilitated and the sediment basins are no longer actively managed, a relatively natural flow regime would be restored, similar to existing conditions.

Surface Water Quality

The diversion drains and sediment basins proposed would be constructed and operated in accordance with the requirements for basins that discharge to 'sensitive' downstream environments. Relatively few overflow events can be expected each year on average, and these would only occur after particularly heavy rainfall events that exceed the design capacity of the basins and when significant runoff can be expected from other parts of the landscape.

Once the overburden emplacement area has been re-vegetated, the erosion rate would be minimal and comparable to natural erosion processes, and the quantity of sediment discharge into the downstream drainage systems can be expected to be comparable to the existing undisturbed landscape. This has been the experience on site to date.

As a result, no significant adverse water quality impacts are expected.

The proposed design and operating standard for the sediment basins is consistent with the objective of achieving neutral or beneficial effect of water quality (NorBE) as required under *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*.

Cumulative Impacts

The existing water quality data outlined previously indicates that the existing operations of the Quarry are not resulting in any significant adverse impacts on the water quality downstream in Tangarang Creek or Barbers Creek.

Based on the results of historic water quality monitoring data combined with the proposed surface water management system, the proposed Southern Overburden Emplacement is unlikely to result in significant adverse cumulative impacts on surface water quality and flow in the surrounding drainage systems.

Approvals and Licences

Water Act 1912 & Water Management Act 2000

The aim of the *Water Management Act 2000* (WM Act) is to provide for the sustainable and integrated management of water sources of NSW, for the benefit of both present and future generations, and defines rules for management of surface water and groundwater in NSW.

The *Water Act 1912* and the WM Act contain provisions for the licensing of water capture and use. If any dams are proposed as part of the water management system, consideration must be given to whether the dams need to be licensed.

Water Extraction License requirements

The *Water Act 1912* and WM Act are administered by the NSW Department of Primary Industries (Water). Under the WM Act, a permit and/or license must be obtained to extract water not covered by a Water Sharing Plan designated under the Act.

Water Sharing Plans (WSPs) establish rules for sharing water between river environmental needs and water users. The Quarry is located within the area of the Greater Metropolitan Region Unregulated Area WSP and three surface water sources within the WSP as follows:

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

The Quarry is located within the Barbers Creek Management Zone and has a Water Access Licence to extract up to 145 megalitres of surface water from Tangarang Creek per year (Licence Number 10SL056926).

The SWA has determined that no amendment to the existing Water Access Licence would be required for the development of the Southern Overburden Emplacement and revised surface water management system for the Quarry. As a result, the proposed modification to the existing Project Approval would not trigger the requirement to modify the existing licence under the WM Act, or seek additional licences.

Harvestable Rights

Under the WM Act, landholders have the right to capture and use 10 per cent of the average regional yearly rainfall runoff from their property. This is known as the harvestable right and corresponds to the maximum dam capacity for the property.

A license would be required under Part 2 of the WM Act if it is intended to extract water from a creek system, or from dams with capacities above the harvestable rights order.

Clause 91B of the WMA lists offences for constructing or using water supply work without, or otherwise than as authorised by, a water supply work approval. Clause 36 of the Water Management (General) Regulation 2011 provides exemptions for both construction and use of certain classes of water storage structures as set out in Schedule 1 of the Regulation.

Schedule 1(3) of the *NSW Water Management (General) Regulation 2011* provides for the following exclusion; "*Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with the best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.*"

There is no restriction on the use of water from dams that comply with this provision. These provisions are applicable to any erosion and sediment control basins constructed to control runoff from overburden emplacements until such time as the vegetation has established to the point when sediment runoff is minimal.

All sediment basins associated with the proposed modification will be constructed and operated for the purposes of sediment control and are therefore excluded from the requirements of the harvestable rights order and do not require licensing under the WM Act.

6.6.3 Mitigation Measures

Prior to the emplacement of overburden within each of the proposed Southern Overburden Emplacement catchment areas, the following surface water management measures would be implemented:

- Proposed sediment basins would be constructed between the toe of the emplacement and the development consent boundary;
- Diversion drains would be constructed to direct surface water runoff from the emplacement into the sediment basins; and
- Sediment fencing would be installed down-slope of any proposed disturbance, where surface water runoff from that area of disturbance is not diverted to either a sediment basin or the Quarry pit;

During overburden emplacement, the area of disturbance must be limited to the minimum area necessary for the proposed phase of work.

Rehabilitation of the proposed Southern Overburden Emplacement would be undertaken progressively as each section of the emplacement is completed. The rehabilitation would be undertaken in accordance with the approved *Peppertree Quarry Landscape and Rehabilitation Management Plan*.

On completion of the Southern Overburden Emplacement and associated rehabilitation, sediment basins capturing surface water runoff from this emplacement could either be retained and allowed to overflow after rainfall, or demolished and the storage area rehabilitated. Because of the risk of further erosion as a result of runoff flowing through the area of the former sediment basins, retention of the sediment basins is recommended.

Sediment basins constructed to capture surface runoff are likely to lead to a temporary change in the flow regime in three small creeks on the eastern side of the emplacement during development and rehabilitation. Once rehabilitation is complete, the flow regime in these creeks is expected to return to conditions similar to current.

The proposed design and operating standard for the proposed sediment basins is consistent with the objective of achieving neutral or beneficial effect of water quality (NorBE) as required under *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011*. No adverse impacts are expected on the water quality in Barbers Creek or the Shoalhaven River.

Given this, and the demonstrated performance of existing operations via the implemented water quality monitoring regime, it is considered that the continued implementation of the *Peppertree Quarry Water Management Plan*, *Peppertree Quarry Landscape and Rehabilitation Management Plan* and associated management measures would be adequate to manage potential erosion, sedimentation or water quality impacts which would arise from activities associated with the modification.

The surface water monitoring program, as dictated by the Project Approval conditions, *Peppertree Quarry Water Management* Plan and Environment Protection Licence would continue to be implemented and reported as per existing requirements.

The *Peppertree Quarry Water Management Plan* would be updated to incorporate the findings of the SWA undertaken as part of this EA and the recommended additional management strategies including construction of additional sediment basins and diversion structures.

As required by Schedule 5, Condition 7 of the Project Approval, the proposed revisions to the *Peppertree Quarry Water Management Plan* will be undertaken within three months of a notice of approval and submitted to DP&E for endorsement.

6.7 Visual Amenity

It is evident that the landscape around the Quarry generally has a high visual absorption capacity due to the existing terrain and scattered vegetation. The high visual absorption capacity corresponds directly with the generally low significance of visual impacts to views of the Quarry site.

Although the proposed Southern Overburden Emplacement is predominantly sheltered from view from most nearby sensitive receivers due to the natural topography and vegetation, it has the potential to be visible from private residences along Long Point Road to the north-east, by recreational visitors to Long Point Lookout in Morton National Park to the east and the Bungonia Lookdown, within the Bungonia National Park to the south. The proposed modification therefore has the potential to impact on the visual amenity and views of local receivers.

A Visual Impact Assessment (VIA) has therefore been prepared by Richard Lamb & Associates Pty Ltd (**Appendix G**) to assess potential impacts to visual amenity associated with the modification, primarily associated with the proposed Southern Overburden Emplacement, but also considering night lighting from the proposed extension to in-pit operating hours.

6.7.1 Existing Environment

The Quarry is situated on the edge of a dissected plateau of the Southern Tablelands of NSW, which is locally drained to the east by Barbers Creek (a tributary of the Shoalhaven River) and to the north by Tangarang Creek (a tributary of Barbers Creek).

The Quarry is bordered to the south by the Limestone Mine, to the east by Morton National Park and by rural properties to the north and west. Surrounding land uses include mining, grazing, rural properties (including an agricultural lime manufacturing facility, fireworks storage facility, turkey farm) and rural residential. Rural residential properties are also located to the north-east of the Quarry along Long Point Road. These properties are separated from the Quarry by the deep Barbers Creek gorge. The Bungonia National Park and Bungonia State Conservation Area are located to the south of the Limestone Mine, across the deep Bungonia Creek Gorge.

The Quarry is in a secluded area and not exposed to high intensity public domain features with large numbers of potential viewers such as main roads or urban areas. It is a significant distance from the nearest highway (Hume Highway) and the nearest urban settlement (Marulan) and is not significantly exposed to either.

Access to the Quarry is provided by Marulan South Road, which is a public, but dead-end road leading to the Limestone Mine, the Quarry and the agricultural lime manufacturing facility. It is a minor rural road that provides access to a small number of private properties and commercial enterprises before entering what is predominantly Boral-owned land. There is no other public access to the immediate environment of the Quarry. East of the Quarry and across the Barbers Creek gorge is Long Point Road, a minor dead-end rural road that terminates in the carpark of the Long Point Lookout. It provides access to a small number of rural properties. Other rural roads that provide potential viewing places of the proposed Southern Overburden Emplacement from isolated locations are Jerrara Road, which leads to Bungonia to the south-west and Glynmar Road and Government Roads, both dead-end rural roads.

To the east and south the landscape is undeveloped and in a natural state in the Morton National Park and Bungonia State Conservation Area. In Bungonia National Park to the south, is the 'Bungonia Lookdown' area and lookouts. To the east, a track from the Long Point Lookout runs for a short distance south, after which it turns east to descend into the Shoalhaven River gorge. The Quarry is partly visible from the informal viewing places to the west of the established track.

Overall, the Quarry and sites of the proposed modification, are of very low visual exposure to the public domain, other than its exposure to adjacent natural landscapes in a portion of Morton National Park to the east.

Assessment Methodology

To assess the visual impacts that would be experienced by viewers, a view point analysis was conducted. This consisted of analysing the likely visual exposure of the proposed Southern Overburden Emplacement using topographic, cadastral and aerial images, then visiting the site and locality to ground-truth potential viewing places and situations. A selection of places were abstracted from the total number of potential viewing locations and situations for individual documentation and assessment. The key viewing locations included a number of public domain locations including those on roads, recreational areas and

lookouts, as well as the vicinity of a number of residential receivers. The location of the receivers and view points (VP) are shown in **Figure 15**.

The locations were selected to represent the kinds of viewers' experience of the proposed Southern Overburden Emplacement that would exist within the immediate area. Locations that represent the main kinds of viewing areas that would be affected were visited and photographed.

At each viewing place a series of observations and assessments were made, as documented for each viewing place in the Photographic Plates in Appendix 1 of the VIA and in the assessment sheets (Appendix 4) of the VIA. A variety of other locations were also visited to ascertain the extent of the visual catchment and the characteristics of the views towards the Quarry.

The VIA also included two and three dimensional (3D) terrain modelling and analysis and the preparation of photomontages to confirm the visibility of the Southern Overburden Emplacement in its final rehabilitated landform. **Figure 16** provides 3D vertical and oblique aerial views of the proposed Southern Overburden Emplacement for context, while **Figures 17** - **20** provide 3D rendered views with and without existing vegetation as well as photomontages showing the actual final view after rehabilitation.

The methodology used in the assessment of visual impacts associated with the proposed modification is outlined in detail within Section 2 of the VIA.

Visual Catchment

The potential total visual catchment associated with the proposed modification is small. The visual exposure to the private domain is limited to a small number of residential receivers and the maximum area of potential public domain exposure, although larger, contains few locations with potential views. The theoretic visual catchment extends toward the east to a medium range part of Morton National Park on the crest of a ridge that runs south for a short distance from the terminus of Long Point Road and to the south to the Bungonia Lookdown within Bungonia National Park.

Visibility is strongly influenced by the undulating topography, vegetation and clearing pattern and by the low exposure to formalised viewing situations such as roads, lookouts and public recreation areas. Although the potential area over which views may be possible in the Morton National Park is large, the number of places that would offer practical access to the views of the proposed Southern Overburden Emplacement would be small and typically restricted to small numbers of viewers, predominantly those visiting the Bungonia Lookdown or pursuing recreational activities such as hiking.

Visibility of the Southern Overburden Emplacement would also be constrained by distance, perspective effects and by intervening elements such as topography and vegetation. In general, other than medium distance parts of Morton National Park to the east at similar elevations, such as informal viewing places accessible from the Long Point track, views would be from locations significantly below the site in relative elevation. The situation of the existing disturbed area of the Quarry being below the horizon of the views means that there would be few opportunities to perceive significant visual effects of the Southern Overburden Emplacement from Morton National Park.

The visibility of the proposed modification is largely confined to the following public and private domain viewing locations.

Public Domain Locations

The modification is of overall low exposure to the public domain.

The few areas of the public domain (roads) that are exposed to views of any part of the existing Quarry are:

- Close range views from part of Marulan South Road immediately adjacent to Peppertree Quarry.
- Distant range views from a short section of Glynmar/Government Road to the west of the proposed Southern Overburden Emplacement; and
- Distant range views from an isolated section of Jerrara Road to the north-west of the proposed Southern Overburden Emplacement.

Other areas of the public domain that are exposed to views are confined to Morton National Park to the east and Bungonia National Park to the south, from which there is a distant view to the crest of the southern extent of the proposed Southern Overburden Emplacement. There are no other views from formal viewing locations (formed lookouts).

Informal lookouts and viewing places associated with tracks in Morton National Park include:

- The track from the Long Point lookout area to the east, in Morton National Park. The lookout itself has a view to the south-east which does not include the Quarry. The track itself runs south along the eastern side slope of a spur, from the carpark near the lookout to a point where it turns north and descends into the Shoalhaven River gorge. The track provides access to locations off the track to its west from which some partial views towards the Quarry are available.

Private Locations

Private locations identified as potential sensitive receivers include 17 residences on rural land (refer to **Figure 15**). It was determined after analysis of the 3D graphics and interpretation of the on-site photographs that of the 17 residential receivers, only two residential receivers (R10 and R15) were considered to have potential views of some part of the proposed Southern Overburden Emplacement, the most substantial of which was predicted to be from R15 (refer to **Figures 17** and **18**).

Commercial Receiver Locations

Two of the closest commercial receivers C2 and C3 were visited and the views photographed, documented and compared to the three dimensional modelling conducted as part of the VIA. A potential future dwelling site proposed on the same property as Receiver C2 (refer to PR on **Figure 15**) was also assessed.

Boral Owned Receivers

Seven residences have been identified as being owned by Boral. As the residences are associated with the Quarry, they were not visited and the views have not been documented. Three dimensional graphics were prepared for a selection of Boral owned residences, however these indicate that with the exception of Receiver B2, these residences would typically also have low visual exposure to the Southern Overburden Emplacement.

FIGURE 15
View point location plan
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4

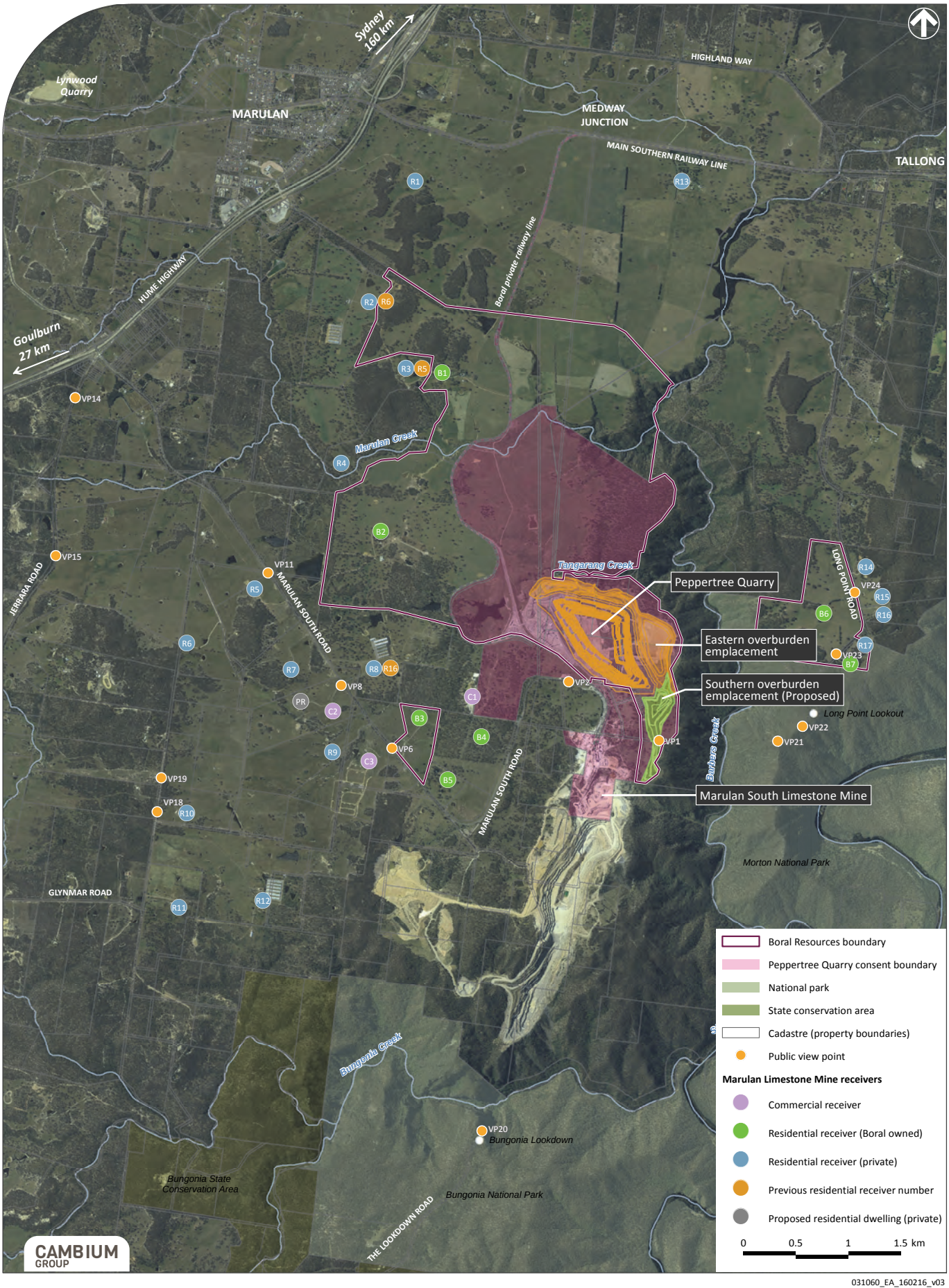

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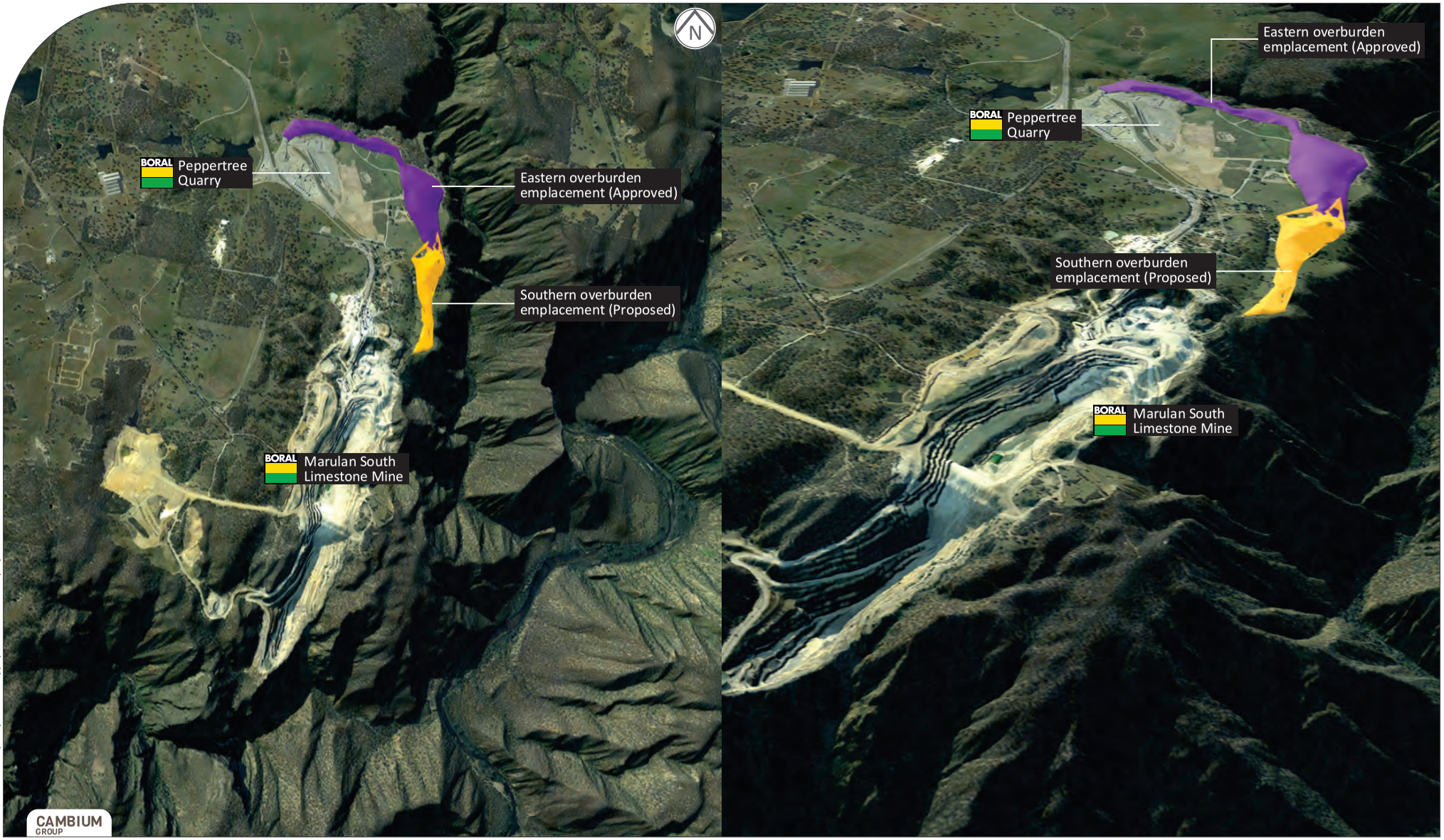
FIGURE 16
3D views of proposed project landform
ENVIRONMENTAL ASSESSMENT

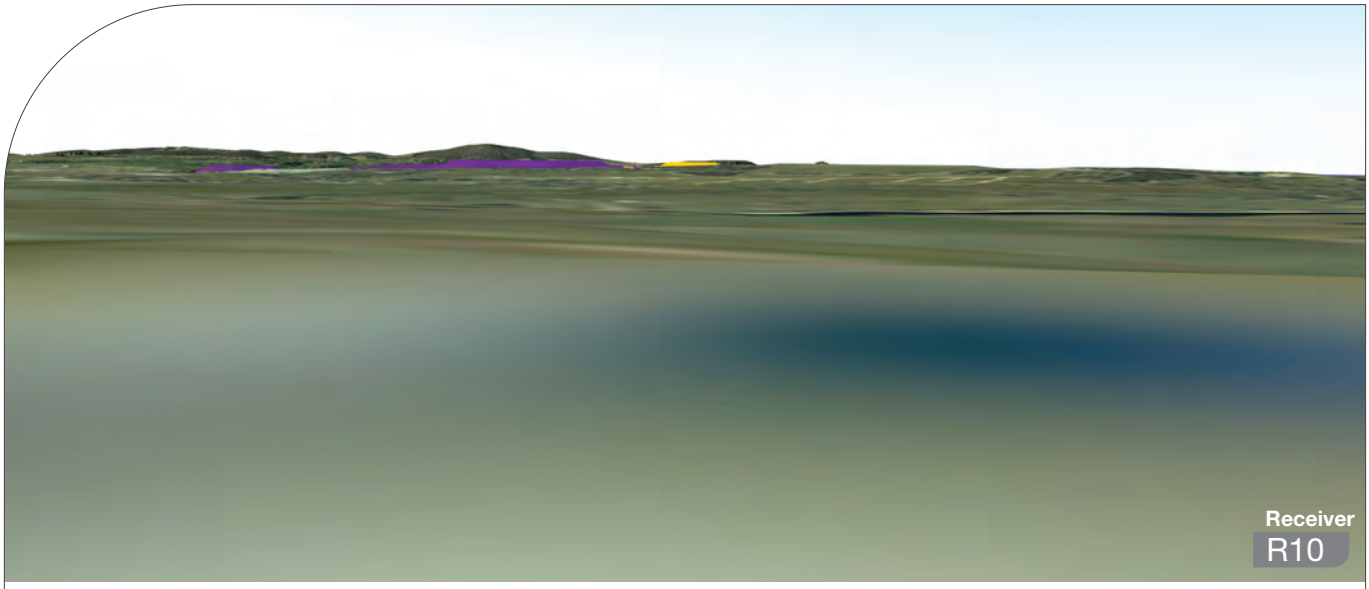
PEPPERTREE QUARRY MODIFICATION 4



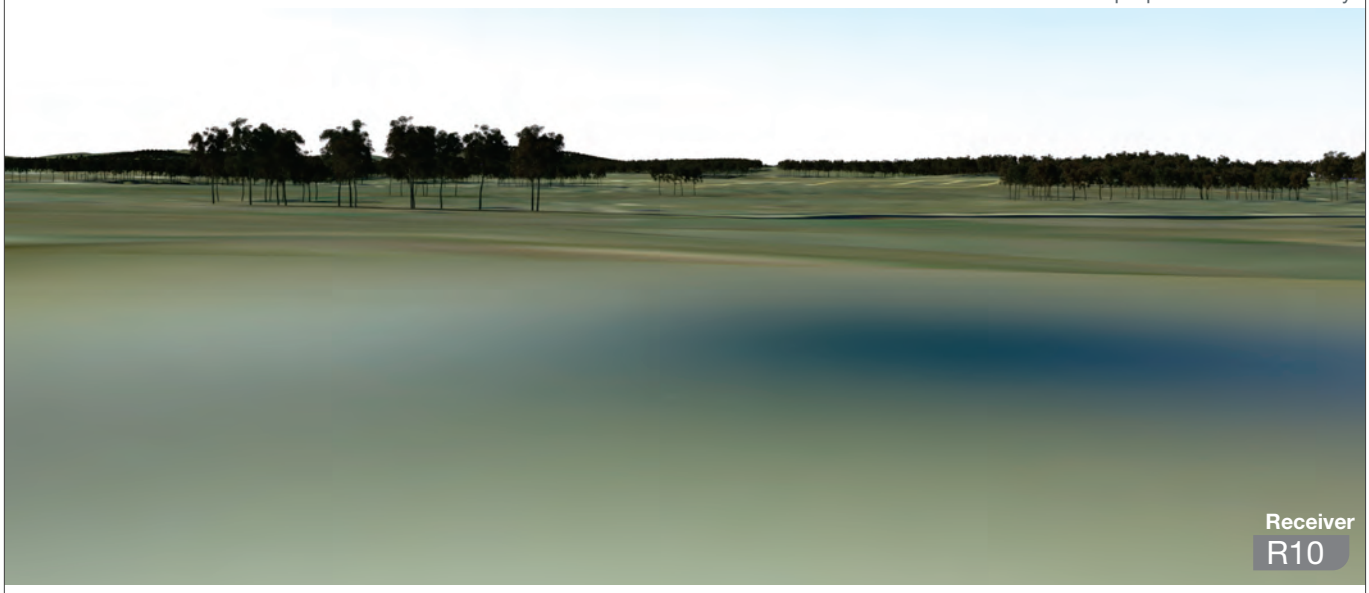
CAMBIUM GROUP

FIGURE 17
Photomontage
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



3D render of terrain and proposed landforms only

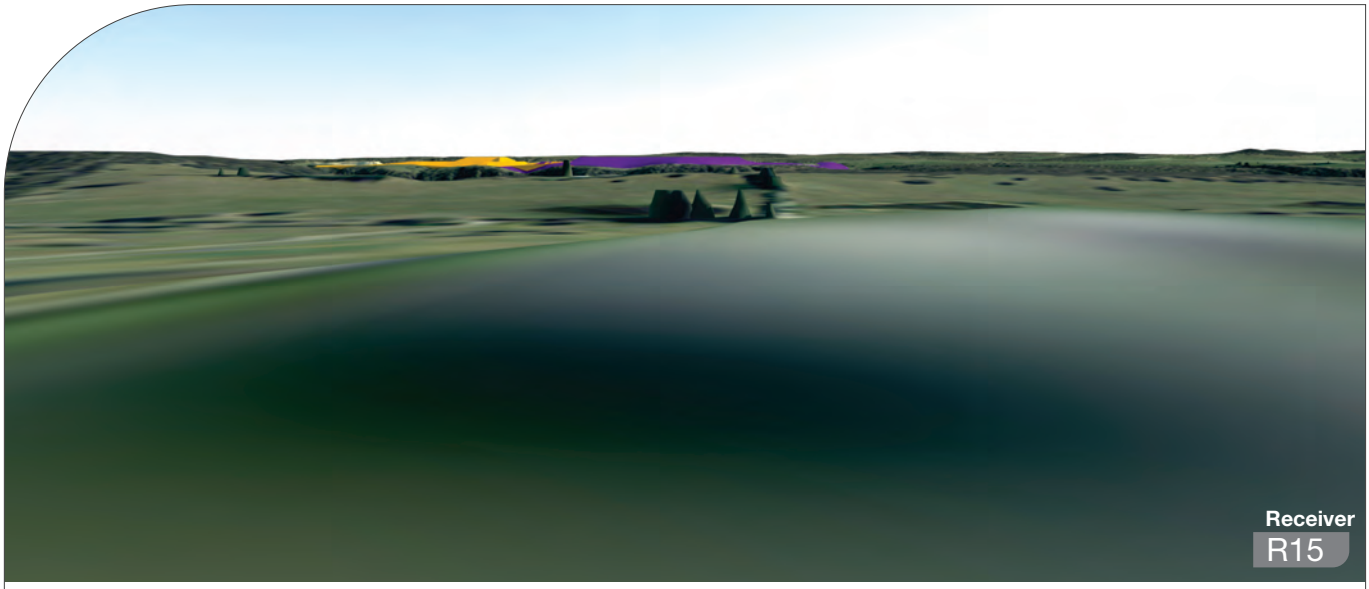


3D render of terrain and proposed landforms with vegetation

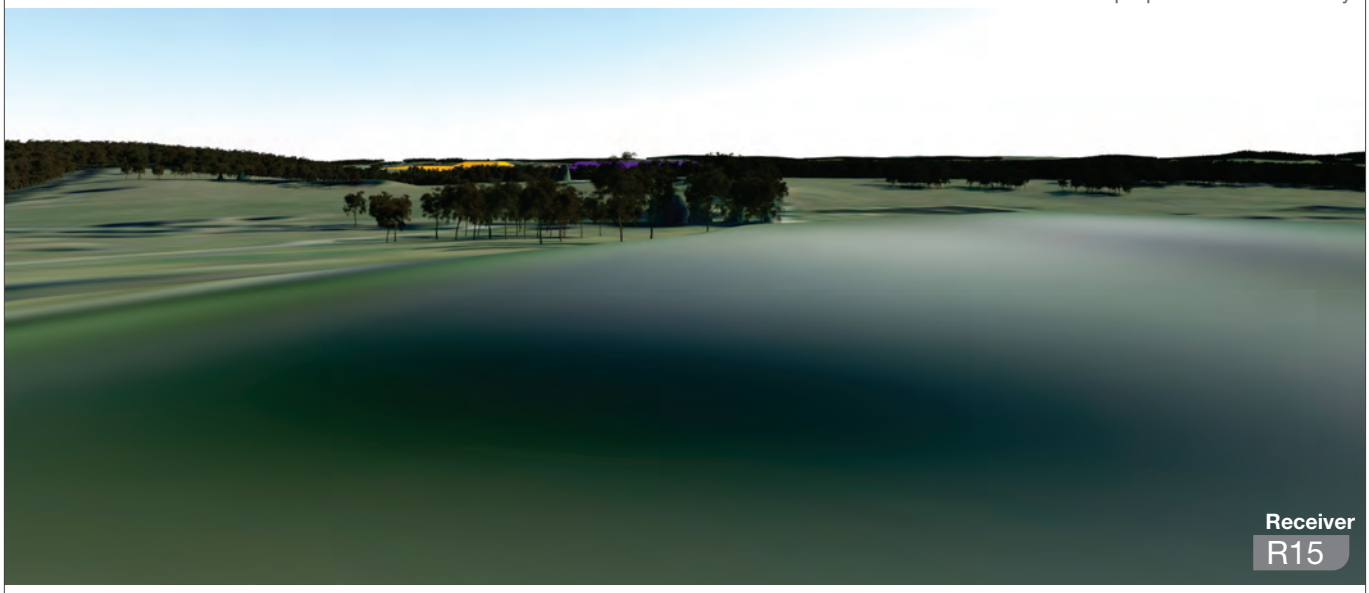
Photographic image from the pool edge at R10. R10 may have a minimal view of part of the Southern Overburden Emplacement, rehabilitation of which will minimise its visibility.

FIGURE 18
Photomontage
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



3D render of terrain and proposed landforms only



3D render of terrain and proposed landforms with vegetation

Photographic image taken from veranda north side of residence. R15 may have a view of part of the Eastern Overburden Emplacement. The photomontage shows the impact of the proposed Southern Overburden Emplacement to be minimal.

6.7.2 Impact Assessment

Summary of Visual Exposure

There are two aspects of the proposed modification, of which only the Southern Overburden Emplacement has a physical presence, in terms of visual impacts. The other is the extension of in-pit working hours taking place within the pit, below natural ground level and out of direct sight from any receivers. As such, there will be no significant visibility of this activity. Visible evidence of the extended working hours will be limited to effects on night-time lighting and occur only if that lighting is visible as a more significant 'glow' reflecting off the atmosphere, to an extent different from the existing approved project.

The only perceived in-pit change will be light associated with the primary crusher, excavator, front end loader, and in the short-term, two trucks, operating for longer hours in the early morning (5am - 7am) and at night from 7pm - 11pm. The remainder of the existing lighting including the out-of-pit Processing Plant, which operates as approved 24 hours per day, 7 days per week, will continue to have its existing visual effects. As the modification to the Quarry does not propose changes to the kind or purpose of lighting, there will be minimal difference between the existing lighting from the approved project and that associated with extending the in-pit working hours.

Visual exposure of the existing quarrying operations is low to the adjacent rural land to the south-west, west and north, as the current operations are predominantly below the horizons of view, with the exception of the crest of the approved Eastern Overburden Emplacement, which is of minor visibility to some medium to distant range views.

The visual exposure of the proposed Southern Overburden Emplacement would be to only a slightly larger area than that of the existing approved project. No roads or residences would be significantly exposed to views of the proposed Southern Overburden Emplacement. A consequence of the Southern Overburden Emplacement is that in some views from the landscape to the south, east and south-west, the topography of the intermediate horizon will be slightly changed as the emplacement is developed, increasing the visual exposure of the newly formed emplacement to views. However, the overall visibility of the emplacement area will be minor.

In the medium range views from the east, for the only residence in the Long Point Road locality with any potential view (Receiver R15), the visual exposure of the Southern Overburden Emplacement will not significantly alter the composition of the view (refer to **Figure 18**).

The highest part of the Southern Overburden Emplacement may barely be visible from the Bungonia Lookdown northern lookout (VP20) (refer to **Figure 19**). A minor change will occur in the mid-ground horizon of the view, caused by increase in the height of the landscape caused by the Southern Overburden Emplacement.

Parts of the proposed location of the Southern Overburden Emplacement are exposed to medium range views from the east (part of the area accessible from the Long Point Lookout Track in the Morton National Park (VP21) (refer to **Figure 20**). However the lookout itself has a view to the south-east which does not include the Quarry.

Proposed Landform

Notwithstanding the low overall visibility of the landform associated with the proposed Southern Overburden Emplacement to most of the visual catchment, the compatibility of this constructed landform to existing and future landform has been carefully considered in regard to mitigation of visual impacts.

In most of the visual catchment, the visual character of the overburden emplacement is not a significant constraint and will not result in any visual impacts. However, in views from the natural settings in the Long Point track area (VP21), the visual effects of the overburden

emplacement will be evident to varying degrees as a result of initial contrasts with the colour, line, form and texture of the existing environment. These changes will be seen in the context of the existing Eastern Overburden Emplacement at the Quarry and the Limestone Mine, both of which are located immediately adjacent to the proposed Southern Overburden Emplacement.

The proposed landform is compatible with the existing and natural topography, to the extent that is reasonably possible. The side slopes are compatible with the gradients of natural precedents in the vicinity and there is opportunity for minor variations in the topography of the faces so as to prove a natural appearance.

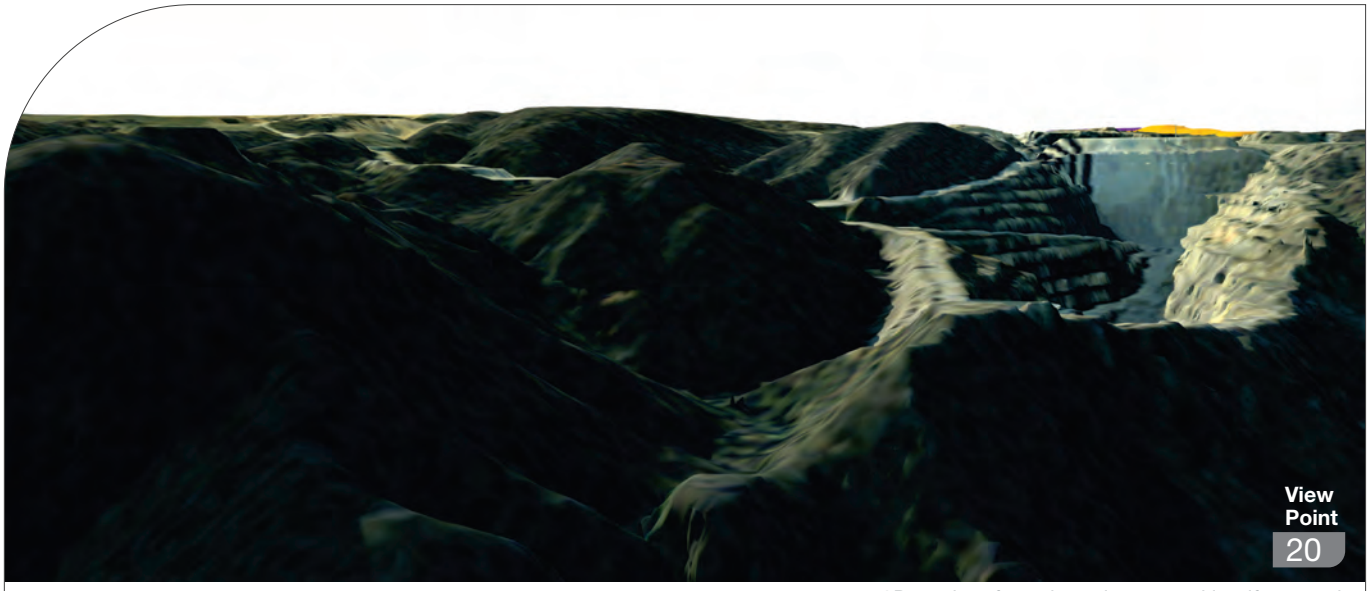
The Southern Overburden Emplacement will be progressively rehabilitated in accordance with the *Peppertree Quarry Landscape and Rehabilitation Management Plan* (ERM, 2012) and will therefore blend in with the adjacent naturally vegetated landscape of the adjacent Barbers Creek gorge over time (refer to **Figures 17** - **20**). The main objectives of the *Peppertree Quarry Landscape and Rehabilitation Management Plan* are to:

…prevent erosion on bunds and overburden, establish self-sustaining native vegetation and native habitats and ensure natural regeneration of the endangered ecological community of Box-Gum Grassy Woodland.

As such, achieving this objective is deemed to be satisfactory in regard to mitigation of the impacts of the proposed new landform associated with the Southern Overburden Emplacement.

FIGURE 19
Photomontage
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



3D render of terrain and proposed landforms only

3D render of terrain and proposed landforms with vegetation

Photomontage from The Lookdown Northern Lookout

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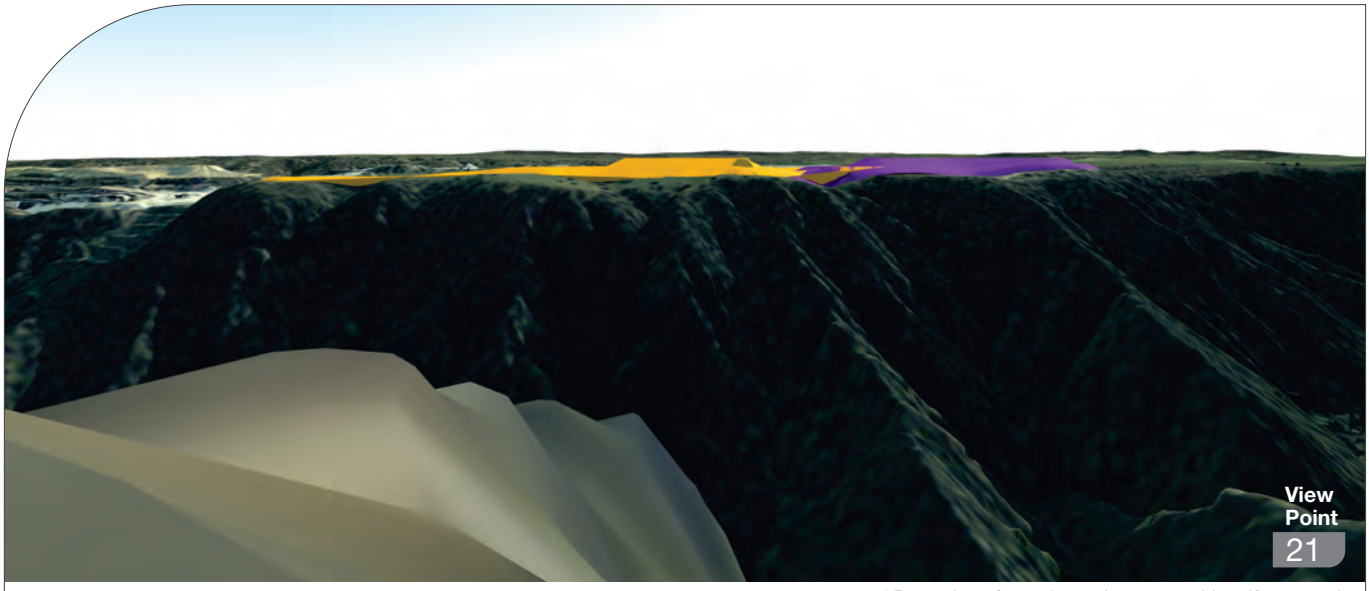
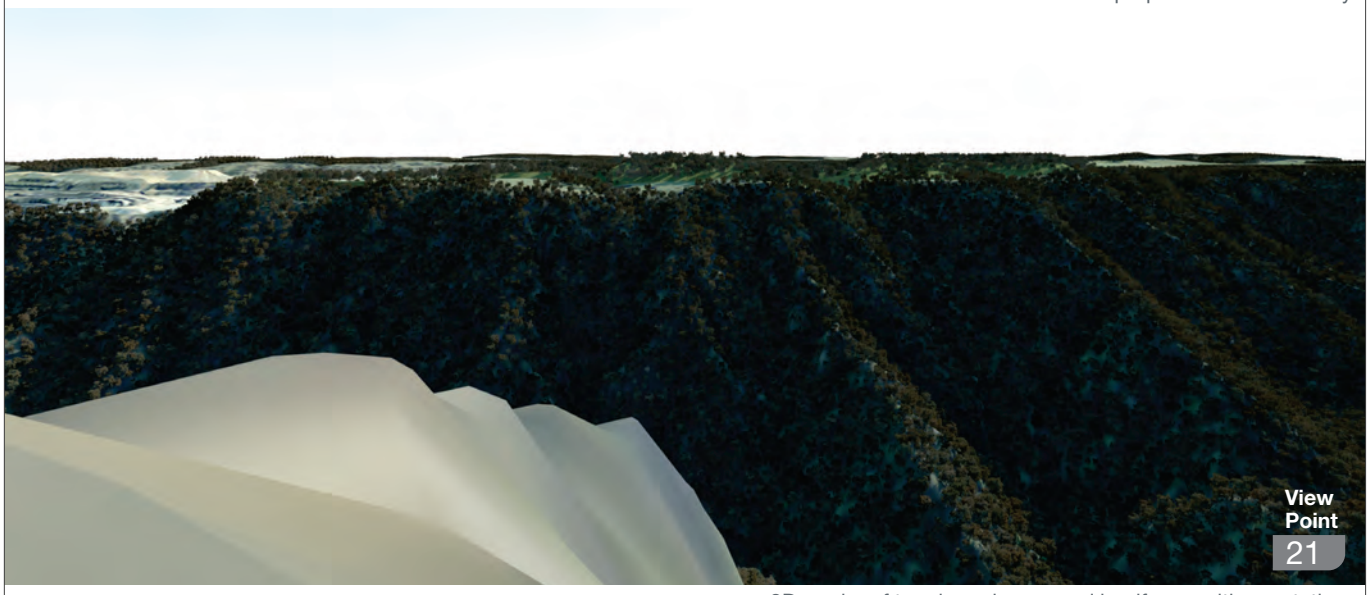
FIGURE 20
Photomontage
ENVIRONMENTAL ASSESSMENT

PEPPERTREE QUARRY MODIFICATION 4



3D render of terrain and proposed landforms only



3D render of terrain and proposed landforms with vegetation

Photographic image taken from informal vantage point. The photomontage shows the impact of the proposed Southern Overburden Emplacement to be minor following rehabilitation

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Rehabilitation

The Southern Overburden Emplacement will be of low overall visibility, however the crest will become partly visible as it approaches final landform height in views from the south-west and earlier in views from the east. There would potentially be contrasts between the Southern Overburden Emplacement and adjacent Eastern Overburden Emplacement unless similar rehabilitation strategies are adopted for both.

The greatest visual exposure is to the east, where there are minimal views from residences, but exposure to recreational land in Morton National Park.

As much of the footprint of the proposed Southern Overburden Emplacement is comprised of disturbed Box-Gum Grassy Woodland and in accordance with the main objectives of the *Peppertree Quarry Landscape and Rehabilitation Management Plan*, stabilisation of the batters and progressive rehabilitation to Box-Gum Grassy Woodland is intended to result in:

- A stable landform with minimal erosion;
- A net improvement in the ecological value of the rehabilitated final landform; and
- The creation of a final landform of appropriate colour, texture and scenic quality, by providing a vegetation cover that is compatible with the existing and adjacent natural environment. In this way, the major contrasts of existing overburden emplacements with the surrounding environment will be minimised.

Rehabilitation has other objectives than visual impact mitigation, such as positive ecological, air quality and water quality outcomes. As a result, rehabilitation of the overburden emplacement would be required, even though the overall visual impacts on views from the east are minor.

Initially, landscape structures for the stabilisation and drainage of the outer slopes of the overburden emplacement may be visible by way of their line and form, such as graded drains and rock-lined water drop structures. Their visibility will decrease completely as vegetation establishes via successful rehabilitation. Because of shadows cast by even small individual plants, the visibility of surfaces and of linear drainage structures will significantly decrease well before maturity of any of the canopy (tree) species.

Lighting

While visiting each of the residential receivers documented, the owners were asked by RLA whether they could perceive night lighting from the Quarry. Each receiver had the opportunity, without prompting, to express whether that lighting, if perceivable, was considered to be obtrusive, or otherwise.

Some of the residents reported seeing light at night in some contexts, primarily as glimpses of security lights, seen while driving in the area. None of the residents expressed concern about brightness, glare or nuisance caused by night lighting. Two residents, one to the west of the Quarry and one to the east reported sometimes seeing a ‘glow’ at night in the general vicinity of the Quarry site as distinct from individual lights visible at times associated with the processing area. This ‘glow’ is presumably a reference to reflected light or the illumination of the atmosphere by lighting in the processing plant area. A distinction was made between the perceived colour of the ‘glow’ that was visible in the vicinity of the Limestone Mine and of the Quarry. Mine light appeared yellow to orange, while the Quarry light appeared blue or white by comparison. Notwithstanding, the residents also reported being generally unconcerned by lighting associated with the Quarry.

There is no proposed change to the existing Quarry lighting as a result of the proposed modification, other than for the potential for any ‘glow’ created by light in the pit to be extended in time as a result of extended working hours. The current ‘glow’ experienced by a small number of receivers is deemed to be from the lighting associated with the out-of-pit works, primarily the processing plant and surrounds, which is the main light source from the Quarry. As a result, the light that is likely to be generated by the extended hours of in-pit

works is unlikely to result in a significant or even noticeable change to the 'glow' created by the existing night time operations. Lighting from the existing night time operations is far greater in scale, extent and intensity than the in-pit operations proposed in the modification to the existing Project Approval.

There would therefore be no significant change to the effects of lighting compared to the current approved operations, which are subject to compliance with Australian Standard AS 4282-1997, Control of Obtrusive Effects of Outdoor Lighting.

Residual Visual Impacts

The activities associated with the proposed modification have a low overall exposure to the surrounding visual catchment. Despite there being a number of rural properties and commercial operations within 3km of the closest part of the modification, there is low visual exposure of the proposed Southern Overburden Emplacement to those receivers and most have no views of the emplacement or in-pit activities.

The proposed Southern Overburden Emplacement is not exposed to view from roads that carry either through traffic or significant numbers of viewers and is not in a destination that would attract visitation by tourists. The road to the Quarry, Marulan South Road, reaches a dead-end in the vicinity of the Boral-owned Quarry and Limestone Mine entrances and this end section, used exclusively by Boral, is proposed to be de-proclaimed as a public road.

With the implement of the rehabilitation methods outlined in the *Peppertree Quarry Landscape and Rehabilitation Management Plan*, the proposed Southern Overburden Emplacement will have only minor impacts on the visual environment, primarily during its active development.

However, the overburden emplacement would be exposed to views from part of the Morton National Park to its east and the Bungonia National Park to the south. The greatest visual exposure of the overburden emplacement is to off-track informal viewing locations accessed from the Long Point Track (VP21). The overburden emplacement is of low visibility to the Bungonia Lookdown lookout (VP20).

VP21 is the only viewing location assessed that has a substantial view of the proposed Southern Overburden Emplacement. The existing processing plant and the eastern face of the Eastern Overburden Emplacement are also visible from this location. The proposed Southern Overburden Emplacement will proactively screen existing views of the processing plant area as well as direct views of night time lighting.

In relation to night-time lighting, there is no proposed change to the existing Quarry lighting, other than for the potential for any 'glow' created by light in the pit to be extended in time as a result of extended working hours. The current 'glow' experienced by a few receivers is from the lighting associated with the out-of-pit works, primarily the processing plant and surrounds, which is the main light source from the Quarry. Therefore the light that is likely to be generated by the extended hours of in-pit works is unlikely to result in a significant or even noticeable change to the 'glow' created by the existing night time operations as lighting from the existing night time operations is far greater in scale, extent and luminance than the in-pit operations associated with the proposed modification.

Any change in night time lighting associated with in-pit works would be most visible from the Morton National Park (VP21), however as the National Park reserve is used primarily for recreational activities, night time use of the tracks would be minimal. As a result, the impacts of night lighting on such viewing locations is considered to be minor and not significant.

The VIA found that while there are some residual visual impacts, these are minor in significance. Impacts were also considered in relation to the extensive and to some extent permanent changes to the visual environment that have been approved and occurred in the past. The residual impacts that will occur as a result of the modification, are considered compatible with both the extractive land uses and the rural/natural visual environment.

6.7.3 Mitigation Measures

Relative to the existing operations, the proposed modification is unlikely to significantly impact upon the visual amenity of surrounding residential and commercial receivers, nor recreational users of the Morton National Park to the east.

The following management measures have been recommended by the VIA to minimise the potential for adverse visual impacts from the proposed Southern Overburden Emplacement landform and extension of in-pit working hours:

- To minimise the visibility of the proposed Southern Overburden Emplacement from views the south east in the Morton National Park, it is recommended that the final embankments, especially the eastern and southern faces, are rehabilitated progressively and as soon as practically possible, following final embankment shaping in accordance with the approved *Peppertree Quarry Landscape and Rehabilitation Management Plan*;
- Prior to, and immediately following the commencement of extended in-pit operations, it is recommended that a night-time audit is undertaken from a number of the potentially most effected view points, to ascertain whether the introduction of night time in-pit works results in any visible lighting or in any change to the 'glow' created above the existing Quarry. If the 'glow' effect was found to noticeably increase by the light from extended in-pit operations, reasonable and feasible measures will be investigated and implemented to mitigate the change in the 'glow' resulting from the in-pit works.

  This may involve gradual replacement of luminaires and lamps for 'Type 2' lighting that may produce obtrusive light. Those that produce light in the blue spectrum such as metal halide floodlights could be replaced by more efficient lamps that produce light in the yellow to red spectrum, such as sodium vapour or more efficient LED lights; and
- The *Peppertree Quarry Landscape and Rehabilitation Management Plan* would be updated to incorporate the findings of the VIA, the recommended additional management strategies associated with the rehabilitation of the proposed Southern Overburden Emplacement and the auditing of night-time lighting during extended in-pit operations.

  As required by Schedule 5, Condition 7 of the Project Approval, the proposed revisions to the *Peppertree Quarry Landscape and Rehabilitation Management Plan* will be undertaken within three months of a notice of approval and submitted to DP&E for endorsement

6.8 Historic Heritage

Due to the proximity of the existing Limestone Mine and the former village of Marulan South, there is the potential for old, disused infrastructure that has potential historic heritage value, to be disturbed during the development of the Southern Overburden Emplacement.

An Aboriginal and Historic Heritage Impact Assessment (AHHIA) was undertaken by EMGA Mitchell McLennan Pty Ltd (EMM) (**Appendix E**) in order to identify historic heritage items, review the management requirements of listed heritage items and identify appropriate management and impact mitigation measures in accordance with their assessed level of significance.

6.8.1 Existing Environment

The Quarry site and most of the adjacent land has been extensively disturbed by agricultural practices such as clearing, grazing, pasture improvement and fodder cropping since European settlement of the area. Aerial photographs dating from 1946 to 1991 confirm a long history of agricultural use (ERM, 2006). Section 4.1 of the AHHIA provides detail on the historical context of the surrounding area.

The proposed Southern Overburden Emplacement area is predominantly grassland and is still actively grazed by cattle.

The Limestone Mine (operational since 1875) is immediately south of the proposed Southern Overburden Emplacement and the site of the former village of Marulan South is to the west. Items of potential industrial heritage occur at and near the Limestone Mine, such as defunct buildings and associated infrastructure. Dwellings and infrastructure associated with the former village of Marulan South no longer remain.

A historic heritage investigation was completed as part of the *Marulan South Quarry Environmental Assessment Report (ERM, 2006)*. The assessment did not identify any listed heritage items or archaeological evidence within the Quarry footprint. The project was not considered to have a significant impact on historic heritage.

Subsequently, EMM completed a historic heritage investigation as part of the *Peppertree Quarry Modification 3 Environmental Assessment* (August 2012). The investigation did not identify any historic heritage items or areas of archaeological potential at the Quarry. The modification was not considered to have a significant impact on historic heritage.

For the purposes of this modification, a search was undertaken of the following historic heritage databases and registers, with no items of historic heritage significance and no areas of archaeological potential identified within proximity to the proposed Southern Overburden Emplacement:

- National Heritage List;
- Commonwealth Heritage List;
- Australian Heritage Database;
- State Heritage Register;
- Relevant Government Agency Section 170 Heritage and Conservation Registers;
- NSW Heritage Inventory; and
- Goulburn Mulwaree LEP.

Further afield and approximately 3 km from the study area, Bungonia National Park and the Bungonia State Conservation area are consolidated into one local listing on the *Goulburn Mulwaree Local Environmental Plan 2009* as Bungonia State Recreation Area (Item No. I027). It is considered to be significant for its natural and cultural associations.

The site of Old Marulan Town, an item listed on the State Heritage Register (Item number 00127), is located approximately 10km from the Quarry, in the vicinity of the Hume Highway – Marulan South Road Intersection. It is considered significant for its ability to illustrate details of an early colonial service, predominantly from 1835 to 1867 through its archaeological resource.

A site survey was undertaken by historic heritage specialists from EMM on 2 July 2015 and no sites or items of historical heritage value were identified.

6.8.2 Impact Assessment

No historic heritage evidence was uncovered during the research phase or field survey of the proposed Southern Overburden Emplacement and as such no further significance assessment is required. No areas of archaeological potential, historic views or community heritage value have been identified.

The proposed modification will not impact known historic heritage, as no evidence of historic heritage items were found in the study area.

Due to the proximity of the existing Limestone Mine and the former village of Marulan South there is the potential for old, disused infrastructure or objects that have potential historic

heritage value, to be located within the proposed footprint of the Southern Overburden Emplacement.

The establishment of the new Southern Overburden Emplacement does not require excavation and therefore potential sub-surface archaeological resources (relics) are not anticipated to be encountered or impacted. Similarly, extension of in-pit working hours would have no potential to impact on archaeological resources due to no change in the disturbance footprint associated with the approved Quarry extraction area (pit).

6.8.3 Mitigation Measures

The proposed modification would not impact upon a place or item of historic heritage significance, nor an area with potential to yield archaeological resources.

The AHHIA did not identify the requirement for additional historic heritage mitigation measures other than the recommendation for continued implementation of an unexpected historic heritage finds protocol.

In accordance with Condition 32A of the Project Approval (06_0074):

If historical archaeological relics are unexpectedly discovered during works, all works must cease and a suitably qualified and experienced historical archaeologist be brought in to assess the find. Depending on the nature of the discovery, additional assessment and recording may be required prior to the recommencement of excavation in the affected area. The Heritage Council (or its Delegate) must be notified of this discovery in writing in accordance with section 146 of the Heritage Act, 1977.

It is considered that this Condition of Approval adequately addresses the objectives of an unexpected heritage finds protocol and no additional mitigation measures, or amendment to existing historic heritage management procedures is required.

6.9 Land Contamination

The potential to encounter or disturb areas of contamination within the footprint of the proposed Southern Overburden Emplacement is considered low given the historical land use of the area prior to the commencement of quarrying operations. Historical land uses comprise previous clearing of original woodland vegetation to facilitate pasture grazing for livestock. As such, the potential for these land uses to result in contamination of soils is unlikely.

An EPA Contaminated Land Record search was undertaken in February 2016 and two sites were recorded within the Goulburn Mulwaree LGA. These sites are located within the township of Goulburn and would not be impacted by the Project.

Detailed site surveys were undertaken as part of the heritage and biodiversity assessments and a number of general site visits were undertaken by the Project team, with no evidence of contamination or potentially contaminating activities identified within the study area.

Boral are unaware of any potential contaminating activities that have been undertaken within the proposed footprint of the Southern Overburden Emplacement. Additionally, establishing the new overburden emplacement would not require excavations and therefore the potential to encounter contaminated soils would be minimised.

As such, no further assessment of contaminated land or land remediation is required.

In the event that previously unidentified contaminated materials are located during development of the Southern Overburden Emplacement, relevant statutory requirements, including potential soil testing and waste classification, would need to be complied with and the material managed and disposed of appropriately.

6.10 Land and Rehabilitation

The proposed Southern Overburden Emplacement will be constructed out of the same material as the existing overburden emplacements on the site and will be designed to similar standards. As such, the Southern Overburden Emplacement will be landscaped and rehabilitated in accordance with the approved *Peppertree Quarry Landscape and Rehabilitation Management Plan*, in order to minimise the potential for visual, air quality, biodiversity and erosion and sedimentation impacts arising from unstabilised ground surfaces.

If required, the *Peppertree Quarry Landscape and Rehabilitation Management Plan* would be revised to incorporate the additional Southern Overburden Emplacement and any additional management strategies to ensure temporary stabilisation of exposed surfaces, permanent stabilisation strategies, progressive rehabilitation with groundcover vegetation during overburden emplacement and final rehabilitation as soon as practical after formation of the Southern Overburden Emplacement.

As required by Schedule 5, Condition 7 of the Project Approval, if proposed revisions to the *Peppertree Quarry Landscape and Rehabilitation Management Plan* are required, the amendments would be undertaken within three months of a notice of approval, and submitted to DP&E for endorsement.

6.11 Traffic and Transport

Following loading by an excavator within the approved extraction area, overburden material would be transported by trucks via internal haul roads to the Southern Overburden Emplacement area. Trucks would return to the Quarry pit via the internal haul road network.

All activities associated with the extension of in-pit operating hours, would be confined to the Quarry pit.

Therefore, the haulage of overburden material and the movement of all vehicles and machinery associated with the modification and the development of the Southern Overburden Emplacement, would be confined to the Quarry's internal haul road network and within the Quarry consent boundary, thereby avoiding additional vehicle movements on the local road network.

6.12 Groundwater

The identification of groundwater resources and potential impacts were previously assessed within the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006). The assessment found that groundwater at the site occurs in discrete fractured zones, the most significant of which is the interface between the overburden and underlying granodiorite. There was no evidence of vertical or lateral movement of groundwater between these zones.

The proposed modification includes the extension of operating hours for in-pit activities. The extension of hours would not result in alteration to the existing quarry operation or degree or depth of land disturbance previously assessed and approved.

The establishment of the new Southern Overburden Emplacement does not require excavations and therefore groundwater will not be impacted.

Additional impacts to groundwater are therefore unlikely to occur as a result of the proposed modification and further assessment of potential groundwater impacts is therefore not required.

6.13 Greenhouse Gas

The identification of greenhouse gas emission sources and potential impacts were previously assessed within the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006). The assessment found that while extraction and processing of granodiorite consumes energy, the Quarry would implement strategies to minimise energy consumption and associated emissions. Such strategies included use of conveyors where possible in place of less efficient truck haulage and transport of aggregate by rail rather than road truck.

The hauling of approximately 1 million m^3 of overburden to the proposed Southern Overburden Emplacement instead of to the Limestone Mine's south pit will reduce the haulage distance for each truck by approximately 9km per return trip. This reduction in haulage distance will significantly reduce both fuel consumption and greenhouse gas emissions associated with approved overburden emplacement activities.

The proposed extension of in-pit operating hours, will result in a slight increase in the duration of in-pit activities which consume fuel and generate greenhouse gas emissions. However, this slight increase in greenhouse gas emissions is likely to be offset by in-pit works changing to a truck-less operation in the near future with blasted rock being loaded by excavator, directly into the primary crusher.

The proposed modification will not result in an increase in total production volumes at the Quarry or the means of finished product transportation by rail.

Boral would continue to monitor and report greenhouse gas emissions generated by Quarry operations in accordance with its commitments under the *National Greenhouse and Energy Reporting Act 2007*.

6.14 Socio-Economic

The potential social impacts of the proposed modification relate largely to impacts on general amenity such as noise, air quality (dust), surface water runoff and visual exposure. These potential social impacts have been thoroughly assessed in the EA and a range of mitigation measures (in addition to those presented in the *Marulan South Quarry Environmental Assessment Report* (ERM, 2006), Project Approval conditions, the Environmental Protection Licence and approved Environmental Management Strategy and Plans) are recommended to minimise potential noise, air quality, surface water and visual impacts so they are not perceived as a nuisance to neighbouring residents and other sensitive receivers.

During consultation around Boral's Marulan South operations, the community have raised concern around the potential impact that overburden emplacements could have on their property values if visible from their residences. As outlined in **Section 6.7**, a thorough investigation has been undertaken by an experienced visual impact specialist, into the potential visual impacts that the proposed modification, particularly the proposed Southern Overburden Emplacement, would have on the views from public view points as well as 17 private residences. The VIA concluded that the only residences that could potentially be exposed to distant views of the proposed Southern Overburden Emplacement are receivers R10 and R15, the most substantial of which was predicted to be from R15. 3D modelling, confirmation by on-site photography and the photomontage (**Figure 18**) show that there would be no perceptible change to the composition of the view from the residential receiver R15. The proposed modification is therefore unlikely to impact on property values of the local community as a result of visual impacts and loss of visual amenity associated with the proposed modification.

As outlined in **Section 3.1**, the building and construction industry in NSW and particularly Sydney has seen a great deal of growth in the last year, with this growth forecast to continue. The NSW Government, together with Federal funding, has committed to significant infrastructure projects, including the Badgerys Creek Airport, new rail lines, and

major road construction and upgrading. Boral is, and will be supplying a number of these projects with concrete and asphalt that includes aggregates and sand from the Quarry on rail through terminals at St Peter's and Enfield. Given the importance of these projects to the New South Wales economy, the additional in-pit operating hours and additional overburden emplacement capacity are crucial for the uninterrupted supply of concrete and asphalt to these and other projects, as well as future demand in the Sydney market.

6.15 Hazards

The proposed modification would not result in any additional hazardous activities to those already undertaken at the Quarry e.g. blasting, storage of fuel etc.

Existing mitigation measures as previously required by the Project Approval conditions and approved Environmental Management Strategy and Plans, would continue to be implemented in order to minimise the potential for adverse impacts or environmental incidents associated with hazardous activities.

6.16 Waste Management

The proposed modification is unlikely to generate any additional types of waste, not currently generated by the approved project.

The main waste source which would result from the development of the Southern Overburden Emplacement is felled trees and shrubs. Cleared vegetation would be used for rehabilitation purposes on the final overburden emplacement embankments or elsewhere on site, where required.

All other waste created through development of the Southern Overburden Emplacement e.g. old livestock fencing, would be reused and/or recycled where possible or disposed of at an appropriately licenced facility.

7 CONCLUSION

Boral is seeking to modify the current Peppertree Quarry Project Approval (PA 06_0074) under Section 75W of the EP&A Act, to provide for the following:

- Extension of daily in-pit operating hours at the Quarry by 6 hours; and
- Establishment of a new overburden emplacement.

Boral needs to increase in-pit operating hours by 6 hours per day, 7 days a week in order to account for the increased scalping of overburden material in the early phases of pit development and to meet annual production volumes up to the approved limit of 3.5 million tonnes per annum. This need has now become more urgent due to rapid growth in the Sydney construction materials market.

Surplus overburden from the Quarry is approved to be emplaced within the Limestone Mine's south pit. Mine planning for the Limestone Mine has ruled out emplacement within the south pit. The Limestone Mine, under its forthcoming development application, is seeking to hold 5 million m^3 (approximately 13 Mt) of overburden for the Quarry, however, this will not be approved until early 2017. As an interim measure, Boral is seeking to place approximately 1 million m^3 of overburden within a new overburden emplacement, to the south of the approved 30 year Quarry pit.

The proposed new overburden emplacement will be located within the south-eastern extent of the future hard rock (granodiorite) resource, which extends south from the existing Quarry pit, to the northern end of the Limestone Mine's north pit. The proposed Southern Overburden Emplacement will not sterilise resource as Boral will relocate this overburden emplacement in the future if the southern granodiorite resource needs to be accessed. Although the Southern Overburden Emplacement may be relocated in the future, this is unlikely to be required for at least the next 25 years.

Specialist technical investigations were undertaken to assess key environmental issues associated with the proposed modification that were identified by the project team and a thorough government agency and community consultation process. These investigations concluded that the proposed modification is unlikely to result in any significant impacts on either the biophysical or social environment with the implementation of:

- Environmental management and mitigation measures outlined in:
  - Existing approved Peppertree Quarry Environmental Management Plans previously required and approved as part of the Project Approval Conditions (PA06_0074);
  - Section 6 of this Environmental Assessment;
- The Biodiversity Offset Strategy;
- Peppertree Quarry Environmental Monitoring Program;
- Requirements of Environment Protection Licence 13088; and
- Project Approval Conditions (PA06_0074).

The existing Environmental Management Plans would be reviewed by Boral following approval of the modification and amended as necessary.

The modification is therefore considered to be in the public interest, and is recommended for approval.

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9 ABBREVIATIONS

Abbreviation	Definition
AHIMS	Aboriginal Heritage Information Management System
AMC	Aboriginal Management Committee
BSD	Background Scoping Document
CCC	Community Consultative Committee
DA	Development Application
DECCW	Department of Environment Climate Change and Water (now OEH)
DP&E	Department of Planning and Environment
DRE	Department of Resources and Energy
EEC	Endangered Ecological Community
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EP&A Act	The NSW Environmental Planning and Assessment Act 1979
EP&A Regulation	The NSW Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth Environmental Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
FBA	Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects, 2014
ha	Hectare
HVAS	High Volume Air Samplers
INP	Industrial Noise Policy
km	Kilometre
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metre
ML	Megalitre
MNES	Matters of National Environmental Significance
Mtpa	Million Tonnes Per Annum
NSW	New South Wales
OEH	Office of Environment and Heritage
$PM_{2.5}$	Particulate matter less than or equal to 2.5 micrometres in aerodynamic diameter
PM_{10}	Particulate matter less than or equal to 10 micrometres in aerodynamic diameter
POEO Act	Protection of Environment Operations Act 1997
SEPP	State Environmental Planning Policy
SWL	Sound Power Level
tpa	Tonnes Per Annum
TSP	Total Suspended Particulate


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