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Peppertree Quarry Modification 5

ENVIRONMENTAL ASSESSMENT

PRELIMINARY RESPONSE TO SUBMISSIONS

Prepared for Boral Quarries | February 2019

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Peppertree Quarry

MODIFICATION 5 ENVIRONMENTAL ASSESSMENT | PRELIMINARY RESPONSE TO SUBMISSIONS REPORT

Prepared for Boral Resources (NSW) Pty Limited
January 2019

PR25

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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 in Marulan South, New South Wales.

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

- develop a new overburden area (South-west Overburden Emplacement – SWOE);
- extend the consent boundary to the south to encompass the SWOE;
- construct a new haul road from the pit to the SWOE;
- construct a new intersection at Marulan South Road to link the new haul road with the SWOE;
- amend the design of the Western Overburden Emplacement (WOE);
- remove the Western Earth Bund (which has not been constructed); and
- relocate a powerline which runs through the proposed SWOE site.

The modifications constitute Modification 5 to the Project Approval. The Minister for Planning is the consent authority for the Project.

Element Environment prepared an environmental assessment (EA) report on behalf of Boral to assess the potential environmental and community impacts from the modification.

The Department of Planning and Environment (DPE) placed the EA report on public exhibition, which ended on 6 December 2018. In a letter dated 10 December 2018, DPE requested a response to submissions (RTS) received from various government agencies and the community.

This report has been prepared as a preliminary response to these submissions by 31 January 2019, as requested by DPE. Given the longer lead-time required for the technical responses to some of the submissions, further work will be carried out after submission of this preliminary response. Specifically, this will involve further assessment of the alternative SWOE locations and review of the proposed noise conditions submitted by the Environmental Protection Authority (EPA).

1.2 Response to submissions

At the close of public exhibition of the EA report, there were 11 agency submissions, two submissions from members of the public and a consolidated submission/request for a RTS from DPE. One member of the public's submission opposed the proposal and the other submissions made comment on the proposal (refer to Appendix A for copies of all submissions).

The points raised in each submission are summarised in Section 2 (in bold), followed by Boral's response. Submissions requiring further technical assessment are noted.

2 RESPONSE TO SUBMISSIONS

Each agency and community submission are addressed in this chapter. As noted in Chapter 1, some matters will be addressed in the final response to submissions to be provided in February 2019.

2.1 Noise

Three respondents provided noise related submissions, which are addressed in this section.

2.1.1 Goulburn Mulwaree Council

Potential noise impact from construction and operation of the proposal on nearby sensitive residential, commercial and industrial receivers was assessed in accordance with the EPA's guidelines. It is recommended that Boral and the EPA review the current environment protection licence prior to a determination of the application.

The EPA recommended noise related conditions of consent in its submission, including revised noise limits. The conditions of consent are being reviewed by the proponent, these are discussed in further detail in section 2.1.3 below.

2.1.2 Department of Planning and Environment

Condition 5 of schedule 3 provides voluntary acquisition rights to three privately-owned receivers (R2, R3 and R8) in the event that noise generated by the quarry exceeds the criteria specified in Table 2 of the Project Approval. As the proposed modification would remove these rights, the Department is seeking to ascertain whether the acquisition rights have been previously triggered by the projects.

In accordance with Condition 5, schedule 3 of the project approval, acquisition rights of adjoining land owners identified as R2, R3 and R8 are triggered when a request is made in writing to Boral based on a verified exceedance.

None of the owners of receivers R2 (which is owned by Boral), R3 or R8 have made written requests to acquire their properties under Schedule 3 Condition 5 of the project approval.

The Department request a summary of noise monitoring conducted for the last two years with respect to these three receivers.

Operational noise is monitored at receivers R2/3/4/8/17 every quarter and reported online as per EPL requirements monthly and in the annual environmental management report. Attended and continuous unattended noise monitoring is carried out day and night at the locations specified in Table 4 of Schedule 3 Condition 4 of the project approval.

The noise monitoring summaries for 2016, 2017 and 2018 are in Appendix B. Note the project approval was revised after Modification 4 to change R5 to R3, R6 to R2 and R16 to R8.

2.1.3 Environment Protection Authority

The EPA has reviewed the noise impact assessment contained within the EA, titled 'Noise Impact Assessment – Peppertree Quarry Mod 5' (NIA), prepared by Wilkinson Murray and dated September 2018.

The EPA considers that the NIA is adequate for the purposes of providing recommended noise conditions which are detailed in Attachment B. The recommended noise conditions

include Lot and DP numbers for receiver identification, and in order to provide these are fully correct these details need to be confirmed by the proponent. It is recommended that this occur as part of any response to submissions by the proponent or prior to any approval of Modification 5 by the Department of Planning and Environment (DPE).

Boral is reviewing the proposed conditions with the view to arranging a meeting with the EPA prior to submission of the final response to submissions report at the end of February 2019.

The recommended conditions also nominate monitoring points for meteorological parameters, and it is understood that the proponent operates a weather station on the premises. The addition of this point to Environment Protection Licence 13088 (EPL) will need to be negotiated between the proponent and the EPA and is relevant to recommended conditions L6.4, M7.1 and M7.2 as detailed in Attachment B.

Boral is reviewing the proposed conditions with the view to arranging a meeting with the EPA prior to submission of the final response to submissions report at the end of February 2019. Monitoring point locations will be discussed with the EPA as part of the EPL revision process.

The EPA does note the NIA should have included an analysis of wind data in accordance with Fact Sheet D2 of the Noise Policy for Industry to assess impacts under any applicable prevailing winds. The NIA adopts standard meteorological conditions in Section 6.1, although a wind data analysis has not been undertaken. The wind roses in Appendix C of the NIA suggest that some prevailing winds may be applicable to the assessment.

The NIA submitted in support of the EA omitted to set out in detail the analysis of the wind data. Notwithstanding the omission, the data was modelled in the assessment and has now been included in section 6.1 of the amended NIA (refer to Appendix D).

As set out in sub-section 6.1.2 (p. 42 of the amended NIA) five years of meteorological data was analysed to establish the wind roses, referenced in the EPA's submission. Wilkinson's analysis of this data concluded that the modelling for the NIA included an assessment of the significance of wind direction and speed, which has been explained in Section 6.1 of the NIA (Appendix D). The analysis showed the frequency of occurrence of winds up to 3 m/s did not trigger the 30% NPfI requirement to consider wind effects for any assessment periods (ie day, evening and night).

Accordingly, the conclusion of the NIA has not been altered and as set out in the EPA's response to the EIS exhibition, the proposal is compliant with the requirements of the NPfI.

The EPA considers that the proposal as presented in the NIA will most likely be able to comply with the recommended conditions in Attachment B under any applicable prevailing winds and has recommended noise-enhancing meteorological conditions in Condition L6.3, which is also consistent with the existing EPL for the premises. However, for completeness DPE may wish to consider whether it requires the proponent amend the NIA to include an analysis of wind data in accordance with Fact Sheet D2 of the Noise Policy for Industry and assess impacts under any applicable prevailing winds.

As noted above, the NIA has been amended to set out the detailed wind analysis that was undertaken to inform the assessment and initial environmental impact assessment. This analysis determined the frequency of winds did not trigger the 30% NPfI requirement to consider wind effects for any assessment periods.

Section 6 of the amended NIA demonstrates consistency with Fact Sheet D2 of the NPfI. An amended NIA is provided at Appendix D to this report.

Boral will liaise with the EPA regarding the proposed conditions, further comment will be provided as part of the final response to submissions at the end of February 2019.

2.2 Biodiversity

Five respondents provided biodiversity related submissions, which are addressed in this section.

2.2.1 Goulburn Mulwaree Council

The proposal has not satisfactorily met the requirements of the Biodiversity Conservation Act. The following direct impacts would result from the proposal:

- **clearing of vegetation conservatively estimated to be 39.69ha including 27.68 ha of endangered ecological community**
- **clearing of associate threatened species habitat**
- **clearing of Koala habitat estimated to be 27.1ha; and**
- **clearing of Large-eared Pied Bat habitat estimated to be 27.1ha**

Boral have acquired 1000ha which helps to offset Koala, Large-eared Pied Bat and the Coastal Grey Box habitat. They are currently negotiating another 360ha to help offset the impacts on the Yellow Box-Blakely's Red Gum grassy woodland endangered ecological community. We are asking they finalise all of the land purchases and satisfy biodiversity requirements before a determination is made.

Negotiations to purchase the 360 ha of land for the purpose of establishing a stewardship site to offset impacts on the Box Gum Woodland were completed in December 2018.

Boral requests Schedule 3 Condition 34 of the project approval be amended to require implementation of the biodiversity offset strategy within 12 months of commencement of construction of the SWOE.

2.2.2 Department of Planning and Environment

The Department notes that Boral has been liaising with OEH over the adequacy of the Biodiversity Assessment report (BDAR) provided in the EA. The Department requests that Boral provides a revised BDAR, prepared in consultation with OEH.

Comments of the DPE are noted. Matters raised by OEH are the subject of further review by Niche Environment and Heritage and will be submitted by the end of February 2019.

Provide a detailed discussion regarding impacts on Koala habitat, having regard to State Environmental Planning Policy No. 44 - Koala Habitat Protection, in particular how it was determined that the site does not contain "core Koala habitat"

The listing of the former Mulwaree Local Government Area under Schedule 1 of State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) is noted.

Niche Environment and Heritage have provided preliminary advice that the site does not contain "core Koala Habitat" due to the absence of a resident Koala population on the site. A further and detailed discussion in relation to the provisions of SEPP 44 will be included in the amended Biodiversity Development Assessment Report (BDAR) that will be submitted at the end of February 2019.

2.2.3 Division of Resources and Geoscience

The Division notes two biodiversity stewardship sites will be established to satisfy the offset requirement for the modification. The Division would appreciate the opportunity to review the proposed offset areas as early in the process as possible.

It is understood that the Division's concern in relation to the establishment of biodiversity stewardship sites is the potential to sterilise future resource opportunities. As part of the process of establishing stewardship through the Biodiversity Conservation Trust (BCT) whether the land is the subject of existing mining leases has been investigated. A review of available information indicates that no mining leases have been issued for the two sites.

2.2.4 Office of Environment and Heritage

As I mentioned to you last week, there are a number of matters in the environmental assessment that require clarification. As I proposed in our discussion, we contacted the Proponent, Boral Resources NSW and their consultants Element and Niche, in relation to improving how they fulfil the impact assessment requirements of the State and Commonwealth legislation under the bilateral.

We identified that the following key issues require addressing in Biodiversity Development Assessment Report (BDAR):

- **Demonstration of the avoidance and minimising principle as it relates to Site Selection;**
- **Survey methodology as it relates to vegetation integrity assessment and the application of the Biodiversity Assessment Method (BAM**
- **Survey methodology as it relates to threatened species of EPBC listed fauna requirements; and**
- **Confirmation of suitable offsets to satisfy both the Commonwealth and State requirements.**

We also recommended that the options to avoid serious impacts to vegetation and fauna through seeking an alternative site should be more thoroughly investigated and considered during the assessment phase to provide confidence for decision makers as to the preferred site.

The BDAR is currently under review by Niche Environment and Heritage. An amended BDAR will be submitted addressing the above points by the end of February 2019.

2.2.5 Department of Industry

The biodiversity and rehabilitation management plan should be updated to include modification 5 if approved.

A biodiversity and rehabilitation management plan for the project has been prepared and implemented in accordance with Schedule 3 Condition 34A of the project approval.

Following approval of the proposed modification the plan will be updated as required. This may be conditioned by the amendment of the project approval to include Condition 34B requiring the adopted biodiversity and rehabilitation management plan be updated within 6 months of the modification being approved.

2.3 Traffic

Three respondents provided submissions regarding traffic, which are addressed in this section.

2.3.1 Goulburn Mulwaree Council

Council is currently negotiating with Boral in relation to the closure and purchase of Council roads within the site (refer Attached, Figure 1). It is recommended that prior to works commencing, all road closure requirements and works are to be finalised.

The modification includes a proposal to construct a new haul road from the pit to the south-west overburden emplacement area.

If the road closure permits are not finalised before this road is operational the haul road will conflict with a public road (Refer Attached, Figure 2).

Council's comments are noted. As set out in section 2.3.2 below, the road closure process is ongoing.

Boral is committed to concluding the Marulan South Road closure process prior to the start of haulage along the proposed haulage road.

2.3.2 Department of Planning and Environment

Provide a map which clearly delineates the positioning of the proposed intersection scenarios.

A plan has been prepared by Cambium showing the location of the alternate intersection location (Appendix E).

The TIA refers to the existing traffic generated by the Limestone Mine and Peppertree Quarry. However, the assessment does not quantify current traffic volumes for either operation, please provide further information.

TIA has been revised (Appendix F) to include the following vehicle movements along Marulan South Road associated with the Quarry:

- Light vehicles – 70 two-way trips (35 in/35 out) comprising employee and visitor vehicles.
- Heavy vehicles – 40 two-way trips on a weekday (20 in/20 out) comprising general, fuel and equipment deliveries; and contractor maintenance vehicles.

The heavy vehicles do not include haul vehicles using internal roads between the Quarry and Marulan South Limestone Mine or the infrequent local deliveries of scalp materials.

Modification 5 will not change the traffic generation of Peppertree Quarry for those vehicle trips travelling to and from the external road network (i.e. towards Hume Highway).

Provide an update on the progress of consultation with Council regarding the purchase and deregistration of the Marulan Road South.

The proposed road closure has been the subject of a public notice in the local paper, the Goulburn post on 20 October 2018 and no objections were received. Direct notification was made to agencies and neighbours on 15 and 21 November, respectively, which gave 28 days to respond.

Two submissions were received in relation to the creation of right of ways in relation to:

- Essential Energy in relation to accessing their substation located at Lot 1 DP 1186554; and
- Office of Environment and Heritage requiring access to the Bungonia National park via Frome Hill Road.

Boral is in the process of engaging a surveyor to prepare the necessary plans to progress the application. The surveyor has been advised of the requirement to include provision for access to the land as identified above.

Ongoing liaison with Council indicates that completion of the road closure process may take between four to six months.

Condition 7 of schedule 2 of the project approval states that quarry products must not be transported from the site by road, except with the written approval of the Secretary. The Department routinely grants approval for the donation of quarried material to neighbours and for use in local community projects. The Department recommends that you consider establishing a weekly or daily cap for such vehicle movements, to avoid the need to seek written approval for each donation. However, the Department notes that these vehicle movements would need to be included in the TIA.

This provision is utilised under very limited circumstances, to permit quarried material collection and use for:

- residents along Marulan South Road;
- local community projects; and
- employees/staff who collect material for their own use.

The matter is being reviewed and a response will be provided in the final response to submissions at the end of February.

2.3.3 Roads and Maritime Service

RMS notes that the proposed modification does not seek to:

- **Change conditions of the currently issued consolidated approval that requires product from the quarry to be transported entirely by rail with the exception of transportation of donated materials and 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); and**
- **Change vehicle movements (e.g. staff, general maintenance vehicles, etc) to and from the site. These vehicles access the site via an existing interchange on the Hume Highway and then via Marulan South Road which is a local road managed by Goulburn Mulwaree Council. Having regard for the above RMS does not believe the modification will have a significant impact on the state road network (i.e. the Hume Highway).**

On this basis RMS does not object to the modification application.

RMS does however note that the proposal is seeking to construct a new intersection on Marulan South Road to allow trucks hauling overburden material from the quarry to cross Marulan South Road and access a new overburden area (South-west Overburden Emplacement) that is proposed as part of this modification. The Environmental Assessment advising that the quarry owner is negotiating with Council to deproclaim/deregister the affected section of Marulan South Road and if it becomes a private road then future intersection operation may be provided via traffic signal control. Noting this RMS suggests that the following requirement is included as a condition in any modified approval issued:

- **If traffic signals are to be installed at the intersection of the new Haul Road and Marulan South Road (refer to Peppertree Quarry Modification 5 Environmental Assessment prepared by Element Environment, Revision 3, dated 31 October 2018) the following requirements should be complied with:**

- **If there is uncontrolled access to the site and it is open to any vehicle wishing to enter the site, then even if the road (i.e. Marulan South Road) is privately owned, it is regarded as a road related area under the Road Transport Act 2013 and RMS must authorise any traffic signal installation. Hence the design, installation and operation must comply with RMS policy and guidelines and approval must be gained from RMS prior to their installation; or**
- **If there is a controlled access to the site via a barrier, gate, security checkpoint or any other means, then the road (i.e. Marulan South Road) within the site is deemed a private road, in which case RMS has no role in the authorisation of traffic signals and the property owner is not obliged to follow RMS policy or guidelines. In this situation the property owner carries all the risk and RMS staff will not audit or comment on the design, installation or operation of the traffic signals. Noting that RMS policy and guidelines in regard to the design, installation and operation of traffic signals do exist it would be good practice in this scenario to use these documents for guidance.**

The recommended condition of RMS is noted. Boral raises no objection.

2.4 Air quality

One submission was received regarding air quality, which was from Council.

The preparation of an Air Quality Management Plan, in consultation with the EPA is a condition of the current consent. It is recommended that the Plan is reviewed by Boral and the EPA in consultation with DPE prior to determination being made.

The air quality assessment report submitted in support of the proposal and contained within the EA (refer to section 6.3 and Appendix C), concluded that the project would not impact on the air quality of identified receivers, subject to implementation of an air quality management plan.

The ongoing implementation of the air quality management plan is ensured through schedule 3, condition 20. Where necessary the plan will be reviewed to ensure ongoing management of air quality.

2.5 Visual amenity

2.5.1 Goulburn Mulwaree Council

The south-west overburden emplacement area will be a new area of disturbance at the site and has the potential to be visible from publicly accessible areas and private properties. The visual impact was analysed and considered to have a low overall visual exposure to those receivers. In the context of the surrounding extractive industries developments, the visual impact is considered acceptable.

The outcome of Council's review is noted in respect to visual exposure.

2.5.2 Tomasy Planning

Our clients do not object to the development, however there is a matter that is pertinent to the Modification, that is an agreement was reached with Boral senior management in November 2011 and July 2013 that trees of an appropriate maturity would be planted along the ridgeline between the subject properties to create a physical visual barrier between the Boral project and the 'Glenrock' property. To date the planting of the appropriate mature trees has not taken place and accordingly it is requested that if the

Department of Planning is of the view that the Modification should be approved a condition should be imposed upon the consent to ensure that the following is implemented:

- **Boral Resources NSW Pty Ltd be responsible for planting of appropriate mature trees along the ridgeline of our client's property to create a physical visual barrier between Boral's Peppertree Quarry, the Marulan South Limestone Operation and the 'Glenrock' property being 248 Highland Way, Marulan.**

Boral notes the proposal will not be visible from the Glenrock property, which was assessed as receiver R13 in *Peppertree Quarry MOD 5 Environmental Assessment – Visual Impact Assessment* (Lamb 2018). The requested tree planting is subject to a previous agreement currently outside the scope of this modification. Boral will continue to liaise with the adjoining landowner in relation to this matter.

2.6 Surface water

2.6.1 WaterNSW

WaterNSW's review has focussed on the water quality implications arising from the construction, operation and decommissioning of the works proposed in the modification application. WaterNSW is satisfied that water quality can be appropriately managed during the construction and operational stages subject to the implementation of the mitigation measures outlined in the EA including revision of the existing Water Management Plan (including the subplans - Site Water Balance, Erosion and Sediment Control Plan, Surface Water Monitoring Program, Groundwater Monitoring Program and Surface and Groundwater Response Plan).

The main issue arising from WaterNSW's review is that the EA appears to lack information on the physical characteristics of the South West Overburden Emplacement (SWOE). This makes it difficult to determine whether the SWOE is likely to be geomorphologically stable in the long term (i.e. that the rate of erosion from the emplacement will be minimal and not greater than that currently occurring at the site). WaterNSW request that this be addressed in the Response to Submissions report.

Advisian has reviewed the proposed physical characteristics, emplacement design and erosion management of the SWOE (Appendix H). The SWOE will predominantly comprise weathered granodiorite and a thin layer of topsoil or alternative growth medium.

There is potential for sheet and gully erosion to impact on the long-term stability of the SWOE. remoulding or breaking down of soil bonds may result in dispersive behaviour. Remoulding of the soil at a moisture content near the optimum for compaction does not increase the potential for dispersion. However, water turbulence in concentrated rapid water flow (e.g. steep drainage channels) may cause soil dispersion.

The SWOE will be progressively revegetated, which will reduce erosion potential on slopes. Additionally, sheet erosion will be managed by:

- Reshaping the batter slopes to be no greater than 1:3 (V:H).
- Limiting bench height to 15 m, reducing the slope length to 34 m.
- Berms between each bench to direct stormwater to dedicated drainage channels.
- Monitoring and remedial actions.

Gully erosion will be managed by:

- Limiting the slope of grass lined drains to 1% gradient.

- Rock lined drains or chutes to convey stormwater to sediment dams.
- Monitoring and remedial actions.

2.6.2 Department of Planning and Environment

Section 5.2 of the Surface Water Assessment Report (Appendix F), notes that discharges from dam 1 may occur after heavy rainfall exceeding the design capacity of the basins, when significant runoff and dilution can be expected from other parts of the landscape. Provide further information concerning the ability of this dilution to prevent water quality impacts outside the project area.

Advisian has modelled the dilution effects of Dam 1 during significant rainfall (Appendix I). It showed the dam only overflows when rain is greater than the 95th percentile 5-day event of 52.8 mm. There are significant natural catchment flows to the dam when rain is greater than the 95th percentile.

The ratio of natural catchment runoff to Sediment Dam N2 overflow is highest for events just exceeding the design storm event and decreases as rainfall increases. The ratio of natural catchment runoff to sediment dam overflow for 90 mm rainfall event (99th percentile 5-day total) is at least 40:1 (dilution 2.3%). The ratio decreases to 24:1 (dilution of 4.1%) for the maximum 5-day rainfall event.

The ratio of natural catchment runoff to Sediment Dam P2 overflow for the 90 mm rainfall event (99th percentile 5-day total) is at least 140:1 (dilution 0.7%). The ratio decreases to 60:1 (dilution of 1.7%) for the maximum 5-day rainfall event.

Water held in Dam 1 will provide additional dilution during significant rain prior to the dam filling and flowing over the spillway.

Given the low proportion of flow from sediment dams and likely elevated suspended solids in natural catchment runoff during rain greater than the 95th percentile, it would be unlikely that overflows from the sediment dams would cause any changes in water quality downstream.

2.6.3 Department of Industry

The Water Management Plan should be updated to include additions of Modification 5 if approved.

Boral notes this recommendation. Boral prepared a water management plan for the project in accordance with Schedule 3 Condition 26 and an erosion and sediment control plan in accordance with Schedule 3 Condition 28 of the project approval.

The relevant conditions contain provisions for the plans to be reviewed “from time to time by the Secretary”. Boral notes these conditions and plan will need to be updated as required to incorporate Modification 5.

Updating/development of water specific plans to occur in consultation with the Natural Resources Access Regulator (NRAR).

Boral notes this recommendation and will consult with the NRAR at DPE’s direction.

2.7 Resources

Division of Resources and Geoscience made a submission regarding potential resource sterilisation.

The Division has reviewed the Environmental Assessment for the modification in regard to resource sterilisation under cl13 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007. The Division is satisfied consideration has been given to sterilisation of resources and that the proposed SWOE will not overlie granodiorite or limestone resources or have any adverse impact on limestone extraction at Marulan South Limestone Mine.

Boral notes this comment.

2.8 Aboriginal heritage

Office of Environment and Heritage made a submission regarding Aboriginal heritage.

OEH is satisfied that the Aboriginal consultation and assessment undertaken for the modification area has been consistent with the methodologies already approved for both major projects associated with this.

Boral notes this comment.

2.9 Bushfire

The NSW Rural Fire Service (RFS) made a submission regarding bushfire.

The RFS recommends that as part of the requirements the proposal should address the aims and objectives of Planning for Bushfire Protection 2006. This should include a fire management plan to ensure appropriate mitigative measures are developed to reduce the risk of wildfire impacts on the facility and to address the risk of activities occurring on the site becoming a potential ignition point for fire escaping from the site.

A bushfire management plan is implemented at Boral's Marulan South operations, comprising Peppertree Quarry and Marulan South Limestone Mine. The bushfire management plan is included at Appendix G for DPE's reference.

Boral actively monitors and maintains the site to manage and mitigate against approaching bushfire and ignition risks. The following bushfire measures are provided on site:

- two water carts are available on site with access to a third water cart if required, which are fitted with cannons and booms for firefighting purposes;
- two 264,000 litre water tanks dedicated to firefighting services feed internal spray systems associated with fire suppression in the screening and crushing buildings. These water tanks and two associated pumps are checked by Wormald on regular basis to ensure operation in the event an emergency;
- sediment ponds built around the current emplacement areas are connected by pipe and pumps to provide additional sources of water for firefighting purposes, if required;
- an access road is maintained around the perimeter of the site that would be augmented in response to the modification around the edge of proposed SWOE; and
- the site fire management systems are audited independently every 12 to 24 months to ensure suitable practices are employed to manage and mitigate fire risk.

Combined with the above, the following operational measures are in place to effectively manage bushfire risk:

- a system is in place to track total fire bans and nearby fires (i.e. "fires near us") to allow site responsive measures in the event of local or regional bushfires;

- Boral's daily tool box meetings identify total fire bans and other high risk fire days and ensures site operations minimise works involving potential ignition sources;
- Boral implements an emergency response plan that includes fire response measures and was developed in consultation with RFS. This plan is reviewed every 12 months and will be updated prior to commencement of the construction of SWOE.

It is further noted that schedule 3, condition 45 addresses on going bushfire management requirements, the inclusion of this condition should satisfy the matters raised by RFS.

2.10 Historic heritage

The Heritage Division of OEH made a submission regarding historic heritage.

The Heritage Division has no comments to make in relation to this project.

The response is noted.

2.11 Crown land

Department of Industry – Crown Lands made a submission regarding Crown land.

Crown Land and Crown Roads subject to the Project Approval Area require any existing or proposed occupation to be authorised under the Crown Land Management Act 2016 or Roads Act 1993. Authorisation to be agreed and executed prior to any activity taking place and within 12 months of Project/ Modification Approval. No works should be undertaken on Crown land without authority to occupy from DoI Crown Lands.

The comments of the Crown Lands Department are noted. Modification 5 does not seek to occupy or undertake works on land requiring Crown Lands consent.

2.12 Powerline easement

Essential Energy (EE) made a submission regarding the proposed realignment of the existing powerlines.

Essential Energy's environmental team have requested that the proposal be re-submitted with the power line removed from the modification so that it can be assessed under Part 5, or request that the powerline relocation is excluded from the project conditions. A big problem with these major project applications is that the definition of "project" encapsulates all components of the activity, including powerlines (where they are included). The consequence is that the powerline then becomes subjected to the conditions of approval and can include matters such as notifying DoPE in undertaking certain works, preparing an OEMP etc.

Essential Energy's (EE) submission was made direct to Boral (refer to Appendix A). Several attempts, by phone and email, have been made to contact EE to clarify the nature of issues experienced with the view to finding a suitable resolution.

Preliminary discussions with the Major Connections Case Manager on Thursday, 31 January 2019 have confirmed that the EE's preference is for the realignment to be removed from the modification application as they do not want to be a consent authority.

The options recommended by EE are considered neither feasible nor practical due to the following:

- The proposal relies on the realignment of the powerlines and as such it should be considered within the scope of the proposed modification; and
- A condition that excludes the powerlines for the project conditions may impede the modification from being implemented.

A review of State Environmental Planning Policy (Infrastructure) 2007, the primary instrument by which EE would undertake Activity Approvals using Part 5 of the EP&A Act 1979, confirms that there are no provisions that would typically require EE to adhere to the terms of a project approval when undertaking works supported by SEPP (Infrastructure).

In the event that conditions are imposed by the DPE in relation to the re-alignment of the powerlines. Draft conditions may be referred to EE for comment to ensure there is no ongoing obligations for further consent following completion of the project works.

The DPE may further consider the inclusion of a note that clarifies the limitations of the project approval in relation to subsequent works to transmission or distribution networks. Other matters

2.13 Resources Regulator

The Resources Regulator within DPE made the following submission.

The Resources Regulator has no specific comments to provide regarding environmental and rehabilitation aspects of the Peppertree Quarry- Modification 5 application.

A detailed review of the forthcoming Marulan South Limestone Mine Development Consent application (SSD 7709) will be undertaken when received.

In the event the Peppertree Quarry SWOE construction is approved and proposed to commence in areas covered by CML 16 prior to approval of the Marulan South Limestone Mine Development Consent, the Marulan South Limestone Mine Mining Operations Plan (MOP), required as a Condition of CML16, would need to be amended to incorporate activities in the areas covered by the Mining Lease.

Boral will forward this comment to Marulan South Limestone Mine's management team for consideration during the continued operations environmental impact assessment process.

2.14 Anonymous submission

One anonymous submission was received which was in opposition to the proposal. The submission covered a number of environmental aspects, which are addressed in this section. As the respondent is anonymous and the noise, air quality and visual objections are general in nature, Boral's ability to provide specific responses is limited, so general responses have been provided in reference to the EA.

DA creep

The submission expressed concern that modifications to the Project Approval will be ongoing and will substantially change the Quarry form its original approval.

Modifications to consents are given legal effect under Section 4.55 of the NSW *Environmental Planning and Assessment Act 1979*, and were previously also given effect under Part 3A (now repealed) of the Act for Major Projects.

The application for Modification 5 was made under Part 3A of the Act. Proposals under this part "must have 'limited environmental consequences beyond those which had been the subject of assessment' (of the original project assessment)" and "the consent authority must be the Minister for Planning" (*Barrick Australia Ltd v Williams*). In this way, the Minister is responsible

for ensuring modified projects do not substantially increase environmental consequences beyond those subject to the original assessment.

As Part 3A of the Act has been repealed, future modifications of the Project Approval (if required) will need to be made under Section 4.55 of the Act. This section requires that "development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all)".

Therefore, legislation prevents the Quarry from varying significantly from the originally approved project.

Noise

The submission expressed concern that the modification will result in additional noise impacts.

As described in Section 6.2 and Appendix B of the EA, potential noise impacts on surrounding receivers were predicted in accordance with EPA's *Noise Policy for Industry*. The noise model assumed worst case equipment locations, that is their closest extent near receivers, and at height on the SWOE. Noise levels were predicted to comply with the noise trigger levels and Project Approval criteria at all receivers.

The highest predicted noise levels which could interrupt sleep at the nearest receiver will be less than the relevant criterion.

Air quality

The submission expressed concern that the modification will result in additional dust impacts.

As described in Section 6.3 and Appendix C of the EA, potential air quality impacts on surrounding receivers from suspended particulates, PM_{10} and $PM_{2.5}$ were predicted in accordance with EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.

The air quality model assumed a worst-case scenario where maximum production was occurring at the Quarry during the approved hours with equipment at the closest locations to the receivers.

The model demonstrates that the Quarry would not exceed the regulatory levels at sensitive receivers.

Traffic

The submission expressed concern that the modification will generate additional traffic.

As noted in Section 2.3.2 above, the modification will not involve an increase in traffic using Marulan South Road between the Quarry and the Hume Highway.

Overburden emplacement

This component of the submission relates to the additional alternative SWOE location analysis that will be addressed in a later submission.

Visual amenity

The submission expressed concern about the height of the proposed SWOE.

As described in Section 6.7 and Appendix G of the EA, visual impacts from the SWOE were assessed for the EA. The SWOE has potential to be visible from publicly accessible areas and private properties.

The SWOE will have a low overall visual exposure to its visual catchment. Despite there being several rural properties and commercial operations within 3 km of the closest part of the Project, there is low visual exposure to those receivers and most have no views of it. Two receivers will have minor exposure to the SWOE. The existing eastern and southern overburden emplacements will significantly screen views of the Project.

APPENDIX A

SUBMISSIONS

Goulburn Mulwaree Council
Locked Bag 22
Goulburn NSW 2580

Civic Centre
184 - 194 Bourke Street
Goulburn NSW 2580
t (02) 4823 4444
e council@goulburn.nsw.gov.au
www.goulburn.nsw.gov.au

Contact: Scott Martin

7 December 2018

Attention: Jack Murphy
Environmental Assessment Officer
NSW Planning and Environment
GPO Box 39
Sydney NSW 2001

Dear Jack

Subject: **MP 06_0074 MOD 5**
Peppertree Quarry – Modification 5

I refer to the above matter which was reported to the Council meeting held 4 December 2018 and provide the following comments.

Goulburn Mulwaree Council does not object to the proposed Peppertree Quarry Modification 5 application currently on public exhibition, however provides the following comments for consideration during the assessment of the application.

Biodiversity

The proposal has not satisfactorily met the requirements of the Biodiversity Conservation Act. The following direct impacts would result from the proposal:

- clearing of vegetation conservatively estimated to be 39.69ha including 27.68 ha of endangered ecological community
- clearing of associate threatened species habitat
- clearing of koala habitat estimated to be 27.1ha; and
- clearing of Large-eared Pied Bat habitat estimated to be 27.1ha

Boral have acquired 1000ha which helps to offset Koala, Large-eared Pied Bat and the Coastal Grey Box habitat. They are currently negotiating another 360ha to help offset the impacts on the Yellow Box-Blakely's Red Gum grassy woodland endangered ecological community. We are asking they finalise all of the land purchases and satisfy biodiversity requirements before a determination is made.

Marulan South Road

Council is currently negotiating with Boral in relation to the closure and purchase of Council roads within the site (refer Attached, Figure 1).

It is recommended that prior to works commencing, all road closure requirements and works are to be finalised.

The modification includes a proposal to construct a new haul road from the pit to the south-west overburden emplacement area.

If the road closure permits are not finalised before this road is operational the haul road will conflict with a public road (Refer Attached, Figure 2).

Noise

Potential noise impact from construction and operation of the proposal on nearby sensitive residential, commercial and industrial receivers was assessed in accordance with the EPA's guidelines. It is recommended that Boral and the EPA review the current environment protection licence prior to a determination of the application

Dust

The preparation of an Air Quality Management Plan, in consultation with the EPA is a condition of the current consent. It is recommended that the Plan is reviewed by Boral and the EPA in consultation with DPE prior to determination being made.

Visual Amenity

The south-west overburden emplacement area will be a new area of disturbance at the site and has the potential to be visible from publicly accessible areas and private properties. The visual impact was analysed and considered to have a low overall visual exposure to those receivers.

In the context of the surrounding extractive industries developments, the visual impact is considered acceptable.

I can be contacted on (02) 48 234 480 if you would like to discuss these comments further.

Yours sincerely

Scott Martin
Director Planning & Environment

Att.

Figure 1

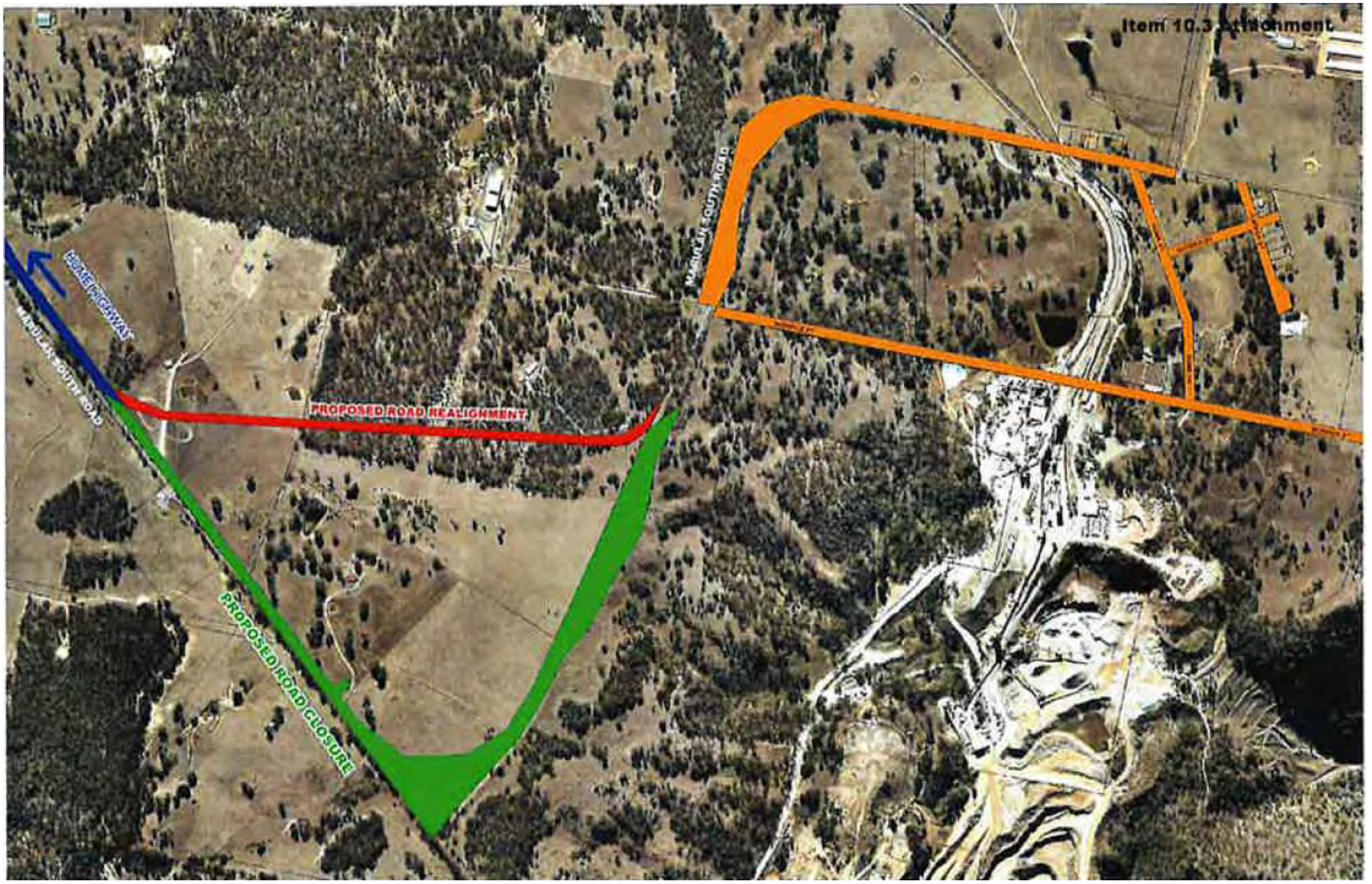
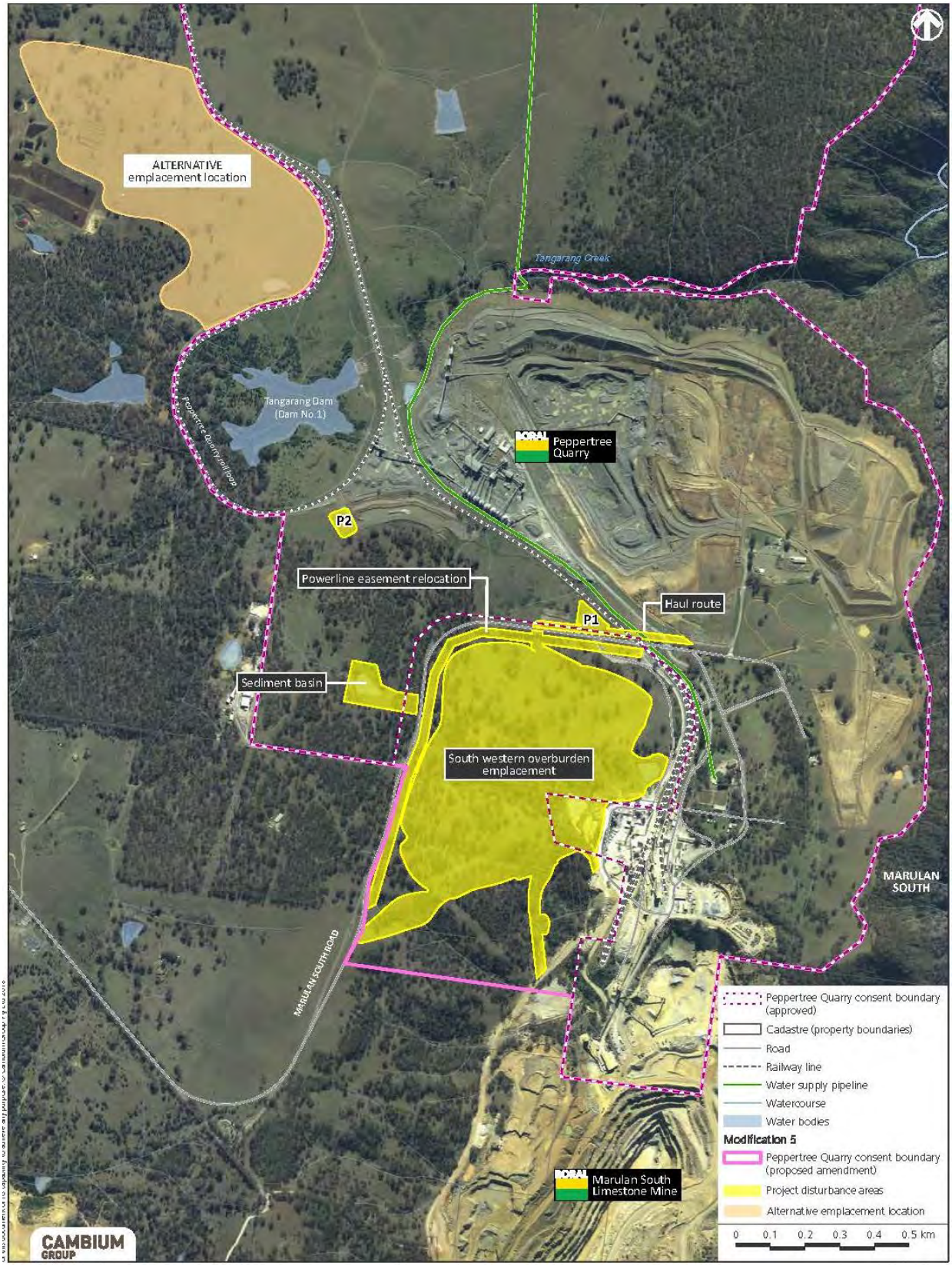

Item 10.3 Attachment
HUME HIGHWAY
MARULAN SOUTH ROAD
PROPOSED ROAD REALIGNMENT
PROPOSED ROAD CLOSURE

Figure 2


ALTERNATIVE emplacement location
Tangarang Creek
Tangarang Dam (Dam No.1)
Peppertree Quarry access loop
Peppertree Quarry
P2
Powerline easement relocation
Haul route
P1
Sediment basin
South western overburden emplacement
MARULAN SOUTH
MARULAN SOUTH ROAD
Marulan South Limestone Mine
CAMBIUM GROUP
Peppertree Quarry consent boundary (approved)
Cadastre (property boundaries)
Road
Railway line
Water supply pipeline
Watercourse
Water bodies
Modification 5
Peppertree Quarry consent boundary (proposed amendment)
Project disturbance areas
Alternative emplacement location
0 0.1 0.2 0.3 0.4 0.5 km

Planning Services
Resource Assessments & Compliance
Contact: Jack Murphy
Phone: 8217 2016
Email: jack.murphy@planning.nsw.gov.au

Kate Jackson
Senior Planning and Development Manager
Boral Resources (NSW) Pty Ltd
PO Box 6041
North Ryde NSW 2113

Dear Ms Jackson

Peppertree Quarry Modification 5 (PA 06_0074 MOD 5)
Request for Response to Submissions

The public exhibition of the Environmental Assessment (EA) for Peppertree Quarry concluded on Thursday 6 December 2018.

In response to the exhibition, the Department received one submission from a member of the community, no submissions from special interest groups and eight submissions from government agencies. The Department notes that the community submission was in the form of an objection. The submissions can be viewed on the Department's website www.majorprojects.planning.nsw.gov.au.

The Department is also expecting additional submissions from the Environment Protection Authority, Department of Industry – Lands & Water and the Local Land Services. The Department will make these submissions available to you as soon as possible once they are received.

The Department now requests that you prepare and submit a Response to Submissions (RTS) report, detailing your responses to all issues raised in the submissions. The Department requests that you give particular consideration to the matters outlined in **Attachment A**, including any requests for clarification and/or further information.

As you are aware, the Department is seeking to deal with all remaining applications made under section 75W of the *Environmental Planning & Assessment Act 1979* (the Act) as soon as possible. The Department therefore requests that the RTS report be submitted to the Department by no later than **14 January 2019**.

If you consider this timeframe is not achievable, please contact the Department to discuss the possibility of transitioning PA 06_0074 to State Significant Development, with the modification request proceeding under section 4.55(2) of the Act.

If you wish to discuss this matter further, please contact Jack Murphy at the details above.

Yours sincerely,

Howard Reed 10-12-18
Director
Resource Assessments

Attachment A

1. **Biodiversity**
   - The Department notes that Boral has been liaising with OEH over the adequacy of the Biodiversity Assessment Report (BDAR) provided in the EA. The Department requests that Boral provides a revised BDAR, prepared in consultation with OEH.
   - Please provide detailed discussion regarding impacts on Koala habitat, having regard to *State Environmental Planning Policy No 44 - Koala Habitat Protection*, in particular how it was determined that the site does not contain 'core Koala habitat'.

2. **Traffic and Transport**
   - The Department requests that Boral provides a map which clearly indicates the positioning of the proposed intersection scenarios.
   - The Traffic Impact Assessment (TIA) refers to 'existing traffic generated by the Limestone Mine and Peppertree Quarry'. However, the assessment does not quantify current traffic volumes for either operation, please provide further information.
   - Please provide an update on the progress of consultation with Council regarding the purchase and deregistration of Marulan South Road.
   - Condition 7 of Schedule 2 of the Project Approval states that quarry products must not be transported from the site by road, except with the written approval of the Secretary. The Department routinely grants approval for the donation of scalp material to neighbours and for use in local community projects. The Department recommends that you consider establishing a weekly or daily cap for such vehicle movements, to avoid the need to seek written approval for each donation. However, the Department notes that these vehicle movements would need to be included in the TIA.

3. **Surface Water**

   Section 5.2 of the Surface Water Assessment Report (Appendix F), notes that 'discharges from Dam 1 may occur after heavy rainfall exceeding the design capacity of the basins, when significant runoff and dilution can be expected from other parts of the landscape'. Please provide further information concerning the ability of this dilution to prevent water quality impacts outside the project area.

4. **Noise**

   Condition 5 of Schedule 3 provides voluntary acquisition rights to three privately-owned receivers (R2, R3 and R8) in the event that noise generated by the quarry exceeds the criteria specified in Table 2 of the Project Approval. As the proposed modification would remove these rights, the Department is seeking to ascertain whether the acquisition rights have previously been triggered by the project. The Department requests a summary of noise monitoring conducted for the last two years with respect to these three receivers.

DOC18/154609-04

Department of Planning and Environment
Resource Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Jack Murphy

Dear Mr Murphy

RE: Project Approval 06_0074 Modification Request No. 5
Boral Peppertree Quarry - Marulan

I refer to your email of 1 November 2018 in which you requested the NSW Environment Protection Authority's (EPA) comments and suggested approval conditions on Boral Resources (NSW) Pty Ltd's Modification 5 proposal for the Peppertree Quarry at Marulan (Project Approval 06_0074). I apologise for the delay in the submission of the EPA's response.

The EPA has reviewed the Environmental Assessment (EA) titled 'Peppertree Quarry Modification 5 – Environmental Assessment', prepared by Element Environment, dated 31 October 2018. The EPA has identified a number of issues in relation to the noise impact assessment and provides further comment in **Attachment A** to this letter regarding this. Please note however, the identified issues do not prevent the EPA from providing recommended conditions for noise, in line with the requirements of the Noise Policy for Industry (EPA 2017), with these detailed in **Attachment B** to this letter. These comments and recommended conditions of approval are provided to assist the Department of Planning and Environment in its decision whether or not to approve the modification.

I trust these comments are of assistance. If you have any queries regarding this letter, please contact Michael Heinze at the EPA's South East Region office in Queanbeyan on (02) 6229 7002.

Yours sincerely

Press. 12/12/18

STEFAN PRESS
Unit Head – South East Region
Environment Protection Authority

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Attachment A – EPA Comments – Peppertree Quarry Mod 5

Noise

The EPA has reviewed the noise impact assessment contained within the EA, titled 'Noise Impact Assessment – Peppertree Quarry Mod 5' (NIA), prepared by Wilkinson Murray and dated September 2018.

The EPA considers that the NIA is adequate for the purposes of providing recommended noise conditions which are detailed in **Attachment B**. The recommended noise conditions include Lot and DP numbers for receiver identification, and in order to provide these are fully correct these details need to be confirmed by the proponent. It is recommended that this occur as part of any response to submissions by the proponent or prior to any approval of Modification 5 by the Department of Planning and Environment (DPE).

The recommended conditions also nominate monitoring points for meteorological parameters, and it is understood that the proponent operates a weather station on the premises. The addition of this point to Environment Protection Licence 13088 (EPL) will need to be negotiated between the proponent and the EPA and is relevant to recommended conditions L6.4, M7.1 and M7.2 as detailed in Attachment B.

The EPA does note the NIA should have included an analysis of wind data in accordance with Fact Sheet D2 of the Noise Policy for Industry to assess impacts under any applicable prevailing winds. The NIA adopts standard meteorological conditions in Section 6.1, although a wind data analysis has not been undertaken. The wind roses in Appendix C of the NIA suggest that some prevailing winds may be applicable to the assessment.

The EPA considers that the proposal as presented in the NIA will most likely be able to comply with the recommended conditions in Attachment B under any applicable prevailing winds and has recommended noise-enhancing meteorological conditions in Condition L6.3, which is also consistent with the existing EPL for the premises. However, for completeness DPE may wish to consider whether it requires the proponent amend the NIA to include an analysis of wind data in accordance with Fact Sheet D2 of the Noise Policy for Industry and assess impacts under any applicable prevailing winds.

Attachment B – Recommended Conditions – Peppertree Quarry Mod 5

Noise Limit Conditions

L6.1 Noise generated at the premises must not exceed the noise limits at the times and locations in the table below. The locations referred to in the table below are indicated by Appendix 3 of the Consolidated Project Approval (06_0074 Mod 4). <Proponent to check all references and Lot/DP numbers for accuracy>

Location	Noise Limits in dB(A)			
	Day	Evening	Night	Night
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	L_{AFmax}
R3 (5) - 113 Green Hills Road Marulan (Lot 2, DP 1060897)	40	35	35	52
R2 (6) - 90 Green Hills Road Marulan (Lot 11, DP 881240)	40	35	35	52
R8 (16) - 381 Marulan South Road, Marulan (Lot 1, DP 1190667)	40	35	35	52
Any other noise sensitive residential receiver location	40	35	35	52

L6.2 For the purposes of condition L6.1:

a) Day means the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.

b) Evening means the period from 6pm to 10pm.

c) Night means the period from 10pm to 7am Monday to Saturday and the period from 10pm to 8am Sunday and public holidays.

L6.3 Noise-enhancing meteorological conditions

a) The noise limits set out in condition L6.1 apply under the following meteorological conditions:

Assessment Period	Meteorological Conditions
Day	Stability Categories A, B, C, D and E with wind speeds up to and including 3m/s at 10m above ground level.
Evening	Stability Categories A, B, C, D and E with wind speeds up to and including 3m/s at 10m above ground level.
Night	Stability Categories A, B, C, D and E with wind speeds up to and including 3m/s at 10m above ground level; or Stability category F with wind speeds up to and including 2m/s at 10m above ground level.

b) For those meteorological conditions not referred to in condition L6.3(a), the noise limits that apply are the noise limits in condition L6.1 plus 5dB.

L6.4 For the purposes of condition L6.3:

a) The meteorological conditions are to be determined from meteorological data obtained from the meteorological weather station identified as (*to be determined*).

b) Stability category shall be determined using the following method from Fact Sheet D of the *Noise Policy for Industry* (NSW EPA, 2017):

i. Use of sigma-theta data (section D1.4).

L6.5 To assess compliance:

(a) with the $L_{Aeq(15\ minutes)}$ or the L_{Amax} noise limits in condition L6.1 and L6.3, the noise measurement equipment must be located:
  (i) approximately on the property boundary, where any residence is situated 30 metres or less from the property boundary closest to premises; or where applicable,
  (ii) within 30 metres of a residence façade, but not closer than 3 metres where any residence on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable,
  (iii) within 50 metres of the boundary of a National Park or Nature Reserve.

(b) with the $L_{Aeq(15\ minutes)}$ or the L_{Amax} noise limits in condition L6.1 and L6.3, the noise measurement equipment must be located:
  (i) at the reasonably most affected point at a location where there is no residence at the location; or,
  (ii) at the reasonably most affected point within an area at a location prescribed by condition L6.5 (a).

L6.6 A non-compliance of conditions L6.1 and L6.3 will still occur where noise generated from the premises is measured in excess of the noise limit at a location other than the locations referred to in condition L6.5 (a) or L6.5 (b).

L6.7 For the purpose of determining the noise generated from the premises, the modifying factor corrections in Table C1 in Fact Sheet C of the *Noise Policy for Industry* (NSW EPA, 2017) may be applied, if appropriate, to the noise measurements by the noise monitoring equipment.

L6.8 Noise measurements must not be undertaken where rain or wind speed at microphone level will affect the acquisition of valid sound pressure level measurements.

Monitoring Conditions

M7.1 The meteorological weather station identified as (*to be determined*) must be maintained so as to be capable of continuously monitoring the parameters specified in condition M7.2.

M7.2 For each monitoring point specified in the table below the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The licensee must use the sampling method, units of measure, averaging period and sample at the frequency, specified opposite in the other columns.

Point (*to be determined*)

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Air temperature	°C	Continuous	1 hour	AM-4
Wind direction	°	Continuous	15 minute	AM-2 & AM-4
Wind speed	m/s	Continuous	15 minute	AM-2 & AM-4
Sigma theta	°	Continuous	15 minute	AM-2 & AM-4
Rainfall	mm	Continuous	15 minute	AM-4
Relative humidity	%	Continuous	1 hour	AM-4

M8 Requirement to Monitor Noise

M8.1 Attended noise monitoring must be undertaken in accordance with Condition L6.5 and:

a) at each location listed in Condition L6.1:
b) occur quarterly in a reporting period;
c) occur during each day, evening and night period as defined in the Noise Policy for Industry for a minimum of:

- 1.5 hours during the day;
- 30 minutes during the evening; and
- 1 hour during the night.

d) occur for three consecutive operating days.

Reporting Conditions

R4 Noise Monitoring Report

A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

a) an assessment of compliance with noise limits presented in Condition L6.1 and L6.3; and
b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits contained in Condition L6.1 and L6.3.

Additions to Definition of Terms of the licence

- Noise Policy for Industry - the document entitled "*Noise Policy for Industry*" published by the NSW Environment Protection Authority in October 2017.

- Noise – 'sound pressure levels' for the purposes of conditions L6.1 to L6.7.

- $L_{Aeq\ (15\ minute)}$ - the value of the A-weighted sound pressure level of a continuous steady sound that, over a 15 minute time interval, has the same mean square sound pressure level as a sound under consideration with a level that varies with time (AS1055.1-1997).

- L_{AFmax} – the maximum sound pressure level of an event measured with a sound level meter satisfying AS IEC 61672.1-2004 set to 'A' frequency weighting and fast time weighting.

12th November 2018

Jack Murphy
Environmental Assessment Officer – Resource Assessments
NSW Planning & Environment
GPO Box 39
Sydney NSW 2001

Emailed: jack.murphy@planning.nsw.gov.au

Your Reference:MP06_0074 MOD5
Our Reference: DOC18/862026

Dear Mr Murphy

Re: Peppertree Quarry – PA06_0074 MOD5 – Modification exhibition

Thank you for the opportunity to provide advice on the above matter. This is a response from the NSW Department of Planning & Environment – Division of Resources & Geoscience, Geological Survey of New South Wales (GSNSW).

Boral Resources (NSW) propose to modify development consent PA06_0074 (MOD 5) for the Peppertree Quarry by:

- clearing approximately 28 ha of endangered ecological community
- developing a new overburden area (South-west Overburden Emplacement – SWOE)
- extending the approval boundary to the south to encompass the SWOE
- constructing a new haul road from the existing pit to the SWOE
- constructing a new intersection at Marulan South Road to link the new haul road with the SWOE
- amending the design of the Western Overburden Emplacement
- removing the Western Earth Bund from the approval
- relocating a powerline which runs through the proposed SWOE site.

The Division has reviewed the Environmental Assessment for the modification in regard to resource sterilisation under cl13 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007. The Division is satisfied consideration has been given to sterilisation of resources and that the proposed SWOE will not overlie granodiorite or limestone resources or have any adverse impact on limestone extraction at Marulan South Limestone Mine.

The Division notes two biodiversity stewardship sites will be established to satisfy the offset requirement for the modification. The Division would appreciate the opportunity to review the proposed offset areas as early in the process as possible.

Geoscience Information Services

The Division has a range of online data related to mineral exploration, land use and general geoscience topics:
http://www.resources.nsw.gov.au/geological/online-services

The location of current exploration and mining titles in NSW, explanations of mining and production titles and the roles of community and government in the decision making process for mining/resource projects may be accessed by the general public using the following online utilities:

https://resourcesandgeoscience.nsw.gov.au/miners-and-explorers/geoscience-information/services/online-services/minview

Queries regarding the above information, and future requests for advice in relation to this matter, should be directed to the Division's Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely

Malcolm Drummond
Senior Geoscientist - Land Use

for Paul Dale
Director – Land Use & Titles Advice

NSW GOVERNMENT | Office of Environment & Heritage

Your reference: MP06_0074 EPBC 2018/8243
Our reference: DOC 18/933715

Howard Reed
Director – Resource Assessments
Planning Services, Department of Planning and Environment

Attention: Jack Murphy – jack.murphy@planning.nsw.gov.au

Dear Howard,

Peppertree Quarry Modification 5, Marulan South

As requested, we have reviewed Peppertree Quarry Modification 5, Marulan South.

The MOD proposal includes the clearing of vegetation listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* an Endangered Ecological Community (EEC). The proposal will also impact on Large-eared Pied Bat (*Chalinolobus dwyeri*) and Koala (*Pharscolarctus cinereus* habitat.

This MOD is deemed a Controlled Action under section 75 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Department of the Environment and Energy (DOEE) advised the likelihood of significant impacts to listed species and communities (section 18 and section 18A). The Matters of National Environmental Significance (MNES) are listed as follows:

- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – critically endangered
- Regent Honeyeater *(Xanthomyza Phrygia)* – critically endangered
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – vulnerable
- Koala (*Pharscolarctus cinereus*) - vulnerable

As I mentioned to you last week, there are a number of matters in the environmental assessment that require clarification. As I proposed in our discussion, we contacted the Proponent, Boral Resources NSW and their consultants Element and Niche, in relation to improving how they fulfil the impact assessment requirements of the State and Commonwealth legislation under the bilateral.

We identified that the following key issues require addressing in Biodiversity Development Assessment Report (BDAR):

- Demonstration of the avoidance and minimising principle as it relates to Site Selection;
- Survey methodology as it relates to vegetation integrity assessment and the application of the Biodiversity Assessment Method (BAM
- Survey methodology as it relates to threatened species of EPBC listed fauna requirements; and
- Confirmation of suitable offsets to satisfy both the Commonwealth and State requirements.

We also recommended that the options to avoid serious impacts to vegetation and fauna through seeking an alternative site should be more thoroughly investigated and considered during the assessment phase to provide confidence for decision makers as to the preferred site.

OEH remains available to the Proponent to review any drafts for adequacy or queries to that point especially as it relates to the refinement of the Biodiversity Development Assessment Report (BDAR) through the Response to Submissions process. OEH will continue to assess the impact of the development on commonwealth species.

OEH is satisfied that the Aboriginal consultation and assessment undertaken for the modification area has been consistent with the methodologies already approved for both major projects associated with this MOD.

Please note, OEH did not review the environmental assessment document relating to Peppertree Quarry MOD 5 prior to its exhibition.

Please contact Senior Conservation Planning Officer, Tania Ashworth on 02 6229 7176 if you would like to discuss this matter further.

Yours Sincerely,

6.12.2018

MICHAEL SAXON
Director South East Branch
Conservation & Regional Delivery
Office of Environment and Heritage

OUT18/17031

Jack Murphy
Environmental Assessment Officer
Resource Assessments
NSW Department of Planning and Environment

jack.murphy@planning.nsw.gov.au

Dear Mr Murphy

Peppertree Quarry - Modification 5 (06_0074)
Environmental Assessment

I refer to your email of 1 November 2018 to the Department of Industry (DoI) in respect to the above matter. Comment has been sought from relevant branches of Lands & Water and Department of Primary Industries. Any further referrals to Department of Industry can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

The department provides the following comments and recommendations for consideration in assessment of the proposal.

DoI -– Water and Natural Resources Access Regulator

- The Biodiversity and Rehabilitation Management Plan should be updated to include Modification 5 if approved.
- The Water Management Plan should be updated to include additions of Modification 5 if approved.
- Updating/development of water specific plans to occur in consultation with the Natural Resources Access Regulator (NRAR).

DoI Crown Lands

- Crown Land and Crown Roads subject to the Project Approval Area require any existing or proposed occupation to be authorised under the *Crown Land Management Act 2016* or *Roads Act 1993*. Authorisation to be agreed and executed prior to any activity taking place and within 12 months of Project/ Modification Approval. No works should be undertaken on Crown land without authority to occupy from DoI Crown Lands.

Yours sincerely

Alex King
Director Cabinet and Legislation Services
Lands and Water - Strategy and Policy
10 December 2018

Transport
Roads & Maritime
Services

Our ref: STH06/01275/02
Contact: Andrew Lissenden 4221 2769
Your ref: PA06_0074 MOD 5

29 November 2018

Jack Murphy
Resource Assessments, Planning Services
NSW Department of Planning and Environment
BY EMAIL: information@planning.nsw.gov.au

PEPPERTREE QUARRY – MODIFICATION 5 (PA 06_0074 MOD 5)

Dear Jack

Roads and Maritime Services (RMS) refers to your email dated 1 November 2018 regarding the above application to modify the project approval for the Peppertree Quarry.

RMS has completed an assessment of the proposed modification, based on the information provided and focussing on the impact to the state road network. For this development, the key state road is the Hume Highway which is located approximately 8km, via the local road network, to the north-west of the existing Peppertree Quarry development.

RMS notes that the proposed modification does not seek to:

- Change conditions of the currently issued consolidated approval that requires product from the quarry to be transported entirely by rail with the exception of transportation of donated materials and 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); and
- Change vehicle movements (e.g. staff, general maintenance vehicles, etc) to and from the site. These vehicles access the site via an existing interchange on the Hume Highway and then via Marulan South Road which is a local road managed by Goulburn Mulwaree Council.

Having regard for the above RMS does not believe the modification will have a significant impact on the state road network (i.e. the Hume Highway). On this basis RMS does not object to the modification application.

RMS does however note that the proposal is seeking to construct a new intersection on Marulan South Road to allow trucks hauling overburden material from the quarry to cross Marulan South Road and access a new overburden area (South-west Overburden Emplacement) that is proposed as part of this modification. The Environmental Assessment advising that the quarry owner is negotiating with Council to

deproclaim/deregister the affected section of Marulan South Road and if it becomes a private road then future intersection operation may be provided via traffic signal control. Noting this RMS suggests that the following requirement is included as a condition in any modified approval issued.

- If traffic signals are to be installed at the intersection of the new Haul Road and Marulan South Road (refer to *Peppertree Quarry Modification 5 Environmental Assessment* prepared by Element Environment, Revision 3, dated 31 October 2018) the following requirements should be complied with:
  - If there is uncontrolled access to the site and it is open to any vehicle wishing to enter the site, then even if the road (i.e. Marulan South Road) is privately owned, it is regarded as a road related area under the *Road Transport Act 2013* and RMS must authorise any traffic signal installation. Hence the design, installation and operation must comply with RMS policy and guidelines and approval must be gained from RMS prior to their installation; or
  - If there is a controlled access to the site via a barrier, gate, security checkpoint or any other means, then the road (i.e. Marulan South Road) within the site is deemed a private road, in which case RMS has no role in the authorisation of traffic signals and the property owner is not obliged to follow RMS policy or guidelines. In this situation the property owner carries all the risk and RMS staff will not audit or comment on the design, installation or operation of the traffic signals. Noting that RMS policy and guidelines in regard to the design, installation and operation of traffic signals do exist it would be good practice in this scenario to use these documents for guidance.

Upon determination of this matter, it would be appreciated if DP&E could email a copy of the Notice of Determination to RMS via development.southern@rms.nsw.gov.au.

If you have any questions please contact Andrew Lissenden on 4221 2769.

Yours faithfully

Chris Millet
Manager Land Use
Southern Region

Cc: Jack.Murphy@planning.nsw.gov.au; and
council@goulburn.nsw.gov.au

TOMASY PLANNING

Level 1
1073 Pittwater Road
Collaroy Beach, NSW 2097
E: denis.smith8@bigpond.com
P: 02 8456 4754
M: 0400 777 115

6 December, 2018

Attention: Director – Resource Assessments
Planning Services
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2000

Attention: Director – Resource Assessments

MP06_0074 MOD 5 - BORAL RESOURCES (NSW) PTY LTD - PEPPERTREE QUARRY
MARULAN SOUTH ROAD, MARULAN

Reference is made to the application for a Modification (5) in respect of the Peppertree Quarry operated by Boral Resources (NSW) Pty Ltd. This submission is made on behalf of Gormen Pty Ltd who are the owners of a significant property known as 'Glenrock' being 248 Highland Way, Marulan. The 'Glenrock' is the largest private holding that abuts the Boral development which includes the Peppertree Quarry and Marulan South Limestone Mine. It is our understanding that the Modification for the Peppertree Quarry involves the following:

- Clearing approximately 28 hectares of endangered ecological community
- Developing a new overburden area (South-west Overburden Emplacement – SWOE)
- Extending the approval boundary to the south to encompass the SWOE
- Construction of a new haul road from the existing pit to the SWOE
- Constructing a new intersection at Marulan South Road to link the new haul road with SWOE
- Removing the Western Earth Bund from the approval and
- Relocating a powerline which runs through the proposed SWOE site

Our client has also met and had discussions with representatives of Boral in August of this year regarding the subject proposal. Our clients do not object to the development, however there is a matter that is pertinent to the Modification, that is an agreement was reached with Boral senior management in November 2011 and July 2013 that trees of an appropriate maturity would be planted along the ridgeline between the subject properties to create a physical visual barrier between the Boral project and the 'Glenrock' property. To date the planting of the appropriate mature trees has not taken place and accordingly it is requested that if the Department of Planning is of the view that the Modification should be approved a condition should be imposed upon the consent to ensure that the following is implemented:

- Boral Resources NSW Pty Ltd be responsible for planting of appropriate mature trees along the ridgeline of our client's property to create a physical visual barrier between Boral's Peppertree Quarry, the Marulan South Limestone Operation and the 'Glenrock' property being 248 Highland Way, Marulan.

Happy to discuss any matter with you on behalf of our client.

DENIS SMITH - DIRECTOR

Good Afternoon Mr Murphy

Thank you for providing WaterNSW with the opportunity to review and comment on the Environmental Assessment (EA) for the Peppertree Quarry modification application (06_0074 Mod 5).

WaterNSW has reviewed the EA. WaterNSW notes the suggestions and recommendations in the EA and recommends those matters are addressed in the Department's assessment of the modification application and approval conditions as follows.

WaterNSW's review has focussed on the water quality implications arising from the construction, operation and decommissioning of the works proposed in the modification application. WaterNSW is satisfied that water quality can be appropriately managed during the construction and operational stages subject to the implementation of the mitigation measures outlined in the EA including revision of the existing Water Management Plan (including the subplans -Site Water Balance, Erosion and Sediment Control Plan, Surface Water Monitoring Program, Groundwater Monitoring Program and Surface and Groundwater Response Plan).

The main issue arising from WaterNSW's review is that the EA appears to lack information on the physical characteristics of the South West Overburden Emplacement (SWOE). This makes it difficult to determine whether the SWOE is likely to be geomorphologically stable in the long term (i.e. that the rate of erosion from the emplacement will be minimal and not greater than that currently occurring at the site). WaterNSW request that this be addressed in the Response to Submissions report.

It is requested that WaterNSW continue to be included as a stakeholder for the proposal. Further, WaterNSW would appreciate being provided with a copy of the Response to Submissions report.

If you have any further questions, please contact Jim Caddey on (02) 4824 3401.

Regards
Malcolm

Malcolm Hughes
Manager Catchment Protection
WaterNSW
Level 14, 169 Macquarie Street, Parramatta NSW 2150
PO Box 398, Parramatta NSW 2124
T: 02 9865 2520 **M:** 0427 466 934
malcolm.hughes@waternsw.com.au
www.waternsw.com.au

From:	Adrian Hohenzollern
To:	Jack Murphy
Subject:	Peppertree Quarry - Modification 5 (PA 06_0074 MOD 5)
Date:	Thursday, 8 November 2018 2:39:59 PM

Hi Jack

Thank you for referring this proposal.
The Heritage Division has no comments to make in relation to this project.

Kind regards
Adrian

Adrian Hohenzollern
Senior Team Leader
Customer Strategies, Heritage Division
Office of Environment and Heritage
Locked Bag 5020 PARRAMATTA NSW 2124
Level 6, 10 Valentine Ave, PARRAMATTA NSW 2150
T: 02 9860 1505 E: adrian.hohenzollern@environment.nsw.gov.au
W www.environment.nsw.gov.au | www.environment.nsw.gov.au/cultureandheritage.htm

NSW RURAL FIRE SERVICE

Resource Assessments Planning Services
Department of Planning & Environment
GPO Box 39
Sydney NSW 2001

Your Ref: PA 06_0074 MOD 5
Our Ref: D18/7942

ATTENTION: Jack Murphy

3 December 2018

Dear Sir/Madam

Peppertree Quarry – Modification 5

I refer to your correspondence dated 1 November 2018 seeking advice regarding bush fire protection for the above Development Application.

The NSW Rural Fire Service has considered the information submitted and provides the following advice:

1. The RFS recommends that as part of the requirements the proposal should address the aims and objectives of Planning for Bushfire Protection 2006. This should include a fire management plan to ensure appropriate mitigative measures are developed to reduce the risk of wildfire impacts on the facility and to address the risk of activities occurring on the site becoming a potential ignition point for fire escaping from the site.

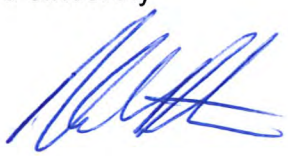
Should you wish to discuss this matter please contact Deborah Dawson on 1300 NSW RFS.

Postal address
Records
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
Planning and Environment Services (South)
Unit 2, 63 Cranbrook Road
BATEMANS BAY NSW 2536

T (02) 4472 0600
F (02) 4472 0690
www.rfs.nsw.gov.au
Email: pes@rfs.nsw.gov.au

Yours sincerely



Martha Dotter
A/Team Leader Development & Assessment
Planning & Environment Services - South

---------- Forwarded message ---------
From: **Andrew Tucker** <andrew.tucker@essentialenergy.com.au>
Date: Thu, 20 Dec 2018 at 09:41
Subject: Peppertree Quarry - Modification 5 (PA 06_0074 MOD 5) Notice of Exhibition
To: angus.shedden@boral.com.au <angus.shedden@boral.com.au>

Hi Angus as discussed the Department of Planning & Environment has contacted EE re your modification application for Peppertree Quarry. Our environmental team have ask me to contact you to have it re-submitted with the power line removed from the modification so that it can be assessed under Part 5, or request that the powerline relocation is excluded from the project conditions. A big problem with these major project applications is that the definition of "project" encapsulates all components of the activity, including powerlines (where they are included). The consequence is that the powerline then becomes subjected to the conditions of approval and can include matters such as notifying DoPE in undertaking certain works, preparing an OEMP etc.

Kind regards,

Andrew Tucker

Major Connections Case Manager

T: 02 6883 4411 | Ext 64411 andrew.tucker@essentialenergy.com.au
PO Box 5730 Port Macquarie NSW 2444 | essentialenergy.com.au
General enquiries: 13 23 91 | Supply interruptions (24hr): 13 20 80

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Planning & Environment
NSW GOVERNMENT | Resources Regulator

Our Ref: DOC18/891819

Jack Murphy
Environmental Assessment Officer
Resource Assessments
Planning Services
Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

By email: jack.murphy@planning.nsw.gov.au

Peppertree Quarry – Modification 5 (PA 06_0074 MOD 5): Response to Request for Advice

Dear Jack,

I refer to the Department of Planning and Environment – Resources Assessments (DPE – Resources & Assessment) email dated 1 November 2018 inviting the Resources Regulator to provide advice regarding Modification 5 to the Peppertree Quarry Development Consent (PA 06_0074 MOD 5).

Development Details

The Peppertree Quarry is an open cut operation located at Marulan South, NSW. The Peppertree Quarry – Modification 5 (PA 06_0074 MOD 5) involves the following:

- clearing approximately 28 ha of endangered ecological community;
- developing a new overburden area (South-west Overburden Emplacement – SWOE);
- extending the approval boundary to the south to encompass the SWOE;
- constructing a new haul road from the existing pit to the SWOE;
- constructing a new intersection at Marulan South Road to link the new haul road with the SWOE;
- amending the design of the Western Overburden Emplacement;
- removing the Western Earth Bund from the approval; and
- relocating a powerline which runs through the proposed SWOE site.

Environment and Rehabilitation

The Resources Regulator notes that Peppertree Quarry extracts granodiorite which is not a mineral prescribed under the *Mining Act, 1992*. As such, the Peppertree Quarry does not require a Mining Lease and the Resources Regulator does not regulate environmental or rehabilitation aspects of the Quarry.

The Resources Regulator also notes that the Peppertree Quarry is located north of the Marulan South Limestone Mine and that both the existing and proposed consent boundary extend over parts of the Marulan South Limestone Mine operation.

The Resources Regulator does regulate environmental and rehabilitation aspects of the Marulan South Limestone Mine and there is a current Mining Title (Consolidated Mining Lease (CML) 16) over this operation.

It is understood that the Marulan South Limestone Mine is subject to a forthcoming Development Consent application (SSD 7009) which will also cover the Peppertree Quarry SWOE. It is expected this will be submitted to DPE by the end of November or early December 2018.

A Mining Lease application is also proposed which will include a Mining Lease covering the SWOE. At present, the existing CML16 covers a very small section of the proposed SWOE, whereas the proposed new Mining Lease will cover the full extent of the SWOE.

Summary of Advice

The Resources Regulator has no specific comments to provide regarding environmental and rehabilitation aspects of the **Peppertree Quarry – Modification 5** application.

A detailed review of the forthcoming Marulan South Limestone Mine Development Consent application (SSD 7709) will be undertaken when received.

In the event the Peppertree Quarry SWOE construction is approved and proposed to commence in areas covered by CML 16 prior to approval of the Marulan South Limestone Mine Development Consent, the Marulan South Limestone Mine Mining Operations Plan (MOP), required as a Condition of CML16, would need to be amended to incorporate activities in the areas covered by the Mining Lease.

For enquiries regarding this matter please contact Greg Kininmonth, Manager Environmental Operations (Southern) on (02) 4276 7428 or minres.environment@planning.nsw.gov.au

Yours sincerely

Greg Kininmonth

On behalf of
Matthew Newton
Director Compliance Operations
Resources Regulator
NSW Department of Planning and Environment

26 November 2018

4th December 2018

Re: Boral Peppertree Quarry Modification 5 (MOD 5) 2018

Opposition to approval of another modification.

Well, here we have yet another modification, number 5 now, to an original development application some 10 years ago for a low environmental impact open cut Granite mining operation.

I can't wait to see MOD 6, MOD 7, MOD 8, MOD 9 and so on, over the next 20 years.

A reputable Goulburn Mulwaree councilor described this common practice in Goulburn as DA Creep. Where a major and possibly unacceptable development application is approved in its basic form, only to have slowly disclose in future DA modifications the greater impact of what were the true intended future plans and proposed operations.

What is proposed here in more noise, dust, traffic movements, and the dumping of mining waste product onto what is pristine environmental rural land, now acquired and owned by Boral, for the sole purpose to disposing of the mining waste for the lowest possible cost and convenience.

Why dump the waste on one of the highest elevation area of Marulan South, 650mtrs ALT
Why not put is in a lower area, like the Bungonia Gorge. Oh No that's state land!

Why not on the lower parts of the 4,000+ acres currently owned by Boral Peppertree or Boral Limestone. There has to be some place more suitable or better placed, possibly at a slightly greater cost or inconvenience for Boral.

Sure in 40 years you may never know what the area looked like for the 5-10 years it took to build the proposed waste mountain. Or the inconvenience and long term psychological damage caused to the quiet residents of Marulan South and its access roads.

Clearly this is a cost effective solution for Boral's mining waste,
but what's in it for the effected residents for the next 10 years of overburden transport movement and earth works.

Is it time for the residents to clearly indicate to Boral and it's share holders, with large road signage, just how much we appreciate this disruption to the peaceful enjoyment of our rural lifestyle properties, the reason we came here and before Boral hatched their master plan.
We have been supportive and patient up to this point.

Boral, clearly you will save money and Boral share holders should do well also.

What's in this proposed modification for the Marulan South long established residents, benefits that will enhance the peaceful enjoyment of our chosen quiet rural lifestyle or,
are we destined to be subjected a continued lifestyle destruction by expansion modifications by Boral, and their shareholders who seem intent on achieving their planned objectives regardless of any human cost.

APPENDIX B

NOISE MONITORING SUMMARY

Receiver	Date	Site Noise Level Contribution	Operational Criteria (dB(A))
Receiver	Date	Site Noise Level Contribution	Operational Criteria (dB(A))
EPL ID		LAeq, 15 minute (dB(A))	daytime
R17	1/5/2018	<30	35
R2	1/5/2018	<30	35
R3	1/5/2018	<30	35
R8	1/5/2018	31	41
R4	1/5/2018	31	35
R17	2/5/2018	31	35
R2	2/5/2018	31	35
R3	2/5/2018	<30	35
R8	2/5/2018	33	41
R4	2/5/2018	<30	35

Receiver	Date	Site Noise Level Contribution	Operational Criteria (dB(A))
EPL ID		Leq, 15 minute (dB(A))	evening / night
R17	2/5/2018	<30	35
R17	2/5/2018	32	35
R2	2/5/2018	32	35
R2	3/5/2018	33	35
R8	3/5/2018	<30	35
R8	3/5/2018	<30	35
R4	3/5/2018	<30	35
R4	3/5/2018	<30	35
R3	3/5/2018	<30	35
R3	3/5/2018	<30	35

Receiver	Date	Site Noise Level Contribution	Operational Criteria (dB(A))
EPL ID		LA1, 1 minute (dB(A))	evening
R2	2/5/2018	32	45
R2	3/5/2018	33	45
R8	3/5/2018	<30	45
R8	3/5/2018	<30	45
R17	2/5/2018	<30	45
R17	2/5/2018	32	45
R4	3/5/2018	<30	45
R4	3/5/2018	<30	45
R3	3/5/2018	<30	45

1. 2018 noise assessment results

R3	3/5/2018	<30	45
EPL ID		**LAeq, 15 minute (dB(A))**	**daytime**
R2	30/01/2018	26	35
R2	30/01/2018	26	35
R2	31/01/2018	16	35
R2	31/01/2018	18	35
R8	30/01/2018	24	41
R8	30/01/2018	22	41
R8	31/01/2018	25	41
R8	31/01/2018	35	41
R17	30/01/2018	22	35
R17	30/01/2018	24	35
R17	31/01/2018	15	35
R17	31/01/2018	11	35
R4	30/01/2018	19	35
R4	30/01/2018	22	35
R4	31/01/2018	28	35
R4	31/01/2018	29	35
R3	30/01/2018	23	35
R3	30/01/2018	25	35
R3	31/01/2018	31	35
R3	31/01/2018	30	35

Receiver	**Date**	**Site Noise Level Contribution**	**Operational Criteria (dB(A))**
EPL ID		**Leq, 15 minute (dB(A))**	**evening / night**
R2	1/02/2018	19	35
R2	1/02/2018	20	35
R8	31/01/2018	30	35
R8	31/01/2018	30	35
R17	1/02/2018	15	35
R17	1/02/2018	18	35
R4	31/01/2018	27	35
R4	31/01/2018	28	35
R3	1/02/2018	24	35
R3	1/02/2018	24	35

Receiver	**Date**	**Site Noise Level Contribution**	**Operational Criteria (dB(A))**
EPL ID		**LA1, 1 minute (dB(A))**	**evening**
R2	1/02/2018	19	45
R2	1/02/2018	20	45
R8	31/01/2018	33	45
R8	31/01/2018	33	45
R17	1/02/2018	17	45
R17	1/02/2018	19	45
R4	31/01/2018	28	45
R4	31/01/2018	29	45
R3	1/02/2018	25	45
R3	1/02/2018	26	45

2. 2018 noise assessment results continued

Residential Receiver	Assessment Dates (2017)	Noise Level Assessment (LAeq (15min))		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver R3	Feb	Day: 35 Night: 35	28/29 29/30	Yes Yes
	May	Day: 35 Night: 35	19/21/27 33/24	Yes Yes
	July	Day: 35 Night: 35	29/38/43/26 32/33/33/34	NO Yes
	December	Day: 35 Night: 35	25/25/25 29/29/30/30	Yes Yes
Receiver R2	Feb	Day: 39 Night: 35	27/27 26/25	Yes Yes
	May	Day: 35 Night: 35	23/24/26 27/28	Yes Yes
	July	Day: 35 Night: 35	25 27/29	Yes Yes
	December	Day: 35 Night: 35	23/23/30	Yes Yes
Receiver R8	Feb	Day: 41 Night: 35	26/27 not monitored	Yes Yes
	May	Day: 41 Night: 35	19/17 33/32	Yes Yes
	July	Day: 41 Night: 35	27/28 31/32	Yes Yes
	December	Day: 41 Night: 35	26 21/18/31/29/26/28	Yes Yes
Receiver 4	Feb	Day: 35 Night: 35	12/22 26/26/27	yes yes
	May	Day: 35 Night: 35	26/17/17 26/27	yes yes
	July	Day: 35 Night: 35	27/28 35/27	Yes Yes
	December	Day: 35 Night: 35	23/26/30 27/27	yes yes
Receiver 17	Feb	Day: 35 Night: 35	20/21/22/23 16/17/19/21/22/23/24	Yes Yes
	May	Day: 35 Night: 35	9/11/17 13/14	yes yes
	July	Day: 35 Night: 35	16/23 16/18	yes yes
	December	Day: 35 Night: 35	19/20/27 20/21/22	yes yes

3. 2017 noise assessment results (LAeq (15min))

Residential Receiver	Assessment Dates (2017)	Noise Level Assessment ($L_{A1\ (1min)}$)		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver R3	Feb	45	34	Yes
	May	45	42/25	Yes
	July	45	36/37/38/39	Yes
	December	45	33/34/34/33	Yes
Receiver R2	Feb	45	30/31/35	Yes
	May	45	27/28	Yes
	July	45	31/33	Yes
	December	45	26/32	Yes
Receiver R8	Feb	45	no monitoring	Yes
	May	45	35/34	Yes
	July	45	35/36	Yes
	December	45	31/32	Yes
Receiver 4	Feb	45	26/26/27	Yes
	May	45	26/27	Yes
	July	45	31/39/39	Yes
	December	45	31/34	Yes
Receiver 17	Feb	45	34/32/36	Yes
	May	45	13/14	Yes
	July	45	20/21	Yes
	December	45	24/25/30	Yes

4. 2017 noise assessment results (LA1 (1min))

Residential Receiver	Assessment Dates (2016)	Noise Level Assessment (LAeq (15min))		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver 2	Feb	Day: 39 Night: 35	22 / 17 / 20 27 / 26	Yes Yes
	May	Day: 39 Night: 35	31 / 28 / 33 28	Yes Yes
	August	Day: 39 Night: 35	24 / 25 / 26 32 / 33/ 34	Yes Yes
	October	Day: 39 Night: 35	Land acquired during the reporting period and under Boral ownership.	
Receiver 5	Feb	Day: 35 Night: 35	21 / 19 / 18 31	Yes Yes
	May	Day: 35 Night: 35	26 / 25 / 26 26 / 26	Yes Yes
	August	Day: 35 Night: 35	32 / 30 / 32 34 / 33	Yes Yes
	October	Day: 35 Night: 35	27 / 21 / 22 28 / 28	Yes Yes
Receiver 6	Feb	Day: 39 Night: 35	22 / 24 / 28 28	Yes Yes
	May	Day: 35 Night: 35	31 / 33 / 32 30	Yes Yes
	August	Day: 35 Night: 35	29 / 30 / 31 34	Yes Yes
	October	Day: 35 Night: 35	31 / 28 / 30 31 / 31	Yes Yes
Receiver 16	Feb	Day: 41 Night: 35	24 / 25 / 31 34 / 33	Yes Yes
	May	Day: 41 Night: 35	30 / 23 / 23 / 20 24	Yes Yes
	August	Day: 41	22 / 25 / 25	Yes
		Night: 35	21 / 20	Yes
	October	Day: 41 Night: 35	26 / 26 / 28 24 / 25	Yes Yes
Receiver 4	October	Day: 35 Night: 35	22 / 25 / 25 26 / 26	Yes Yes
Receiver 17	October	Day: 35 Night: 35	23 / 17 / 15 26 / 25 / 23 / 22	Yes Yes

5. 2016 noise assessment results (LAeq (15min))

Residential Receiver	Assessment Dates (2016)	Noise Level Assessment ($L_{A1\,(1min)}$)		
		Compliance Criteria	Measured Noise Levels dB(A)	Compliance with Criteria
Receiver 2	Feb	45	29 / 28	Yes
	May	45	28	Yes
	August	45	No Measurement	-
	October	45	No Measurement	-
Receiver 5	Feb	45	31	Yes
	May	45	26 / 26	Yes
	August	45	34 / 33	Yes
	October	45	28 / 28	Yes
Receiver 6	Feb	45	29	Yes
	May	45	30	Yes
	August	45	34 / 34	Yes
	October	45	31 / 31	Yes
Receiver 16	Feb	45	38 / 36	Yes
	May	45	24	Yes
	August	45	21 / 20	Yes
	October	45	24 / 34	Yes
Receiver 4	October	45	24	Yes
Receiver 17	October	45	26	Yes

6. 2016 noise assessment results (LA1(1min))

APPENDIX C

PROPOSED NOISE CONDITIONS

To be provided in final response to submissions.

APPENDIX D

REVISED NOISE IMPACT ASSESSMENT REPORT

ACOUSTICS AND AIR

NOISE IMPACT ASSESSMENT

PEPPERTREE QUARRY MOD 5

REPORT NO. 14250-A
VERSION B

JANUARY 2019

PREPARED FOR

ELEMENT ENVIRONMENT
ON BEHALF OF BORAL RESOURCES (NSW) PTY LTD

WILKINSON MURRAY

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	5 March 2018	George Jenner	John Wassermann
B	Draft	30 May 2018	George Jenner	John Wassermann
B	Final	20 July 2018	John Wassermann	-
B	Final	17 August 2018	John Wassermann	-
B	Final	21 September 2018	John Wassermann	-
B	Final	23 January 2019	John Wassermann	-

Note

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Quality Assurance

Wilkinson Murray operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified and Licence No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Celebrating 50 Years in 2012

Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Orange, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

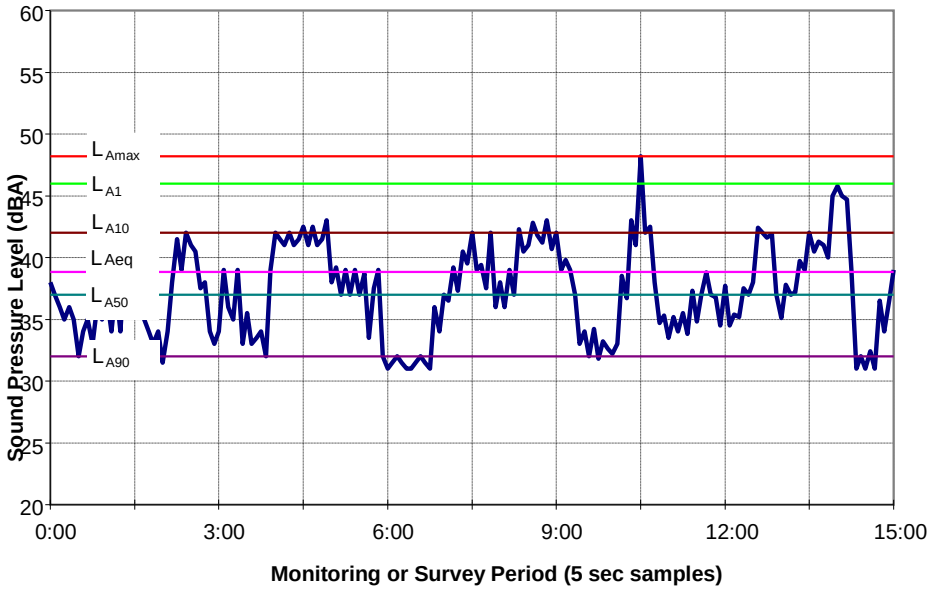
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



EXECUTIVE SUMMARY

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

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

- Develop a new overburden area (South-west Overburden Emplacement – SWOE);
- Extend the consent boundary to the south to encompass the SWOE;
- Construct a new haul road from the pit to the SWOE;
- Construct a new intersection at Marulan South Road to link the new haul road with the SWOE;
- Amend the design of the Western Overburden Emplacement (WOE);
- Remove the Western Earth Bund (which has not been constructed); and
- Relocate a powerline which runs through the proposed SWOE site.

This will be Modification 5 to the current Project Approval. The Minister for Planning is the consent authority for the proposed modification.

Since the project was approved, the New South Wales Environment Protection Authority (EPA) has released the *Noise Policy for Industry* (*NPfI*). The *NPfI* proposes slightly different method for assessing noise and has implications for assessment during daytime and for cumulative noise assessment.

The assessment has found that:

- At all receivers the predicted noise level for day time operations associated with the proposed south western overburden emplacement comply with the *NPfI* noise trigger levels.
- The predicted noise level for proposed in-pit operations during the evening and night time comply with the operational *NPfI* noise impact assessment criteria.
- The predicted noise levels are below the land acquisition criteria at all residences.
- The predicted noise levels comply with the *NPfI* sleep disturbance noise trigger levels at all residences.
- Predicted noise levels comply with the *NPfI* amenity levels. Therefore, the cumulative industrial noise levels are predicted to be satisfactory.

1 INTRODUCTION

1.1 Overview

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

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

- Develop a new overburden area (South-west Overburden Emplacement – SWOE);
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- Remove the Western Earth Bund (which has not been constructed); and
- Relocate a powerline which runs through the proposed SWOE site.

This will be Modification 5 to the current Project Approval. The Minister for Planning is the consent authority for the proposed modification.

This report presents a noise assessment of the proposed modification. Noise modelling will consider the changed landform due to the modified WOE and construction of the SWOE, and any adverse acoustic consequences of not building the Western Earth Bund. The Project Approval includes noise assessment criteria. Since the project was approved, the New South Wales Environment Protection Authority (EPA) has released the *Noise Policy for Industry (NPfI)*. The *NPfI* proposes a slightly different method for assessing noise and has implications for assessment during daytime and for cumulative noise assessment.

To assess the potential noise impacts associated with the Project, this report compared the Project with noise criteria developed from the *NPfI* and limits in the Project Approval.

The noise assessment evaluates potential noise impacts associated with the Project in accordance with the *NPfI*.

Transportation noise (rail and traffic) and blasting has not been conducted in this report as no modification is being proposed to existing transportation of product off site or blasting regimes.

2 SITE DESCRIPTION

2.1 Existing Environment & Quarry Operations

2.1.1 Site Description

The Quarry is at Marulan South in the Goulburn Mulwaree Local Government Area (LGA) and is approximately 175 km south-west of Sydney (Figure 2-1Figure 2-1). Access is via Marulan South Road, which connects the Quarry and Boral's Marulan South Limestone Mine (the Limestone Mine) with the Hume Highway approximately 9 km to the north-west (Figure 2-2). Boral's private rail line connects the Quarry and Limestone Mine with the Main Southern Railway approximately 6 km to the north (**Error! Reference source not found.**).

The Quarry is on approximately 650 ha of Boral owned land, which includes the Quarry (occupying approximately 70 ha), additional granodiorite resources to the south and surrounding land (Figure 2-3 and Figure 2-4). The site is zoned RU1 –- Primary Production under the Goulburn Mulwaree Local Environmental Plan (LEP) 2009 (Figure 2-5). Mining and extractive industries are permissible in this zone with consent.

2.1.2 Approved Project

The current operations of the Quarry are approved under Project Approval PA06_0074 as modified.

Quarry Activities & Infrastructure

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 use as a construction and building material. The hard rock aggregates produced at the site are a range of different shapes and sizes for different purposes. Primary production is of concrete and asphalt aggregates (10 mm) and railway ballast (28-50 mm) with capacity to produce larger aggregates (>100 mm) for rock armour and gabion baskets. Fines (generally <5 mm) produced during crushing of product are blended with limestone sand from the Limestone Mine to produce a marketable manufactured sand.

Infrastructure at the Quarry includes a processing plant, rail loop and loading facilities, two 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 2-6.

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.

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 DP&E.

Operating Hours & Workforce

The Quarry operates 24 hours, 7 days a week with in-pit activities restricted to the hours of 5 am to 11 pm. Approved operating hours are outlined in detail in Table 2-1.

Table 2-1 Approved operating hours.

Activity	Day	Time
Construction works	Monday to 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 to 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	5.00am to 11.00 pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

The Quarry employs 30 full time persons distributed over 2-3 shifts.

2.2 Proposed Modifications

The proposed SWOE will be south of the WOE, south of Marulan South Road and in the north-western corner of the Limestone Mine. This new overburden emplacement area will be needed in late 2018 and will take approximately 4 years to establish. The emplacement will cover approximately 44 ha and will be RL650 at completion.

A new haul road is proposed to be constructed from the southern extent of the pit to the SWOE. A new intersection is proposed to allow haul trucks to cross Marulan South Road from the new haul road to the SWOE. Alternatively, the haul road will be along an upgraded length of Marulan South Road from the southern extent of the pit to the proposed intersection, if Boral takes ownership of this section of road from council.

The powerline, which supplies electricity to the Limestone Mine, passes through the area where the SWOE is proposed to be constructed. Therefore, Boral proposes to relocate the powerline along the eastern and southern side of Marulan South Road (and adjacent to the western and northern sides of the SWOE) to the intersection with Cooper Crescent, then divert south into the Limestone Mine's infrastructure area.

The powerline will be approximately 1,300 m long and will require an approximately 20 m wide easement along its length.

Part of the WOE is planned for a future shared road sales stockpile area for the Quarry and Limestone Mine and will be a component of the Limestone Mine's State significant development application. The proposed amendment to the WOE would involve replacing the 30 m high triangular section of the emplacement with approximately 2 m of emplaced overburden material, which once completed would serve as a foundation for the shared road sales stockpile area.

Two sediment dams will be constructed either end of the WOE to catch and treat dirty water until the batters are rehabilitated. sediment dam P2 will also catch clean water from upslope of the WOE. Sediment dam P1 will be approximately 2.1 ML in volume and sediment dam P2 will be approximately 5.8 ML in volume.

The approved Western Earth Bund is a 10 m high bund located to the north of the railway line, south of the Quarry's entrance driveway and extending along the south-western edge of the Quarry pit. This has not been constructed yet, and it is proposed to abandon this component of the project.

The only ground disturbance associated with the modification will be for the SWOE, powerline relocation and new haul road (Figure 2-7).

Figure 2-1 Region context

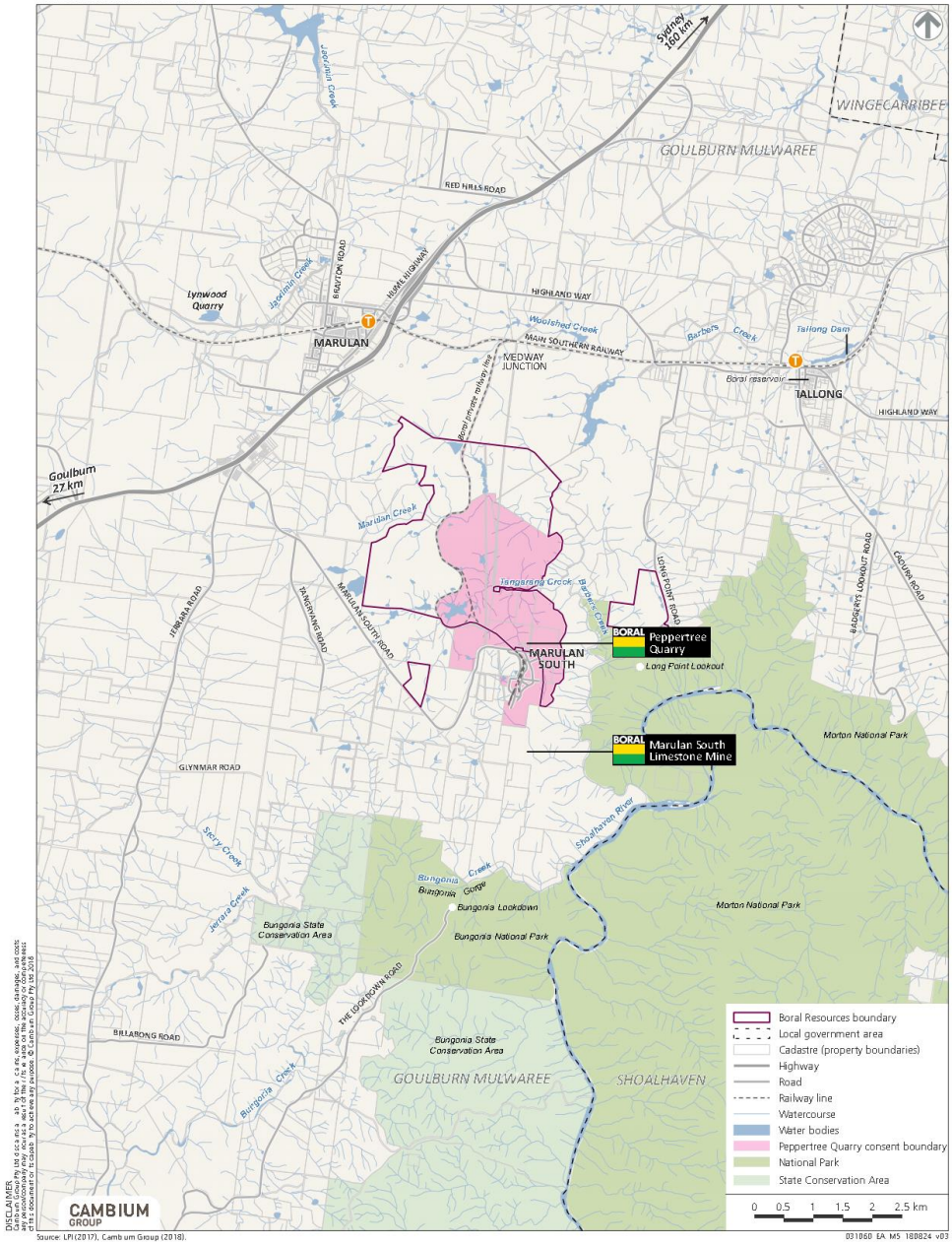


Figure 2-2 Local Context

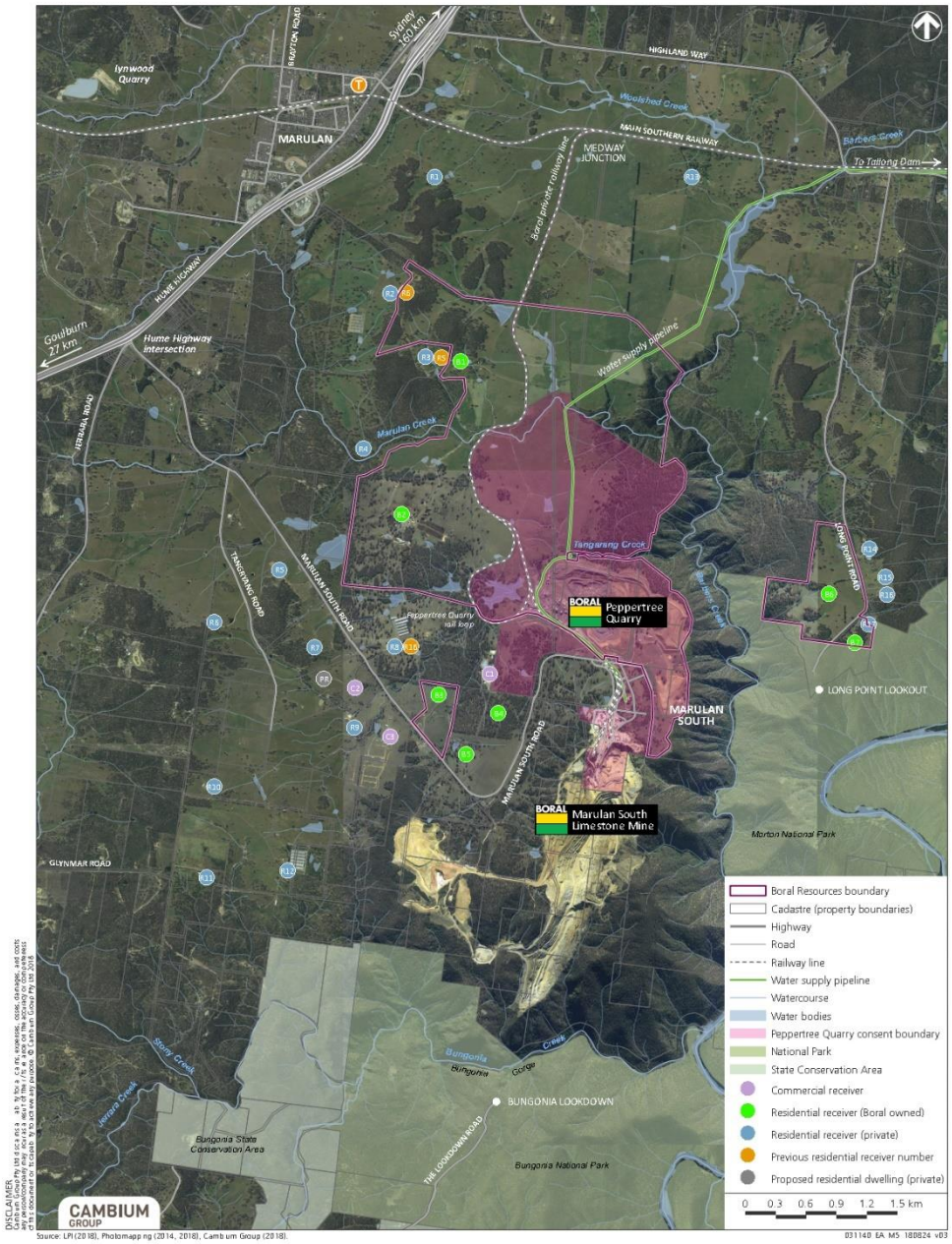


Figure 2-3 Land ownership

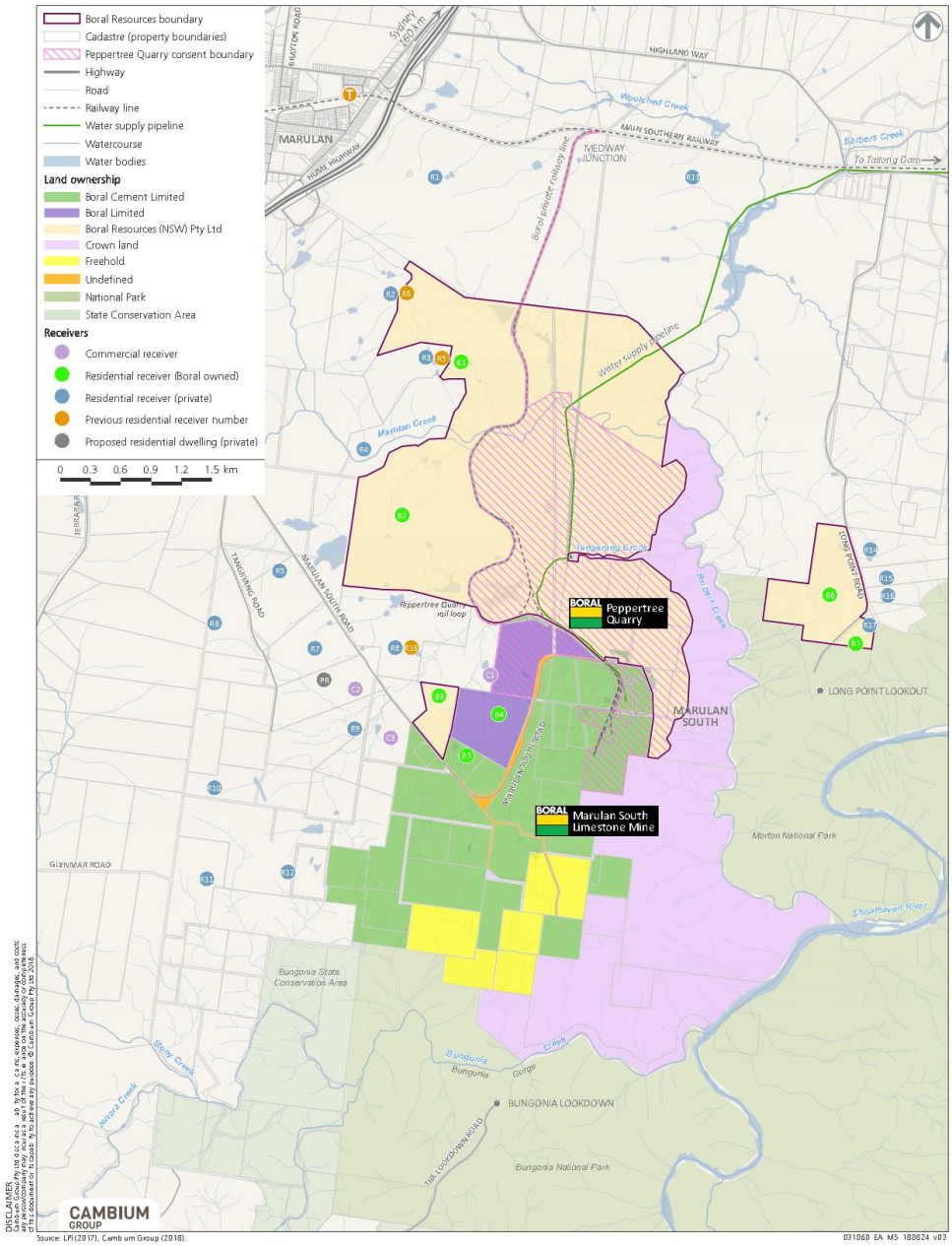


Figure 2-4 Land use

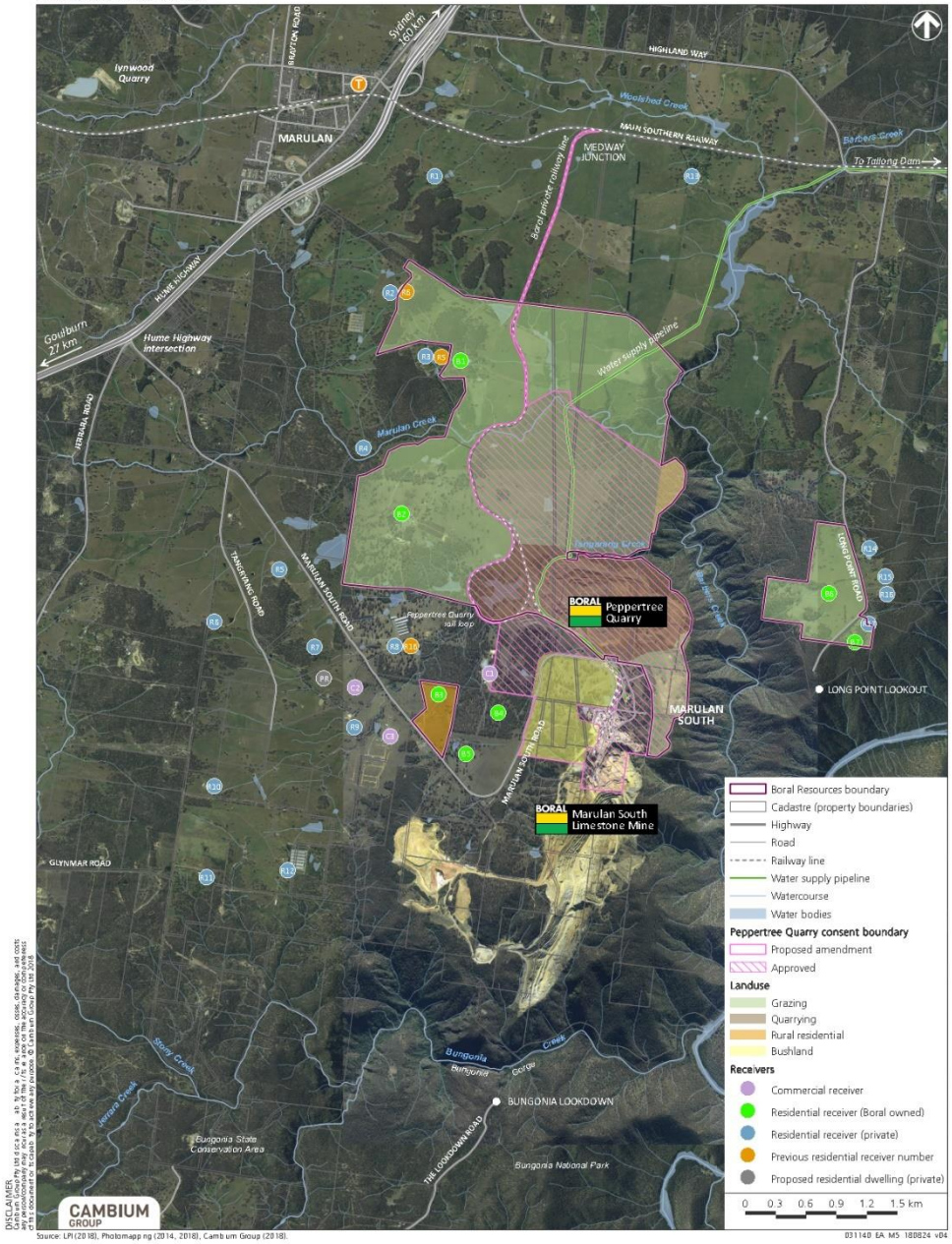


Figure 2-5 Local Zoning

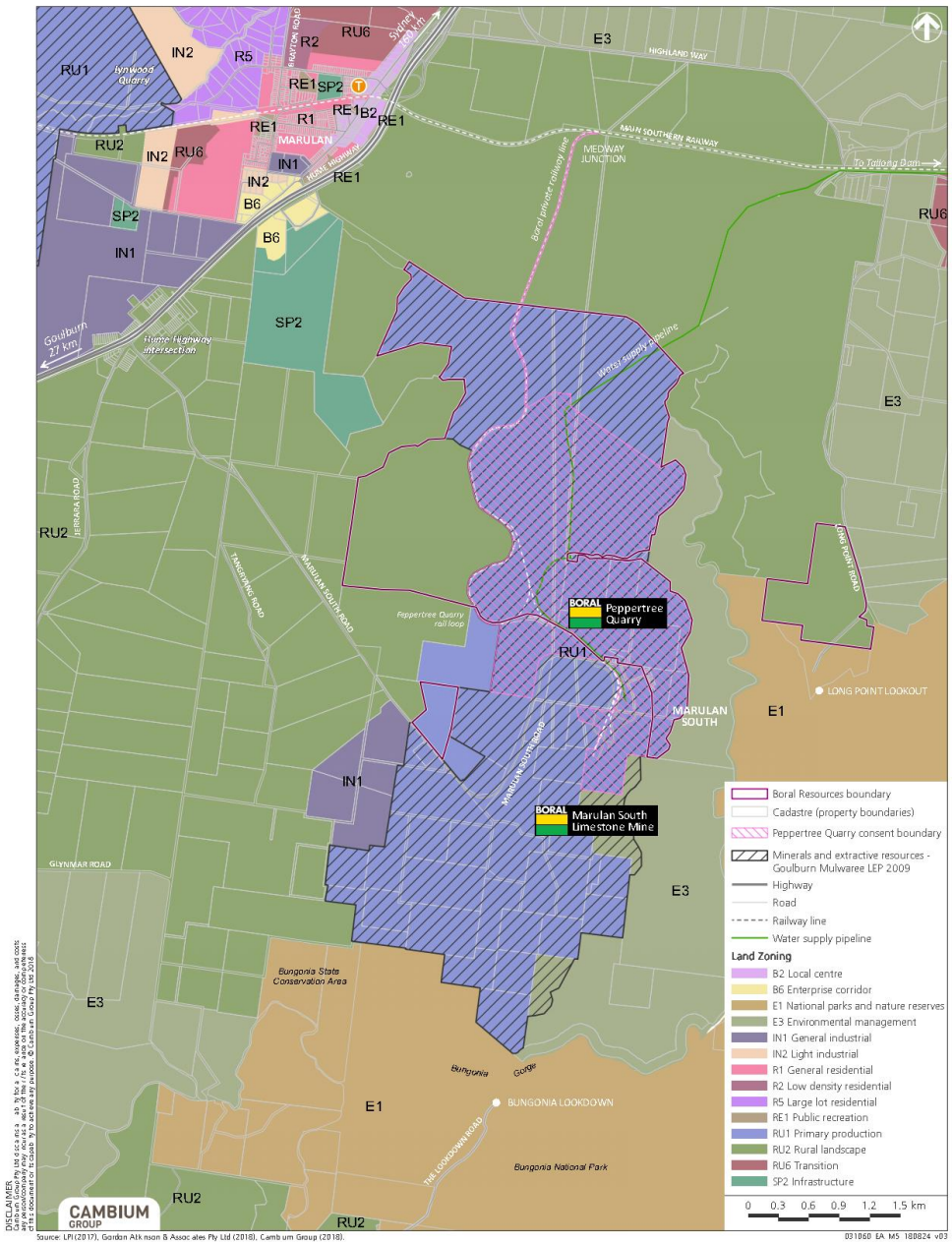


Figure 2-6 The Project

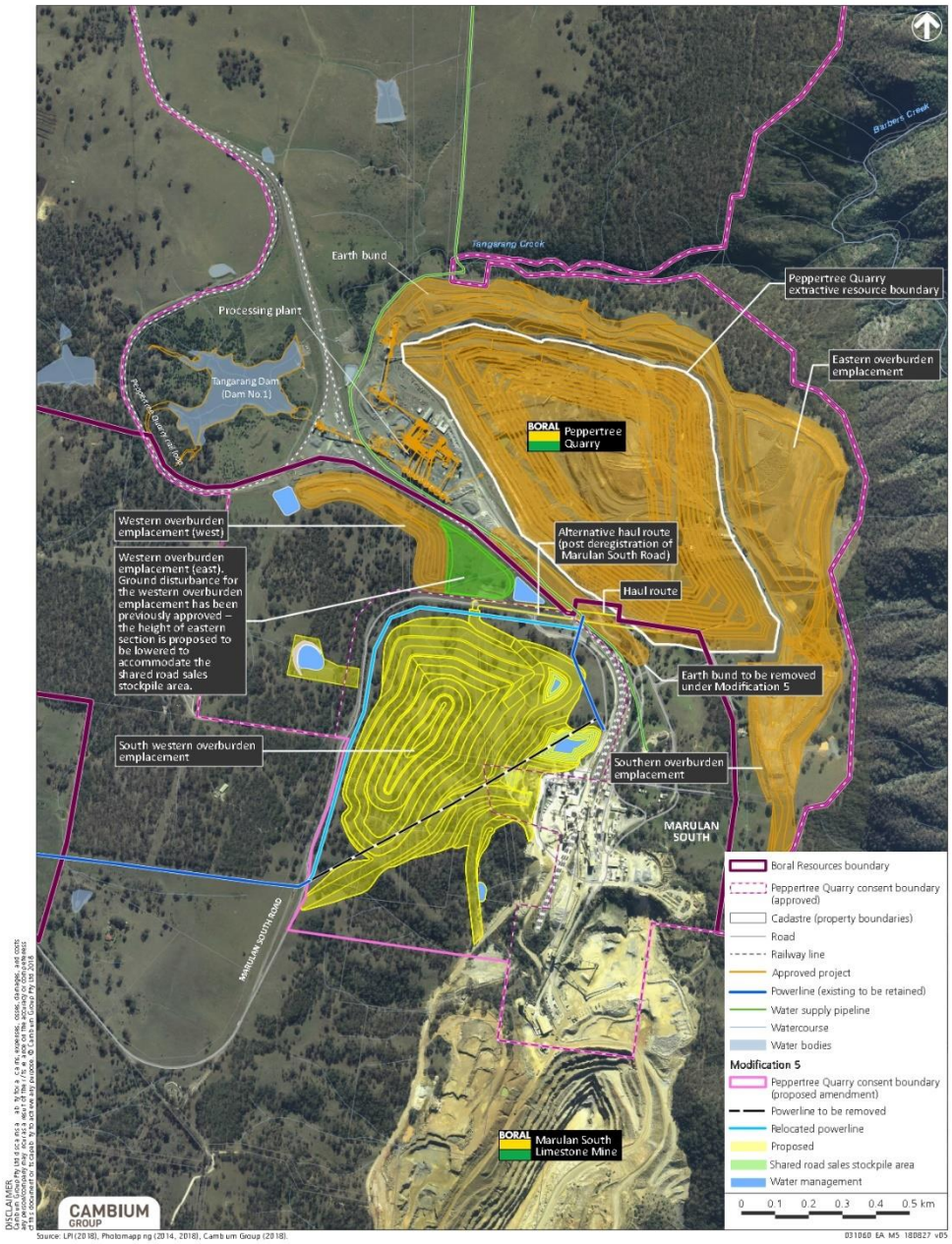
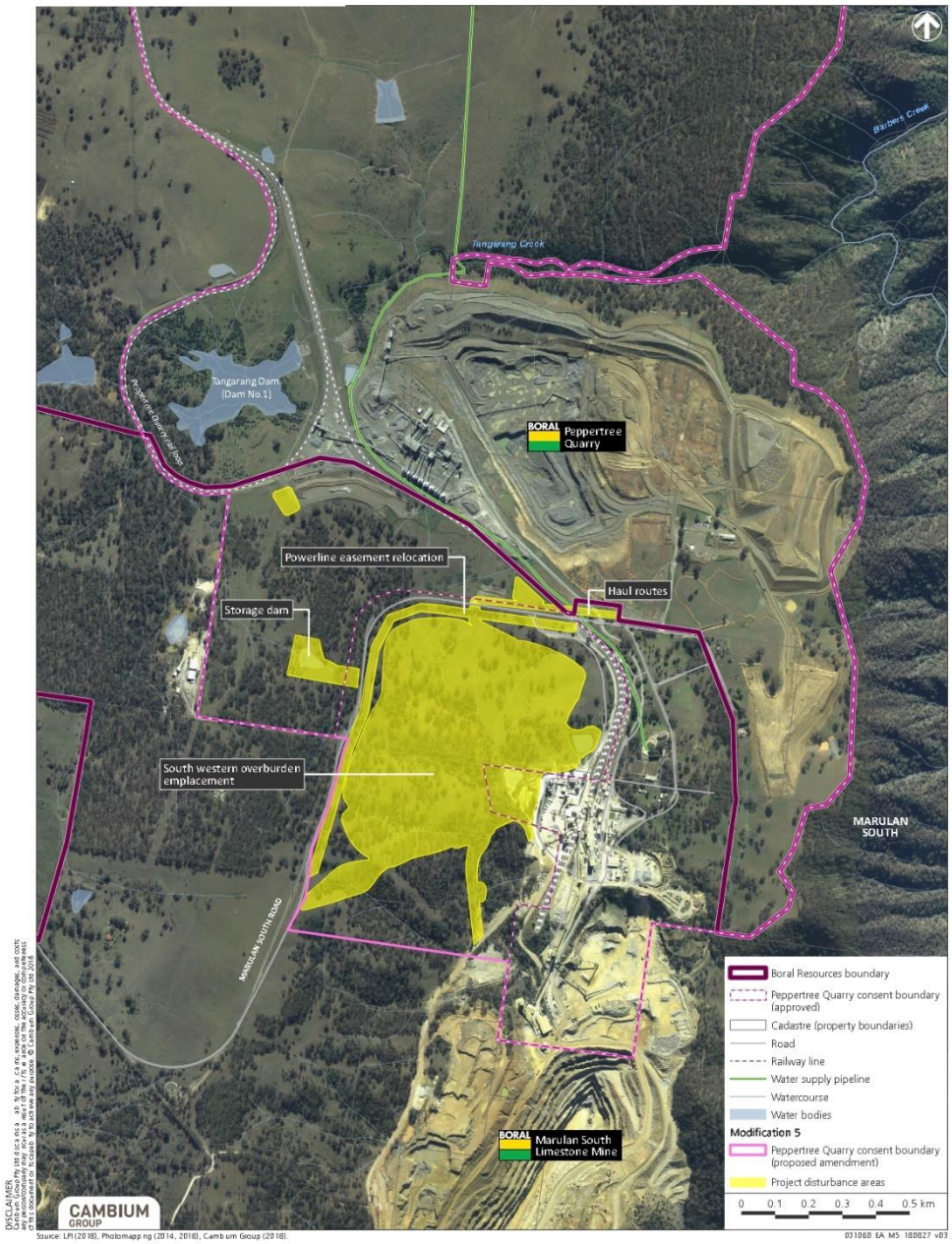


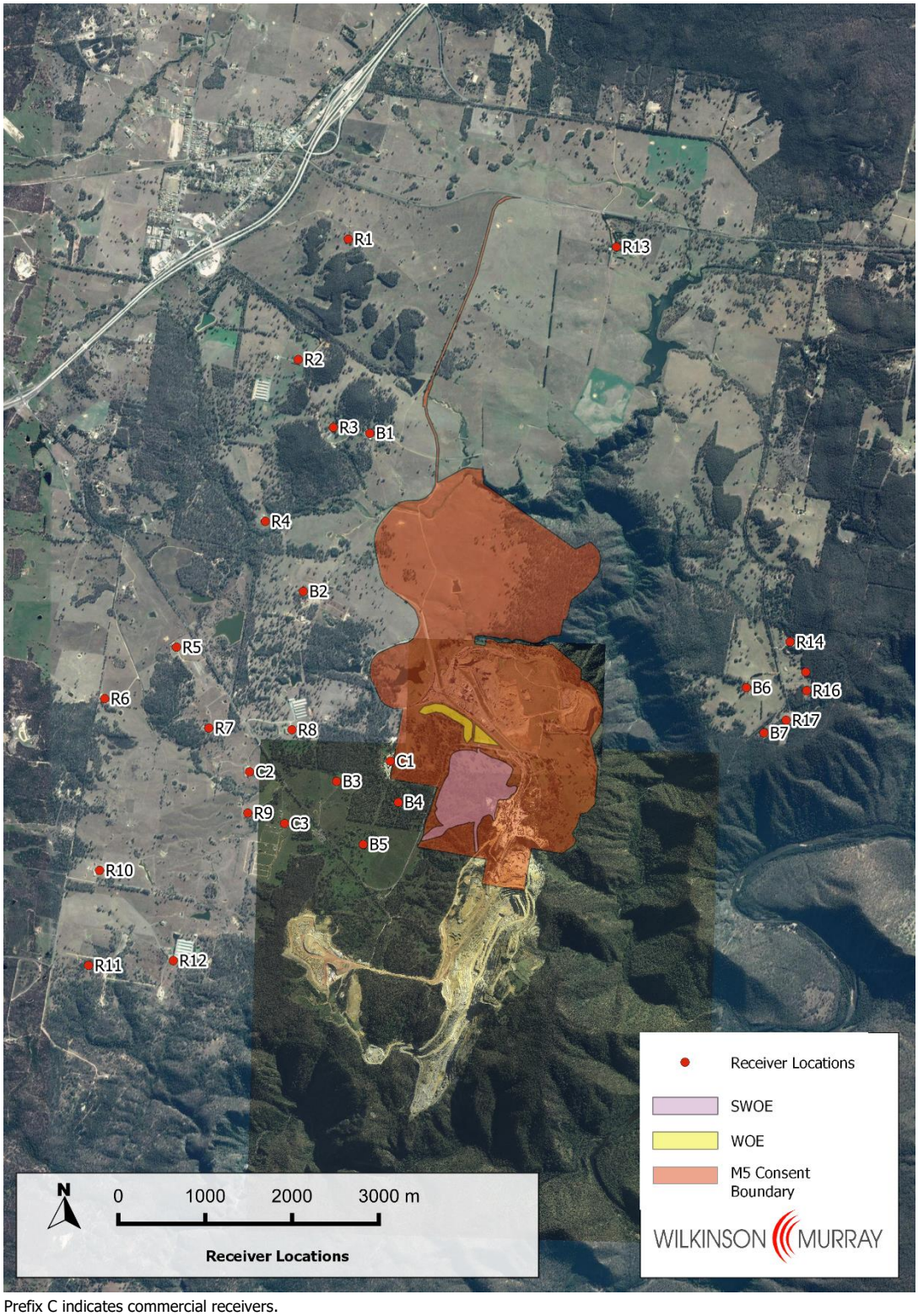
Figure 2-7 Project disturbance area



3 IDENTIFICATION OF SENSITIVE RECEIVERS

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 mine along Long Point Road. These properties are separated from the mine by the deep Barbers Creek gorge. Figure 3-1 presents the location of the quarry in relation to sensitive receivers of relevance to this assessment.

Figure 3-1 Sensitive Receivers



Prefix C indicates commercial receivers.
Prefix B indicates Boral owned receivers.
Prefix R indicates privately owned residential receiver.

3.1 Existing Project Approval

The noise-sensitive receptors identified in the Appendix 3 of the Project Approval are presented in Figure 3-1 and the noise conditions from Schedule 3 of the Project Approval are presented below:

Operational Noise Impact Assessment Criteria

4. *The Proponent must ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence on privately owned land.*

Table 1: Noise Impact Assessment Criteria

Residential Receiver Locations	***Day (7:00am to 7:00pm)*** $L_{Aeq,15min}$	***Evening (7:00pm to 10:00pm)*** $L_{Aeq,15min}$	***Night (7:00pm to 10:00pm)***	
			$L_{Aeq,15min}$	$L_{A1,1min}$
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*

Notes:

- *Residential receiver locations are shown on the plan in Appendix 3.*
- *Receiver numbers in parentheses are those identified in the approval prior to the notification of Modification 4 in 2016.*

Noise generated by the development is to be measured in accordance with the relevant requirements of the Industrial Noise Policy (as may be updated from time-to-time). Appendix 7 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 1 do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Land Acquisition Criteria

5. *If the noise generated by the project exceeds the criteria in Table 2, the Proponent must upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in Conditions 6-8 of Schedule 4.*

Table 2: Land Acquisition Criteria

Residential Receiver	***Day (7:00am to 7:00pm)*** $L_{Aeq,15min}$	***Evening / Night (7:00pm to 7:00am)*** $L_{Aeq,15min}$
R3 (5)	*40*	*40*
R2 (6)	*40*	*40*
R8 (16)	*44*	*44*

Notes:

- *Residential receiver locations are shown on the plan in Appendix 3.*
- *Receiver numbers in parentheses are those identified in the approval prior to the notification of Modification 4 in 2016.*

It should be noted that the Project Approval does not have any conditions that require consideration of land acquisition for any privately-owned land where criteria are exceeded on more than 25 percent of the land.

3.2 Noise Compliance Monitoring

Noise compliance monitoring for Peppertree Quarry is undertaken quarterly in accordance with the Noise Management Plan. The conclusions from compliance monitoring are:

- Daytime site noise levels associated with the quarry comply with the relevant $L_{Aeq,15minute}$ operational noise impact assessment criteria contained in the Project Approval; and
- Night time site noise levels associated with the quarry comply with the relevant $L_{Aeq,15minute}$ and $L_{A1,\ 1minute}$ operational noise impact assessment criteria contained in the Project Approval.

Additional compliance monitoring was conducted at R3 using an unattended directional noise monitoring (BarnOwl®). The analysis of the data indicated that there were potential exceedances of the 35 dBA $L_{Aeq,15min}$ noise criteria from Peppertree Quarry and these levels could have been caused by unusual temperature inversion conditions during the daytime period.

ERM conducted noise monitoring for current quarry operations (ERM, February 2018 "Peppertree Quarry Site Inspection and Noise monitoring") (ERM report). The aim of the report was to determine sources of noise generated by the quarry and recommend reasonable and feasible mitigation measures to reduce noise levels and minimise impacts.

The ERM report presented measured noise levels at the following receivers:

- R2;
- R3;
- R4;
- R8; and
- R9.

A total of 46 operator attended noise measurements were completed by ERM. Background L_{A90} noise levels varied significantly between 22 dBA and 48dBA depending on the measurement location, on average the L_{A90} levels were approximately 37dBA. Ambient L_{Aeq} noise levels also varied significantly between 31dBA and 54dBA depending on the location, on average L_{Aeq} noise levels were approximately 43dBA.

Of the 46 operator attended noise measurements that were completed, quarry noise levels contributions, $L_{Aeq,\ 15minutes}$, were generally less than 30dBA. For a limited number of measurements, the quarry noise emissions were more easily detectable and contributed more to the overall acoustic environment, with noise levels contributions between 30 and 35dBA.

The potential for low frequency and tonal noise emissions were noted for each measurement by ERM. ERM stated that in general that quarry noise emissions may have an unbalances spectrum containing components within the low frequency range of the spectrum, but the overall low frequency levels are generally acceptable with due regard to the newly released EPA Policy for Industry.

The key noise generating items of equipment and activities were identified to be:

a) Primary crusher situated within the pit; and

b) the primary bin/ surge stockpile situated out of the pit but associated with the primary material processing activities.

The secondary, tertiary and quaternary material processing activities were observed to generate noise but this did not contribute significantly to the sites noise levels.

The ERM report recommended the following noise mitigation that have been adopted by Boral, namely:

- maintain and replace the "acoustic curtains" that are fitted to the primary crusher.
- maintain and replace the "acoustic pads" that are fitted to the primary crusher.
- enclose the primary bin.

The proposed noise mitigation has been installed and or is committed too by Boral. For example, Figure 3-2 shows the installed noise enclosure for the Primary bin.

Figure 3-2 Primary Bin noise mitigation

4 BACKGROUND NOISE LEVELS

This section discusses the Rating Background Levels (RBL) to be used in the assessment.

Determining ambient background levels in the absence of noise from the Limestone Mine or Peppertree Quarry is complicated by their continued operations, which only cease for a period of 3-days over the Christmas break.

The NPfI is encourages long-term background noise monitoring (with a minimum of one week of noise data) at a location to determine existing background noise levels that are indicative of levels during the entire year. To set appropriate RBLs for this assessment this report considers long term historical monitoring data for Peppertree, as well as monitoring carried out for the Marulan South Mine Continued Operations assessment. This will ensure that RBLs established would be indicative of levels during the entire year and considered yearly and seasonal variations.

4.1 Measurements during Christmas Shutdown, 2014

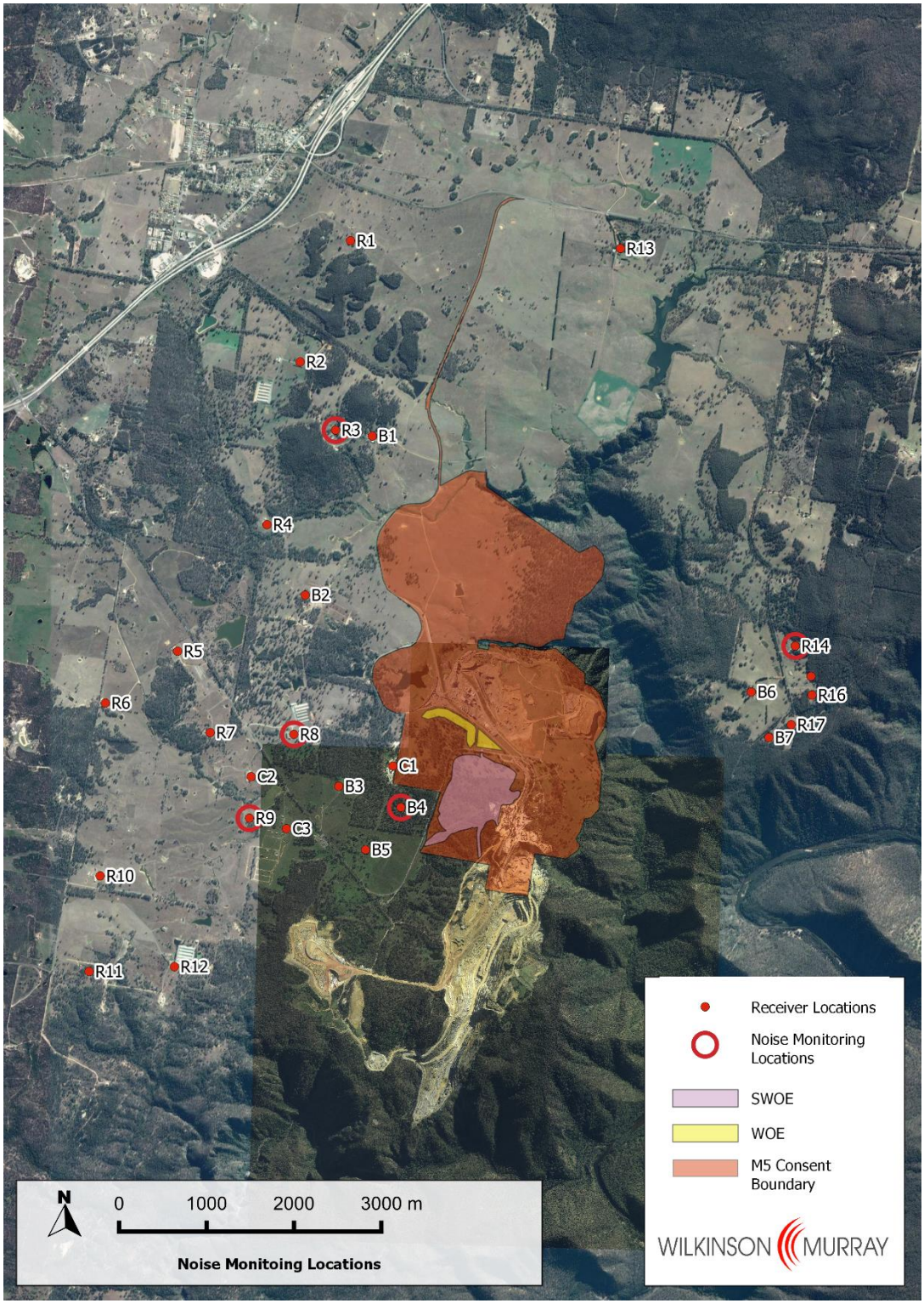
Background noise levels were measured by unattended noise loggers at five (5) locations during the Christmas break of 2014 for the Marulan South Mine Continued Operations assessment.

As the measurements were compromised by adverse weather, the background levels used in the assessment are determined from an analysis of the Christmas 2014 monitoring, ongoing quarterly monitoring for Peppertree Quarry, and other previously published RBLs in Peppertree Quarry environmental assessments.

4.1.1 Monitoring Locations

Noise monitoring locations are shown on Figure 4-1.

Figure 4-1 Noise Monitoring Locations



4.1.2 Equipment

The noise monitoring equipment used for background noise measurements consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary of Acoustic Terms for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

4.1.3 Measurement Results

Due to adverse weather conditions, no complete sets of daytime measurements were taken; however, there are two (2) complete evening and night time background noise measurements. As there were only two days of data, and some of it affected by meteorology, the RBLs for the daytime period were estimated from the measurement charts. The results of the background noise measurements are shown in Table 4-1, and the result charts in Appendix A. The charts show the measured noise level at 15-minute intervals throughout the monitoring period. RBLs are determined from the set of 15-minute L_{A90} levels for day, evening and night on any day. The charts also show other standard noise descriptors such as $L_{Aeq,15min}$ and the L_{Amax} for the 15-minute periods.

At the eastern noise monitoring location (on the eastern side of Barbers Creek gorge (R14), the evening period measurement is higher than the daytime period. In accordance with the *NPfI* recommendations, the evening RBL will be set to the daytime level.

Because the monitoring period was limited, and site observations indicated that the long-term RBL is not influenced by noise from Peppertree Quarry and Marulan South Mine, the results shown in Table 4-1 will be considered in the context of previous monitoring and ongoing compliance monitoring at Peppertree Quarry.

That analysis shows that while the measured levels during the Christmas shutdown are slightly lower than the adopted long-term RBL, they are within the range of RBLs measured over many years.

Table 4-1 Measured Rating Background Levels, December 2014

Location	RBL, dB(A)		
	Daytime	Evening	Night
(B4) Mine Manager Property	34	31	30
(R8) Turkey Farm	35	32	32
(R9) Western Location	35	32	32
(R3) Northern Location	35	31	31
(R14) Eastern Location	31	33	27

Notes:
1 Day: the period from 7.00am to 6.00pm.
2 Evening: the period from 6.00pm to 10.00pm.
3 Night: the period from 10.00pm to 7.00am.

4.2 Other RBL Data

Additional background noise levels have been measured around the Limestone Mine as part of the Peppertree Quarry noise compliance monitoring program. Daytime attended background ($L_{A90,15min}$) noise monitoring results from 2011 to 2014 are presented in Table 4-3. Unattended background ($L_{A90,period}$) noise monitoring results from 2011 to 2017 are presented in Table 4-4.

Background noise levels were measured for the environmental assessment of the Peppertree Quarry Modification 2 in 2011. The relevant measured levels are shown in Table 4-2 (only daytime and night time periods are reported in the Environmental Assessment).

Table 4-2 Background Noise Levels

Receiver	Period	RBL
R2	Daytime	30
	Night time	30
R8	Daytime	34
	Night time	34

To view the long-term trend in RBL, Table 4-4 includes:

- RBL from Peppertree Compliance Monitoring;
- RBL from Peppertree Environmental Assessment; and
- RBL from Wilkinson Murray Measurements, December 2014.

Table 4-3 Daytime Attended Background Levels Measured during Peppertree Quarry Compliance Monitoring , $L_{A90,15min}$ – dBA

ID		5 & 6 Oct 2011	L_{A90}	12 Oct 2012	L_{A90}	12 Jan 2012	L_{A90}	13 Jan 2012	L_{A90}	21 Nov 2012	L_{A90}	22 Nov 2012	L_{A90}	16 Jan 2013	L_{A90}	17 Jan 2013	L_{A90}	
R8	16	11.12am	34	12.51pm	38	3.20pm	42.5	9.18am	37.1	11.22am	35	12.31pm	39	10.50am	36	11.33am	35	
B2	4	2.31pm	38	12.39pm	40	12.46pm	35.4	12.45pm	34.3	4.26pm	38	8.26am	34	14.44pm	27	7.49am	35	
B3	3	3.27pm	37	12.50pm	38	2.08pm	33.0	8.10am	37.6	2.56pm	39	9.34am	42	15.18pm	39	7.20am	40	
B5	2	0.59pm	38	2.22pm	37	2.44pm	30.6	8.43pm	37.0	2.20pm	29	9.02am	41	10.07am	32	12.05pm	33	
B6	1	0.43pm	31	3.36pm	39	10.22am	32.3	10.12am	34.1	11.22am	35	10.30am	29	13.55pm	36	9.05am	37	
R3	5	10.11am	38	4.43pm	38	4.00pm	30.3	10.58am	32.9	1.20pm	40	11.51am	34	11.48am	32	10.12am	35	
R2	6	10.49am	37	4.16pm	35	11.21am	33.3	11.26am	39.2	12.34pm	41	11.17am	34	12.30pm	41	10.50am	44	
ID		**8 Aug 2013**	L_{A90}	**9 Aug 2013**	L_{A90}	**22 Oct 2013**	L_{A90}	**24 Oct 2013**	L_{A90}	**22 Jan 2013**	L_{A90}	**22 Jan 2013**	L_{A90}	**22 Oct 2014**	L_{A90}	**23 Oct 2014**	L_{A90}	**Median**
R8	16	12.25pm	40	11.20am	33	-	-	11.11am	52	3.03pm	43	1.13pm	42	12.30pm	32	9.45am	28	**37**
B2	4	1.53pm	39	10.16am	44	14.59pm	32	9.20am	48	12.53pm	38	11.26am	39	-	-	-	-	**38**
B3	3	1.22pm	40	-	-	-	-	-	-	12.15pm	42	11.55am	41	-	-	-	-	**39**
B5	2	12.55pm	39	10.54am	41	14.22pm	34	10.12am	51	11.22am	42	8.45am	38	12.00pm	36	9.15am	30	**36**
B6	1	12.42pm	37	9.11am	37	-	-	7.41am	45	1.46pm	32	9.38am	27	-	-	-	-	**36**
R3	5	11.31am	41	12.20pm	41	-	-	8.33am	47	4.14pm	36	10.34am	33	2.00pm	31	1.02pm	28	**35**
R2	6	10.56am	41	11.59am	45	-	-	8.58am	54	3.53pm	34	10.13am	39	1.15pm	40	12.30pm	35	**37**

Table 4-4 Combined Background Levels Measured during Various Studies from Peppertree Quarry and Marulan Mine, $L_{A90,period}$ – dBA

Date	R4			R2			R8			B6			B5		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
Peppertree EA	-	-	-	30	30	30	34	34	34	-	-	-	-	-	-
25 July 2012	36	37	46	-	-	-	32	32	32	33	33	33	-	-	-
22 November 2012	36	34	30	30	37	33	36	34	35	-	-	-	-	-	-
17 January 203	33	31	30	34	30	30	-	-	-	-	-	-	33	38	34
22 August 2013	34	38	40		38	40	35	35	38	-	-	-	40	36	35
October 2013	34	34	33	35	38	36	35	33	30	-	-	-	32	30	30
January 1014	30	30	30	31	30	30	35	34	32	-	-	-	38	36	34
August 2014	40	40	38				36	35	34	-	-	-	34	33	33
October 2014	34	32	32	34	32	32	32	32	32	-	-	-	30	31	30
December 2014 (WM)	34	31	31				35	32	32	-	-	-	-	-	-
April 2015	33	33	33	34	36	34	37	33	29	-	-	-	33	35	25
July 2015	36		38				34	38	36	-	-	-	-	-	-
February 2016	30	31	37	35	32	36	36	35	35	-	-	-	31	38	36
May 2016	-	-	-	-	-	-				-	-	-	-	39	-
August 2016	37	45	-	-	-	40	34	31	30	-	-	-	34	35	34
October 2016	37	38	-	-	-	40	35	34	31	-	-	-	-	-	-
February 2017	40	-	-	40	37	38	36	32	40	-	-	-	-	-	-
May 2017	30	31	30	37	37	39	31	30	33	-	-	-	-	-	-
July 2017	27	29	29	29	28	33	31	31	30	-	-	-	-	-	-
December 2017	32	34	38	38	38		38	35	37	-	-	-	-	-	-
Median	**34**	**33**	**33**	**34**	**36**	**35**	**35**	**34**	**33**	**33**	**33**	**33**	**33**	**36**	**34**

	Wind affected
-	No Data

4.3 Adopted RBL Values

Based on site observations and attended monitoring reports, it is considered that the long-term RBL at the receiver locations is not caused by noise emission from either Peppertree Quarry or the Limestone Mine. As the limited data collected during Christmas shutdown was not sufficient to set RBLs for the assessment, it has been considered with previously collected data.

The reported background noise levels measured around the Limestone Mine as part of the Peppertree Quarry noise compliance monitoring program were typically low and therefore it is unlikely that the L_{A90} levels would have been influenced by quarry or mine noise. This is confirmed by site noise levels measured when the Limestone Mine and quarry was shut down (Table 4-1) and noise levels measured for Peppertree Quarry compliance purposes (Table 4-3 and Table 4-4), which show similar trends with the daytime levels being higher than evening and night.

The NPfI suggests that for the long-term noise data, the rating background level is defined as the median value of:

- all the day assessment background levels over the monitoring period for the day;
- all the evening assessment background levels over the monitoring period for the evening; or
- all the night assessment background levels over the monitoring period for the night. 'Median' is the middle value in a number of values.

As stated above the RBL is usually the median of separate assessment periods, for a conservative assessment, measurements greater than RBL 40 dBA were excluded from this assessment. While there is no requirement to do this under the *NPfI*, those levels were judged atypically high for a rural setting and may have been impacted by extraneous noise, for example from insects. Combining these results, the RBL at each receiver are shown in Table 4-5.

Table 4-5 Rating Background Levels – L_{A90}

Receiver	Rating Background Level, L_{A90}		
	Daytime[1]	Evening[2]	Night[3]
R1	34	34	34
R2	34	34	34
R3	34	34	34
R4	34	33	33
R5	34	33	33
R6	34	33	33
R7	34	33	33
R8	35	34	33
R9	35	34	33
R10	35	34	33
R11	35	34	33
R12	35	34	33

Receiver	Rating Background Level, L_{A90}		
	Daytime[1]	Evening[2]	Night[3]
R13	31	31	30
R14	31	31	30
R15	31	31	30
R16	31	31	30
R17	31	31	30

5 NOISE POLICY FOR INDUSTRY

5.1.1 Overview

The NSW *NPfI* provides a framework and process for deriving noise criteria for consents and licences that enable the EPA and others to regulate premises that are scheduled under the *Protection of the Environment Operations Act 1997*.

The *NPfI* documents a procedure for assessment and management of industrial noise which involves the following steps:

- Determining the project noise trigger levels for a development. The project noise trigger level is a benchmark level above which noise management measures are required to be considered and is not intended as a mandatory requirement. They are derived by considering short-term intrusiveness due to changes in the existing noise environment (applicable to residential receivers only) and maintaining noise level amenity for particular land uses for residents and other sensitive receivers;
- Predicting or measuring noise produced by the development (having regard to any associated annoying characteristics and prevailing meteorological effects);
- Comparing the predicted or measured noise level with the project noise trigger level and assessing impacts and the need for noise mitigation and management measures;
- Considering any residual noise impacts following the application of feasible and reasonable noise mitigation measures;
- Setting statutory compliance levels that reflect the best achievable and agreed noise limits for development; and
- Monitoring and reporting environmental noise levels from the development.

For assessing intrusiveness, the background noise level (L_{A90}) is measured and the RBL determined (refer to Section 4). The *NPfI* states that where the daytime RBL was measured at less than 35 dBA, then a minimum daytime RBL of 35 dBA must be used. Therefore, the daytime RBL for all sensitive receivers has been adjusted to 35 dBA as the measured RBL at all receivers was 35 dBA or lower.

The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous noise level (L_{Aeq}) of the source (measured over a 15-minute period) does not exceed the background noise level (RBL) by more than 5 dBA. Therefore, the Project intrusiveness noise trigger levels are calculated by adding 5 dBA to the RBL.

Table 5-1 summarises the minimum assumed RBLs and the intrusiveness noise levels relevant to the Project.

Table 5-1 Project Intrusiveness Noise Trigger Levels, dBA

Receiver	RBL			Intrusiveness Noise Level		
	Daytime	Evening	Night	Daytime	Evening	Night
R1	35	34	34	40	39	39
R2	35	34	34	40	39	39
R3	35	34	34	40	39	39
R4	35	33	33	40	38	38
R5	35	33	33	40	38	38
R6	35	33	33	40	38	38
R7	35	33	33	40	38	38
R8	35	34	33	40	39	38
R9	35	34	33	40	39	38
R10	35	34	33	40	39	38
R11	35	34	33	40	39	38
R12	35	34	33	40	39	38
R13	35	31	30	40	36	35
R14	35	31	30	40	36	35
R15	35	31	30	40	36	35
R16	35	31	30	40	36	35
R17	35	31	30	40	36	35

Note 1: Daytime 7.00am–7.00pm; Evening 7.00pm–10.00pm; Night 10.00pm-7.00am.

5.1.2 Amenity Noise Level

The *NPfI* amenity noise level is specific to the type of land use and associated activities. The amenity noise levels relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms and amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To prevent increases in industrial noise due to the cumulative effect of several developments in an area, the project amenity noise level for each new source of industrial noise is set at 5 dBA below the recommended amenity noise level. For comparison to the intrusiveness level, the project amenity noise trigger level is converted from a period level (day, evening or night time periods) to a 15-minute level by adding 3 dBA.

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess mitigation options and determine achievable noise requirements.

Derivation of *NPfI* amenity noise trigger levels is given in Section 5.1.3.

Table 5-2 Amenity Noise Levels, dBA

Receiver	Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level $L_{Aeq,period}$ (dBA)	Project Amenity Trigger Level $L_{Aeq,15min}$ dBA
Residence	Rural	Day	50	48
		Evening	45	43
		Night	40	38
Commercial	All	When in use	65	63

Note 1: Daytime 7.00am–7.00pm; Evening 7.00pm–10.00pm; Night 10.00pm-7.00am.

At commercial receivers, the $L_{Aeq,15min}$ project amenity noise level is 63 dBA.

5.1.3 Project Noise Trigger Levels

In determining the project noise trigger levels, a comparison needs to be made between the amenity and intrusiveness noise levels, and the lowest noise level needs to be selected for each period (day, evening and night). As outlined in Table 5-2, for 24 operations, the highest amenity noise level for a rural receiver at night time can be 38dBA. Therefore, for those residential receivers where the night time intrusiveness noise trigger level is 39 dBA (refer to Table 5-1) an adjusted project noise trigger level of 38 dBA needs to be adopted. The resulting project trigger levels are shown in Table 5-3.

Table 5-3 Project Noise Trigger Levels, $L_{Aeq,15min}$ dBA

Receiver	Project Noise Trigger Level (*NPfI*)		
	Daytime	Evening	Night
R1	40	39	38
R2	40	39	38
R3	40	39	38
R4	40	38	38
R5	40	38	38
R6	40	38	38
R7	40	38	38
R8	40	39	38
R9	40	39	38
R10	40	39	38
R11	40	39	38

Receiver	Project Noise Trigger Level (*NPfI*)		
	Daytime	Evening	Night
R12	40	39	38
R13	40	36	35
R14	40	36	35
R15	40	36	35
R16	40	36	35
R17	40	36	35
All commercial Receivers	63	63	63

Note 1: Daytime 7.00am–7.00pm; Evening 7.00pm–10.00pm; Night 10.00pm-7.00am.

5.2 Maximum Noise Level Events

Noise sources of short duration and high level that may cause disturbance to sleep if occurring during the night time need to be considered.

The most appropriate descriptors for a source relating to sleep disturbance is the $L_{A1\ (1\ minute)}$ (the level exceeded for 1% of the specified time period of 1 minute) or L_{AFmax} (the maximum level during the specified time). The NSW EPA accepts that these descriptors are interchangeable as they both describe maximum noise level.

The approach recommended by the *NPfI* is to apply the following initial screening noise levels:

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL + 5 dB, whichever is the greater; and/or
- L_{AFmax} 52 dBA or the prevailing RBL + 15 dB, whichever is the greater.

The sleep disturbance screening noise levels apply outside bedroom windows during the night time period (10:00pm to 7:00am).

Where the screening noise levels cannot be met, a detailed maximum noise level event assessment should be undertaken.

As highest night time RBL at any receiver is 34 dBA:

- The highest RBL+5 dB is 39 dBA; and
- The highest RBL + 15 dB is 49 dBA.

Therefore, the maximum event screening levels at all receivers are:

- $L_{Aeq,15min}$ 40 dBA; and
- L_{AFmax} 52 dBA.

The maximum noise level (sleep disturbance) criteria are presented in Table 5-4 for all receivers.

Table 5-4 Maximum Noise Event Screening criteria, dBA

Receiver	*NPfI*	
	$L_{Aeq,15min}$	L_{AFMax}
R1	40	52
R2	40	52
R3	40	52
R4	40	52
R5	40	52
R6	40	52
R7	40	52
R8	40	52
R9	40	52
R10	40	52
R11	40	52
R12	40	52
R13	40	52
R14	40	52
R15	40	52
R16	40	52
R17	40	52

5.3 Low Frequency Noise

Where a noise source contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, the *NPfI* recommends correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels. The only relevant characteristic for noise from the Quarry is the potential for dominant low-frequency content.

The *NPfI* recommends investigating whether a modifying factor for low-frequency noise is applicable based on an analysis of third octave band levels where there is a difference between C- and A- weighting levels of more than 15dB. The factor to be applied depends on comparison of the third octave spectrum of the noise against the threshold spectrum in Table 5-5 (Table C2 from *NPfI*).

Table 5-5 Low Frequency Noise Thresholds (Table C2 from *NPfI*)

Threshold & Predicted Level	One-Third Octave Centre Frequency, Hz												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
$L_{Zeq,15min}$ threshold level	92	89	86	77	69	61	54	50	50	48	48	46	44

The following corrections apply where the measured dBC minus dBA level is 15 dB or more:

- where any of the one-third octave noise levels in *NPfI* Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured / predicted A-weighted levels applies for the evening / night period.
- where any of the one-third octave noise levels in *NPfI* Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured / predicted A-weighted levels applies for the evening / night period and a 2 dBA positive adjustment applies for the daytime period.

5.4 Residual Noise Impacts

The *NPfI* recognises that where all source and pathway feasible and reasonable noise mitigation measures have been applied a proposed development might give rise to residual noise impacts.

Table 4.1 of the *NPfI*, which interprets the significance of any potential noise exceedances, is reproduced below in Table 4-4. These significance categories (i.e. negligible, marginal, moderate and significant) are generally consistent with Table 1 of the *Voluntary Land Acquisition and Mitigation Policy* (*VLAMP*) (DP&E, 2014) which addresses noise and air quality impacts from State significant mining, petroleum and extractive industry developments. An updated draft version of this policy (DP&E, 2017) was released in November 2017. Given the policy is still in draft form, the revised policy has not been considered in this assessment.

Table 5-6 Significance of Residual Noise Impacts

If the predicted noise level minus the project noise trigger level is:	And the total cumulative industrial noise level is:	Then the significance of residual noise level is:
<=2 dBA	Not applicable	Negligible
>= 3 but <=5 dBA	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
>= 3 but <=5 dBA	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1dB	Moderate
>5 dBA	=< recommended amenity noise level	Moderate
>5 dBA	> recommended amenity noise level	Significant

The *NPfI* also gives examples of noise mitigation measures addressing residual noise impacts in Table 4.2 of the policy. Table 4.2 of the *NPfI* is reproduced in Table 5-7.

Table 5-7 Examples of Receiver-Based Treatment to Mitigate Residual Noise Impacts

Significance of residual noise level	Example of potential treatment
Negligible	The exceedance would not be discernible by the average listener and therefore would not warrant receiver-based treatment or controls.
Marginal	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
Moderate	As for 'marginal', but also upgraded façade elements, such as windows, doors or roof insulation, to further increase the ability of the building façade to reduce noise levels.
Significant	May include suitable commercial agreement where considered feasible and reasonable.

Table 5-8 presents the methodology for assessing noise levels which may exceed the *NPfI* Project noise trigger levels at privately-owned residences.

Table 5-8 Project Noise Impact Assessment Methodology

Noise Management Zone		Noise Affectation Zone
1-2 dB above Project noise trigger levels	**3-5 dB above Project noise trigger levels**	**> 5 dB Project noise trigger levels**
No treatment/controls required	• Voluntary mitigation rights applicable. • Architectural treatment required if requested (incl. ventilation & upgraded façade elements).	• Voluntary mitigation rights applicable. • Architectural treatment required if requested (incl. ventilation & upgraded façade elements). • Voluntary land acquisition rights applicable.

6 NOISE MODELLING PROCEDURE

Operational noise levels at nearby receivers have been calculated using the Environmental Noise Model (ENM) a proprietary computer program from RTA Technology Pty Ltd. ENM accounts for the effects of distance, shielding, ground effects, air absorption and meteorological effects. This modelling has been previously accepted by the EPA for use in environmental noise assessments. The assessment models the total noise at each receiver from the operation of the Project. Total predicted operational noise levels are then compared with the operational noise trigger levels presented in Section 5.

Typical quarrying operations involve the stripping of overburden and the extraction of hard rock using open-cut drill and blast techniques. Overburden is transported by trucks to the overburden emplacement areas, where it is spread and shaped by dozer. Worst-case noise scenarios assume overburden emplacement in the new SWOE.

Quarried material is 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. The mobile crusher/ conveyor system can be positioned close to the extraction location, thereby facilitating in-pit crushing works to be "truck-less" most of the time. 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 and screening. Product material is stored in the various storage bins prior to being dispatched off-site by trains.

Operational scenarios were developed to represent the potential worst-case impact from operations occurring on-site and the potential to generate noise at the surrounding sensitive receptors.

The typical approved daytime operations of the Peppertree Quarry (as presented in Table 6-1) with the following proposed overburden hauling and emplacement activities associated with the SWOE was modelled:

SWOE

- 1x Dozer;
- 1x Grader;
- 1x Watercart (30,000 litres Articulated); and
- 12x Cat 740 Trucks (40 tonnes articulated) or 8x Cat 777 Trucks (100 tonnes).

In-pit extraction and processing operations

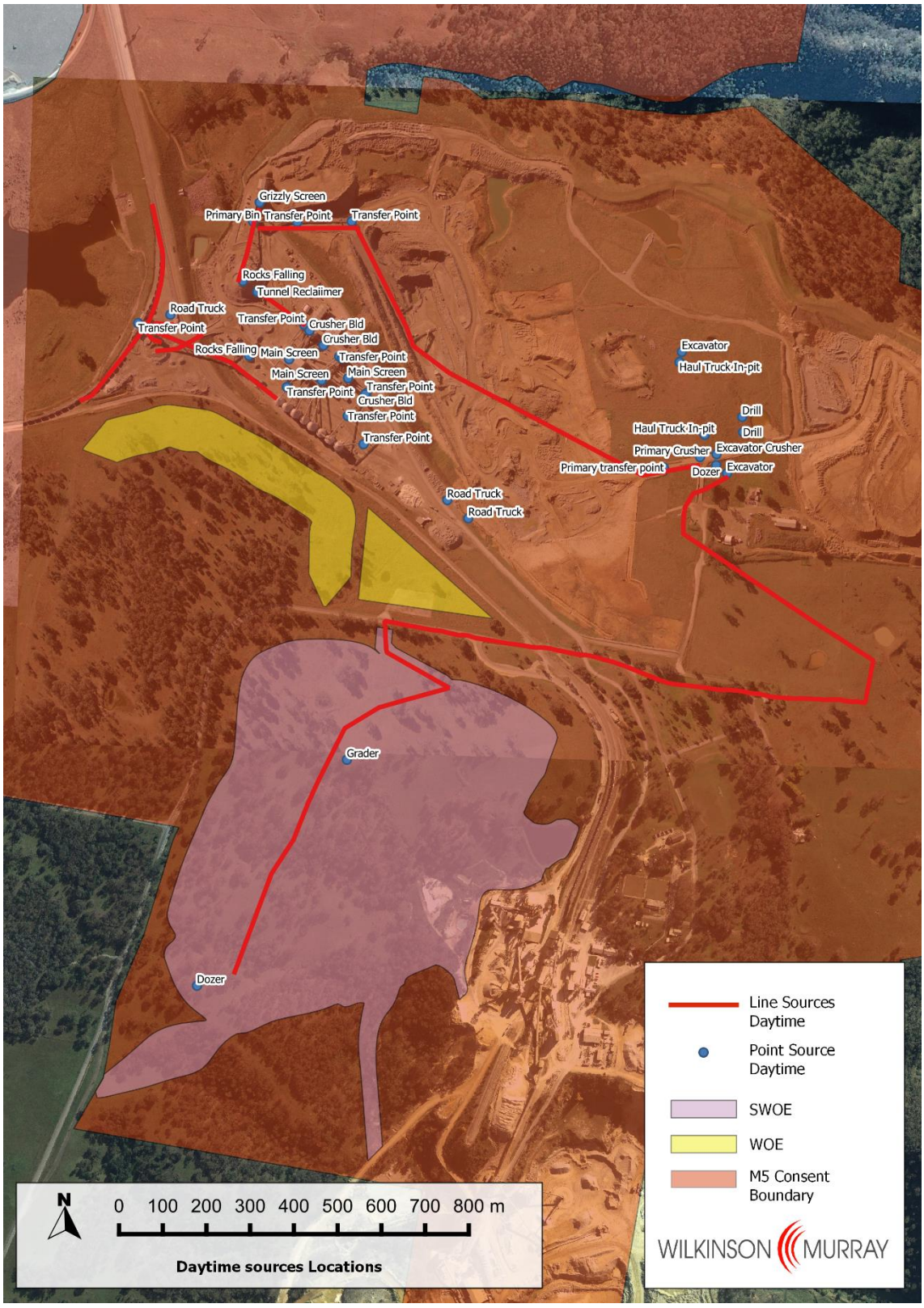
- 1x in-pit Mobile Crusher operating at RL 555;
- 2x Excavator (150 tonne);
- 2x Trucks (40 tonne Articulated) (Worst case operation when trucks are used to move material to the Primary crusher);
- 2x Drill Rigs at RL 570; and
- 1x Watercart (10,000 litre).

Secondary / Tertiary Processing, rail loading and product transportation

- Primary Screening Plant;
- Grizzly Screen;
- Secondary Crushing & Screening;
- Tertiary Crushing & Screening;
- Numerous conveyors and transfer points;
- Primary bin;
- Rocks falling on Stockpile (surge);
- Tunnel reclaim;
- Train moving slowly through loading facility;
- Loading Rail wagons;
- Enclosed Rail storage bins loading;
- 2x FELs; and
- 3x Road Trucks (delivery of limestone sand).

Figure 6-1 shows the locations of the noise sources for the typical approved daytime operations and the proposed overburden hauling and emplacement activities associated with the SWOE.

Figure 6-1 Indicative Modelling Scenario for the Modified Daytime Operations (7am-7pm)



Typical approved evening / night time operations of the Peppertree Quarry (as presented in Table 6-1) with the following proposed in-pit operations all operating at RL555 and between 5.00am and 11.00pm:

In-pit extraction and processing operations

- 1x in-pit Mobile Crusher operating at RL 555;
- 1x Excavator (65 tonne) + 2x Trucks (40 tonne Articulated) all operating at RL 570;
- 2x Drill Rigs at RL 570; and
- 1x Watercart (10,000 litre).

It should be noted that the secondary and tertiary processing, rail loading and product transportation also operates during the evening and night time period.

Presently two trucks are used in the pit to haul blast rock from the blast face to the crusher, as required. Once all overburden within the pit is removed, there will be no trucks and only an excavator or front end loader will replace the trucks. To assess worst-case noise impacts the two trucks hauling blast rock from the blast face to the crusher was modelled.

Figure 6-2 shows the locations of the noise sources for the typical approved evening / night time operations of the Peppertree Quarry with the in-pit operations.

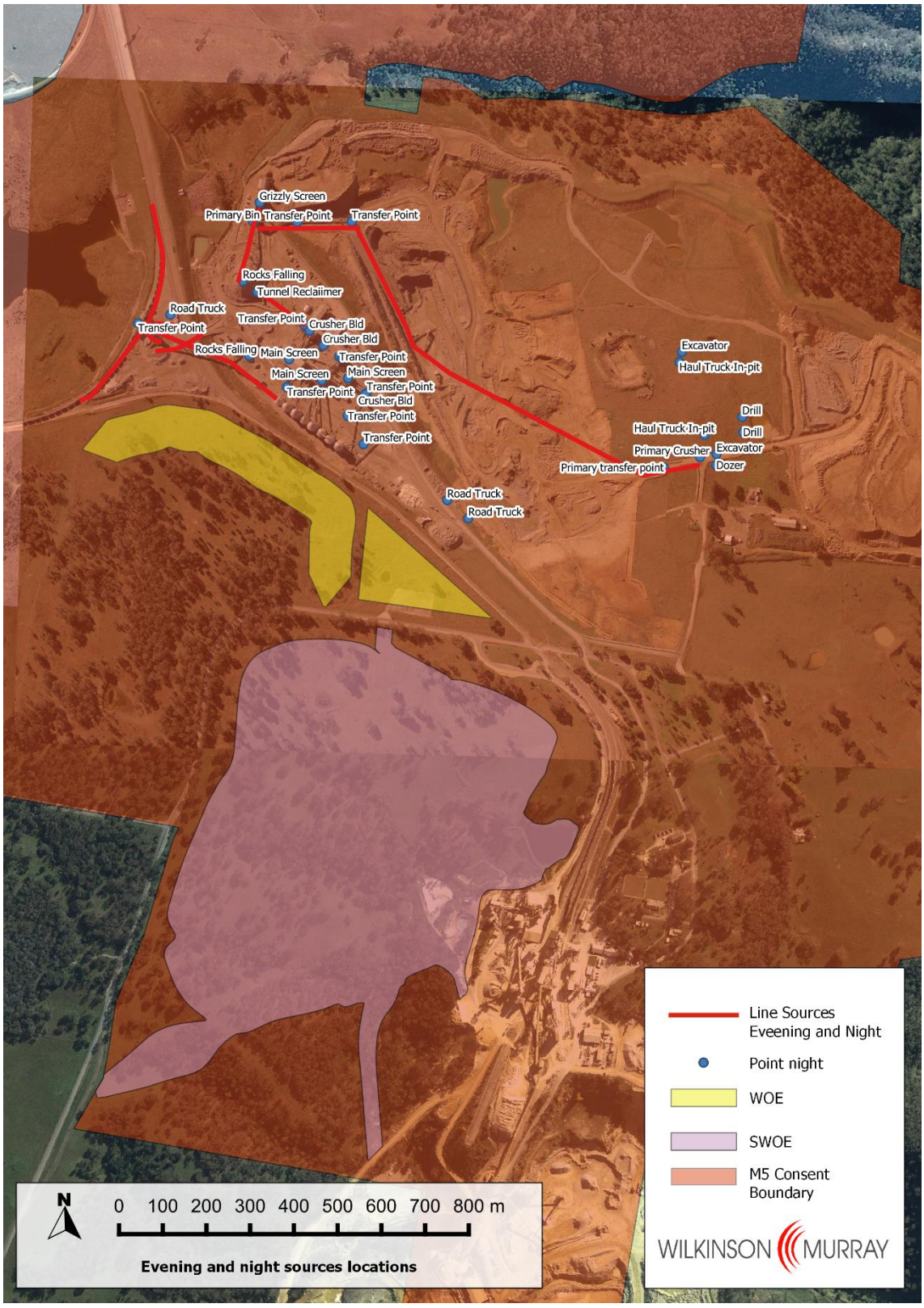
These scenarios were based on the assumption that all plant and equipment operate simultaneously. In practice, such an operating scenario would be unlikely to occur, and the results of the modelling are typically conservative.

The quarry operations included in the noise modelling scenarios are summarised in . While night time operations are unchanged, there is some change in overburden emplacements which could lead to a potential change in acoustic shielding to some receivers. Therefore, an assessment of night time noise emission is included.

Table 6-1 Operations Modelled

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

Figure 6-2 Indicative Modelling Scenario for the Modified Evening / Night Time Operations (7pm-7am)



An inventory of sound power levels of plant, equipment and operations are presented in Table 6-2. The sound power levels are based on a combination of measured noise levels, data from previous environmental assessments of the Peppertree Quarry and Wilkinson Murray's database.

Table 6-2 Equipment Sound Power Levels

Fleet Item	Typical Plant Description	Location	Sound Power Level L_{Aeq} (dBA)	Reference
Haul Trucks	Articulated Truck	In-pit	110	Site noise measurements
	Articulated Truck Cat 740 (40t)	Overburden emplacement	110	Site noise measurements
	Haul Truck Cat 777 (100t)	Overburden emplacement	114	Wilkinson Murray database
Primary Screening Plant		Processing area	104	Site noise measurements
Grizzly Screen		Processing area	104	Site noise measurements
Primary Bin		Processing area	108*	ERM
Secondary Crushing & Screening		Processing area	104	Site noise measurements
Tertiary Crushing & Screening		Processing area	104	Site noise measurements
Conveyor (Pit to Stockpile)		Processing area	80dBA per m	Peppertree Mod 2
Rocks falling on Stockpile		Processing area	103	Site noise measurements
Tunnel reclaim		Processing area	93	Site noise measurements
Train moving slowly through loading facility		Rail loading & product transportation	103	Site noise measurements
Conveyor (others)		Processing area	75dBA per m	Peppertree Mod 2
Conveyor transfer points		Processing area	92	Site noise measurements
Drill		In-pit	115	Wilkinson Murray database
In-pit Mobile Crusher		In-pit	115*	Site noise measurements

Fleet Item	Typical Plant Description	Location	Sound Power Level L_{Aeq} (dBA)	Reference
Primary transfer point		In-pit	108	ERM
Road Trucks		Processing area	102	Wilkinson Murray database
Dozer	D10 / D11	Overburden emplacement	112	Peppertree Mod 2
Enclosed Rail storage bins loading		Rail loading & product transportation	94	Peppertree Mod 2
Excavators	Komatsu 850	In-pit	106	Peppertree Mod 2
Loaders	Komatsu WA800	Processing Area	114	Peppertree Mod 2
	CAT 988	In-pit	111	Peppertree Mod 2
Grader	CAT 140H	Haul roads	108	Wilkinson Murray database
Watercarts		Haul roads	110	Wilkinson Murray database

* Mitigation Included

As noted, the hauling could be done using 12 x Cat 740 Trucks (40 tonnes articulated) or 8 x Cat 777 Trucks (100 tonnes). The total source sound power level of the use of the Cat 740 Trucks will be 2dBA lower than the use of 8 x Cat 777 Trucks. Therefore, both truck types were modelled as outlined in the noise modelling scenarios in Table 6-3.

At the beginning of Modification 5, the landform where the overburden is placed on the SWOE was assumed to be at the level of the existing land. For the scenario representing the end of Modification 5, it was assumed that the SWOE would be near its final configuration and haul trucks would sometimes be shielded by the top of the emplacement.

In all daytime scenarios, it was assumed that emplacement was taking place at the south western end of the SWOE, representing a typical worst-case scenario for noise to closest residential Receivers 8 and 9.

Table 6-3 Noise Modelling Scenarios

Scenario	Period	Haul Trucks	Phase of Modification
1	Day	8 x 777	Beginning of Mod 5
2	Day	12 x 740	Beginning of Mod 5
3	Day	8 x 777	End of Mod 5
4	Day	12 x 740	End of Mod 5
5	Night	N/A	Life of Modification

6.1 Environment for Noise Assessment Process

6.1.1 Accounting for Different Meteorological Conditions

Fact Sheet D of the *NPfI* defines standard meteorological conditions and noise-enhancing meteorological conditions to be considered for the assessment. The definition of those conditions is provided in Table D1 of Fact Sheet D which is reproduced in **Table 6-4**.

Table 6-4 ***Standard and noise-enhancing meteorological conditions.***

Meteorological conditions	*Meteorological parameters*
Standard meteorological conditions	*Day/evening/night: stability categories A-D with wind speed up to 0.5m/s at 10m AGL*
Noise-enhancing meteorological conditions	*Day/evening: stability categories A-D with light winds (up to 3m/s at 10m AGL)* *Night: stability categories A-D with light winds (up to 3m/s at 10m AGL) and/or stability category F with winds up to 2m/s at 10m AGL*

Notes: *m/s = metres per second; m = metres; AGL = above ground level; where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10m AGL. Stability categories are based on the Pasquill-Gifford stability classification scheme.*

Fact Sheet D provides two options when considering meteorological effects:

- Conservatively adopt noise-enhancing meteorological conditions without processing meteorological data local to the site; or
- Determine the significance of noise-enhancing meteorological conditions based on meteorological data local to the site and:
    1) adopt significant noise-enhancing conditions for the assessment, where noise-enhancing meteorological conditions are deemed significant; or
    2) adopt standard meteorological conditions for the assessment where noise-enhancing meteorological conditions are not deemed significant.

As Boral maintains two weather stations (one on the Limestone Mine site and one at Peppertree Quarry), an analysis of the meteorological data was undertaken to determine the significance of noise-enhancing meteorological conditions at the site.

6.1.2 Analysis of Meteorology

Temperature Inversions

Five years of meteorological data from the Peppertree Quarry weather station were provided by Boral. The data included the Pasquill-Gifford stability category. The *NPfI* states: "Where the sum total of F and G inversions occur for at least 30% of the total night time in winter, the project area is considered to be significantly affected by inversions warranting noise assessment."

Table 6-5 presents the results of the analysis of the occurrence of temperature inversions on winter nights and shows that temperature inversions occur for less than 30% of winter nights.

Table 6-5 Percent Occurrence of F & G Inversions on Winter Nights

Year	Winter
2012	-
2013	25.6
2014	29.8
2015	28.7
2016	24.5
2012/2017	27.2
Average	**27.2**

Prevailing winds

The assessment of the significance of wind needs to consider both the wind speed and direction.

The NPfI recommends consideration of wind effects if they are a "feature" of the area. The NPfI defines "feature" as the presence of source-to-receiver winds at speeds up to 3 m/s (measured at 10 m above ground level) and occurring for 30% of the time or more in any assessment period and season.

Five years of meteorological data from the Peppertree Quarry weather station was analysed and wind roses for each season and assessment period are presented in Appendix C. A summary of the prevailing weather analysis is presented in Table 6-6.

Table 6-6 Prevailing wind analysis results

Wind Direction	Assessment Period											
	Summer Day	Summer Evening	Summer Night	Autumn Day	Autumn Evening	Autumn Night	Winter Day	Winter Evening	Winter Night	Spring Day	Spring Evening	Spring Night
N	9.1	7.4	15	10	9.5	13.2	7.6	6.6	8	7.2	7.6	14.1
NNE	9.1	10.6	10.6	7.3	8.2	5.6	4.5	3.3	1.4	6.2	7.4	8.2
NE	10.4	18.5	14.6	8.5	12.6	5.5	4.2	4.1	0.6	7.1	16.1	10
ENE	15.8	29	21.5	14.5	18.8	7.4	7.2	6.8	0.7	10.4	22.5	12.6
E	18.4	29.3	26.1	18.5	22.9	10.1	10.2	8.7	1.4	12.3	23.6	14.2
ESE	18.2	28.2	26.4	20.8	25.2	13.2	13.2	11.2	3.1	13.2	22.4	14.5
SE	15.9	19.5	20.3	20.6	20.4	13.8	15.4	10.8	5.5	12	13.4	12.1
SSE	7.9	7.3	11.1	14.2	13.2	11.7	12.9	8.5	6.8	7.9	6	8.1
S	3.6	2.9	5	9.7	8.1	9	10.8	7.3	7.4	5.3	3.7	5.3
SSW	2.5	1.8	2.7	7.4	4.7	6.1	8.7	5.2	7.6	4.4	3.5	4.2
SW	2.8	3.6	2.2	5.9	6.6	5.8	6.9	7.2	8.8	4.4	4.9	5
WSW	3.4	5.2	3.9	6.9	10.7	9	8.1	13.6	13.6	4.8	9.2	9

Wind Direction	Assessment Period											
	Summer Day	Summer Evening	Summer Night	Autumn Day	Autumn Evening	Autumn Night	Winter Day	Winter Evening	Winter Night	Spring Day	Spring Evening	Spring Night
W	4.3	6.7	8.5	9.4	17.6	18.9	10.2	24.5	26	5.7	16	22.1
WNW	5.6	7.2	14.9	12.1	19.8	26.4	12.4	27.6	29.4	6.7	17.5	28.7
NW	6.3	6.3	17.6	12.7	18.3	26.3	12.2	25.1	27.9	7.1	16.5	28.5
NNW	8.3	6.3	18.1	12	15.4	23.2	10.5	18.4	21.8	7.4	13	26

The analysis shows that the frequency of occurrence of winds up to 3 m/s did not triggered the 30% NPfI assessment requirement for any assessment periods (ie day, evening and night).

6.1.3 Adopted Meteorological Parameters for Noise Assessment Model

Given these results, standard meteorological conditions as described above were used for assessment of noise emissions.

Temperature and humidity make small differences to prediction using ENM. The parameters used were:

- for daytime – 70% relative humidity, 20^{o} degrees Celsius; and
- for evening and night time – 90% relative humidity, 10^{o} degrees Celsius.

7 NOISE IMPACT ASSESSMENT

7.1 Operational Noise Assessment

Predicted noise levels for the identified operational scenarios have been calculated using the assumptions presented above. Predictions for the daytime scenarios are presented in Table 7-1 (beginning of Modification 5) and Table 7-2 (end of Modification 5).

Predictions for the evening and night time scenario is presented in Table 7-3.

Table 7-1 Daytime Predictions LAeq,15min dBA – At start of Modification 5 (Scenarios 1 and 2)

Receiver	Predicted Noise Levels, $L_{Aeq,15min}$		Trigger or Approval Levels	
	Scenario 1 8x Cat 777 Trucks	Scenario 2 12x Cat 740 Trucks	*NPfI* Trigger	Project Approval Criteria
R1	19	18	40	35
R2	28	27	40	35
R3	31	31	40	35
R4	29	27	40	35
R5	30	29	40	35
R6	26	25	40	35
R7	32	31	40	35
R8	37	36	40	41
R9	31	30	40	35
R10	27	26	40	35
R11	24	23	40	35
R12	25	24	40	35
R13	23	22	40	35
R14	29	28	40	35
R15	30	28	40	35
R16	29	27	40	35
R17	30	28	40	35

Table 7-2 Daytime Predictions $L_{Aeq,15min}$ dBA – End of Modification 5 (Scenarios 3 and 4)

Receiver	Predicted Noise Levels, $L_{Aeq,15min}$		Trigger or Approval Levels	
	Scenario 3 8x Cat 777 Trucks	Scenario 4 12x Cat 740 Trucks	*NPfI* Trigger	Project Approval Criteria
R1	19	18	40	35
R2	28	27	40	35
R3	31	30	40	35
R4	29	28	40	35
R5	30	29	40	35
R6	28	27	40	35
R7	33	32	40	35
R8	38	37	40	41
R9	35	34	40	35
R10	30	29	40	35
R11	24	23	40	35
R12	24	23	40	35
R13	23	21	40	35
R14	30	29	40	35
R15	31	30	40	35
R16	30	29	40	35
R17	31	29	40	35

Table 7-3 Evening and Night Time Predictions – $L_{Aeq,15min}$ dBA – (Scenarios 5)

Receiver	Predicted Noise Levels, $L_{Aeq,15min}$	Trigger or Approval Level	
		NPfI Trigger	Project Approval Criteria
R1	16	38	35
R2	24	38	35
R3	28	38	35
R4	23	38	35
R5	28	38	35
R6	20	38	35
R7	28	38	35
R8	32	38	35
R9	26	38	35
R10	22	38	35
R11	16	38	35
R12	17	38	35
R13	18	35	35
R14	24	35	35
R15	23	35	35
R16	21	35	35
R17	20	35	35

The predicted noise levels for proposed daytime, evening and night time operations, including the proposed SWOE, comply with the operational noise trigger level at all locations. The predicted levels comply with the Project Approval criteria at all locations.

Predicted noise contour for daytime scenarios 3 and night time scenario 5 are presented in Appendix B. Daytime scenarios 3 is presented as it presents the greatest impact.

7.2 Comparison of noise modelling with measured noise levels

The ERM report presented measured noise levels at the following receivers:

- R2;
- R3;
- R4;
- R8; and
- R9.

A total of 46 operator attended noise measurements were completed by ERM. Of the 46 operator attended noise measurements that were completed, quarry noise levels contributions, $L_{Aeq,15minutes}$, were generally less than 30dBA. For a limited number of measurements, the quarry noise emissions were more easily detectable and contributed more to the overall acoustic environment, with noise levels contributions between 30 and 35dBA.

From the results of the noise measurements, ERM identified the key noise generating activities were the Primary crusher situated within the pit and the primary bin/ surge stockpile situated out of the pit and recommended noise mitigation to reduce their noise contributions which have been assumed to be in place for the noise predictions presented in this report. The predicted noise levels presented in this report are therefore lower than those measured by ERM and considering this the predicted noise levels presented in this report are generally consistent with the measured noise levels from ERM.

7.3 Maximum Noise Level Assessment

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

Night time operator-attended noise measurement results have been examined to review the existing corresponding L_{AFmax} noise levels and determine the difference between the intrusive $L_{Aeq,15min}$ and the corresponding maximum L_{AFmaxn} noise levels.

The results of night time noise measurements for the compliance monitoring for Peppertree Quarry in 2014 and 2017 (ERM, 2014, 2105, 2016 and 2017) are summarised in Table 7-4, including the measured (quarry-contributed) intrusive $L_{Aeq,15min}$ and the L_{AFmax} noise levels.

Table 7-4 Measured Maximum Night Time $L_{Aeq,15min}$ and L_{AFmax} Noise Levels

Receiver	2014			2015			2016			2017		
	Measured $L_{Aeq,15min}$	Measured L_{AFmax}	Difference	Measured $L_{Aeq,15min}$	Measured L_{AFmax}	Difference	Measured $L_{Aeq,15min}$	Measured L_{AFmax}	Difference	Measured $L_{Aeq,15min}$	Measured L_{AFmax}	Difference
R2 (6)	25	33	**8**	27	35	**8**	29	31	**2**	25	32	**7**
R3	31	38	**7**	30	35	**5**	26	33	**7**	33	42	**9**
R8 (16)	23	33	**10**	-	-	**-**	24	34	**10**	27	32	**5**
R17	-	-	**-**	-	-	**-**	24	24	**0**	23	32	**9**
R4	-	-	**-**	-	-	**-**	26	26	**0**	27	34	**7**
Mean			**8**			**6**			**4**			**7**

The night time operator-attended noise measurement results show a difference of between 0 and 10 dBA between the (quarry-contributed) intrusive $L_{Aeq,15min}$ and the maximum L_{AFmax} noise levels.

ERM in their analysis of L_{AFmax} noise levels identified a difference of $L_{Aeq,15min}$ and the maximum L_{AFmax} noise levels of between 2 to 8dB which is consistent with the analysis above.

For a conservative sleep disturbance assessment, a 10dBA difference has been assumed between the calculated $L_{Aeq,15min}$ and the maximum L_{AFmax} noise levels. The predicted L_{AFmax} noise levels from the night time operations are presented in Table 7-5.

Table 7-5 Night Time Predictions – L_{AFmax} dBA – (Scenarios 5)

Receiver	Predicted Noise Levels L_{AFmax}	Maximum Noise Event Screening criteria L_{AFmax}
R1	26	
R2	34	
R3	38	
R4	33	
R5	38	
R6	30	
R7	38	
R8	42	
R9	36	52
R10	32	
R11	26	
R12	27	
R13	28	
R14	34	
R15	33	
R16	31	
R17	30	

The predicted L_{AFmax} night time noise levels comply with the sleep disturbance criteria of 52 dBA at all locations. The predicted L_{AFmax} noise levels are comparable to those measured for quarry compliance.

7.4 Land Acquisitions Noise Criteria

As the land acquisition criteria in the Project Approval are equal to or higher than the operational target noise levels, the predicted daytime, evening and night time noise levels associated with the proposed modifications, do not exceed the land acquisition criteria at any residence.

According to the *VLAMP*, the Project is subject to voluntary land acquisition when the recommended maximum noise levels in Table 2.1 of the INP is exceeded on more than 25% of any privately-owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls.

The recommended voluntary land acquisition criteria are:

- Daytime – 55 $L_{Aeq,period}$;
- Evening – 50 $L_{Aeq,period}$; and
- Night time – 45 $L_{Aeq,period}$.

Wilkinson Murray has reviewed potential impacts on privately-owned land. Review of the noise contours in Appendix D established that the daytime 55 dBA $L_{Aeq,period}$, the evening 50 dBA $L_{Aeq,period}$ and night time 45 dBA $L_{Aeq,period}$ remain within lands owned by Boral. The noise contours used for this review are based on $L_{Aeq,15min}$ predictions and therefore should be considered conservative as the minus 3 dB conversion from a 15-minute to period level has not been considered.

8 LOW FREQUENCY NOISE IMPACTS

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 *NPfI* 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.

It is a requirement of the Quarry's approval to "include a program to characterise and measure low frequency noise emissions" as such noise emissions have been reported by receivers in the past.

The *NPfI* recommends investigating whether modifying factors are applicable based on an analysis of third octave band levels where there is a difference between C- and A-weighting levels of more than 15 dB (See Section 5-3).

The noise modelling data used for the predictions was in octaves. Data below 63 Hz, and third octave source data, is generally not available. The uncertainty of the calculation of the difference between C- and A-weighting levels would appear to be quite large.

At the most-affected receiver (R8) a difference between C- and A-weighting levels of 18dB was calculated. shows the results of a low-frequency analysis calculated to Receiver 8 under noise-enhancing meteorological conditions during daytime and night time. Because third octave data at low frequencies is unavailable, the calculation is based on a spectrum measured by Wilkinson Murray at Receivers R17 and R3 when investigating low frequency noise emission from Marulan South Mine.

Table 8-1 Low Frequency Noise Analysis at Receiver 8

Threshold & Predicted Level	Overall		One-Third Octave Centre Frequency, Hz												
	A	C	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
$L_{Zeq,15min}$ threshold level	-	-	92	89	86	77	69	61	54	50	50	48	48	46	44
Predicted Level, Worst Case (Receiver 8)	38	56	47	52	51	44	44	44	43	44	41	42	40	37	32

The predicted level at Receiver 8 is below the threshold level in all frequency bands, so no modifying factor is indicated for low frequency noise. This will also hold for all other receivers and is consistent with the ERM report.

Boral is committed to ameliorating any low frequency noise issues if they arise for the Project consistent with the most recent low frequency noise assessment process from the *NPfI*.

9 RESIDUAL NOISE IMPACTS

The concept of "residual noise impact" was introduced in the *NPfI*. They describe the situation where best-achievable noise level from a development exceeds the project noise trigger level when assessed at a sensitive receiver location.

Residual noise impacts are identified after all source and pathway feasible and reasonable noise mitigation measures have been considered. The significance of the residual impact and the need to assess receiver-based treatment options may need to be considered as part of an authority's determination / approval process.

There are no predicted residual noise impacts at any receiver.

10 CONCLUSION

This report details predicted operational noise emissions from the proposed modifications to the Peppertree Quarry.

To assess the potential noise impacts associated with the proposed modifications to the Peppertree Quarry operations, this report compared the predicted noise emissions from the existing and proposed operations with the operational noise impact assessment criteria in the Project Approval, and with proposed revision to noise criteria based on noise "trigger" levels describe in the NSW *Noise Policy for Industry*.

The assessment has found that:

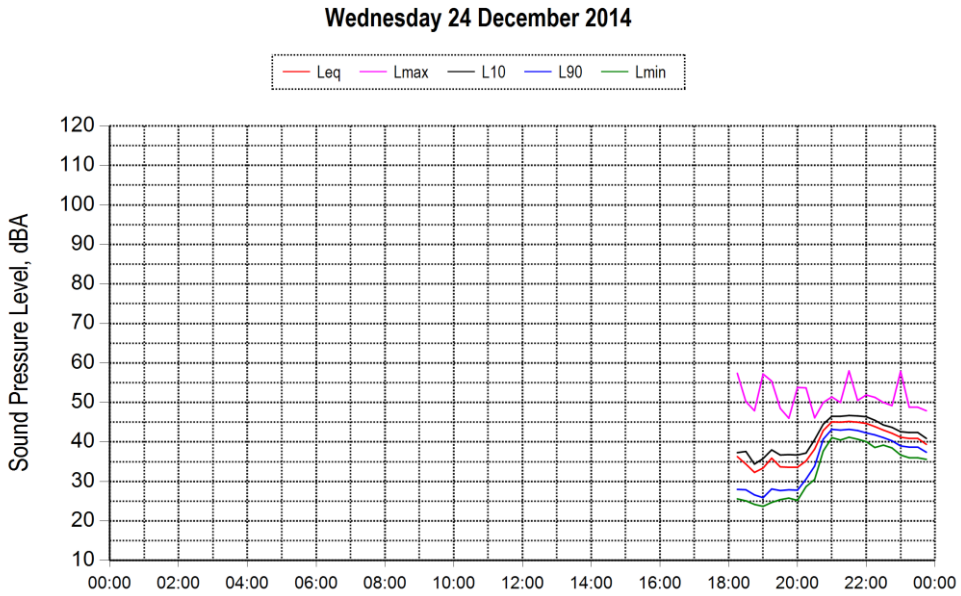
- At all receivers the predicted noise level for day time operations associated with the proposed SWOE comply with the *NPfI* noise trigger levels.
- The predicted noise level for proposed in-pit operations during the evening and night time comply with the noise trigger levels from the *NPfI*;
- As the land acquisition criteria in the Project Approval are higher than or equal to the operational noise trigger levels, the predicted daytime, evening and night time noise levels associated with the proposed modifications, do not exceed the land acquisition criteria at any residence;
- Maximum noise levels from the modified Peppertree Quarry operations have been analysed and it is expected that compliance with the sleep disturbance criteria in the Project Approval and trigger levels from the *NPfI*, would be achieved at all locations.

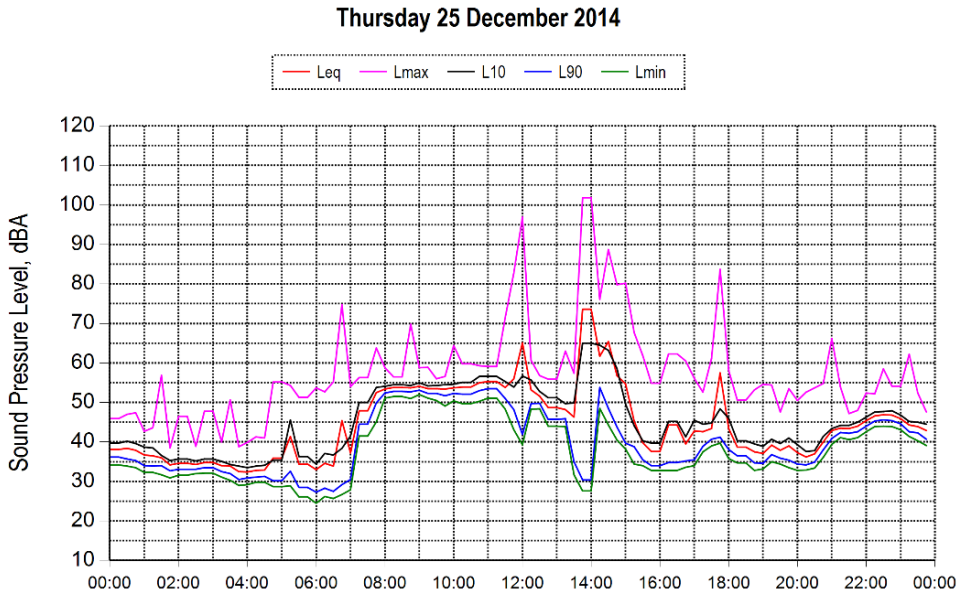
Given these conclusions, and the demonstrated performance of existing operations via the ongoing noise monitoring regime, it is considered that the continued implementation of the Noise Management Plan and associated management measures would be adequate to manage potential operational noise impacts which would arise from activities associated with the modified Peppertree Quarry operations.

APPENDIX A

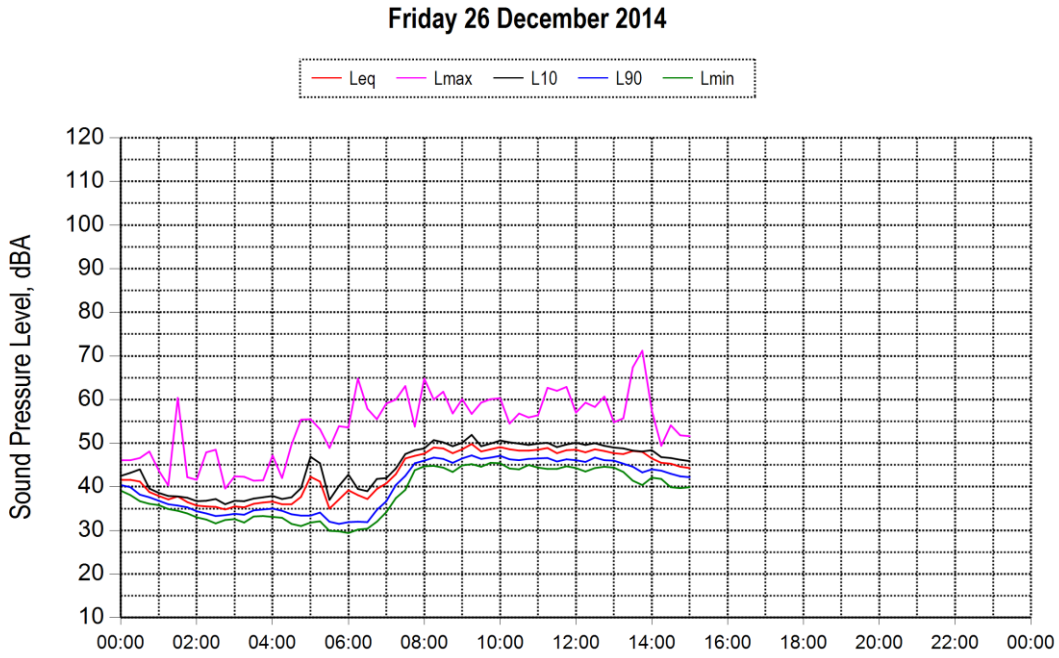
NOISE MONITORING RESULTS

B4) Mine Manager Property

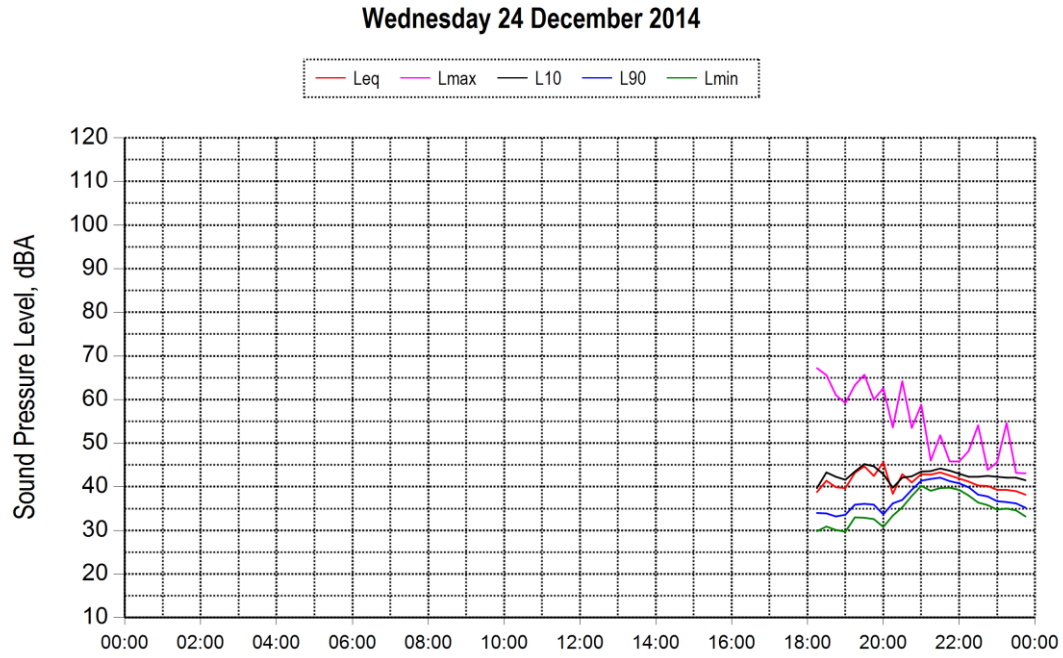


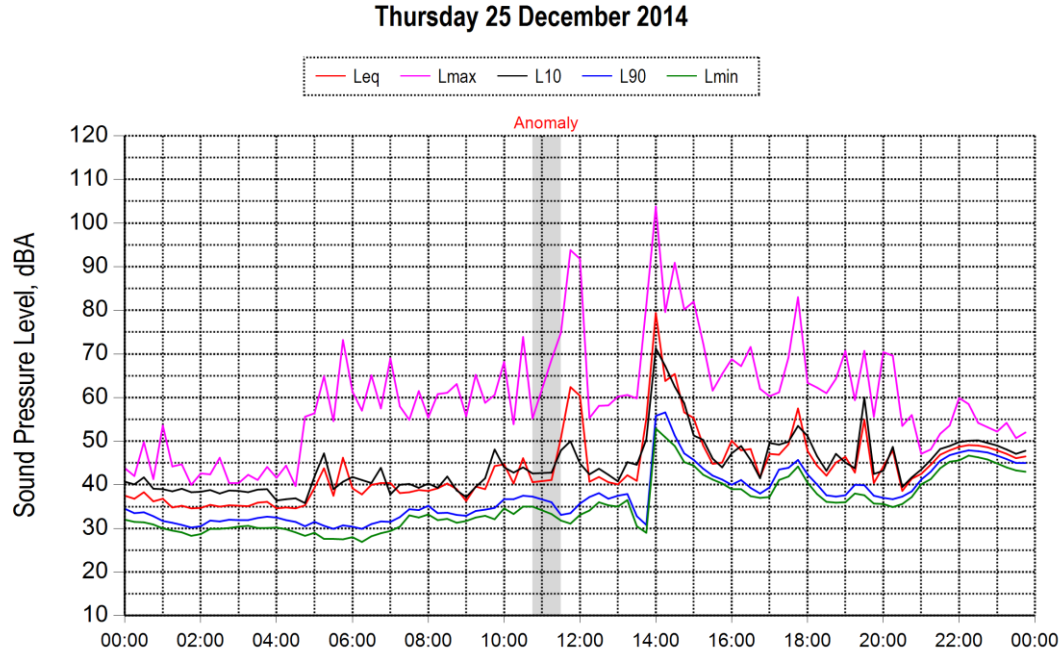


B4) Mine Manager Property

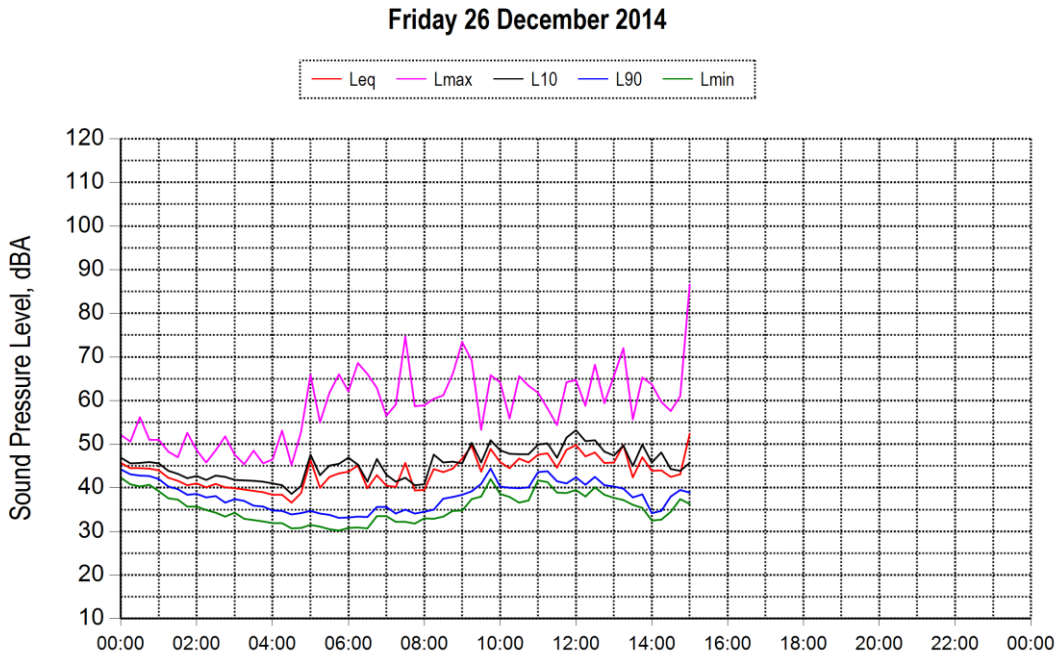


(R8) Turkey Farm

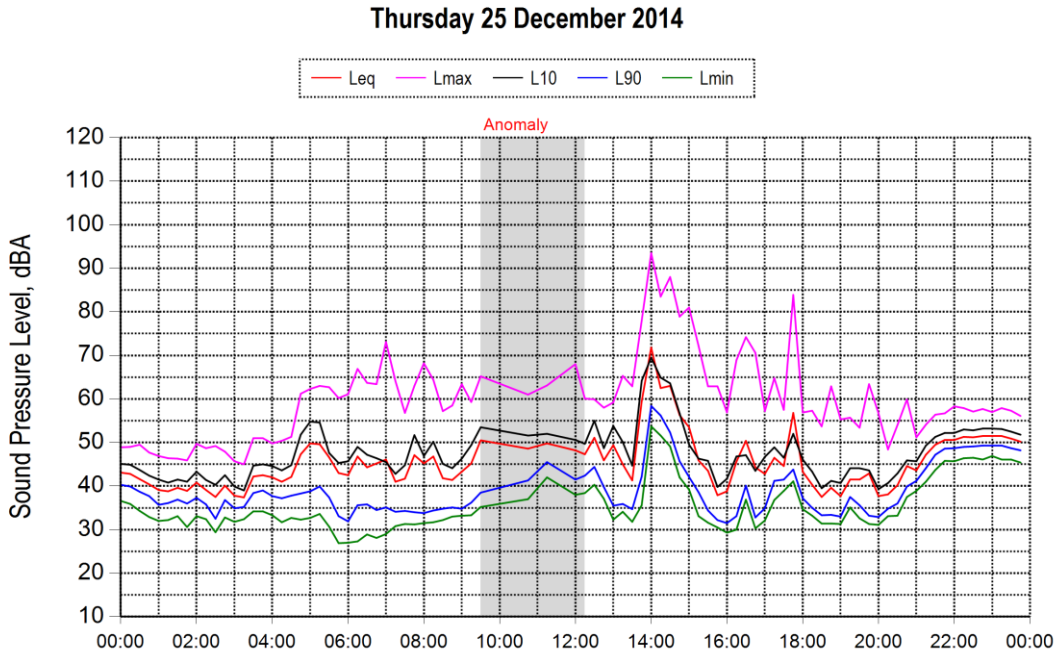


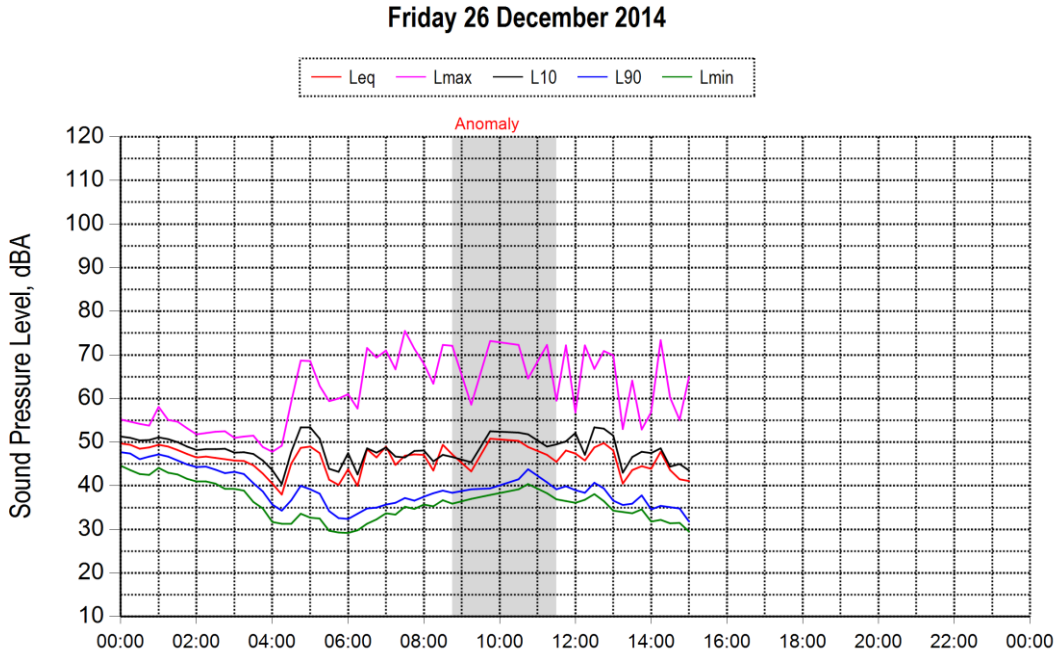


(R8) Turkey Farm

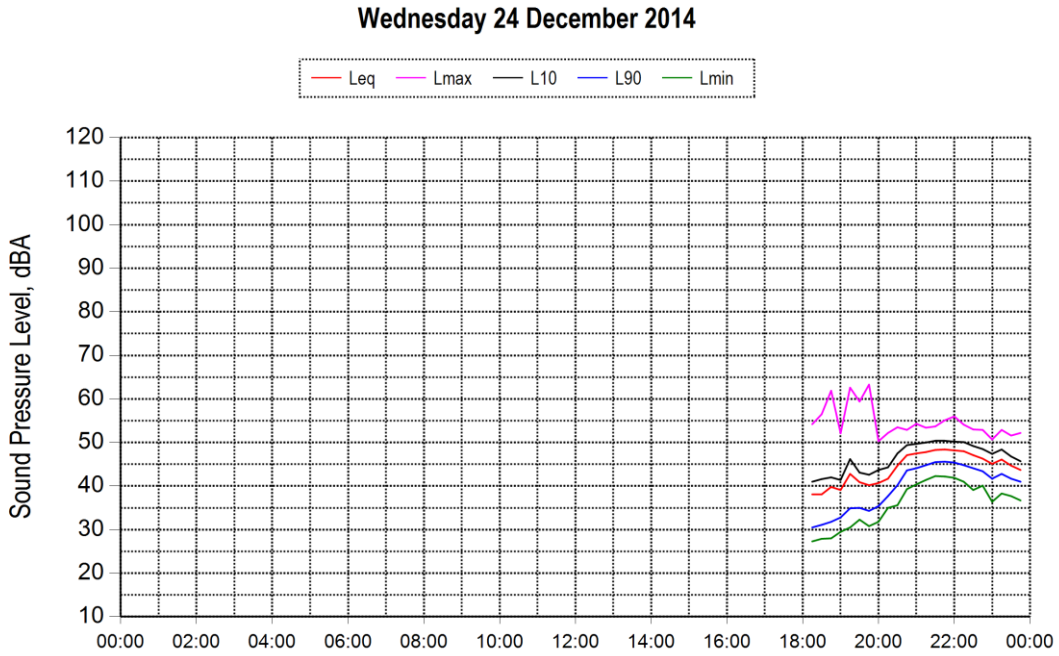


(R9) Western Location

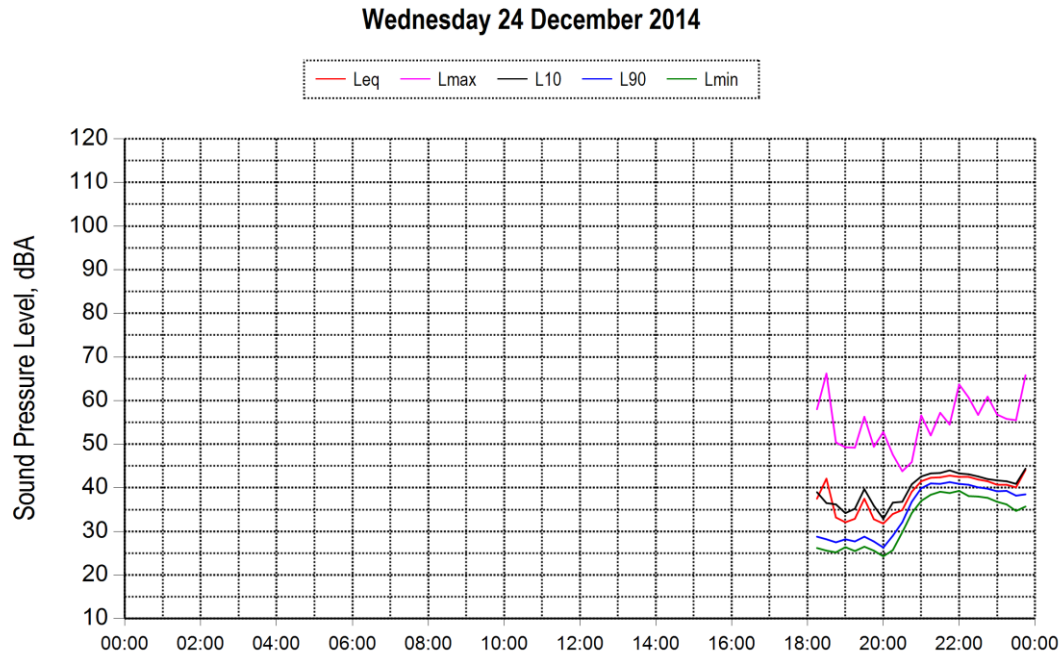


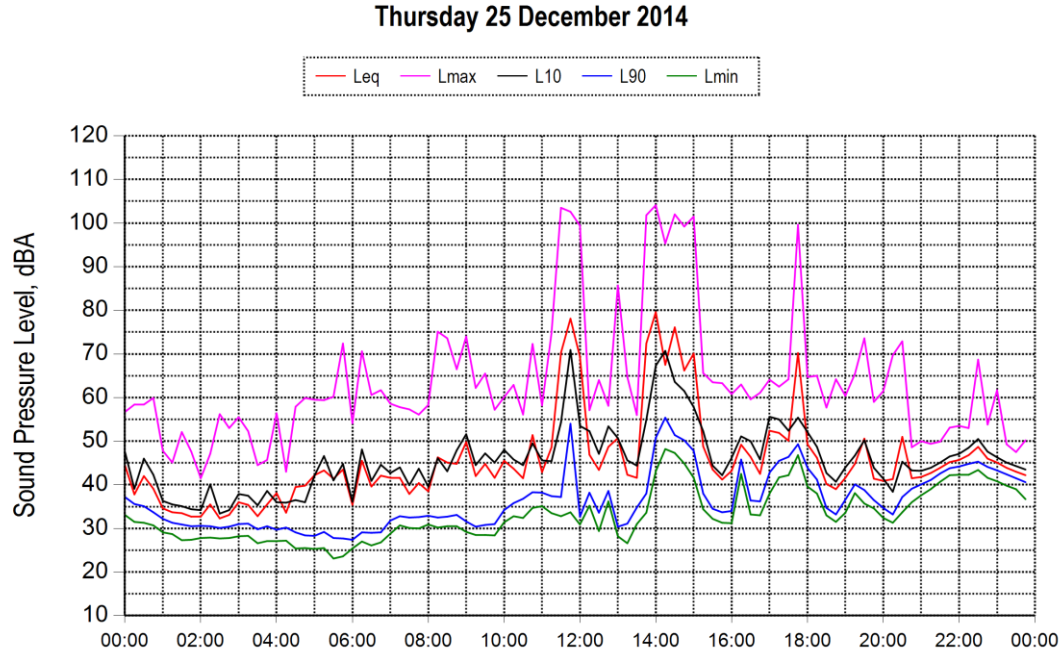


(R9) Western Location

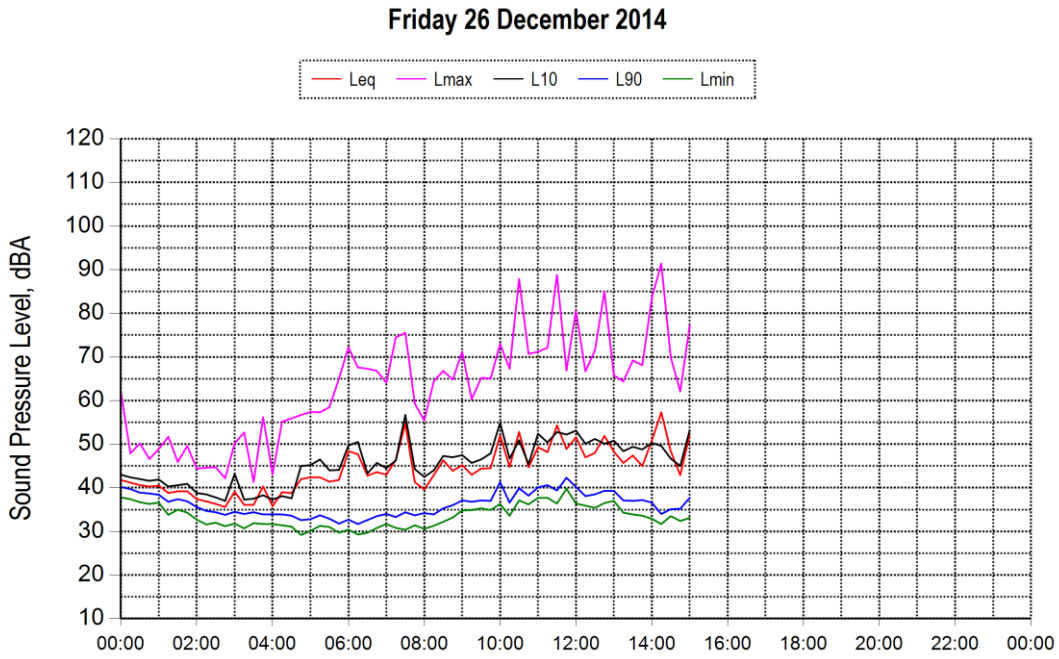


(R3) Northern Location

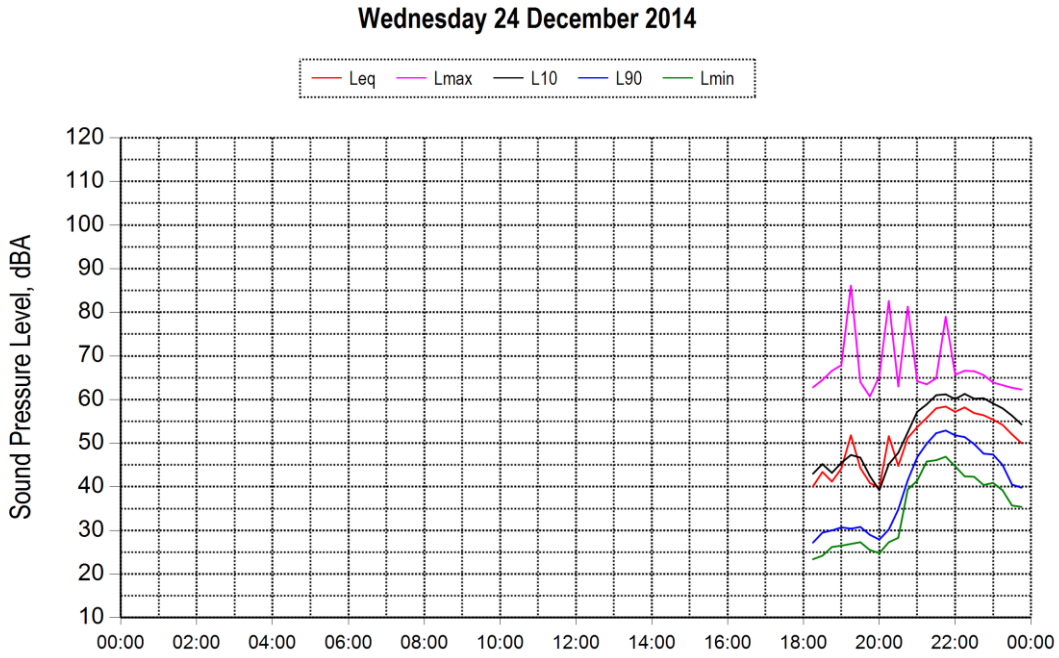


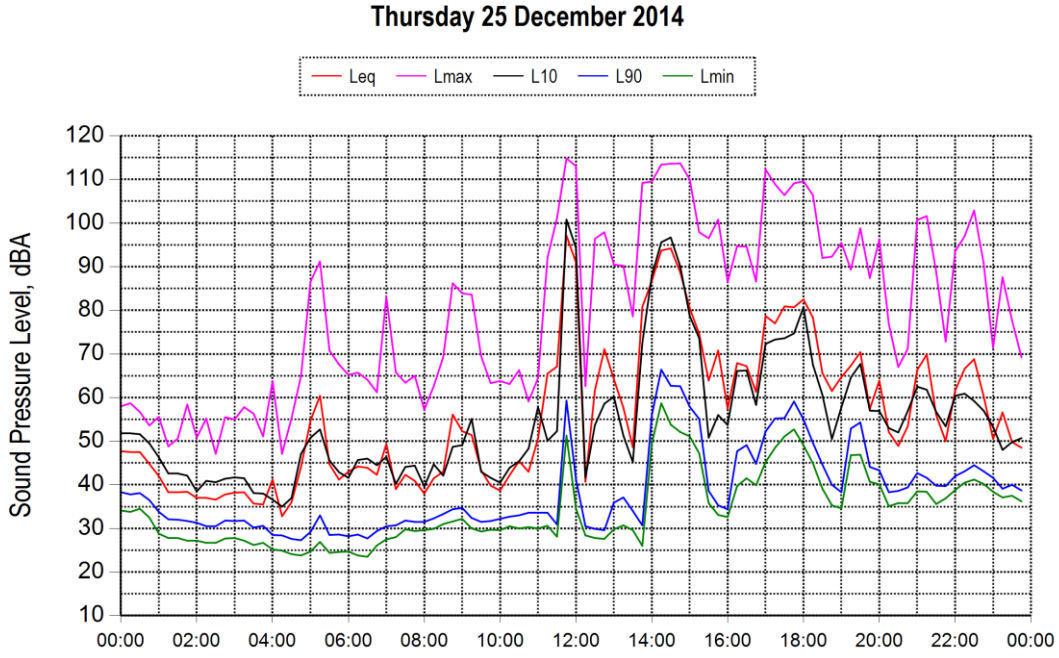


(R3) Northern Location

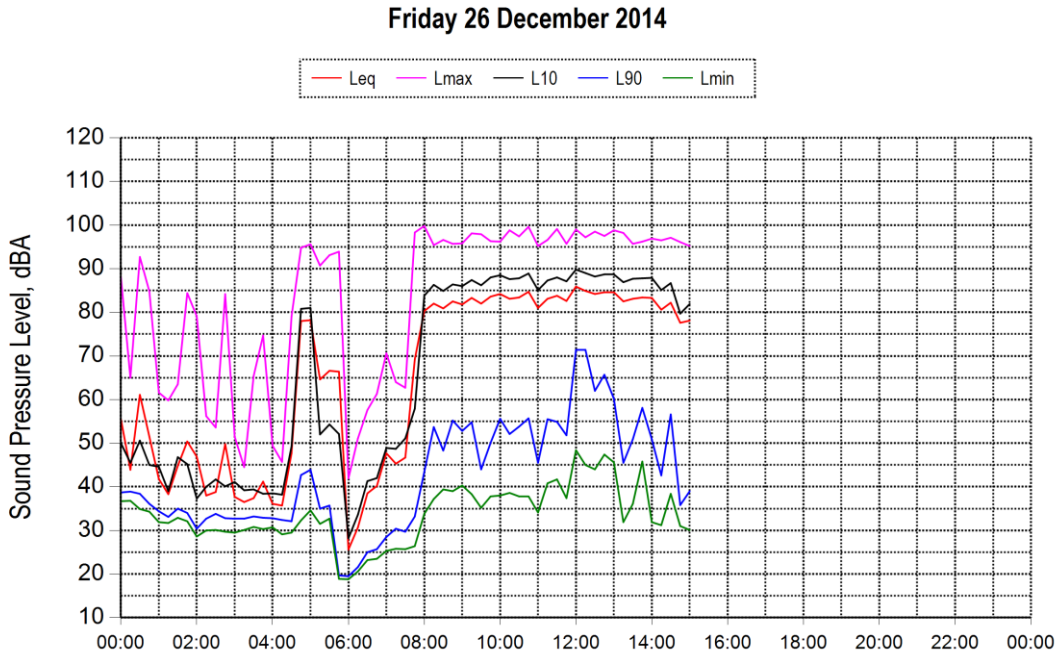


(R14) Eastern Location



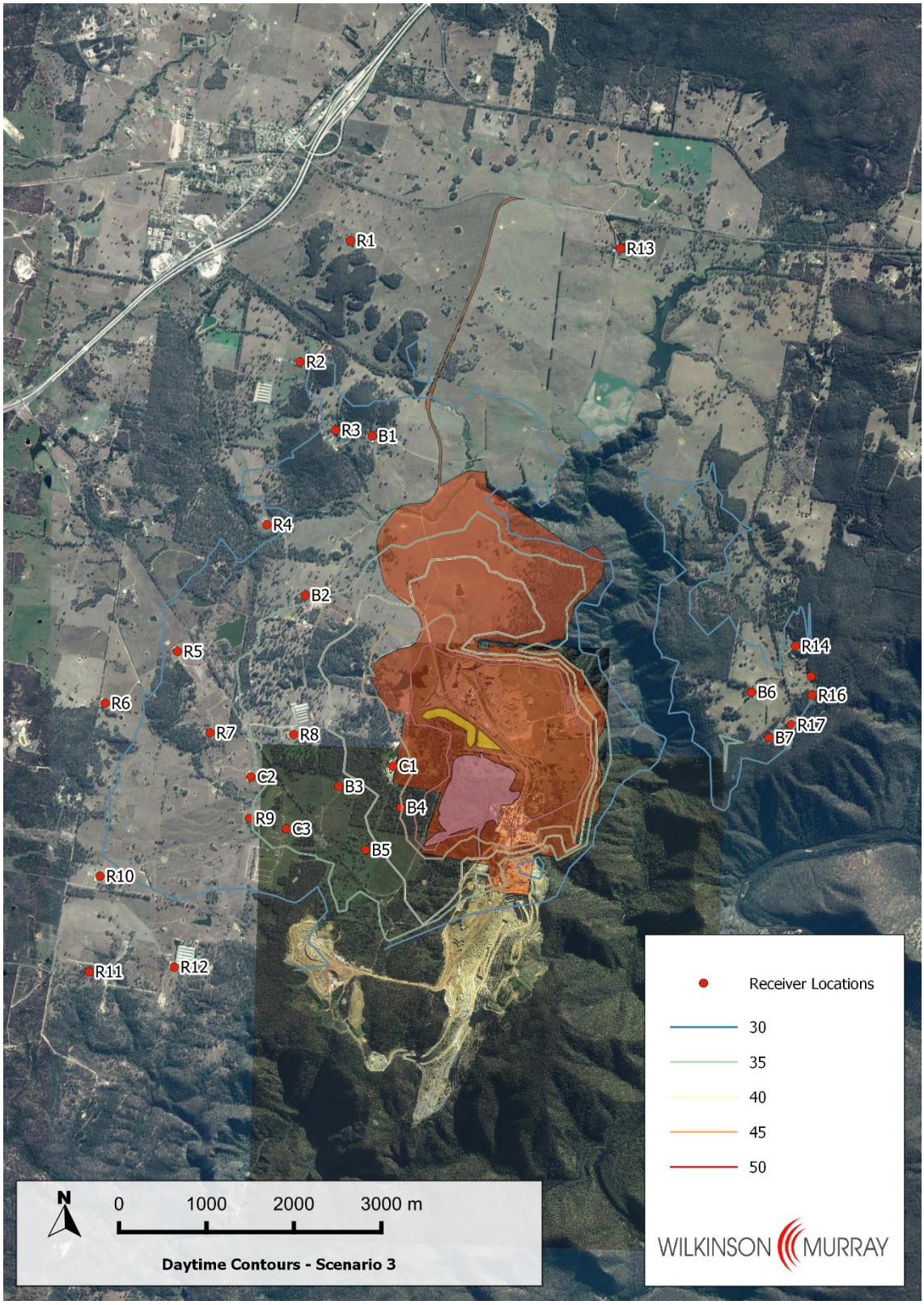


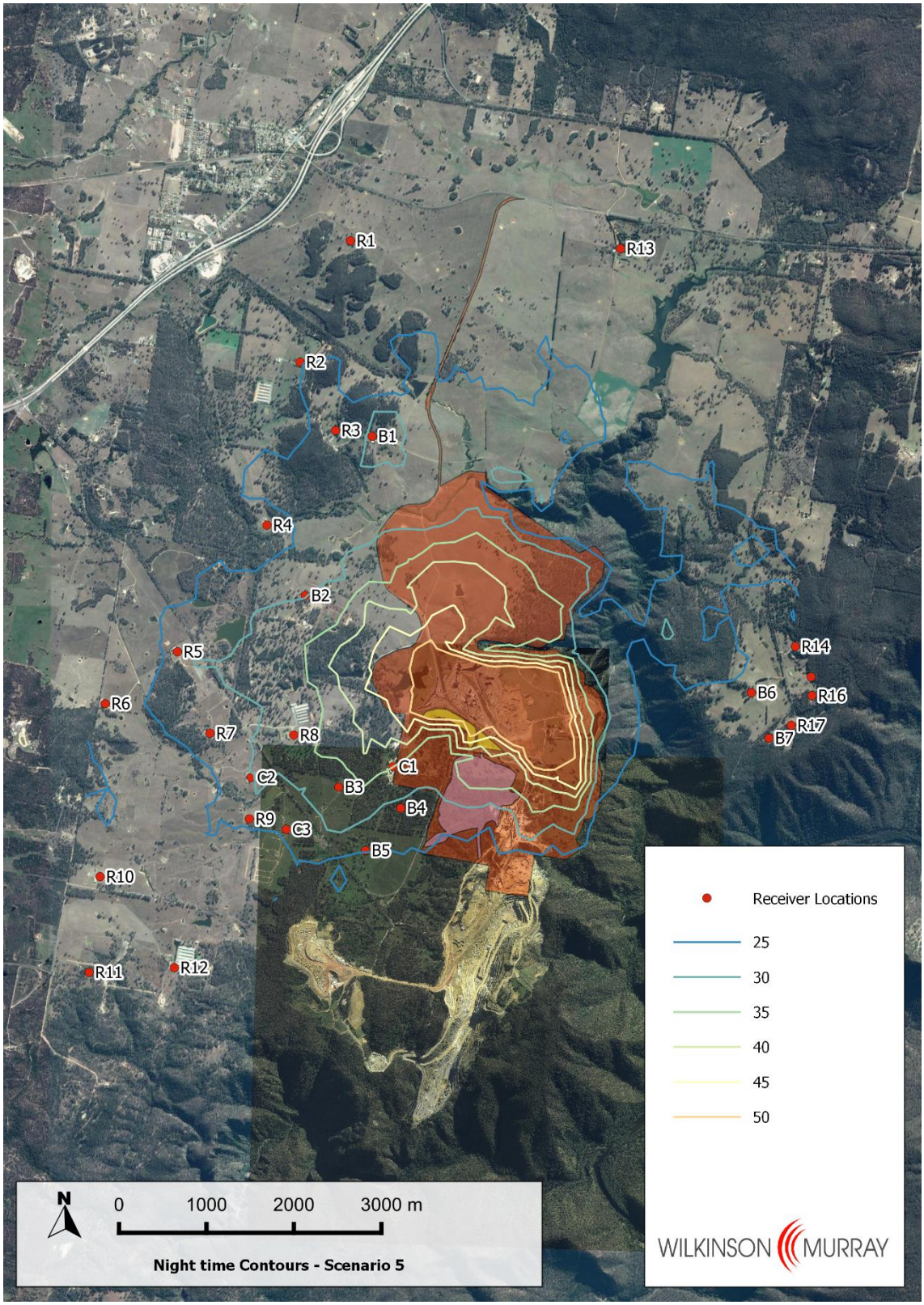
(R14) Eastern Location



APPENDIX B

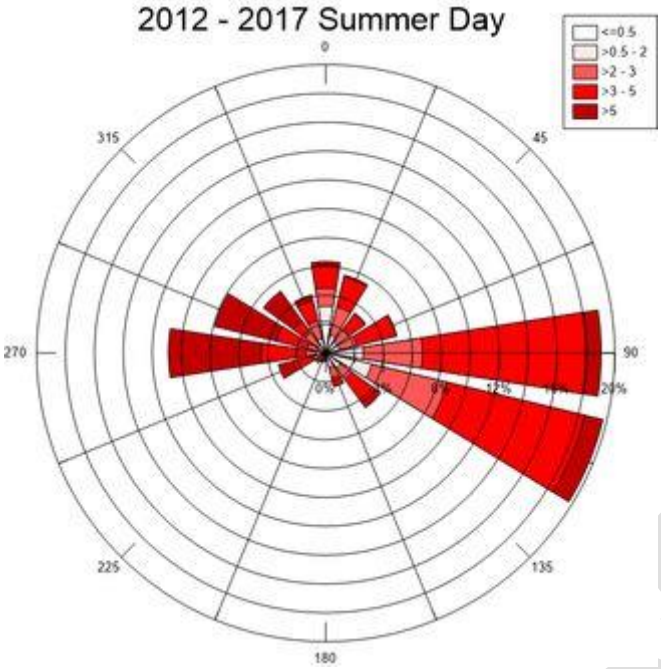
NOISE CONTOURS

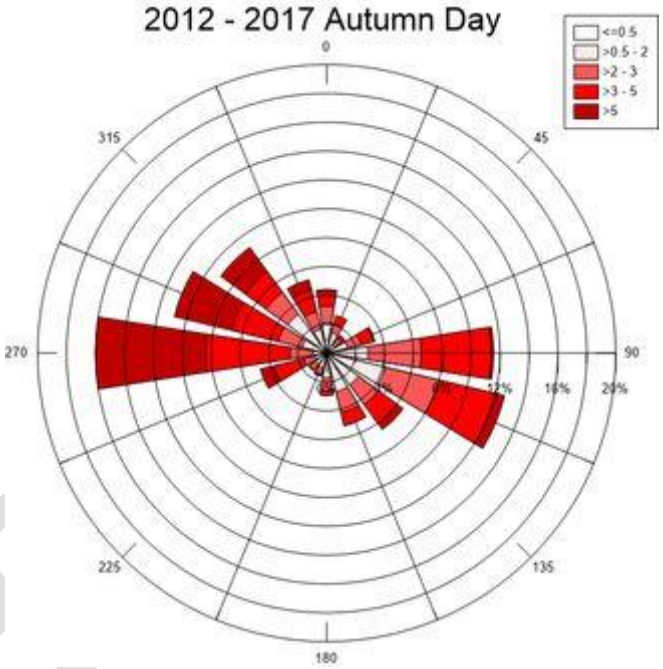

R1
R13
R2
R3
B1
R4
B2
R5
R14
R6
B6
R16
R7
R8
R17
B7
C1
C2
B3
B4
R9
C3
B5
R10
R11
R12
Receiver Locations
30
35
40
45
50
N
0
1000
2000
3000 m
Daytime Contours - Scenario 3
WILKINSON MURRAY


R1
R13
R2
R3
B1
R4
B2
R5
R14
R6
B6
R16
R7
R8
R17
B7
C1
C2
B3
B4
R9
C3
B5
R10
R11
R12
Receiver Locations
25
30
35
40
45
50
N
0
1000
2000
3000 m
Night time Contours - Scenario 5
WILKINSON MURRAY

APPENDIX C

WIND ROSES


2012 - 2017 Summer Day
<=0.5
>0.5 - 2
>2 - 3
>3 - 5
>5
0
45
90
135
180
225
270
315
0%
5%
10%
15%
20%
25%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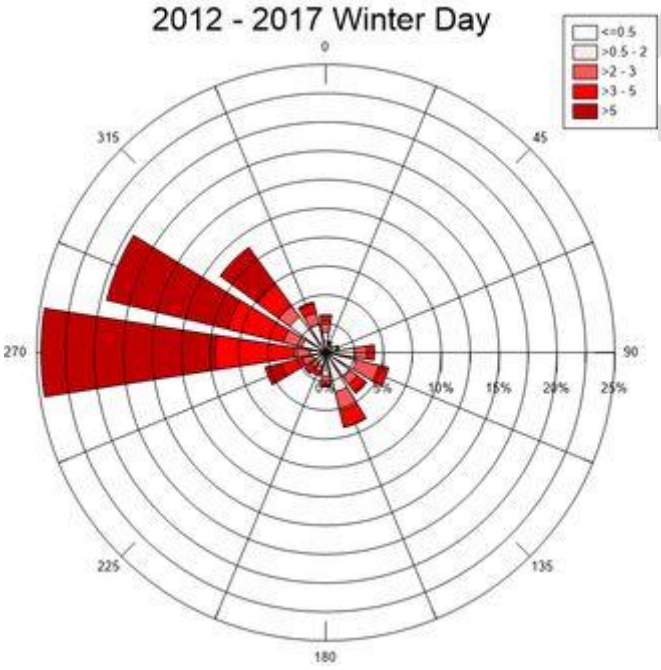
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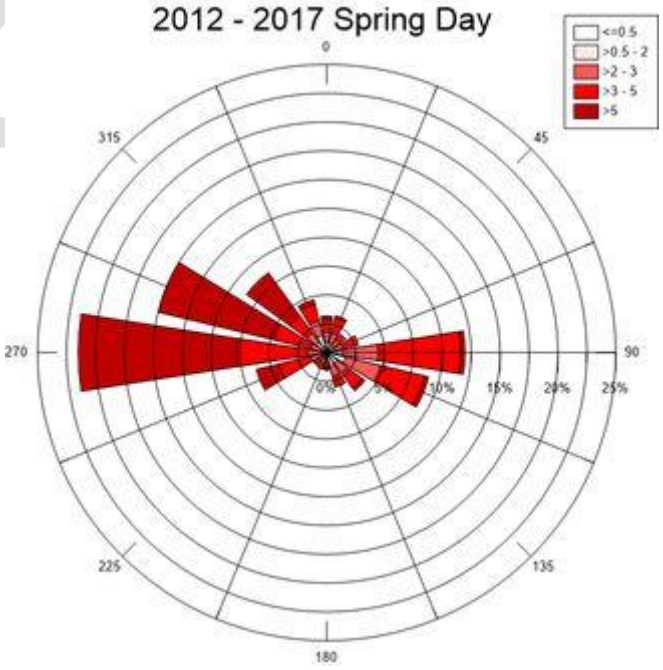
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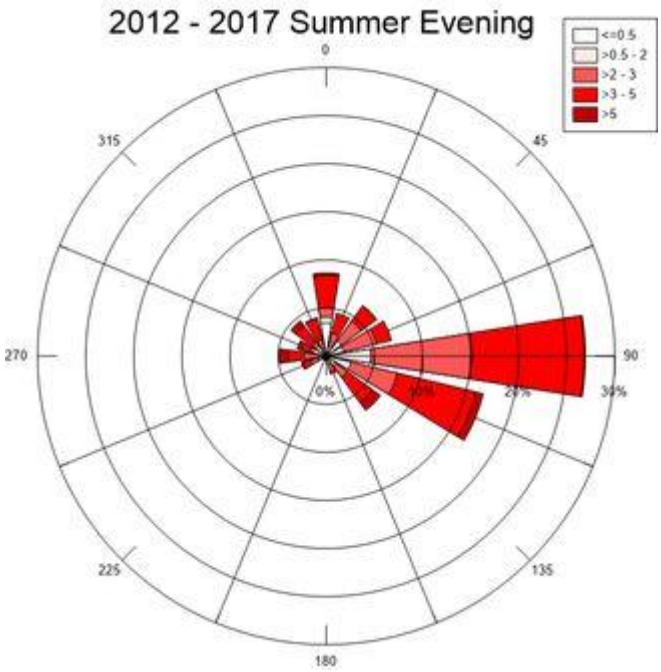
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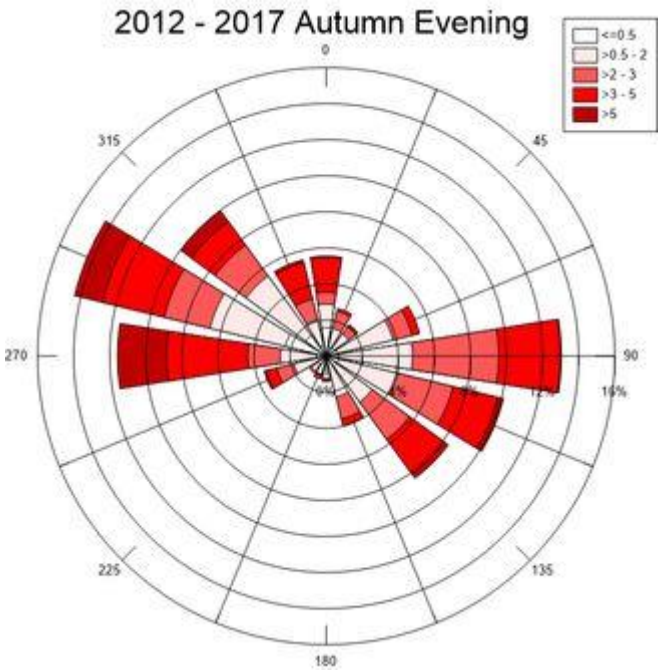
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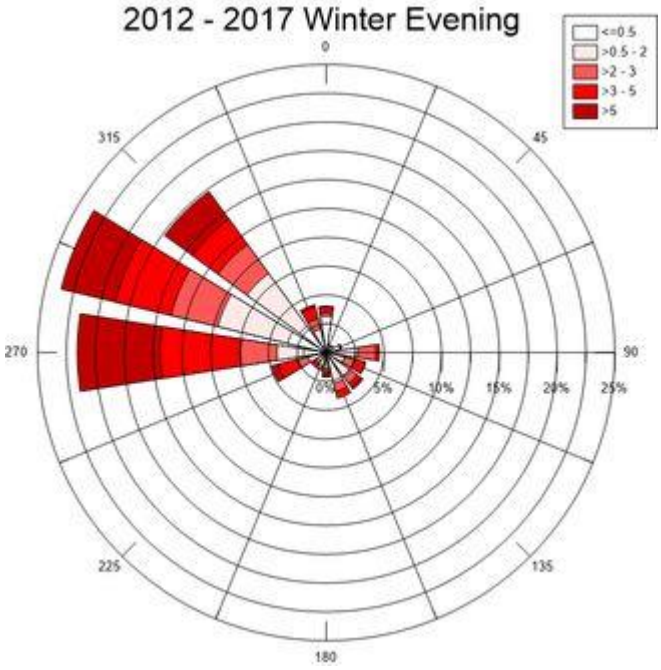
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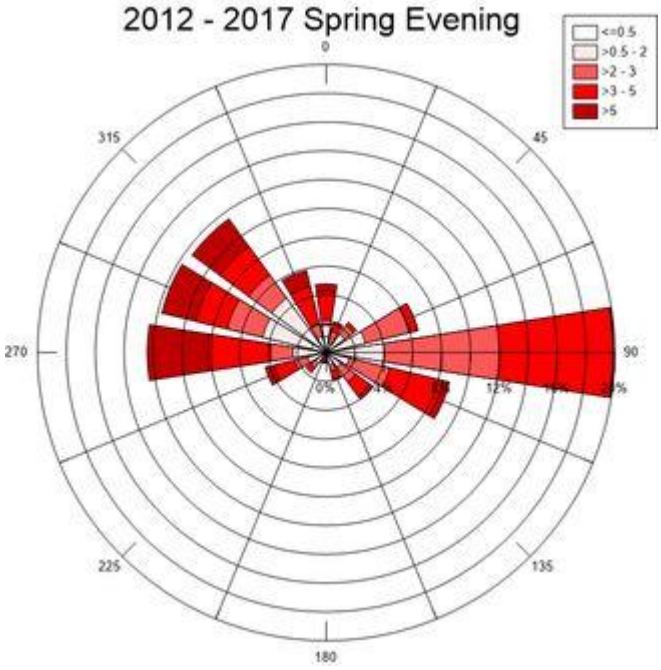
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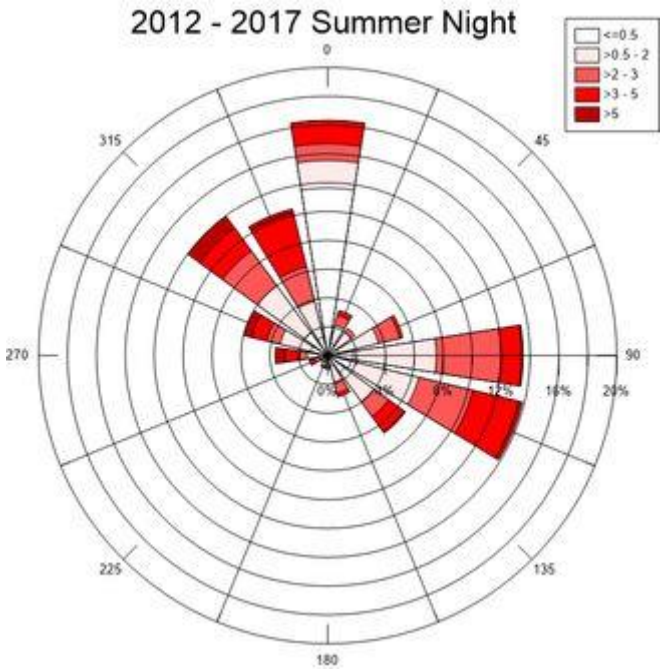
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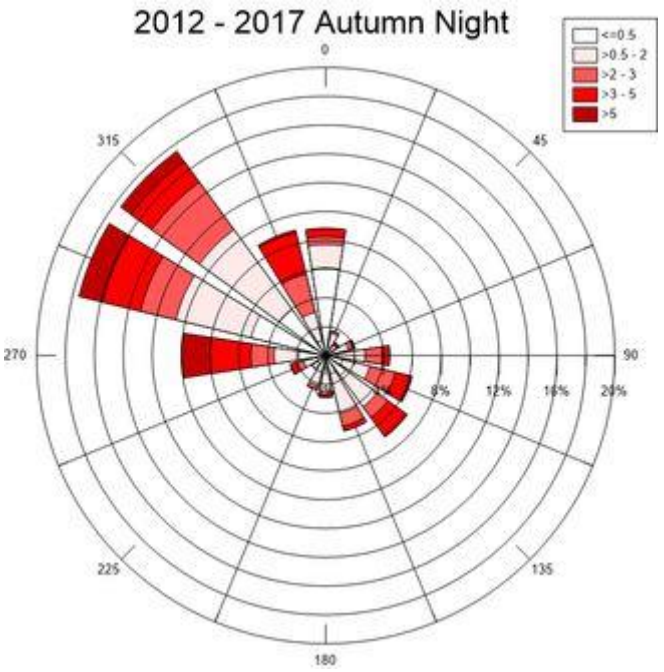
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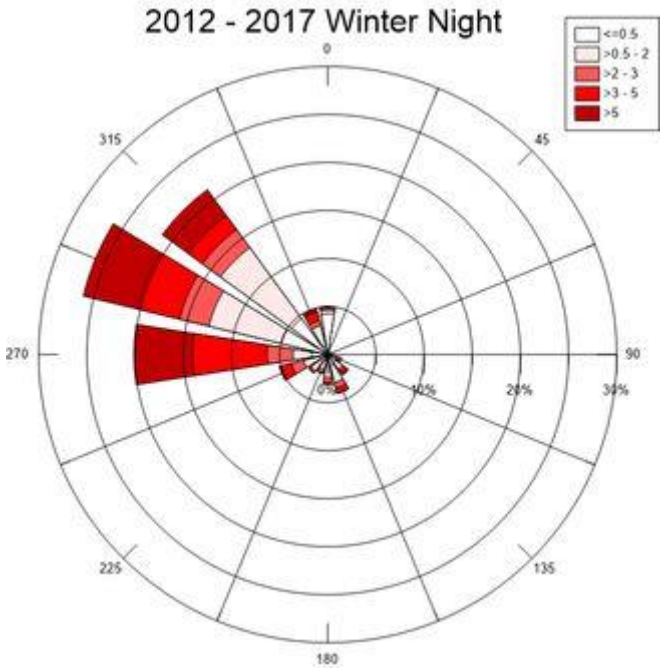
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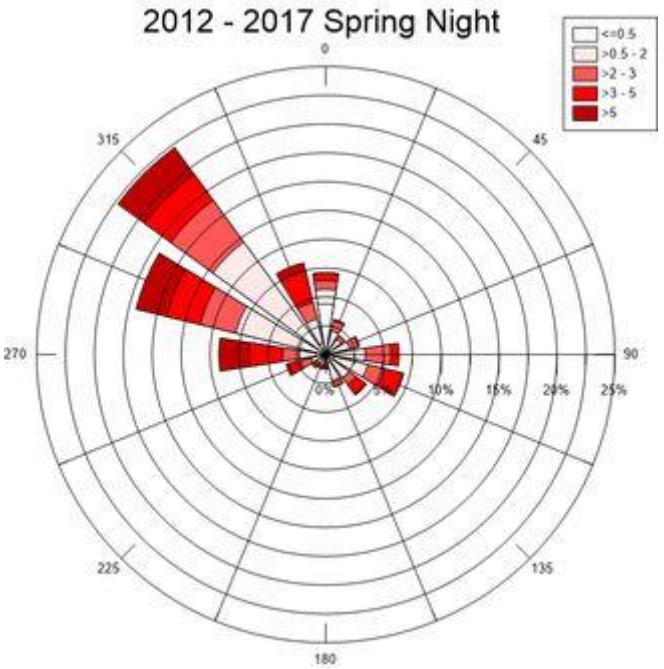
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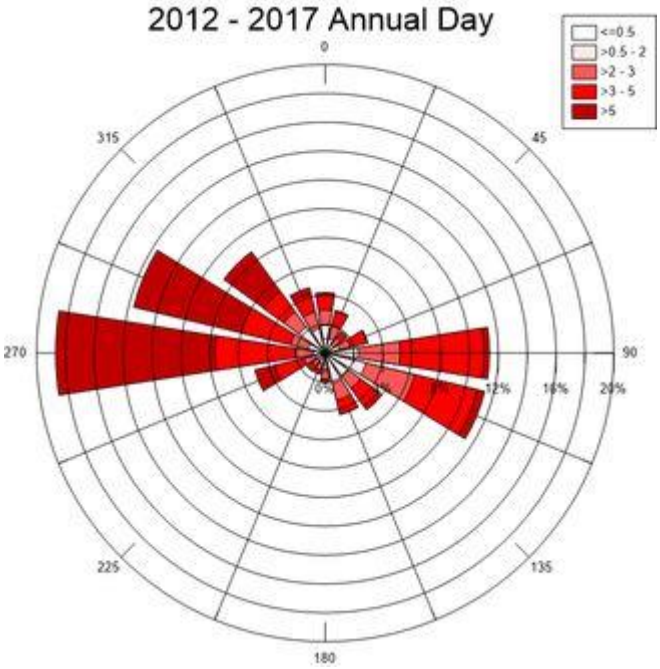
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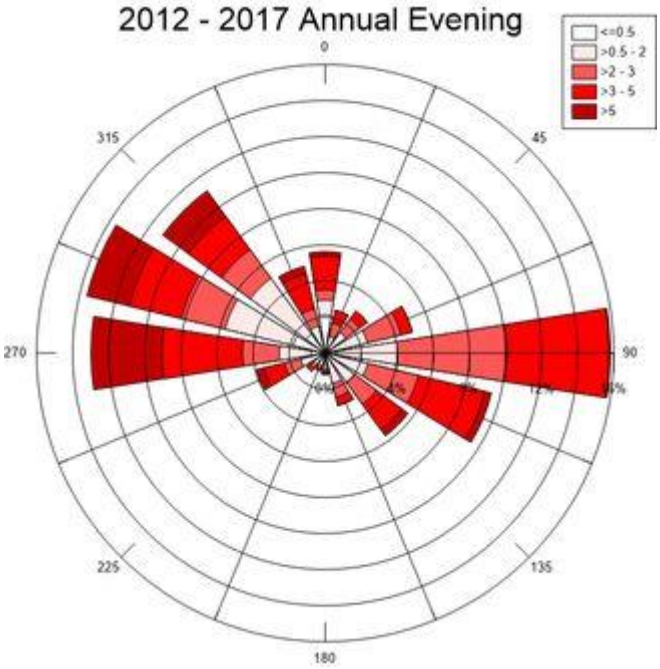
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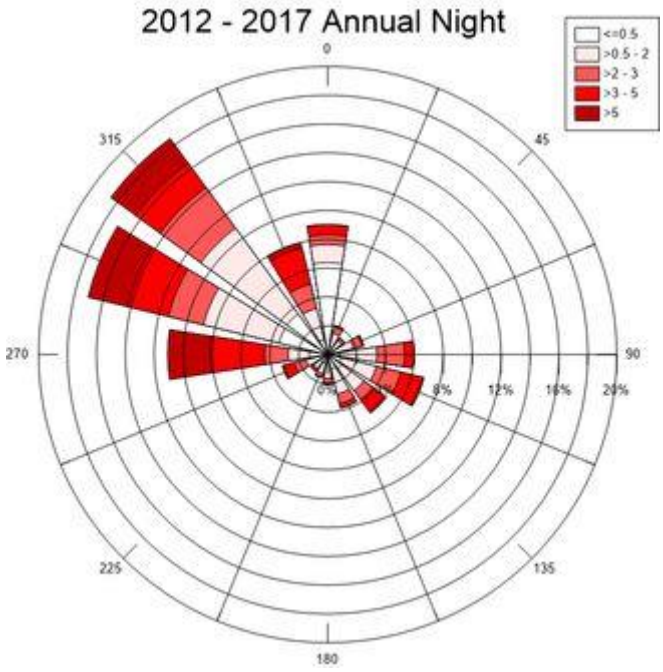
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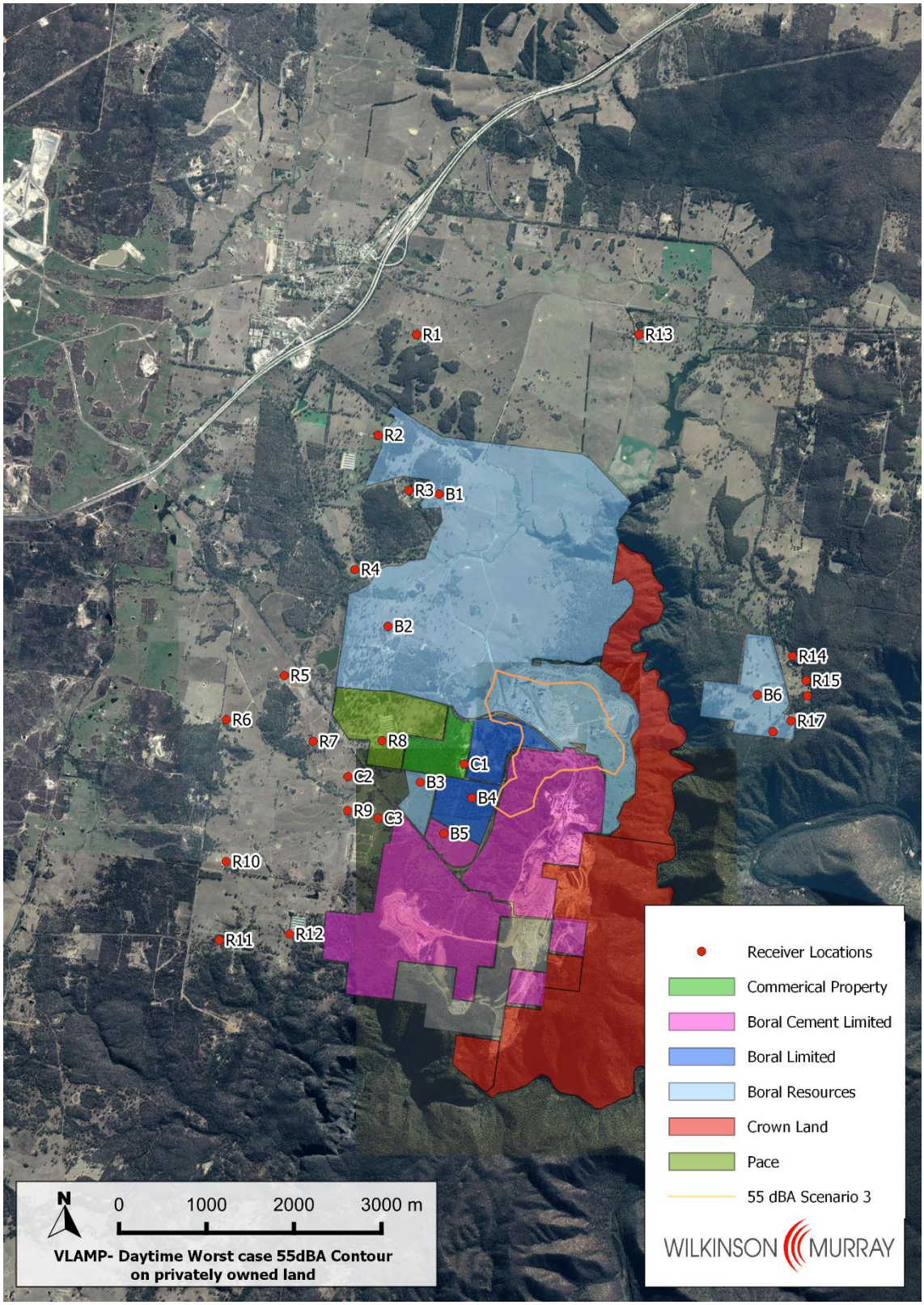
APPENDIX D

VLAMP Assessment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VLAMP- Daytime Worst case 55dBA Contour
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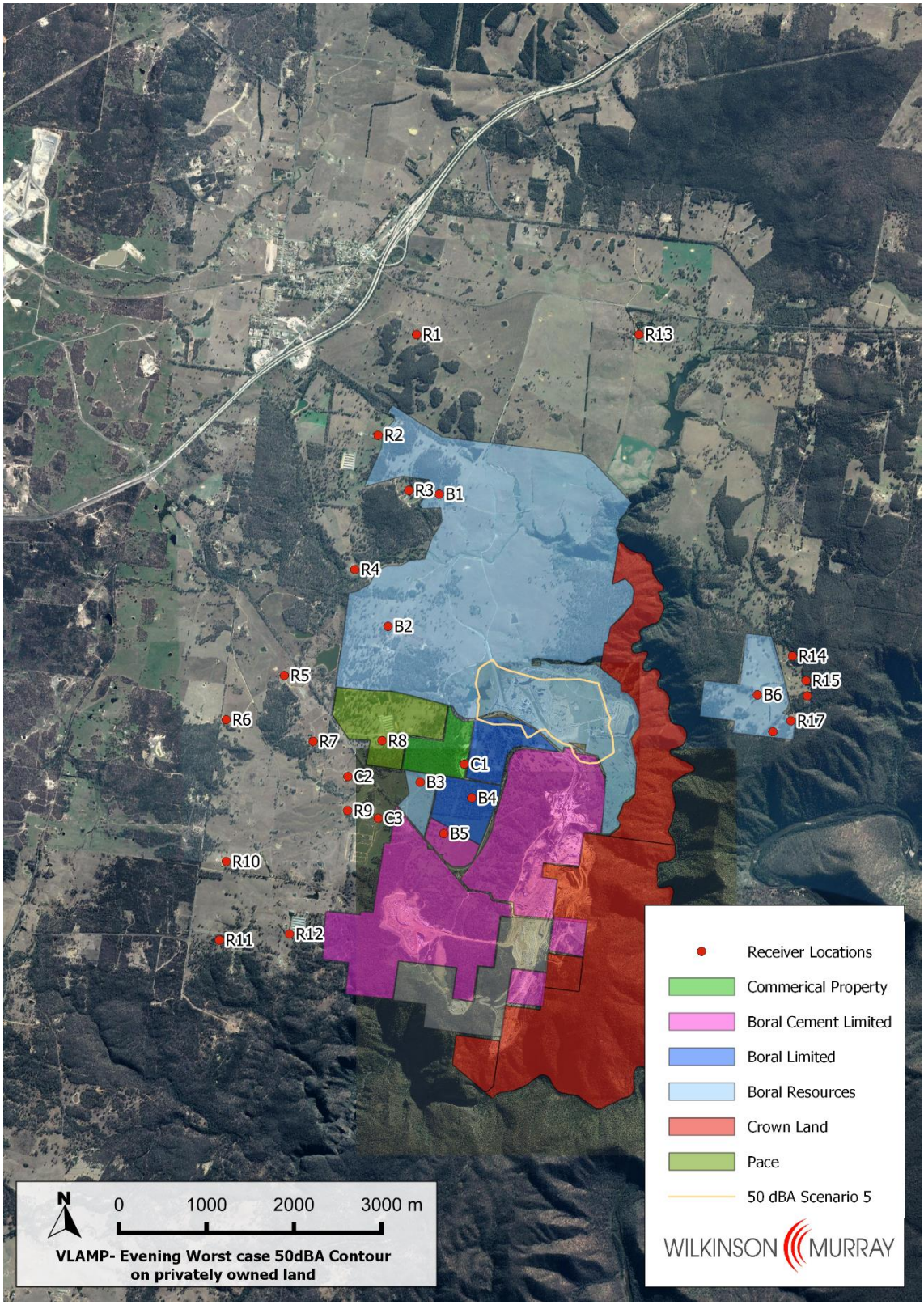
WILKINSON MURRAY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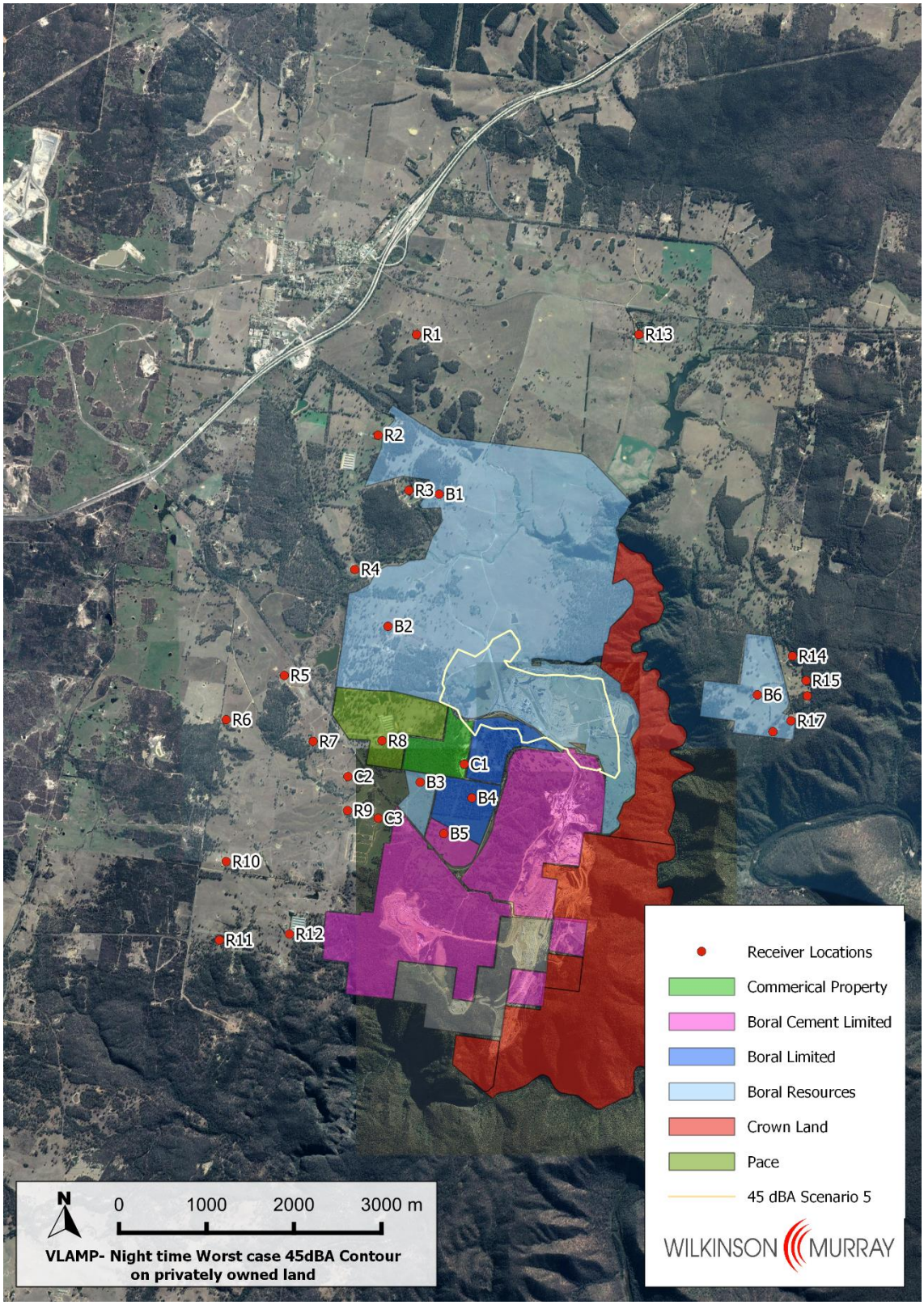
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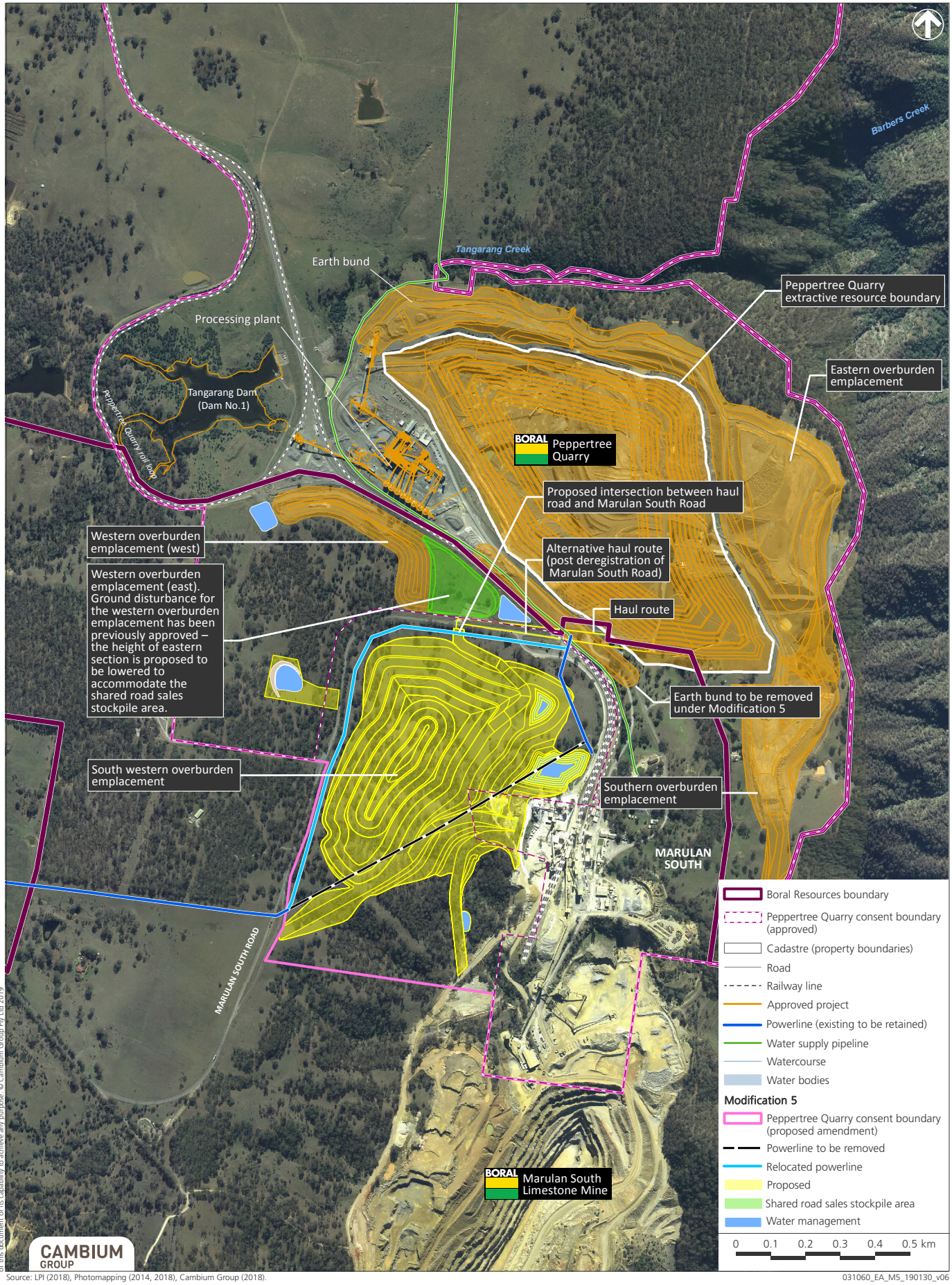
VLAMP- Night time Worst case 45dBA Contour
on privately owned land
Receiver Locations
Commerical Property
Boral Cement Limited
Boral Limited
Boral Resources
Crown Land
Pace
45 dBA Scenario 5
WILKINSON MURRAY

APPENDIX E

REVISED EA FIGURE 7

Figure 7
The Project

PEPPERTREE QUARRY MODIFICATION 5
ENVIRONMENTAL ASSESSMENT



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Source: LPI (2018), Photomapping (2014, 2018), Cambium Group (2018).

031060_EA_M5_190130_v06

APPENDIX F

REVISED TRAFFIC IMPACT ASSESSMENT REPORT

TRAFFIC IMPACT ASSESSMENT

FOR

MODIFICATION 5

FOR

PEPPERTREE QUARRY

MARULAN SOUTH ROAD
MARULAN SOUTH

Ref. 18033r

Updated
25 January 2019

Prepared By

TRANSPORT & URBAN PLANNING PTY LTD
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Road Safety & Project Management Consultants
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CONTENTS

ILLUSTRATIONS

REFERENCES

APPENDICES

1.0 INTRODUCTION

1.1 Overview

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

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

- develop a new overburden area (South-west Overburden Emplacement – SWOE);
- extend the consent boundary to the south to encompass the SWOE;
- construct a new haul road from the pit to the SWOE;
- construct a new intersection at Marulan South Road to link the new haul road with the SWOE;
- amend the design of the Western Overburden Emplacement (WOE);
- remove the Western Earth Bund (which has not been constructed); and
- relocate a powerline which runs through the proposed SWOE site.

This will be Modification 5 to the current Project Approval. The Minister for Planning is the consent authority for the proposed modification.

1.2 Structure of this Report

This report has been prepared to assess the traffic impacts associated with Modification 5 and will inform the preparation of the (EA).

The assessment has been undertaken in accordance with the requirements of Roads and Traffic Authority's now Roads & Maritime Services (RMS) *Guide to Traffic Generating Developments October 2002*.

Other technical standards/publications referenced in this assessment include:

- Austroads Guide to Road Design and RMS supplements.
- Austroads Guide to Traffic Management and RMS supplements.
- Austroads Guide to Traffic Management Part 12. Traffic Impacts of Developments.
- Goulburn Mulwaree Council Development Control Plan (DCP) 2009.
- Goulburn Mulwaree Council's Section 94 Development Contributions Plan 2009 Amendment No. 2.

The remaining sections of this report address the following;

- Section 2 – provides an overview of the existing operations at the Quarry;
- Section 3 – describes the Project;
- Section 4 – evaluates the traffic impacts of Modification 5; and
- Section 5 – presents conclusions.

2.0 SITE AND EXISTING APPROVED PROJECT

2.1 Site Description

The Quarry is at Marulan South in the Goulburn Mulwaree Local Government Area (LGA) and is approximately 175 km south-west of Sydney. Access is via Marulan South Road, which connects the Quarry and Boral's Marulan South Limestone Mine (the Limestone Mine) with the Hume Highway approximately 9 km to the north-west. Boral's private rail line connects the Quarry and Limestone Mine with the Main Southern Railway approximately 6 km to the north.

The Quarry is on approximately 650 ha of Boral owned land, which includes the Quarry (occupying approximately 70 ha), additional granodiorite resources to the south and surrounding land. The site is zoned RU1 –- Primary Production under the Goulburn Mulwaree Local Environmental Plan (LEP) 2009. Mining and extractive industries are permissible in this zone with consent.

There is an extensive ground water, surface water and air quality monitoring network around the Quarry and Limestone Mine.

2.2 Approved project

The current operations of the Quarry are approved under Project Approval PA06_0074 as modified.

Quarry Activities and Infrastructure
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 use as a construction and building material. The hard rock aggregates produced at the site are a range of different shapes and sizes for different purposes. Primary production is of concrete and asphalt aggregates (10 mm) and railway ballast (28-50 mm) with capacity to produce larger aggregates (>100 mm) for rock armour and gabion baskets. Fines (generally <5 mm) produced during crushing of product are blended with limestone sand from the Limestone Mine to produce a marketable manufactured sand.

Infrastructure at the Quarry includes a processing plant, rail loop and loading facilities, two water storage dams, an in-pit mobile crushing plant, overburden emplacement areas, noise and visual bunding, product stockpiles, and staff facilities.

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.

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 DP&E.

Operating hours and workforce
The Quarry operates 24 hours, 7 days a week with in-pit activities restricted to the hours of 5 am to 11 pm. Approved operating hours are outlined in detail in **Table 1**.

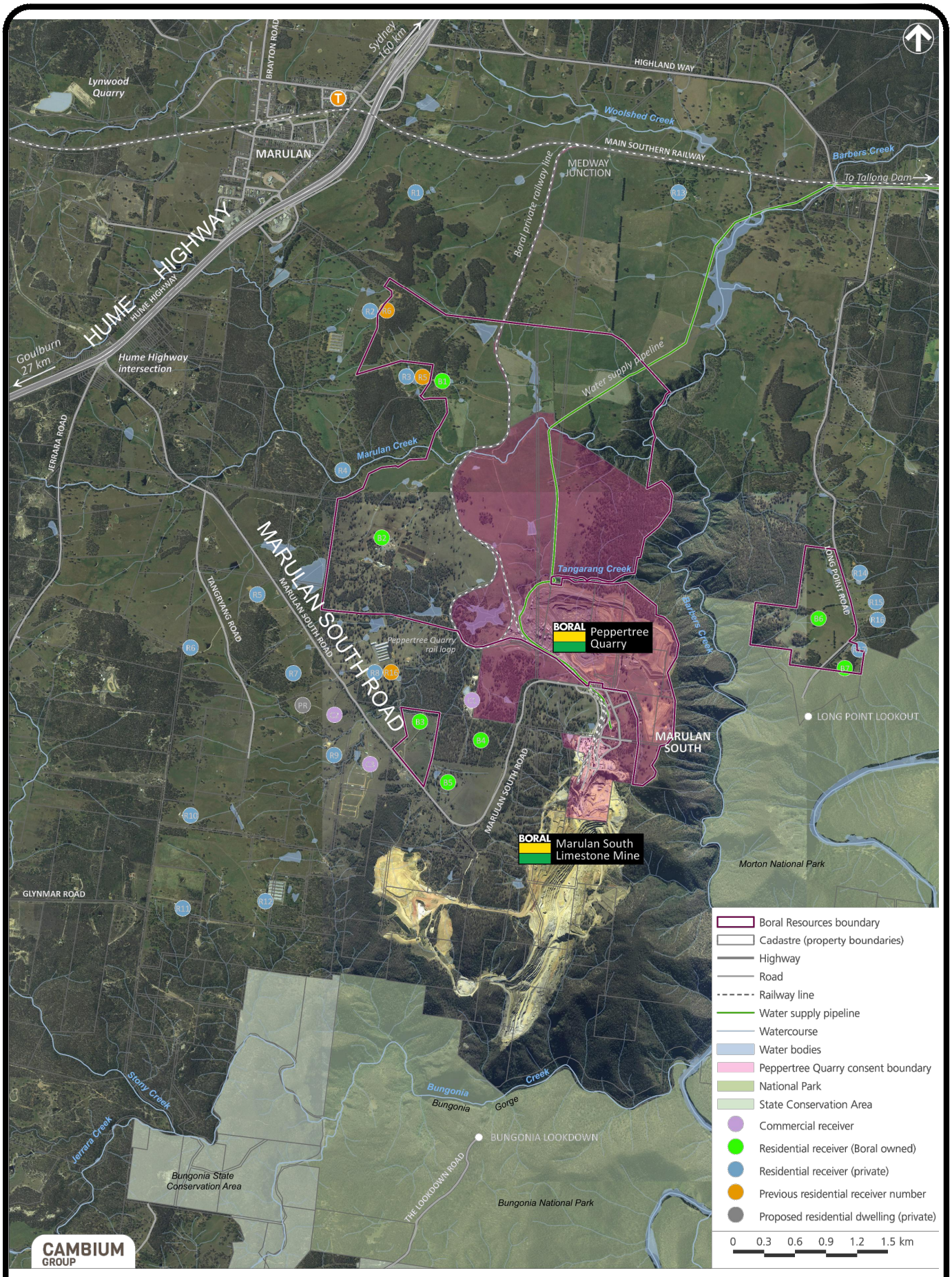

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FIGURE 1

PEPPERTREE QUARRY
MODIFICATION 5

SITE LOCATION

JOB NO.18033

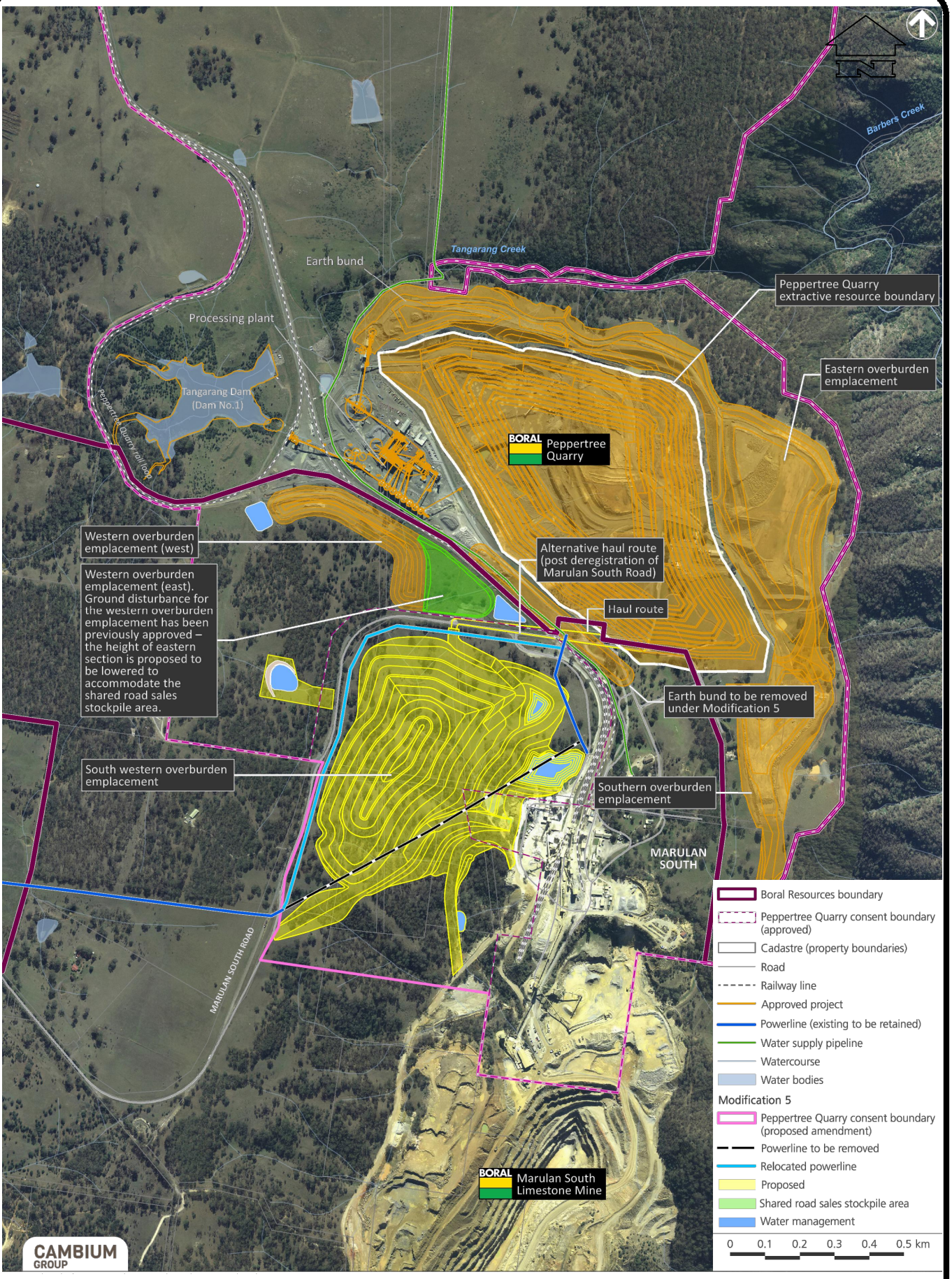

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FIGURE 2

PEPPERTREE QUARRY
MODIFICATION 5

THE PROJECT

JOB NO.18033

Table 1: Approved operating hours

Activity	Day	Time
Construction works	Monday to Friday Saturday Sunday and public holidays	7.00 am to 6.00 pm 8.00 am to 1.00 pm None
Topsoil/overburden removal/emplacement	Any day	7.00 am to 7.00 pm
Blasting	Monday to Saturday Sunday and public holidays	9.00 am to 5.00 pm None
In-pit activities (including drilling, extraction, processing, and transfer of material out of the pit)	Any day	5.00 am to 11.00 pm
Out-of-pit activities (including processing, stockpiling, train loading and distribution, and maintenance)	Any day	24 hours

The Quarry employs 30 full time persons distributed over 2-3 shifts.

3.0 PROPOSED MODIFICATIONS

The proposed SWOE will be south of the WOE, south of Marulan South Road and in the north-western corner of the Limestone Mine. This new overburden emplacement area will be needed in late 2018 and will take approximately four years to establish. The emplacement will cover approximately 44 ha and will be RL650 at completion.

A new haul road is proposed to be constructed from the southern extent of the pit to the SWOE. A new intersection is proposed to allow haul trucks to cross Marulan South Road from the new haul road to the SWOE. Alternatively, the haul road will be along an upgraded length of Marulan South Road from the southern extent of the pit to the proposed intersection, if Boral takes ownership of this section of road from council.

The powerline, which supplies electricity to the Limestone Mine, passes through the area where the SWOE is proposed to be constructed. Therefore, Boral proposes to relocate the powerline along the eastern and southern side of Marulan South Road (and adjacent to the western and northern sides of the SWOE) to the intersection with Cooper Crescent, then divert south into the Limestone Mine's infrastructure area.

The powerline will be approximately 1,300 m long and will require an approximately 20 m wide easement along its length.

Part of the WOE is planned for a future shared road sales stockpile area for the Quarry and Limestone Mine, and will be a component of the Limestone Mine's State significant development application. The proposed amendment to the WOE would involve replacing the 30 m high triangular section of the emplacement with approximately 2 m of emplaced overburden material, which once completed would serve as a foundation for the shared road sales stockpile area.

Two sediment dams will be constructed either end of the WOE to catch and treat dirty water until the batters are rehabilitated. sediment dam P2 will also catch clean water from upslope of the WOE. Sediment dam P1 will be approximately 2.1 ML in volume and sediment dam P2 will be approximately 5.8 ML in volume.

The approved Western Earth Bund is a 10 m high bund located to the north of the railway line, south of the Quarry's entrance driveway and extending along the south-western edge of the Quarry pit. This has not been constructed yet, and it is proposed to abandon this component of the project.

The only ground disturbance associated with the modification will be for the SWOE, sediment dams P1 and P2, powerline relocation and new haul road.

4.0 ASSESSMENT OF TRAFFIC IMPACTS

4.1 Existing Traffic Generation

Both Peppertree Quarry and the Limestone Mine use Marulan South Road as the main vehicle access road to the Hume Highway. The total traffic generation for external trips generated by Peppertree Quarry and the Limestone Mine that use Marulan South Road to travel towards the Hume Highway is a total of 538 vehicles on an average weekday including 190 heavy vehicles (Austroads Class 3-12). These are total two way trips.

This represents 269 inbound and 269 outbound trips per weekday of which 95 inbound and 95 outbound trips are heavy vehicles (Austroads Class 3-12).

Peppertree Quarry accounts for up to 70 two way light vehicle trips (35 in/35 out) associated with employees and visitors and up to 40 heavy vehicle trips on a weekday (20 in/20 out).

The heavy vehicle trips include general deliveries to the quarry, fuel deliveries, contractor maintenance vehicles and equipment deliveries.

The above heavy vehicle numbers do not include internal trips between the Limestone Mine and Peppertree Quarry which use an internal haul road, east of the rail level crossing and or deliveries of scalp material, which is an infrequent occurrence.

Boral currently uses the exception provisions of the current consent for Peppertree Quarry to provide scalp material;

- to local residents in Marulan South Road, which can be up to 1,000 tonnes.

- For local community projects; and
- To employees/staff who collect material for their own use. This is limited to 12 deliveries per calendar year, which are not always used.

Boral considers the current arrangement of using the exception provision is efficient and works well and does not seek to change this.

Modification 5 will not change the traffic generation of Peppertree Quarry for those vehicle trips travelling to and from the external road network (i.e. towards Hume Highway) and seeks no changes to the existing arrangement for the scalp material.

4.2 Background

Boral are negotiating with Goulburn Mulwaree Council regarding the purchase and deregistration of the section of Marulan South Road between the Peppertree Quarry/Limestone Mine and the Aglime Fertiliser facility's access road to the west.

As outlined in Section 4.2, Boral is proposing a new intersection along this section of Marulan South Road. The assessment of the new intersection assumes that the section of Marulan South Road to the east of the Aglime facility's driveway, is still a public road when Modification 5 is approved.

4.3 Proposed New Intersection of Marulan South Road at New Haul Road Crossing

Figure 3 shows the proposed intersection layout for the intersection of the new Haul Road and the SWOE access road with Marulan South Road.

This will be a new cross junction intersection on Marulan South Road located some 310 metres west of the rail level crossing near the entrance to the Limestone Mine and 175 metres west of the truck access road to the Limestone Mine.

The intersection will be located at/near the change of the speed limit between 60km/h and 80km/h. If this section of Marulan South Road is to remain a public road, then it is recommended that the 60km/h speed limit that applies in the old Marulan South village, be extended 200 metres to the west, so that the new intersection is located in the 60km/h speed limit area.

The intersection will be designed with suitable geometry including wider road pavement on Marulan South Road to cater for the wider trucks that will transport the overburden from Peppertree Quarry to the SWOE.

Trucks hauling overburden from the Peppertree Quarry pit to the SWOE, will travel along one of two routes:

(i) Along Marulan South Road to and from the east with the overburden trucks turning left into the SWOE access road and right out of the SWOE access road.

(ii) From the new Haul Road into the SWOE access road and vice versa as a cross movement across Marulan South Road.

Two options are proposed for the intersection design based on the haul route from Peppertree Quarry to the SWOE.

4.4 Traffic Impacts of New Haul Road Intersection at Marulan South Road

The traffic volumes using the intersection will consist of:

(i) The existing traffic generated by the Limestone Mine and Peppertree Quarry travelling between the sites and the Hume Highway;

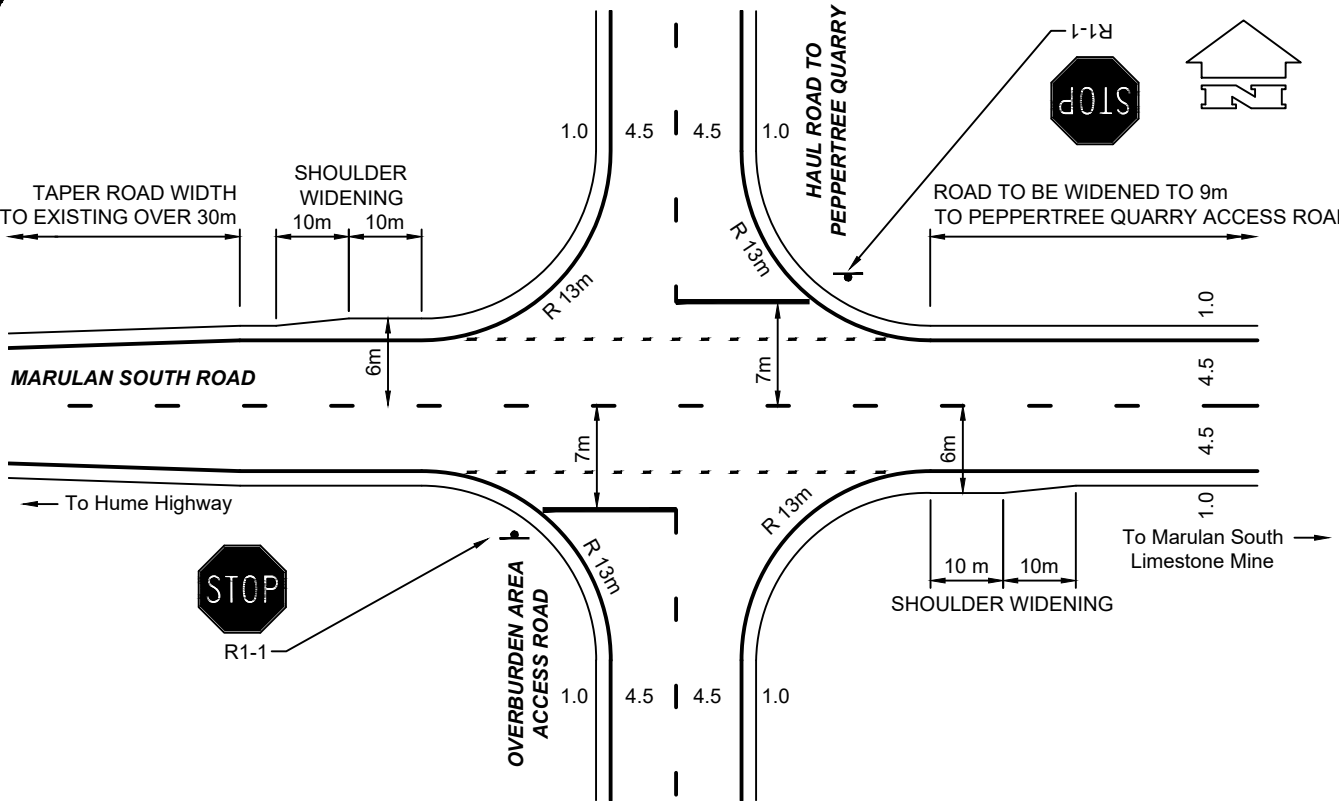
(ii) Boral's internal heavy vehicle movements generated by overburden removal from the Peppertree Quarry pit and emplacement at the proposed SWOE; and

(iii) Traffic associated with the Limestone Mine's forthcoming development application including the future shared road sales stockpile area.

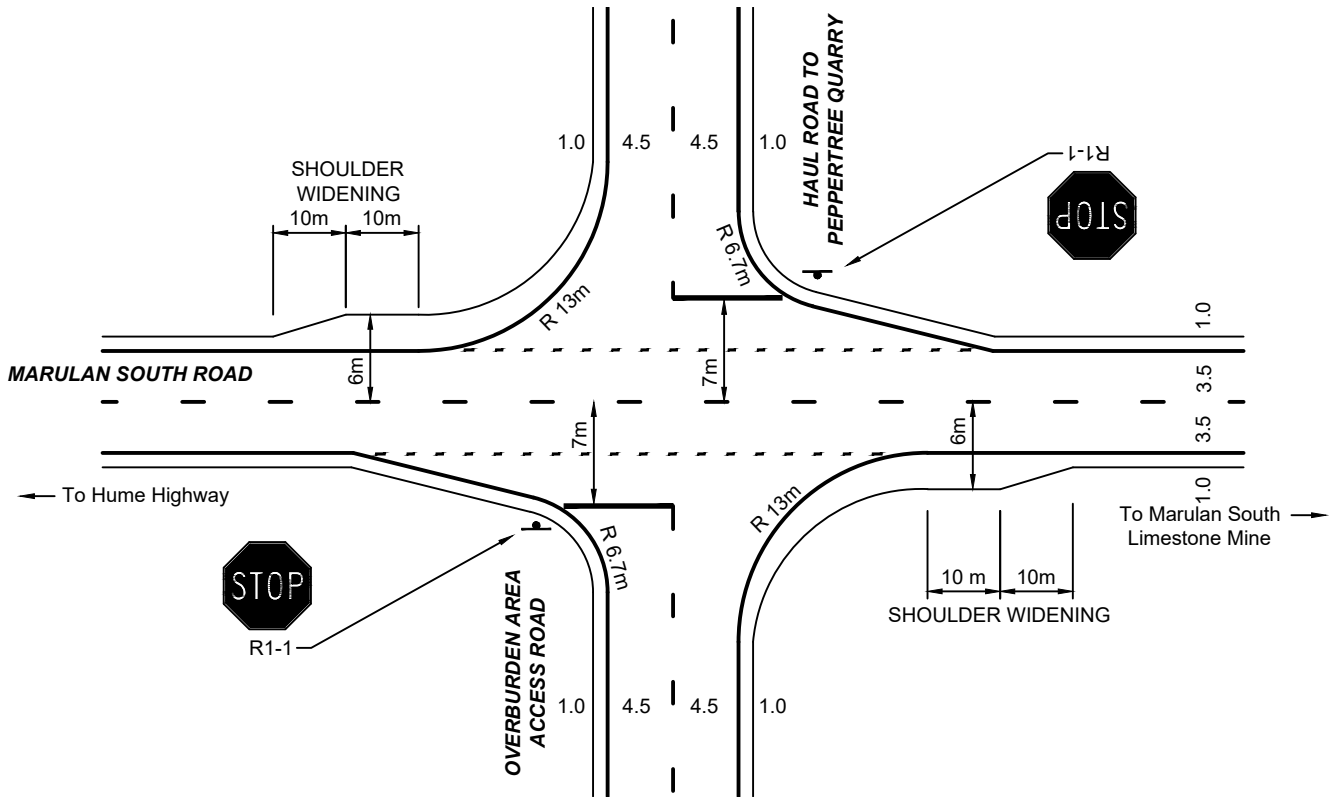
Peppertree Quarry's development approval allows for topsoil/overburden removal and emplacement, 7 days a week between 7am-7pm (i.e. 12 hours a day). A total of 28 haul trucks per hour will be generated by the transport of the overburden material to the SWOE. (i.e. 28 truck movements in each direction).

Figure 4 shows the estimated traffic generated by the above truck movements for the following two scenarios.

1. The overburden trucks travelling along Marulan South Road to and from Peppertree Quarry to the east; and



SCENARIO 1
MARULAN SOUTH ROAD WIDENED TO 9m
FROM INTERSECTION TO PEPPERTREE QUARRY ACCESS ROAD



SCENARIO 2
MARULAN SOUTH ROAD TO REMAIN 7m WIDE

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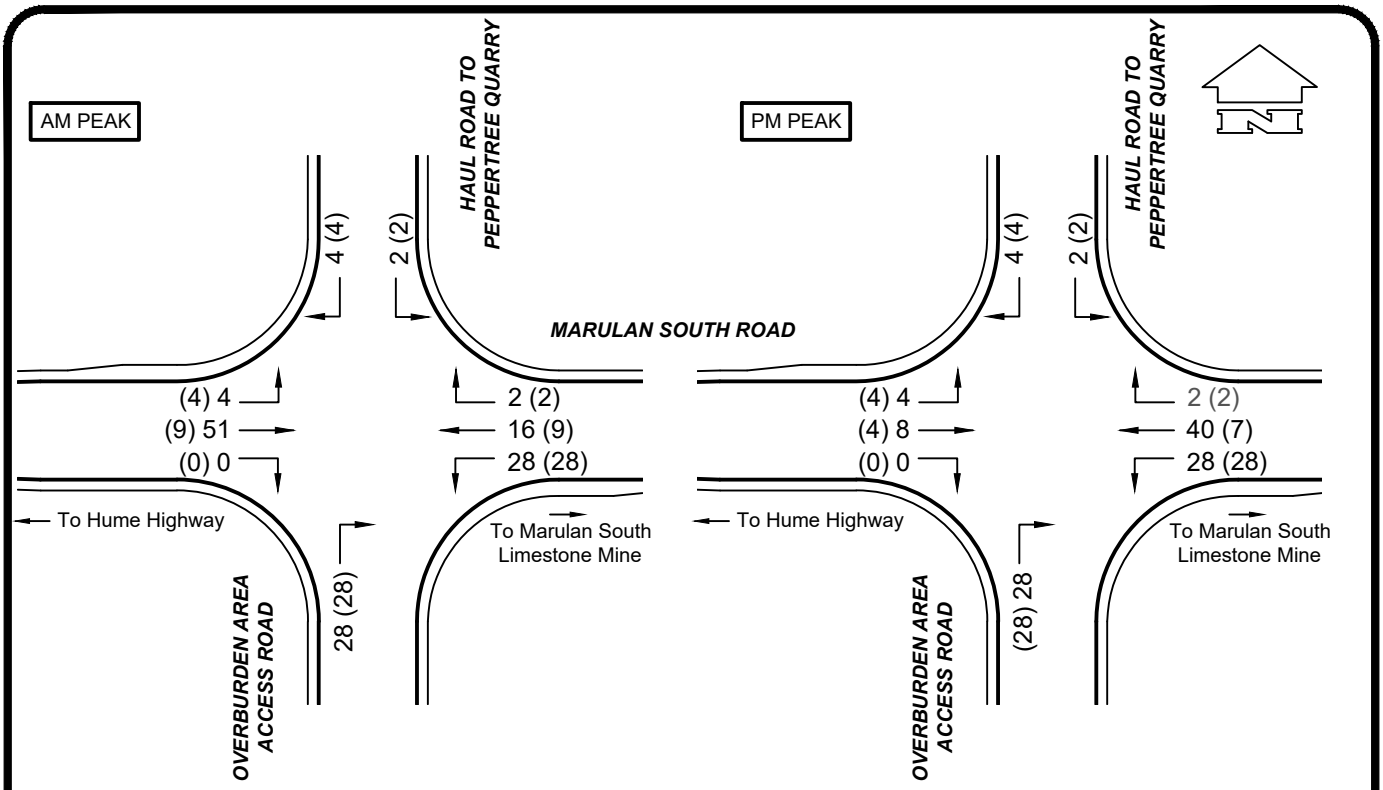
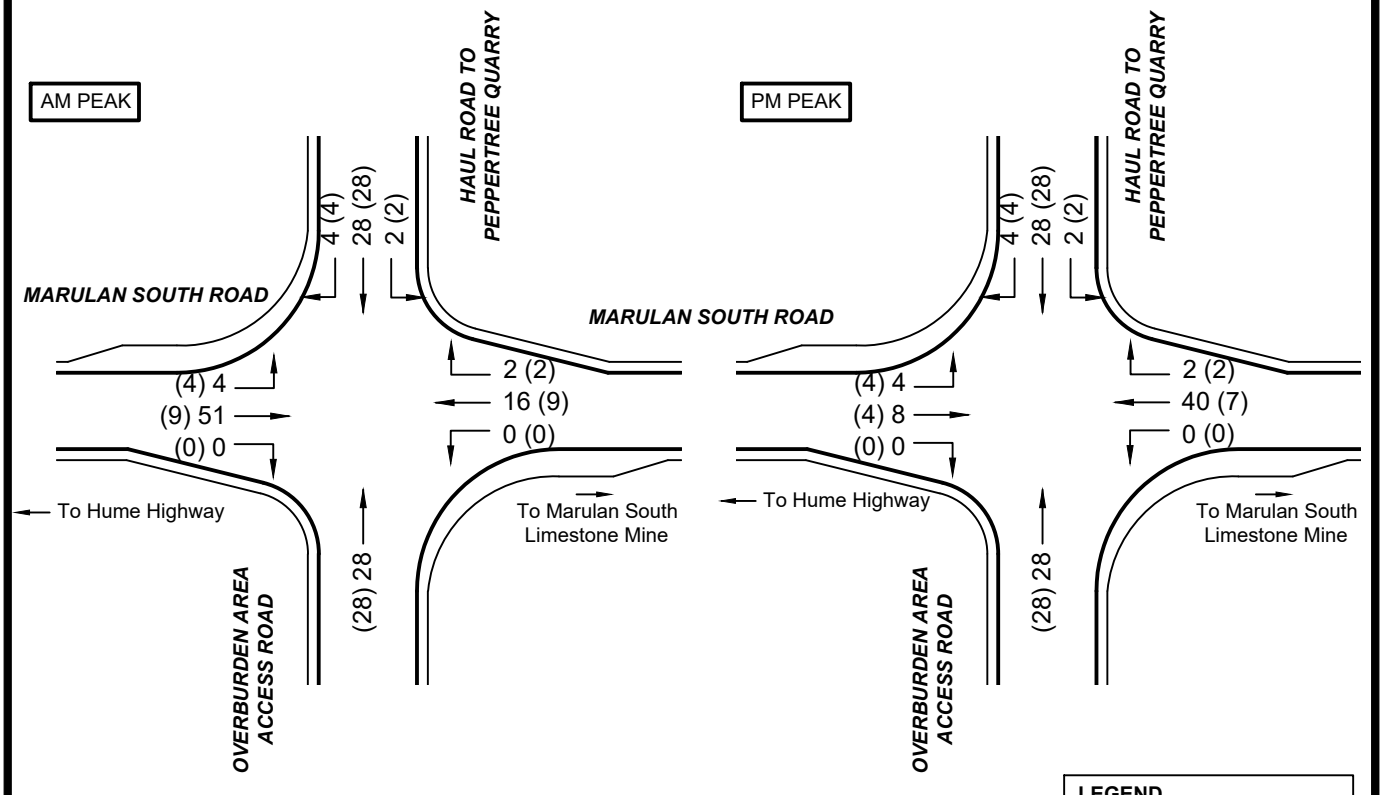
FIGURE 3

PEPPERTREE QUARRY MODIFICATION 5
CONCEPT LAYOUT OF PROPOSED INTERSECTION OF MARULAN SOUTH RD, NEW HAUL ROAD & OVERBURDEN AREA ACCESS ROAD
JOB NO.18033



SCENARIO 1
MARULAN SOUTH ROAD WIDENED TO 9m
FROM INTERSECTION TO PEPPERTREE QUARRY ACCESS ROAD



SCENARIO 2
MARULAN SOUTH ROAD TO REMAIN 7m WIDE

LEGEND

4	TOTAL VEHICLES
(4)	HEAVY VEHICLES

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FIGURE 4

PEPPERTREE QUARRY MODIFICATION 5

FUTURE PEAK HOUR TRAFFIC VOLUMES
AT INTERSECTION OF MARULAN SOUTH RD, NEW HAUL ROAD & OVERBURDEN AREA ACCESS ROAD

JOB NO.18033

2. The overburden trucks travelling along internal Peppertree Quarry haul roads, crossing Marulan South Road using the new intersection and access road to the SWOE.

Also included in **Figure 4** are the other light and heavy vehicles estimated to use the intersection in the AM and PM peak hours, including vehicles that will access the proposed road sales stockpile area which will be developed by the Limestone Mine.

Austroads Guide to Road Design – Part 4A Unsignalised and Signalised intersections provide guidance on the warrants for turn treatments on a major road at unsignalised intersections. **Figure 4.9** of the above document which is included in **Appendix 1** shows that for an intersection where the design speed is less than 100km/h, a left turn movement of 28vph (which is the highest turning volume at the intersection) the major road through volume either in the same direction or the opposing direction would need to be equal to or greater than 250vph, for the warrant to be met for the provision of an auxiliary lane for right or left turn movements.

The overall approach volumes using Marulan South Road in each direction are significantly less than this threshold of 250vph and therefore the provision of auxiliary lanes in Marulan South Road to cater for turning movements at the proposed intersection is not warranted.

To examine the likely delays at the proposed intersection, SIDRA traffic modelling has been undertaken using the traffic volumes shown in **Figure 4.**

The modelling has assumed the geometry shown on **Figure 3** with single lane approaches for each leg of the intersection based on a wider lane width to cater for the oversize vehicles. Stop Sign control has been provided on the overburden access road and the new haul road and increased (larger) gap acceptance times due to the proportion of heavy vehicles using the intersection.

The results of the modelling are shown in Table 4.1 show that the intersection would have a good operation in both peak hours for both scenarios. RMS Guidelines indicate a Level of Service D or better (i.e. A, B, C or D) is the desirable criteria for intersections.

For Scenario 1, with the overburden trucks travelling to and from the east along Marulan South Road, the intersection would operate at a Level of Service A with low delays to all movements. Vehicle delays for the minor access roads controlled by the Stop sign were 12.2 seconds or less per vehicle indicating relatively low delays.

For Scenario 2, with the overburden trucks crossing over Marulan South Road and using both the new haul road and SWOE access roads, the intersection will also operate at a Level of Service A (good operation) with low vehicle delays for all movements at the intersection. Vehicle delays for minor access roads controlled by the Stop signs would be around 13.1 seconds per vehicle

TABLE 4.1

SIDRA MODELLING RESULTS FOR INTERSECTION OF MARULAN SOUTH ROAD/NEW HAUL ROAD/OVERBURDEN ACCESS ROAD IN AM AND PM PEAK HOURS WITH STOP SIGN CONTROL

	Scenario 1		Scenario 2	
	AM	**PM**	**AM**	**PM**
LS	A	A	A	A
AVD (sec)	4.8	5.2	5.7	6.1
HMD (sec)	12.2	11.3	11.3 (13.1)	10.5 (12.5)

Where: LS – Level of Service
AVD – Average Vehicle Delay in seconds for all vehicles using intersection
HMD – Highest Movement Delay in seconds for any movement at the intersection

Scenario 1 – Overburden trucks use Marulan South Road east of intersection
Scenario 2 – Overburden trucks use New Haul Road
11.3 (13.1) – HMD in seconds for cross movement and for right turn out of New Haul Road

Geometric Considerations

In terms of sight distance, the intersection will be designed to comply with Austroad requirements. Available sight distance to and from the intersection along Marulan South Road will be a minimum of 200 metres to the west (i.e. to the curve) and 250 metres to the east.

Austroad's Safe Intersection Sight Distance for a design speed of 60km/h is 113 to 121 metres depending on a 2.0 second or a 2.5 second reaction time.

Therefore, the intersection will have satisfactory sight distance.

As noted previously, it is recommended that the existing 60km/h speed limit in the vicinity of the mine entrance and old Marulan South village be extended and relocated 200 metres to the west along Marulan South Road, if the intersection is constructed and operational while this section of Marulan South Road remains a public road. If Marulan South Road is purchased, deregistered and under Boral's control, it is also recommended that the speed limit for this section of road be reduced to 60km/h.

4.5 Future Intersection Treatment Option of Traffic Signals

In the event that the section of Marulan South Road from the Aglime facility's driveway eastwards, becomes a private road under the control of Boral (i.e. deproclaimed/deregistered as a public road), Boral may decide to provide traffic signal control of the intersection to ensure safety is maximised for vehicles using the intersection and its workforce.

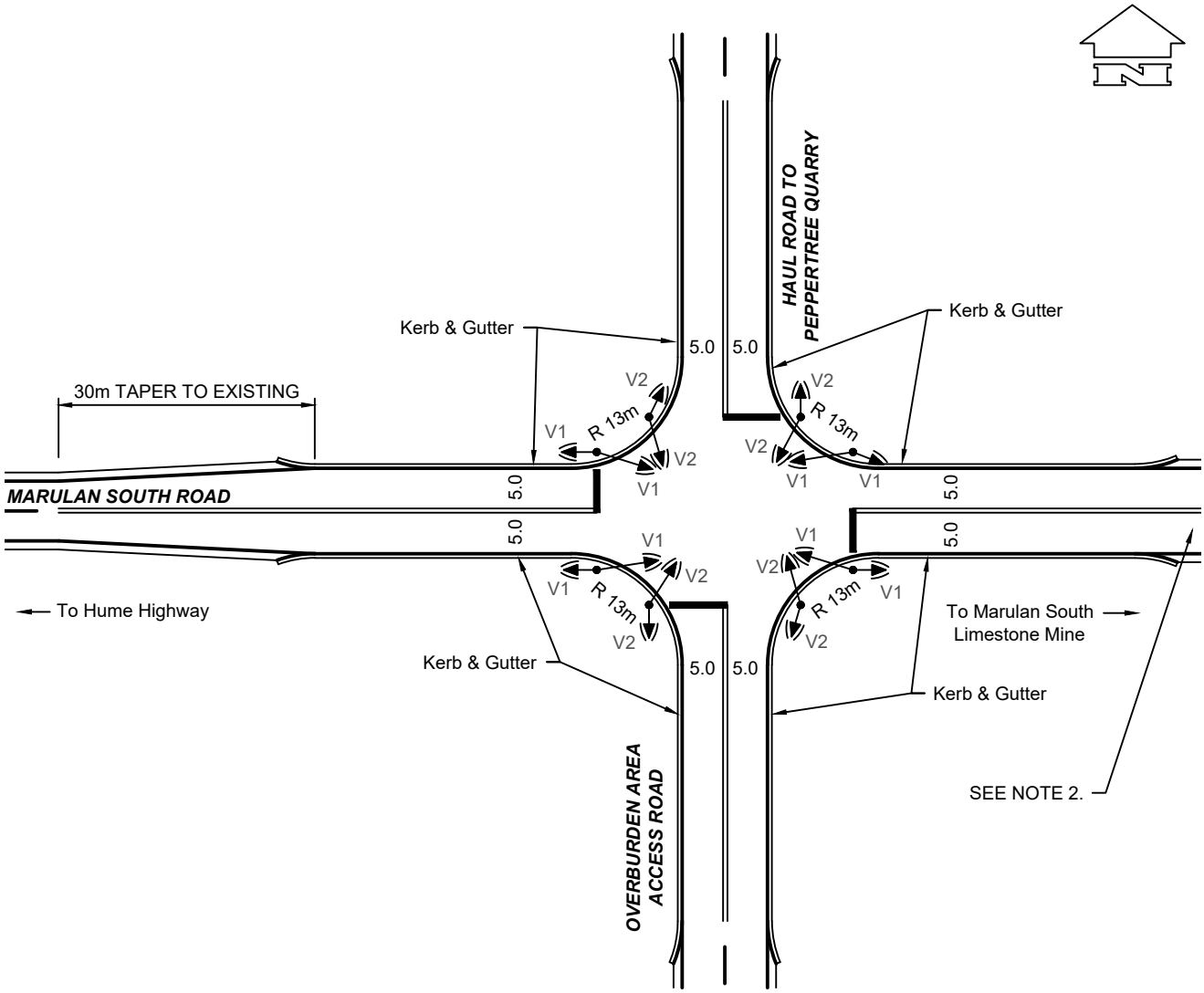
The design volumes shown in **Figure 4** indicate that single lane approaches and departures would be sufficient to cater for the estimated vehicles using the intersection. Also a simple two phase operation with Marulan South Road operating in one phase (i.e. A phase) and the Haul Road/Overburden Access Road operating the second phase (i.e. B phase) would safely accommodate vehicle movements at the intersection.

The traffic signals being located on private roads could either be vehicle activated (i.e. have detectors in each approach) or operate as fixed time, with preset phase times and the type of operation could be determined at design stage.

As noted above, single lane approach and departures would be adequate. The intersection layout would be determined by the size of the vehicles using the intersection and their turning requirement.

No pedestrian crossing facilities would be required.

A concept layout for the intersection under traffic signal control is shown in **Figure 5**. This layout would suit Scenario 2 where the haul trucks cross Marulan South Road from the Haul Road to the Overburden Access Road and vice versa. However, the intersection could also cater for Scenario 1 where the haul trucks use Marulan South Road east of the intersection and turn left into and right out of the SWOE Access Road.



NOTES:

1. Kerb & gutter to be provided for 30m on all legs of intersection.

2. Marulan South Road to be widened to 9m east of intersection and existing vehicle access to Peppertree Quarry if overburden haul trucks use this section of Marulan South Road (ie Scenario 1).

3. Mast arm posts may be required for primary lanterns subject to height of trucks.

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FIGURE 5

PEPPERTREE QUARRY MODIFICATION 5

CONCEPT LAYOUT OF PROPOSED INTERSECTION OF MARULAN SOUTH RD, NEW HAUL ROAD & OVERBURDEN AREA ACCESS ROAD FOR TRAFFIC SIGNALS

JOB NO.18033

To examine the operation of the intersection under traffic signal control, SIDRA traffic modelling has been undertaken using the future AM and PM traffic volumes shown for Scenario 2 on **Figure 4**. A cycle length of 45 seconds was adopted, together with fixed phase times for each phase, due to the number of heavy vehicles.

The results of the modelling are shown in Table 4.2 and indicate that the intersection would operate at a good Level of Service (Level of Service A operation) under traffic signal control with average vehicle delays in the order of 11.6 seconds to 13.5 seconds per vehicle for both Scenario 1 and Scenario 2. The low degree of saturation (DS) for all the models indicates that the intersection has plenty of spare capacity.

Therefore, future traffic signal control is a suitable option for the traffic management at this intersection, if Marulan South Road becomes a private road.

If future signalisation occurs, the traffic signals would be designed to RMS Standards and as a private road, Marulan South Road, at its closure location, would have suitable controls implemented as agreed with the road authorities.

TABLE 4.2

SIDRA MODELLING RESULTS FOR INTERSECTION OF MARULAN SOUTH ROAD/NEW HAUL ROAD/SWOE ACCESS ROAD IN AM AND PM PEAK HOURS WITH TRAFFIC SIGNAL CONTROL

	Scenario 1		Scenario 2	
	AM	**PM**	**AM**	**PM**
LS	A	A	A	A
AVD (sec)	12.9	13.5	11.6	11.9
DS	0.104	0.125	0.104	0.104

Where: LS – Level of Service
AVD – Average Vehicle Delay in seconds for all vehicles using intersection
DS – Degree of saturation

Scenario 1 – Overburden trucks use Marulan South Road east of intersection
Scenario 2 – Overburden trucks use New Haul Road

5.0 CONCLUSIONS

Modification 5 for Peppertree Quarry has very minor traffic impacts associated with the construction of a new intersection in Marulan South Road, just west of the railway line crossing near the entrance of the Quarry and the Limestone Mine.

The new cross junction intersection will connect a proposed new haul road between the pit of Peppertree Quarry and the SWOE which will be south of Marulan South Road.

Two conceptual design options have been developed for the intersection with Stop Sign control on the new haul road and the SWOE Access Road. It is recommended that the speed limit in Marulan South Road at the intersection be reduced to 60km/h, if this section of Marulan South Road remains a public road.

The assessment has found that the future use of this Stop Sign controlled intersection by trucks travelling between the SWOE and the pit at Peppertree Quarry, together with other vehicles using Marulan South Road at the intersection will have relatively minor impacts. The intersection will have a Level of Service A operation, which represents a good operation.

In the event that Marulan South Road becomes a private road, Boral may, at a future time, install traffic signals at the cross junction intersection. Analysis of the intersection's operation under traffic signal control shows that the intersection would have a good operation, if this option is adopted.

REFERENCES

1. Austroads Guide to Road Design

2. Austroads Guide to Road Safety – Version 1 December 2010

3. Austroads Guide to Traffic Management including Part 12. Traffic Impacts of Development

4. RTA (now RMS) Austroads Guide Supplements – Austroads Guide to Traffic Management – January 2011

5. RTA (now RMS) Supplement to Austroads Guide to Road Design Parts 1-5, 6 and 8

6. RMS Supplements to Austroads Guide to Road Safety

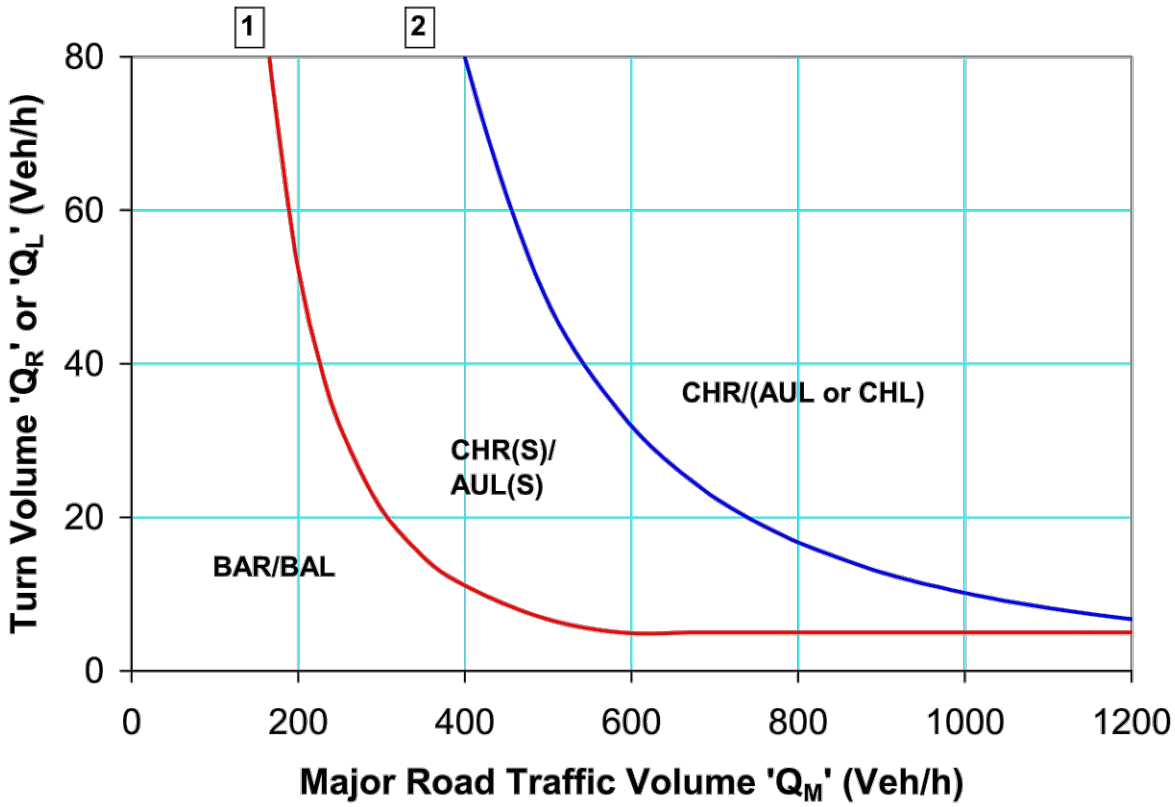
7. RTA (now RMS) Guide to Traffic Generating Developments October 2002

8. Goulburn Mulwaree Council Development Control Plan

9. Goulburn Mulwaree Council Section 94 Development Contributions Plan 2009 Amendments No. 2

APPENDIX 1

WARRANTS FOR TURN TREATMENTS ON THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS



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APPENDIX 1

PEPPERTREE QUARRY MODIFICATION 5

WARRANTS FOR TURN TREATMENTS ON THE MAJOR ROAD AT UNSIGNALISED INTERSECTIONS

JOB NO.18033

APPENDIX G

BUSHFIRE MANAGEMENT PLAN

Attachment 3: Bushfire Management Plan

Boral Limited

South Marulan Operations

Bushfire Management Plan 2015

In producing this Bushfire Management Plan (BMP), the principal consideration has been to provide for the protection and safety of human life (including Staff and Contractors of Boral, residents of the locality and firefighters suppressing bushfire events, Property and Boral infrastructure.

A Bushfire left unattended has the potential to endanger lives and damage property. During the bushfire season (October to April) winds are predominately from the SW and NNW. A bushfire on Boral land during such wind conditions has the potential to impact upon flora and fauna of the Morton and Bungonia National Park areas.

An incoming bushfire has the potential to impact Boral in the following manner:

- Damage to buildings exposed
- Isolation from the general community
- Loss of regenerative plantings
- Loss of electricity supply

Activities that create sparks or hot particles, such as metal grinding and welding will be limited to workshops and hardstand or areas clear of vegetation by a minimum of 20m. Designated hot work areas will have completed a “Designated Hot Work Area Risk Assessment HSEQ-6-06-F01”. All fire bans, as determined by the NSW Rural Fire Service, will be adhered to by employees, contractors and service providers and enforced by Boral Management.

The risk of bushfires in adjacent lands spreading to Boral assets will be minimised by the provision of slashed/mowed fire breaks along boundary fences. In case of remnant or regenerating woodland that is adjacent to the boundary of the lease area, the firebreak will be constructed between the woodland/grassland interfaces. Prevailing winds during summer are from the SE, however NW winds that lead to an extreme fire danger, I.e. elevated temperatures and low humidity do occur. Firebreak design will therefore take into consideration that a bushfire is likely to enter the site from the NW, and exit the site to the SE. Firebreaks should also be designed to protect the western boundary by stopping bushfires within the Boral area threatening the Morton national Park.

Criteria and Guidelines

The relevant legislation and standards applicable to the management of bushfire and maintenance of equipment include the following:

- Rural Fires Act, 1997;
- Rural Fires Regulation 2002;
- Australian Standard 1851.1-1995 Maintenance of Fire protection Equipment;

- Planning for Bushfire Protection, 2006, and
- Australian Standard 1019-2000 Internal Combustion Engines – spark emission control devices.

This BMP has been prepared utilising the advice given by the Community Safety officer of the Southern tablelands zone, NSW Rural Fire Service.

Permits

A permit is not required for hazard reduction fires outside the statutory bush fire season but is required that you advise both Firecom and the local brigade 24hours prior to lighting the fire.

A permit must be sought from the Marulan Brigade Captain for fires outside during the Bush Fire Danger Period. This permit is free and can be issued for up to 14 days. It is automatically revoked in the event of a Total Fire Ban. Hot work does not normally fall into the category of requiring a permit but fines for the disposal of explosives for instance do require a permit.

Risk Assessment

An Annual bushfire risk assessment will be undertaken on the site before the bushfire season begins. The bushfire season typically occurs between October and March. However, factors such as fuel load, rainfall history and climatic conditions may bring forward or extend the bushfire season.

The bushfire risk assessment will consider:

- Fuel Loads on Boral land;
- Advice from the Marulan Brigade Captain of the NSW Rural Fire Service;
- The climatic conditions (particularly rainfall) of the preceding year;
- Methodologies of bushfire risk assessment

Bushfire Management Plan Map

A map shall be prepared of the Boral South Marulan Operations and it shall contain at least the following data:

- Boundaries of Boral holdings
- High risk assets
- Access points
- Water points
- Access roads and tracks
- Vegetation types
- Annually assessed Fuel loads
- Any previous fires or hazard reductions
- RFS station location

A table shall be appended to the map with the following information:

- In case of fire call 000 (triple zero)
- Southern tablelands zone RFS contacts
- Marulan RFS Brigade contacts
- Boral key contacts

A second table shall be appended containing:

- The address of each quarry
- GPS location in Australian Map grid
- GPS location in latitiude and longtitude.

A third table shall be appended containing:

- NSW RFS escalating warning system and its meanings
- NSW fire danger levels and their meanings

Specific Risk Control Measures

Mowing

Under some circumstances it may be necessary to mow with nylon cord due to terrain. Mowing shall not take place on days of very high fire danger or above. Mowers shall have at least a 9 litre air water fire extinguisher immediately available.

Vehicles

All vehicles will be restricted to identified vehicle routes to reduce the risk of spark emissions. If a vehicle is required to traverse across grassed areas, it is to have an upward exhaust.

Petrol powered vehicles and equipment shall not be used in or over vegetation on days of Catastrophic Fire danger.

Diesel powered vehicles and equipment shall not be used in or over vegetation on days of Catastrophic Fire danger.

Electricity Transmission

Electricity transmission easements will be inspected regularly to ensure regenerating vegetation does not have the potential to interfere with power lines that sag. Boral will liaise with the owner of the electrical transmission infrastructure with regards to vegetation management within the easement.

Lightning

In the event of a lightning strike at least two persons shall keep a regular check on the location for at least the next day.

Smoking

The risk of accidental bushfire ignition from lit cigarettes will be incorporated in site inductions.

Fire fighting equipment

Boral has a wide range of facilities that will be made available to control and extinguish bushfires. This equipment includes but is not limited to:

- Fast fill hoses and connections
- Two water tankers
- Clean water dams with maintained access points
- Earthmoving equipment
- Water pumps
- Portable radios
- Fire alarms
- First aid room and supplies

This equipment will be made available on request to the Southern Tablelands Zone RFS for use within the Boral area.

Plan Dissemination

All employees on site shall be informed of the response requirements of this plan and shall receive a refreshment of these requirements at the start of each bushfire season.

Copies of the plan shall be disseminated to:

Name	Position	Address
Dean Beltrame	Site Manager – Limestone	Hume St Marulan South
Angus Shedden	Site Manager –Peppertree	843 Marulan South Rd Marulan South
Sharon Makin	Environmental Advisor-Peppertree	843 Marulan South Rd Marulan South
Grant Thomson	Environmental Officer - Limestone	Hume St Marulan South
Rob Lasker	HSE Advisor	Hume St Marulan South
	Marulan Brigade Captain	Cnr Portland and Goulburn Ave (PO Box 201) Marulan NSW 2579
Ian Kennerley	Southern Tablelands Zone Operations Officer	Southern Tablelands Control Centre 82-88 Combermere St (PO Box 805) Goulburn NSW 2580

This plan will also form part of the Boral Cement Marulan EMP.

Fire Incidents

Any incidents of unplanned bushfire during the Bushfire danger period will be reported directly to Triple Zero. The Boral Environmental Officers, Site Managers and HSE advisor shall be notified as soon as possible in this event.

Communications

All employees, contractors and service providers will be made aware of the emergency procedures applicable on the Boral site.

Regular communication and liaison will occur between the Environmental Officer – Peppertree, the Southern Tablelands RFS and Marulan Brigade Captain.

This communication is to occur:

- Annually in the form of a report on bushfire management activities and bushfire risk assessment;
- Operationally during coordinated responses to bushfires on Boral land via radio communication; and
- Immediately following a bushfire on Boral land. The purpose of the liaison activity is to identify any areas of improvement in the BMP.

Firebreaks and perimeter Tracks

Taking into consideration the prevailing winds, fuel breaks will be placed on the western and southern boundaries.

A cleared area will be established and maintained around above ground facilities and buildings. Access tracks will be inspected and maintained if necessary.

An area beside the access tracks will be cut or slashed extending firebreaks. Existing firebreaks will be maintained. Access dams and water supplies will be inspected and maintained if necessary.

Response

Information on the bushfire danger period is broadcast by the official emergency warning radio, which in this case is 666 ABC Canberra. A radio shall be set up to receive these warnings. The radio shall have an emergency backup power supply so it will continue in the event of a power failure. A person or persons shall be detailed to listen to this radio on days of very high fire danger and above.

Total Fire Bans

On days of total fire ban (Toban) the following activities shall take place:

- Check operation of Firefighting Equipment
- Toolbox the warning to all persons on site.

On days of total fire ban (Toban) the following activities shall NOT take place:

- Hot Work in the open air
- Driving of petrol vehicles on or over vegetation
- Mowing/slashing
- Earthworks in vegetation

Catastrophic fire conditions

On days of Catastrophic conditions the following activities shall take place in addition to Toban activities:

- A risk assessment of all operations
- A risk assessment on closing the plant and sending people home
- A test of all firefighting equipment
- Establishment of communications with the Marulan Brigade Captain

On days of Catastrophic conditions the following activities shall NOT take place in addition to Toban activities:

- Hot Work
- Driving in or on vegetation in any vehicle
- Explosions other than pre charged holes
- Train despatch wherever possible

IT IS CRITICAL THAT BORAL DOES NOT WAIT AND RELY ON BROADCAST WARNINGS BEFORE TAKING ACTION.

FIRES SOMETIMES SPREAD OR ESCALATE SO RAPIDLY THAT WARNING IS NOT POSSIBLE.

If it is a catastrophic day and there is a big fire and it is headed to South Marulan then assume the warning system has failed.

Emergency Warnings

Emergency warnings are broadcast over public radio and the designated public emergency channel is 666 ABC Canberra.

Because of the somewhat unique location of the South Marulan quarries with only one access road Boral needs to respond at a higher level than most of the community.

Advice:

"A fire has started. There is no immediate danger. Stay up to date in case the situation changes"

On receipt of this warning Boral shall:

- Check on the availability and operation of firefighting equipment
- Warn all persons on site of the "advice"
- Establish communications with key persons

Watch and Act

"There is a heightened level of threat and you need to start taking action now"

On receipt of this warning Boral shall:

- Activate and check all firefighting equipment
- Ensure all persons onsite are aware of the warning
- If the fire has impact potential risk assess and act on evacuation of workers to their home

Emergency Warning

"An Emergency warning is the highest level of bushfire alert. You need to take action NOW. Any delays puts your life at risk"

On receipt of this warning Boral shall:

- Risk assess to stop persons leaving the site
- Assemble and account for all persons in the planned safe location
- Communicate with Firecom.
-

Responsibilities and Accountabilities

Site Manager

The site manager will have the following responsibilities:

- Ensure that all conditions of consent are followed by contractors, employees and service providers;

- Ensure that all relevant regulations licences and approvals are complied with by all personnel on site;
- Maintain overall responsibility for activities undertaken on the Boral site.
- Ensure the plan is communicated to the Marulan RFS Captain and the Southern Tablelands Zone Operations Officer;
- Ensure an adequate number of persons are on the Toban notifications list
- Ensure firefighting equipment is as compatible as possible with the local RFS
- Ensure a liaison meeting with the local RFS brigade takes place at least once a year.

Environmental Officer / HSE Advisor

The Environmental Officer / HSE Advisor will report to the Site manager. They will be responsible for:

- Ensure that all procedures detailed in this management plan are followed and implemented by the site.
- In the absence of the fire officer the duties will be the responsibility of a person delegated in a formal way.

Table 1: Bushfire Contacts List

In case of Emergency or to report a fire call 000 (triple zero)

Name	Position	Mobile	Phone	Email
Rob Lasker	HSE Advisor Boral Cement	0401 894 640	48 203 023	Robert.lasker@boral.com.au
Sharon Makin	Environmental Advisor – Peppertree	0401 894 185	48 411 701	Sharon.makin@boral.com.au
Grant Thomson	Environmental Officer – Limestone	0401 893 609	48 203 049	Grant.thomson@boral.com.au
Dean Beltrame	Site Manager – Limestone	0401 896 979	48 203 061	Dean.beltrame@boral.com.au
Angus Shedden	Site Manager – Peppertree	0401 894 513	48 411 701	Angus.shedden@boral.com.au
Ian Kennerley	Southern Tablelands RFS Operations Officer		48 222 900	Ian.kennerley@rfs.nsw.gov.au
Peter Dyce	Southern Tablelands RFS Community Safety officer		48 222 900	Peter.dyce@rfs.nsw.gov.au
Firecom	Yass Goulburn		6226 3100 4822 2900	
Warren	Marulan RFS Captain	0407 227 047	4841 1555	

Table 2 Address and coordinates of Boral South Marulan Operations

Operation	Address	GPS – Mapgrid	GPS – lat / long
Boral Cement Marulan South Limestone Mine	Hume St Marulan South NSW 2579	56H228543.1 6149025.871	34°45'53.3" South 150°02'02.7" East -34.764849 150.034110
Boral Peppertree Quarry	843 Marulan South Rd Marulan South NSW 2579	56H228078 6149734	34.D45.501 150D1.756

Table 3 NSW RFS Escalating Warning System

There are three levels of Bush Fire Alerts:

Advice	A fire has started. There is no immediate danger. Stay up to date in case the situation changes.
Watch And Act	There is a heightened level of threat. Conditions are changing and you need to start taking action now to protect you and your family.
Emergency Warning	An Emergency Warning is the highest level of Bush Fire Alert. You may be in danger and need to take action immediately. Any delay now puts your life at risk.

Table 4 NSW Fire Danger Levels

FIRE DANGER RATING	WHAT YOU SHOULD DO
CATASTROPHIC	For your survival, leaving early is the only option. Leave bush fire prone areas the night before or early in the day – do not just wait and see what happens. Make a decision about when you will leave, where you will go, how you will get there and when you will return. Homes are not designed to withstand fires in catastrophic conditions so you should leave early.
EXTREME	Leaving early is the safest option for your survival. If you are not prepared to the highest level, leave early in the day. Only consider staying if you are prepared to the highest level – such as your home is specially designed, constructed or modified, and situated to withstand a fire, you are well prepared and can actively defend it if a fire starts.
SEVERE	Leaving early is the safest option for your survival. Well prepared homes that are actively defended can provide safety – but only stay if you are physically and mentally prepared to defend in these conditions. If you're not prepared, leave early in the day.
VERY HIGH HIGH LOW MODERATE	Review your Bush Fire Survival Plan with your family. Keep yourself informed and monitor conditions. Be ready to act if necessary.

APPENDIX H

SWOE GEOMORPHOLOGY LETTER REPORT

Advisian
WorleyParsons Group

Advisian
Level 31, 12 Creek St
Brisbane QLD 4000
Australia

P: +61 7 3377 7000

Advisian Pty Ltd
ABN: 50 098 008 818

www.advisian.com

1 February 2019

Rachel Snape
Planning and Development Manager NSW/ACT
Boral Land and Property Group
39 Delhi Road
North Ryde NSW 2113

Dear Rachel,

RESPONSE TO SUBMISSION – OVERBURDEN GEOMORPHOLOGY

1 Introduction

This letter provides additional information on the physical characteristics of the proposed South West Overburden Emplacement (SWOE) to support the Peppertree Quarry modification application (06_0074 Mod 5). The proposed SWOE is located on the adjacent Boral South Marulan Limestone Mine and is required to emplace approximately 13 Mt of overburden from the Quarry. The SWOE also forms part of the Marulan South Limestone Mine Continued Operations State Significant Development Application that has been lodged with the Department of Planning and Environment.

2 Overburden characteristics

2.1 Geology

The local geology consists of the Glenrock Granodiorite igneous intrusion which forms part of the Middle Devonian aged Marulan Batholith. The unit has intruded into Silurian aged shale, limestone and sediments that form the host rock (ERM, 2006).

2.2 Physical properties

Overburden from the Peppertree quarry consists of weathered granodiorite and topsoil. Topsoil is characterised as a duplex soil with a thin topsoil A horizon (less than 0.3m) and a clayey B horizon (Boral, 2017a). The weathered granodiorite generally comprises sandy clay and clayey sand. The sand is fine grained. Clay is low plasticity, brown to light brown, very stiff

grading with depth and extremely low strength, with some gravel at some locations and occasional fresh granodiorite boulders of varying dimension, typically less than 1.0 m diameter (PSM, 2010). Particle size distribution of overburden varies across the Quarry site as shown in Figure 1. Locations of test pits are detailed in Attachment A.

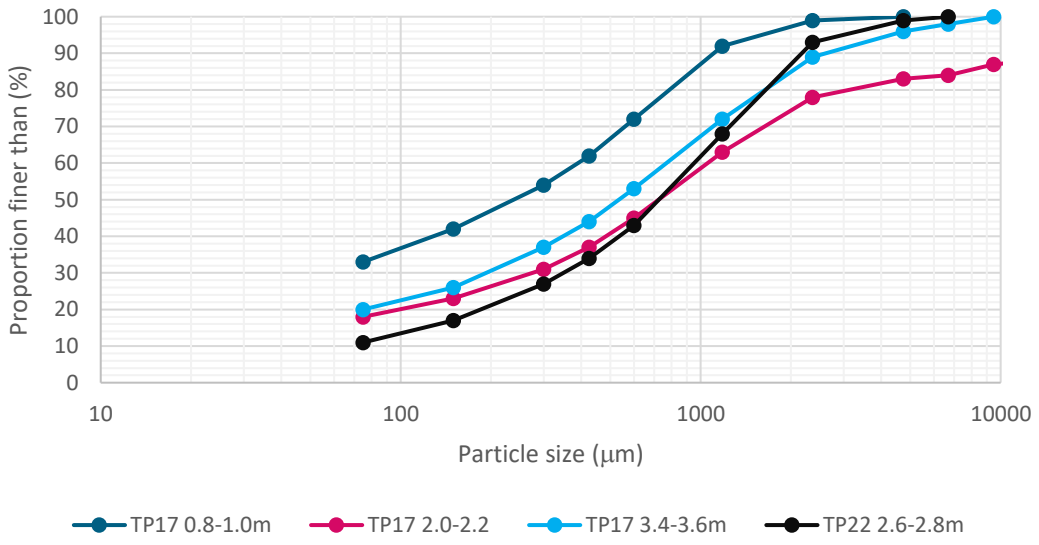

Figure 1 Summary of PSD (source: PSM, 2010)

Emerson Class testing characterises the instability of soil structure when immersed in water as a measure of erosion potential. Overburden across the Quarry site was consistently Emerson Class 5 (PSM, 2010), indicating soils are non-dispersive, but remoulding or breaking down of soil bonds may result in dispersive behaviour. Remoulding of the soil at a moisture content near the optimum for compaction does not increase the potential for dispersion. However, water turbulence in concentrated rapid water flow (e.g. steep drainage channels) may cause soil dispersion.

2.3 Emplacement design

The SWOE will be constructed in four (4) successive lifts of 15 m. Following emplacement of overburden material, the landform will be shaped to produce a batter slopes of 1:3 (V:H) and final stormwater drainage. The slope length will be reduced with 5 m wide berms between each of the lifts.

The berms will be graded at approximately 1% perpendicular to the emplacement slope to direct runoff to sediment basins, acting as contour drains. Rock lined drains or chutes will be utilised where higher channel slopes are required to direct runoff to the sediment dam.

Following shaping of the final landform, a growth medium will be placed on the surface. Typically, this layer consists of natural topsoil material stripped ahead of ground disturbance, but may consist of subsoils, organic mulches, weathered geological strata, or even particularly

suitable overburden material as a rock mulch. Ameliorants, if required, may be applied to the trimmed overburden surface prior to topsoil (Boral, 2017a).

The establishment of a vegetation community, especially groundcover species, is essential in reducing erosion of sloping landforms. Vegetation establishment works will be undertaken immediately following placement of the growth medium.

Location, sizing and erosion protection specifications will be determined during detailed design prior to emplacement construction as part of revision to the Water Management Plan (Section 6 - Erosion and Sediment Control). The Biodiversity and Rehabilitation Management Plan details specifics of topsoil stripping, recovery and stockpiling (Section 7.3) and vegetation establishment (Section 6.2.5).

The indicative rehabilitation schedule is detailed in the Marulan South Limestone Mine Continued Operations State Significant Development (SSD) Application. The SWOE is referred to in the Marulan South Limestone Mine Continued Operations SSD as the Northern Overburden Emplacement, however this also includes overburden from the South Marulan Limestone to create a stockpile and laydown area to the south of the SWOE. The schedule indicates that rehabilitation would have commenced on the western side by Year 5 (Stage 1) of the project, with rehabilitation completed by Year 13 (Stage 2). Figures showing the indicative mine development are shown in Attachment B.

Rehabilitation monitoring is detailed in the Peppertree Quarry Biodiversity and Rehabilitation Management Plan, which commenced in 2018 (Boral, 2018). The plan also outlines remedial actions should rehabilitation of the emplacement not meet the required performance measures.

2.4 Potential impacts and mitigation strategies

The potential for sheet and gully erosion to impact on the long-term stability of the SWOE will be managed through design and management aspects, detailed in the Biodiversity and Rehabilitation Management Plan (Boral, 2017a) and Water Management Plan (Boral, 2017b). These will be updated following an approval of modification 5. Combined with detailed designs prepared in accordance with Managing Urban Stormwater: Soils & Construction (Landcom, 2004). In summary, sheet erosion risk is mitigated through several strategies, including;

- reshaping the batter slopes to 1:3 (V:H)
- limiting bench height to 15 m, reducing the slope length to 52 m
- berms between each bench to direct stormwater to dedicated drainage channels
- placement of growth medium and early establishment of vegetation, including light cover crop to assist in early soil stabilisation where necessary
- monitoring and remedial actions.

Gully erosion risk is mitigated through several strategies, including;

- limiting the slope of grass lined drain to 1% gradient
- rock lined drains or chutes to convey stormwater to sediment dams
- monitoring and remedial actions.

3 Conclusion

Overburden from the Quarry is predominantly weathered Granodiorite, with a thin layer of topsoil. Viable topsoil is recovered prior to disturbance in the quarry area for use in rehabilitation. The SWOE concept design has incorporated a number of features to ensure long term erosion stability. The design elements and management actions ensure the SWOE complies with the objectives of the Biodiversity and Rehabilitation Management. Detailed erosion and sediment control design in accordance with Managing Urban Stormwater Guidelines (Landcom, 2004) will provide specifications for erosion and sediment control features. These designs will be included in a revision of the Water Management Plan (Section 6: Erosion and Sediment Control) prior to construction of the emplacement.

Rehabilitation of the SWOE will ensure long term geomorphological stability, with erosion rates similar to that of the natural landscape. Monitoring and remedial actions detailed in the Biodiversity and Rehabilitation Management Plan also allow for adaptive management of the emplacement if the aspects of the completion criteria and performance measures are not achieved.

Yours sincerely,

Michael Butcher

Lead Environmental Engineer

References

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Boral. (2017b). *Peppertree Quarry Water Management Plan.* Boral Resources (NSW) Pty Ltd.

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ERM. (2006). *Marulan Proposed Quarry* . Sydney: Report prepared for Boral Resources Pty Ltd as part of the Marulan South Envinonmental Assessment.

Landcom. (2004). *Managing Urban Stormwater: Soils and Construction.* Sydney: New South Wales Government.

PSM. (2010). *Geotechnical Investigation for the proposed Peppertree Quarry Development at Marulan South.* Report prepared for Boral Resources (NSW) Pty Ltd.

Attachment A: Test pit locations

Test Pit	Easting	Northing	Elevation (mAHD)	Topsoil depth (m)
TP17	227947	6150234	600	0.3
TP18	227992	6149999	598	0.4
TP19	227833	6150334	592	0.3
TP20	228121	6150063	591	0.2
TP21	228181	6150172	586	0.2
TP22	228106	6150304	592	0.3

Adapted from PSM, 2010

Advisian

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Attachment B: Marulan South Limestone Mine Continued Operations Staging

Figure 6.2
Indicative mine layout - Stage 1

MARULAN SOUTH LIMESTONE MINE CONTINUED OPERATIONS - SSD APPLICATION
SURFACE WATER ASSESSMENT

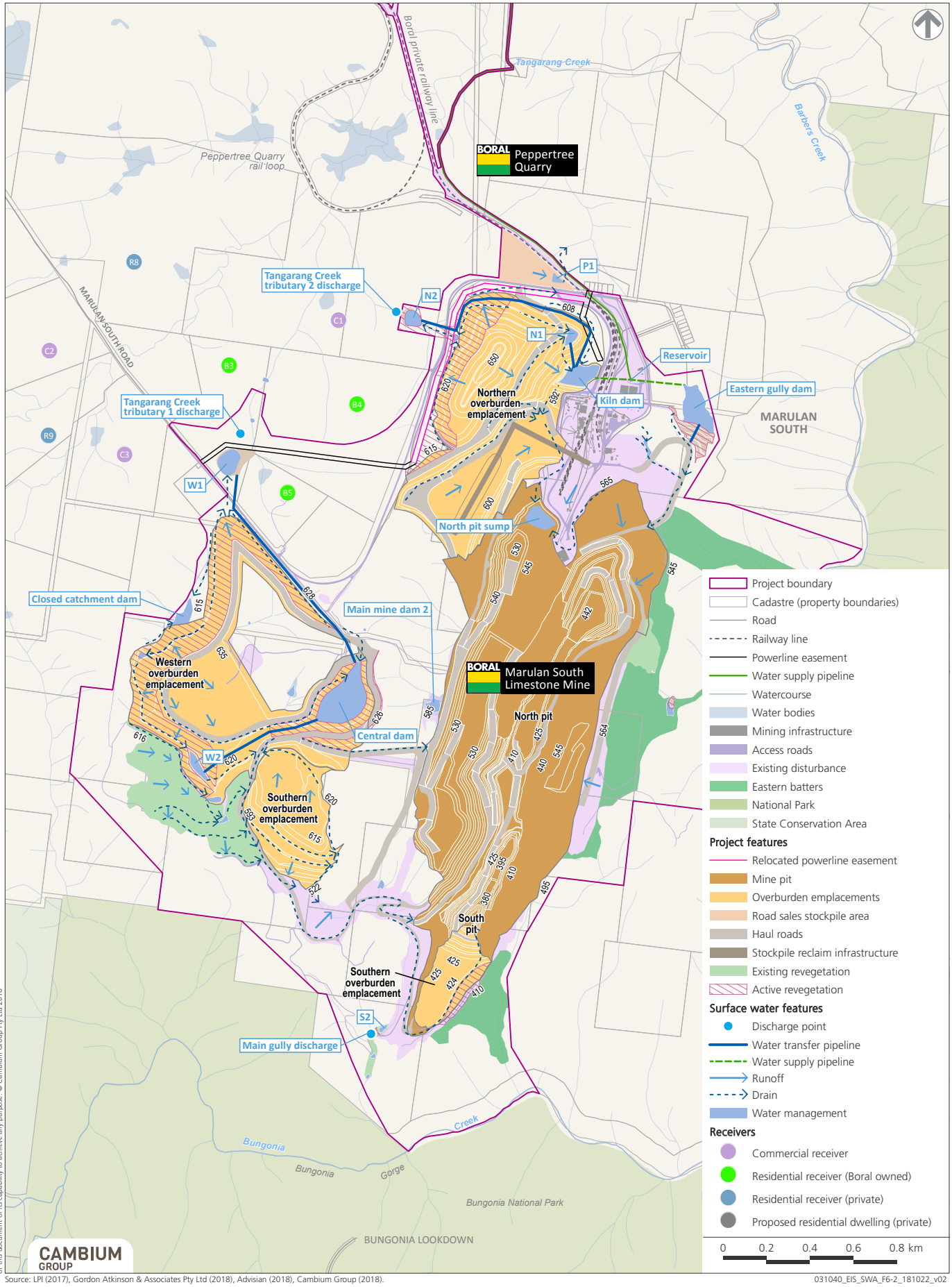

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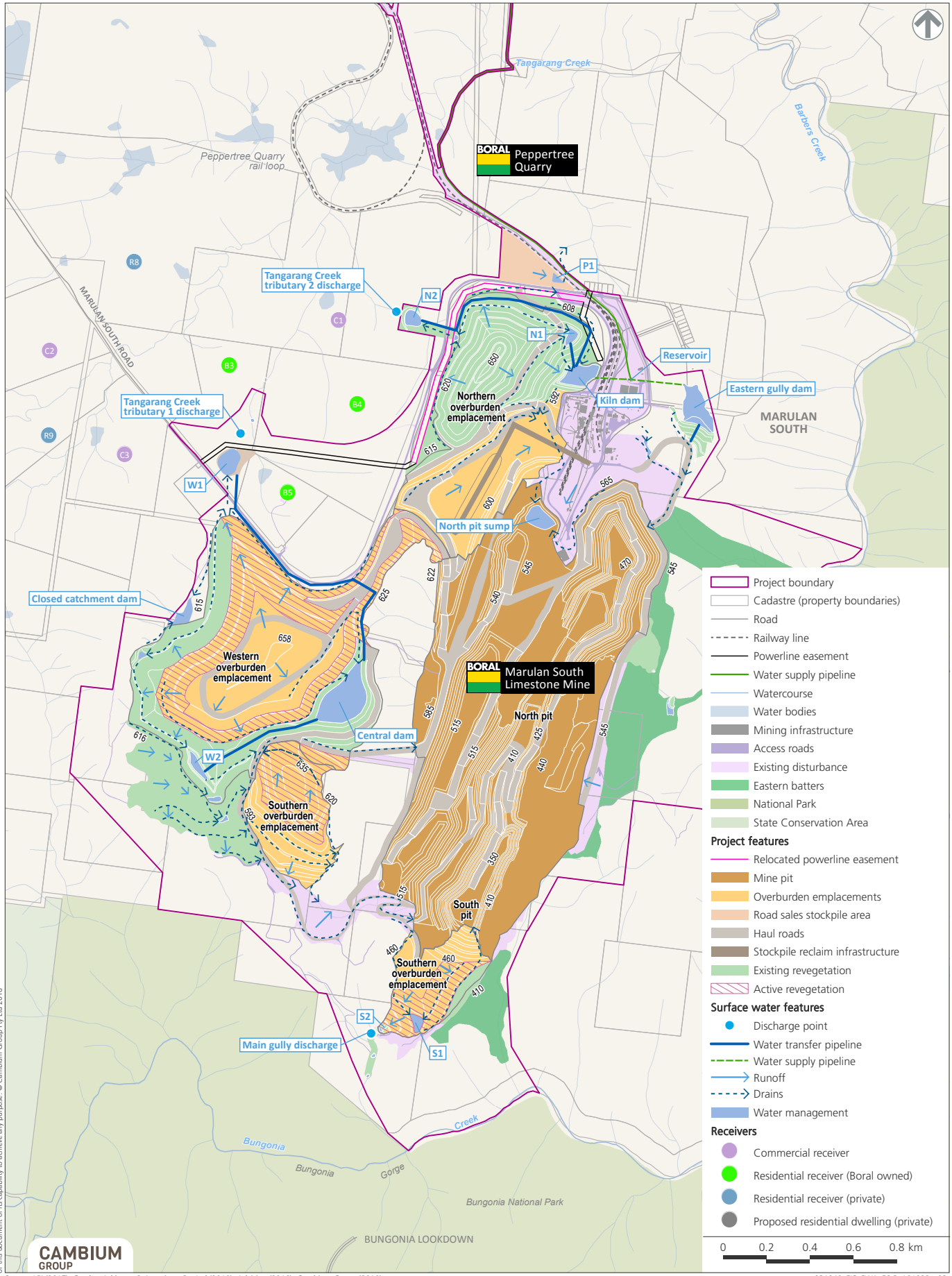
Figure 6.3
Indicative mine layout - Stage 2

MARULAN SOUTH LIMESTONE MINE CONTINUED OPERATIONS - SSD APPLICATION
SURFACE WATER ASSESSMENT



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APPENDIX I

SWOE SEDIMENT DILUTION LETTER REPORT

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1 February 2019

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Boral Land and Property Group
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Dear Rachael

RESPONSE TO SUBMISSION – DAM 1 DILUTION

1 Introduction

This letter provides additional information on the expected dilution of overflows from the sediment basins as a result of rainfall greater than the sediment basins design capacity to support the Peppertree Quarry modification application (06_0074 Mod 5). The modification application includes two (2) additional sediment basins to capture and treat sediment laden water sediment basins prior to discharge into Dam 1.

1.1 Dam 1 description

The main water supply dam for the Peppertree Quarry is Dam 1. The dam is located on Tangarang Creek approximately 2 km upstream of the confluence with Barbers Creek. Tangarang Creek has a total catchment area of 753 ha.

The dam has a capacity of 112 ML, with annual entitlement of 145 ML from the Shoalhaven River Water Source. The dam was originally licenced under the Water Act 1912 (10SL056926), with the licence subsequently converted to Water Access Licence WAL25291 and Water Supply Works Approval 10WA102701, following the commencement of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources in 2011.

Dam 1 currently captures runoff from predominantly open grassland to the west of the dam (catchment area 615 ha) and overflows from Dam K in large storm events (catchment area of 16 ha). The dam has been constructed with an underdrain in the embankment that provides environmental flow to Tangarang Creek of approximately 10% of dam inflows. Dam 1 has a spillway to allow the safe passage of flood waters to Tangarang Creek. The spillway crest is fixed at 592 m AHD.

1.2 Water relevant aspects of the proposed modification

The proposed modification includes the addition of 2 sediment basins, N2 to collect stormwater from the South West Overburden Emplacement (SWOBE) and P2 to collect stormwater from the Western Overburden Emplacement (WOBE). The sediment basins are sized to accommodate the 95th percentile 5-day rainfall event. As detailed in the MOD5 Surface Water Assessment, a site specific value of 52.8mm was determined.

2 Dilution assessment

Advisian has undertaken further analysis to determine the relative inflows to Dam 1 following rainfall events that exceed the design capacity of sediment dams N2 and P2. A water balance model was developed to determine the relative amounts of runoff from catchments and account for water captured in the sediment basins prior to discharge. Runoff is estimated from climate (daily rainfall and potential evaporation) based on the Australian Water Balance Model (AWBM) method.

Mining industry standard AWBM catchment parameters were applied to disturbed catchments, such as overburden emplacements. Locally derived AWBM catchment parameters for the natural catchment upstream of Dam 1 are based on analysis conducted as part of the adjacent Marulan Limestone Quarry. Monte Carlo analysis was undertaken of the 5-day rainfall events from the 1 July 1889 – 30 June 2017 climate record to determine inflow to Dam 1 from the natural catchment and overflows from sediment dams N2 and P2. Dilution is calculated as the sediment dam overflow divided by the Dam 1 inflow.

2.1 Results

Results of the Monte Carlo analysis of the water balance is shown in Figure 2 to Figure 6. The results show the range of overflow from sediment dams from all 5-day rainfall sequences from the 128-year climate record. Sediment Dam N2 overflows in events over 52.8 mm (Figure 1), consistent with the design criteria. In events greater than the 95th percentile, overflow increases with rainfall as shown in Figure 2, up to a maximum of 58 ML. The ratio of natural catchment runoff to sediment dam overflow is highest for events just exceeding the design storm event and decreases as rainfall increases. The ratio of natural catchment runoff to sediment dam overflow for 90 mm rainfall event (99th percentile 5-day total) is at least 40:1 (dilution 2.3%), as shown in Figure 3. The ratio decreases to 24:1 (dilution of 4.1%) for the maximum 5-day rainfall event..

Similarly, Sediment Dam P2 overflows in events over 52.8mm (Figure 4), consistent with the design criteria. In events greater than the 95th percentile, overflow increases with rainfall as shown in Figure 5to a maximum of 24 ML (). The ratio of natural catchment runoff to sediment dam overflow decrease as rainfall increases. The ratio of natural catchment runoff to sediment dam overflow for the 90 mm rainfall event (99th percentile 5-day total) is at least 140:1

(dilution 0.7%), as shown in Figure 6. The ratio decreases to 60:1 (dilution of 1.7%) for the maximum 5-day rainfall event.

The modelling indicates that most rainfall events above the 5-day 95th percentile would cause Dam 1 to fill and commence to spill through the spillway from natural flows alone, but it would depend on the soil moisture conditions and storage in Dam 1 prior to the event. The water held in Dam 1 at the start of the event would provide additional dilution, prior to water discharging from Dam 1 into Tangrang Creek via the dam spillway.

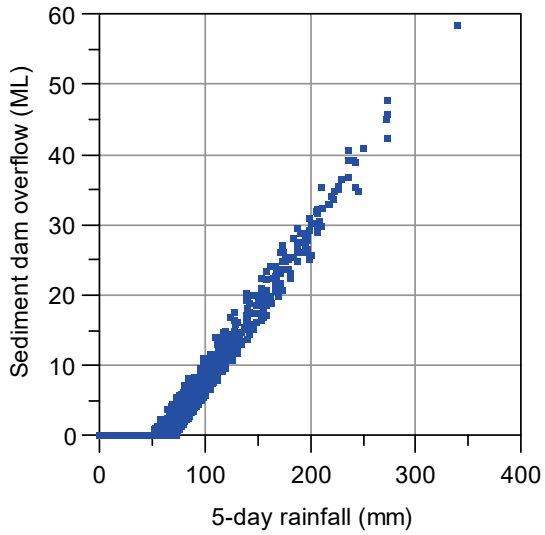


Figure 1 N2 overflow vs 5-day rainfall

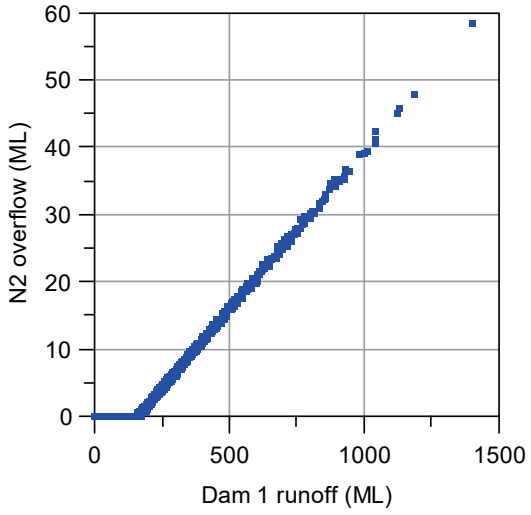


Figure 2 N2 overflow vs Dam 1 runoff

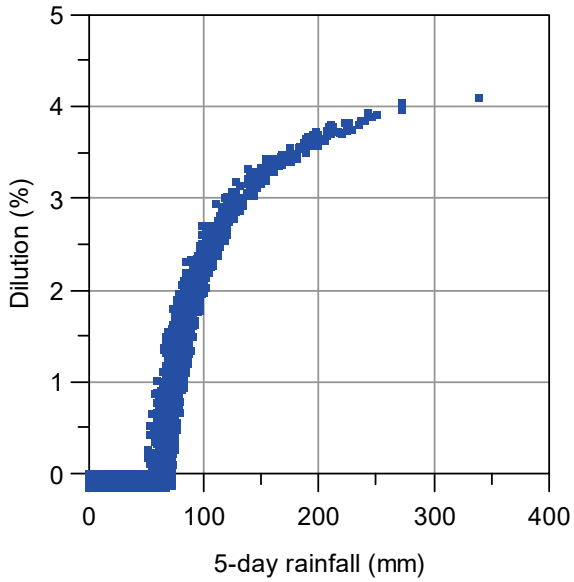


Figure 3 N2 overflow dilution vs 5-day rainfall

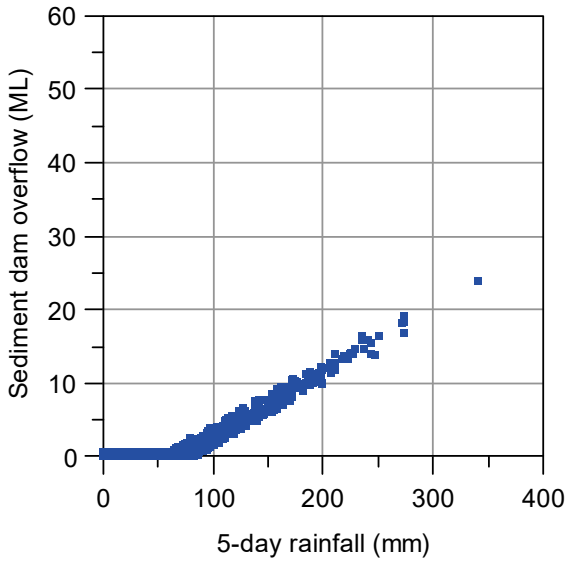


Figure 4 P2 overflow vs 5-day rainfall

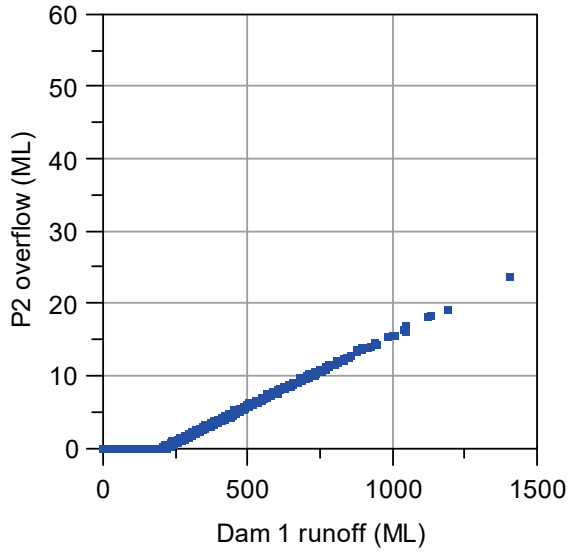


Figure 5 P2 overflow vs Dam 1 runoff

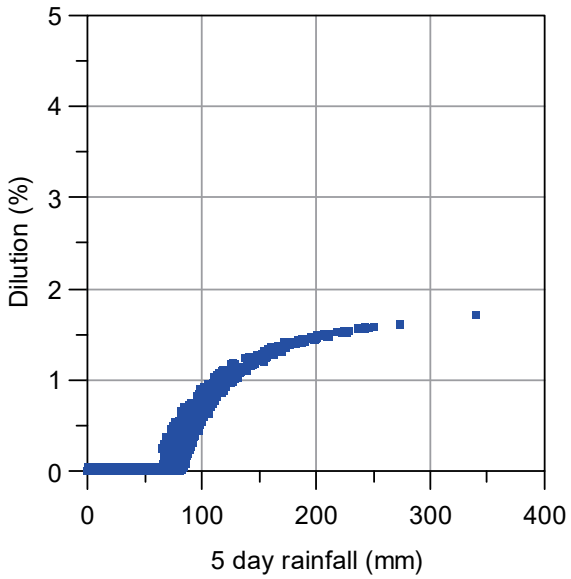
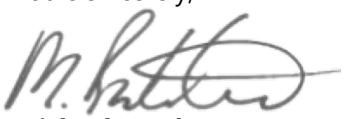


Figure 6 P2 overflow dilution vs 5-day rainfall

3 Conclusion

Water balance modelling of the proposed sediment dams shows that overflows only occur in rainfall events greater than the 95th percentile 5-day event of 52.8mm. In rainfall events greater than the 95th percentile, there is significant natural catchment flows into Dam 1. Modelled indicates that natural catchment runoff is at least 40 times sediment dam N2 overflow and 140 times sediment dam P2 overflow for the 99th percentile rainfall event. Modelled dilution is slightly less in the maximum rainfall, with natural runoff 24 times sediment dam N2 overflow and 60 times sediment dam P2 overflow. Water held in Dam 1 will provide additional dilution during significant rainfall events prior to the dam filling to capacity and overflowing through the dam spillway. Given the high level of dilution and likely elevated suspended solids in natural catchment runoff during rainfall events greater than the 95th percentile, it would be unlikely that overflows from the sediment dams would cause water quality impacts outside the project area.

Yours sincerely,



Michael Butcher

Lead Water Resources Engineer