Appendix 14

Ardmore Park Quarry – Modification 3

Revised Noise Impact Assessment

prepared by

VMS Australia Pty Ltd

(Total No. of pages including blank pages = 94)

October 2018

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23 October 2018

10-1414 Response to EPA Submission 20181023

RW Corkery & Co Pty Limited
Level 1, 12 Dangar Road
BROOKLYN NSW 2083

Attention: **Mr Robert W. Corkery**

Dear Rob

Ardmore Park Quarry - Modification 3
Noise Impact Assessment
Response to EPA Submission

1 Introduction

Further to receipt of comments from the NSW Environment Protection Authority (EPA), dated 1 March 2018, in relation to the review of the Environmental Assessment for the Ardmore Park Quarry Modification 3 (the Project), the *Ardmore Park Quarry Noise Impact Assessment Project Modification 3* dated 19 December 2017 (report reference 10-1414 R1R1 20171219, herein referred to as "2017 NIA") has been revised and presented in *Ardmore Park Quarry Revised Noise Impact Assessment Project Modification 3* dated 23 October 2018 (report reference 10-1414 R1R3 20181023, herein referred to as "Revised NIA") and is attached as **Attachment A**.

The Revised NIA has also been updated to include an assessment under the *Noise Policy for Industry* (NPfI) and consequently additional sections have been added to the NIA report, including Sections 5.2 and 6.2, plus additions to Sections 7.3, 7.4, 7.5 and 9.

Based on the Revised NIA for the Project, the following responses have been prepared to address the comments from the EPA in relation to the 2017 NIA.

2 Response to EPA Comments

2.1 Comment 2

Table 3 in the NIA provides details of noise related complaints recorded by Multiquip. The EPA has provided details to Multiquip of complaints lodged to the NSW Environment Line in November 2013 and August 2016, however these complaints do not appear in Table 3 of the NIA.

- *Recommendation: Update Table 3 in NIA with an accurate register of complaints reported to Multiquip and the EPA.*

VMS AUSTRALIA PTY LTD
ABN: 52 168 418 013
Lot 192 Woods Road WYEE NSW 2259

PO Box 6450 Silverwater NSW 1811
Telephone: 1800 867 000
Email: sydney@vms.com.au
Website: www.vms.com.au

2.1.1 Response to Comment 2

Table 3 of the 2017 NIA has been updated in Table 3 of the Revised NIA to include the complaints received in 2013 and 2016. In addition, complaints received during 2018 have also been included.

2.2 Comment 3

Figure 3 Sensitive Receptor Locations in the NIA appears to indicate that Residence 6 is project related, however the NIA provides calculations for that Residence as if it were not project related. Table 1 of the AQIA indicates that Receptor R6 is a project owned residence.

- *Recommendation: Clarify which sensitive receptors are project related and which are not, as this has implications from a noise perspective in terms of agreed/acceptable impacts.*

2.2.1 Response to Comment 3

It is confirmed that Residence 6 is not Project related (as reflected in Figure 3 of the Revised NIA). Residence 6 has been assessed as a non-project related sensitive receiver throughout the Revised NIA.

2.3 Comment 6

The EPA notes that as part of the modification process, the quarry proposes to extend its operating hours (product transportation) during part of the 'night' period as defined in the NSW Industrial Noise Policy (INP), from 5am to 7am. The EPA notes that the proponent identifies F-class and G-class temperature inversions as a feature of the area according to the methodology in the INP, but does not consider temperature inversions in the NIA due to "the significantly reduced morning shoulder period operations". The EPA disagrees with this approach and believes that as the increased hours of operation specifically occur during the defined night period, temperature inversions should be considered.

- *Recommendation: That the NIA considers temperature inversions.*

2.3.1 Response to Comment 6

The last paragraph in Section 6 of the 2017 NIA has been amended in last paragraph of Section 6.1 of the Revised NIA to identify F-class temperature inversions as being relevant to the assessment of the extended operating hours occurring during the night-time period. Section 6.2 has also been added to the Revised NIA to include weather conditions assessible under the NPfI.

Table 13 and Table 14 have been added to the Revised NIA and present the noise emissions under night-time calm and F-class temperature inversions (ie Project Approval weather conditions) and NPfI noise enhancing weather conditions.

2.4 Comment 7

No prevailing winds were included in the modelling, yet the NIA states in Section 3.4 that there was 'a prevailing south to south-westerly wind' during attended monitoring in response to a complaint. A south to south-westerly wind would enhance the noise levels at some of the identified residential receivers, especially at any sensitive receivers to the north and north-east of the site.

- *Recommendation: That the NIA should be clear on whether any winds are 'prevailing' in accordance with the methodology in the INP.*

2.4.1 Response to Comment 6

The confusing wording in Section 3.4 of the 2017 NIA has been removed in Section 3.4 of the Revised NIA. The finding of no prevailing winds presented in Section 6 of the 2017 NIA remains correct.

2.5 Comment 8

The predicted noise levels for equipment operating in-pit are significantly lower than those calculated by the EPA with a simple distance calculation to R3. The proponent should provide adequate detail on the modelled depth of the equipment operating in the quarry pit, as the EPA cannot verify the modelled results in the NIA without modelling details such as equipment heights/in-pit depths.

- *Recommendation: That the proponent provide adequate detail on the modelled depth of the equipment operating in the pit.*

2.5.1 Response to Comment 8

Two operational scenarios have been assessed in the 2017 NIA / Revised NIA – Basalt extraction and sand extraction.

Figure 4 of the 2017 NIA / Revised NIA shows the basalt extraction operational scenario used in the noise modelling. The elevations of operating equipment are as follows:

- The in-pit basalt crushing equipment and FEL would be operated at 630m AHD.
- The Sand Screening and Washing Plant and FEL would be operated at 640m AHD.
- The Dozer (Dz) operating to the north would be at surface (soil / overburden stripping activities) at approximately 640m AHD.
- The excavator (Ex), dump trucks (DT) and water truck (WT) would commence operations near surface, however, operate at progressively lower elevations. Accordingly, the noise sources have been modelled 5m to 10m below surface (630m to 635m AHD).
- The road trucks (PT) travel at surface which can be identified from the 5m contours on the figure (progressively rising from 635m AHD to 660m AHD).
- The Dry Screening Plant (SP) would operate at 620m AHD.

Figure 5 of the 2017 NIA / Revised NIA shows the sand extraction) operational scenario used in the noise modelling. The elevations of operating equipment are as follows:

- The in-pit basalt crushing equipment and FEL would be operated at 630m AHD.
- The Sand Screening and Washing Plant and FEL would be operated at 640m AHD.
- The Dozer (Dz) operating to the north would be at surface (soil / overburden stripping activities) at approximately 640m AHD.
- The excavator (Ex), dump trucks (DT) and water truck (WT) within the sand extraction area would commence operations near surface, however, operate at progressively lower elevations. Accordingly, the noise sources have been modelled 5m to 10m below surface (620m to 625m AHD).
- The road trucks (PT) travel at surface which can be identified from the 5m contours on the figure (progressively rising from 640m AHD to 660m AHD).
- The Dry Screening Plant (SP) would operate at 620m AHD.

Also, Section 7.3 has been added to the Revised NIA which presents a summary of the Quarry noise model validation against the March 2018 operational noise compliance survey results. Accordingly, the noise predictions have been revised in Section 7.4 of the Revised NIA.

2.6 Comment 9

The EPA notes that some of the proposed equipment appears to have not been included in the modelling. For example, Figures 4 and 5 of the NIA indicate 'front-end loader x 2', however Table 8 indicates only one front-end loader was included in the model. Similarly, the conveyors indicated in Figure 4 (Basalt processing) are also not included in Table 8 of the NIA.

- *Recommendation: That the proponent provide adequate detail on proposed equipment used in the modelling.*

2.6.1 Response to Comment 9

The equipment schedule presented in Table 8 of the 2017 NIA has been revised in Table 9 of the Revised NIA. The sound power level associated with conveyors and conveyor drives has been included into sound power level nominated for the primary piece of equipment feeding the conveyor.

2.7 Comment 10

The EPA notes that although the NIA states "that basalt and sand extraction operations are not undertaken concurrently", there is no discussion on whether sand extraction and basalt extraction can occur simultaneously and if so, what the predicted noise levels will be from the combined operations.

- *Recommendation: That the proponent clarify why sand and basalt extraction cannot occur simultaneously and what management practices would be put in place to ensure this. In the absence of this, the NIA should consider a worst-case scenario of sand and basalt extraction occurring simultaneously.*

2.7.1 Response to Comment 10

Table 12 has been added to the Revised NIA to present the cumulative noise emissions during potential concurrent sand and basalt extraction and night-time product dispatch operations, respectively. Two additional dump trucks have also been added to the equipment schedule presented in Table 9 of the Revised NIA to allow for the concurrent extraction operations.

2.8 Comment 11

The EPA notes that the NIA does not include an assessment of any applicable annoying noise characteristics as per Fact Sheet C of the Noise Policy for Industry.

- *Recommendation: That the NIA include an assessment of annoying noise characteristics and, where necessary, add a correction to the predicted noise levels.*

2.8.1 Response to Comment 11

Section 4 of the INP was withdrawn and the modifying factor adjustments outlined in the EPA's Noise Policy for Industry (2017, NPfI) – Fact Sheet C are to be used when assessing the characteristics of a noise source. Fact Sheet C nominates modifying factor corrections of up to 10 dBA for noise sources that contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, that can cause greater annoyance than other noise at the same noise level.

Based on the Quarry noise surveys conducted to date (refer to Section 3.4 of the 2107 NIA / Revised NIA) the noise emissions from the Quarry site do not contain any annoying noise characteristics. Also, based the complaints received to date (refer to Section 3.5 of the 2107 NIA / Revised NIA) there may have potentially been noise emissions with annoying noise characteristics on one-off occasions which were dealt with promptly and were unusual occurrences. Accordingly, noise emissions from the Quarry do not have annoying noise characteristics and consequently no modifying factor adjustments have been applied to the assessment.

Section 7.3.1 has been added to the Revised NIA to cover modifying factor adjustments.

2.9 Comment 12

The EA describes a proposed 2 metre to 3 metre high visual amenity bund in Section 2.2.4. The NIA does not mention this bund and therefore it is not clear if the modelling in the NIA included the proposed visual amenity bund.

- *Recommendation: The NIA should clarify if the modelling in the NIA included the proposed visual amenity bund.*

2.9.1 Response to Comment 12

The modelling in the 2107 NIA / Revised NIA includes the Visual Amenity Bund Wall. Clarification of the inclusion of bunding within the noise modelling has been added to Section 7.1 of the Revised NIA.

2.10 Comment 13

The EPA notes that the EA states there is a proposed increase in the size of the product trucks to 50 tonnes, in order to increase product transport capacity without increasing the number of truck movements. It is reasonable to expect that there would be a corresponding increase in the sound power level (SWL) of the product trucks given the increase in size. Table 8 of the NIA, however, states that the SWL of the product trucks will be the same as is currently approved.

- *Recommendation: That the NIA include a discussion on the sizes of existing and proposed product trucks and their associated SWLs.*

2.10.1 Response to Comment 13

The proposed larger product trucks to be used at the Quarry are Kenworth or Scania trucks. Based on maximum noise testing result of 82.8 dBA conducted in accordance with Vehicle Standard (Australian Design Rule 83/00 – External Noise) 2005 (ADR 83/00) the sound power level (SWL) of each truck is calculated to be 108 dBA. However, the 2017 NIA adopted a SWL of 113 dBA to conservatively represent the continued use of the lower capacity (higher SWL) trucks or potential underperformance of the trucks. It is noted that the proposed product trucks are larger than the current product trucks, however, the new product trucks are compliant with the United Nations – Economic Commission for Europe Regulation No. 51 *UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES HAVING AT LEAST FOUR WHEELS WITH REGARD TO THEIR NOISE EMISSIONS*, which has very stringent noise emission requirements for trucks and consequently much lower SWLs than would normally be anticipated.

A table to note has been added to Table 9 of the Revised NIA to justify no increase in the truck SWL.

2.11 Comment 14

As noted above, the SWL used for product trucks is unclear. There is also no information about what modelling method/standard was used for noise predictions. Consequently, the EPA is unable to verify the results for the modelling of noise from off-site traffic movements.

- *Recommendation: Additional information must be provided in the NIA.*

2.11.1 Response to Comment 14

The SWL for the product trucks is identified in Table 8 of the 2017 NIA and Table 9 of the Revised NIA.

The calculation of road traffic noise was undertaken using the US Environment Protection Agency's method for the prediction of the L_{Aeq} noise levels for the offset distances to the closest residences adjacent to the Approved Quarry Transport Route.

The US EPA's method for prediction of the L_{Aeq} noise levels from traffic is an internationally accepted theoretical traffic noise prediction model which takes into account the L_{Amax} vehicle noise levels (light and heavy), receiver offset distance, passby duration, vehicle speed, ground absorption (based on the ratio of soft ground and average height of propagation), number of hourly vehicle movements, receiver height, truck exhaust height and the height and location of any intervening barriers.

Section 8.2 of the 2017 NIA has been revised in Section 8.2 of the Revised NIA to include additional information on the modelling method used to predict the road traffic noise emissions.

2.12 Comment 15

To assess the off-site traffic movements in Section 8, the NIA includes the daytime criteria for a freeway/arterial/sub-arterial road from the NSW Road Noise Policy (RNP) of LAeq15hr 60dBA. The EPA notes that both the Project Approval and the Noise Management Plan for the premises include traffic noise criteria of LAeqlhr 55dBA.

- *Recommendation: The proponent should clarify why they have chosen to assess the offsite traffic movements against a different criteria to the limits included in the Project Approval for the site. Alternatively, the NIA should include an assessment of off-site traffic noise against the current Project Approval traffic noise criteria.*

2.12.1 Response to Comment 15

The Project Approval was granted based on a traffic noise assessment undertaken in accordance with the current guideline at the time, the ECRTN. Under the ECRTN, the appropriate assessment criterion at the time was 55 L_{Aeq1hr}. As stated in Section 8.1 of the 2107 NIA / Revised NIA, the ECRTN was replaced by the RNP in July 2011. Accordingly, it is appropriate to update the traffic noise assessment in accordance with the current road noise policy, the RNP. Under the RNP, the appropriate assessment criteria are the $L_{Aeq(period)}$ criteria for principal haulage routes. Notwithstanding, Section 8.1 of the 2107 NIA has been revised Section 8.1 of the Revised NIA to include the Project Approval daytime traffic noise criterion (55 $L_{Aeq(1hour)}$), including the introduction of the corresponding night-time road traffic noise criterion (50 $L_{Aeq(1hour)}$). Further, an assessment against the Project Approval traffic noise criteria has been added to Section 8.4 of the Revised NIA. Note, though not presented in the report, an analysis comparing the $L_{Aeq(period)}$ against the $L_{Aeq(1hour)}$ noise levels found that the $L_{Aeq(1hour)}$ noise levels are typically 1dBA higher than the $L_{Aeq(period)}$ noise levels. Consequently, there is a potential negligible exceedance of up to 0.7 dBA at House Number 989 Jerrara Road during the 6 am to 7 am hour of the morning shoulder period based on the existing 2017 traffic flow data.

2.13 Comment 16

Section 5.3.3.2 of the EA states 'The increased hours of transportation would allow for scheduling to minimise, where practical, truck movements during the following periods

8:00am to 9:00am Monday to Friday during school terms
3:00pm to 4:00pm Monday to Friday during school terms.'

However, Tables 9 to 11 of the EA (and Tables 13 to 16 of the NIA) do not indicate a change in the proposed heavy vehicle movements during those hours.

- *Recommendation: That the NIA clarify truck movement times along the transport route.*

2.13.1 Response to Comment 16

Section 8.3 of the 2017 NIA has been amended in Section 8.3 of the Revised NIA to include reference to scheduling to minimise truck movements during the morning and afternoon school periods. Table 17 has been added to the Revised NIA to provide an illustration of truck movement scheduling under average (88 truck movements), high demand (110 truck movements) and maximum production (124 truck movements) days. The corresponding schedule for high demand and maximum production days (within each month) is also provided.

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Ardmore Park Quarry

Revised Noise Impact Assessment

Project Modification 3

VMS AUSTRALIA

Report Number 10-1414R1

Revision 3

RW Corkery & Co Pty Limited

Level 1, 12 Dangar Road
BROOKLYN NSW 2083

VMS AUSTRALIA PTY LTD
ABN: 52 168 418 013
Lot 192 Woods Road WYEE NSW 2259

PO Box 6450 Silverwater NSW 1811
Telephone: 1800 867 000
Email: sydney@vms.com.au
Website: www.vms.com.au

PREPARED FOR: **RW CORKERY & CO PTY LIMITED**
LEVEL 1, 12 Dangar Road BROOKLYN NSW 2083

PREPARED BY: **VMS Australia Pty Ltd**
Lot 192 Woods Road WYEE NSW 2259
ABN: 52 168 418 013

Quality Management

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10-1414	Revision 3	23 October 2018	Mark Blake	Ryan Wakeling	Mark Blake
10-1414	Revision 2	14 May 2018	Mark Blake	Ryan Wakeling	Mark Blake
10-1414	Revision 1	19 December 2017	Ryan Wakeling	Mark Blake	Mark Blake
10-1414	Final	27 November 2017	Ryan Wakeling	Mark Blake	Mark Blake

This Report by VMS Australia Pty Ltd is prepared for the Client listed above and is based on the objective, scope, conditions and limitations as agreed. The Report presents only the information that VMS Australia Pty Ltd believes, in its professional opinion, is relevant and necessary to describe the issues involved. The Report should not be used for anything other than the intended purpose. All surveys, forecasts, projections, and recommendations contained in or associated with this report are made in good faith and on the basis of information supplied to VMS Australia Pty Ltd at the date of this report, and upon which VMS Australia Pty Ltd relied.

VMS Australia Pty Ltd does not accept any liability or responsibility to any party with respect to the information and opinions contained in this report.

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APPENDICES

1 Introduction

RW Corkery & Co Pty Limited (RWC), on behalf of CEAL Limited Pty Ltd (trading as Multiquip Quarries), has commissioned VMS Australia Pty Ltd (VMS) to conduct a noise impact assessment for the proposed modification of activities at the Ardmore Park Quarry (the Quarry), operated by Multiquip Quarries (Multiquip, the Proponent).

The Quarry was granted Project Approval (PA 07_0155) by the NSW Minister for Planning on 20 September 2009. As part of the Environmental Assessment (EA), a Noise and Vibration Impact Assessment (NVIA) was prepared by Heggies Pty Ltd. The NVIA included several noise mitigation strategies and the noise modelling was performed based on a combined extraction rate of 400,000 tpa for sand and hard rock products. The findings of the NIA indicated that the noise assessment goals could be met at all surrounding residences.

In May 2010, a modification to PA 07_0155 was sought to relocate the quarry access road entrance on Oallen Ford Road by approximately 180 m to the south. A noise assessment found that the revised predicted noise levels remained in compliance with the noise assessment goals at all surrounding residences. The modification was approved on 8 October 2010 (Mod 1).

In June 2013, an application to modify PA 07_0155 was submitted to allow for the transportation of up to 20,000 tpa to local customers via travelling south on Oallen Ford Road from the quarry access road entrance. A noise assessment found that the predicted traffic noise levels could comply with the noise assessment goals at all noise sensitive receivers adjacent to the proposed transport routes. The modification was approved on 11 December 2013 (Mod 2).

Multiquip now proposes to undertake a number of additional modifications to operations at the Quarry, including increasing the production limit from 400,000 tpa to 580,000 tpa, extending the extraction area, extending the hours of transport operations, incorporating additional campaign processing operations, accepting ENM for backfilling the extraction area and extending the quarry life to 2047 (the Modification).

Accordingly, VMS has been engaged to undertake a noise impact assessment (NIA) of the environmental emissions likely to be associated with the Modification. The NIA was completed in November 2017 (2017 NIA) and accompanied an EA for the Modification which was placed on public exhibition between 19 January and 26 February 2018. Following exhibition, and in response to requests for additional information from the Environment Protection Authority (EPA) as well as some changes to the Modification, the NIA has been amended and updated (Revised NIA, this document).

2 Quarry Setting

The Ardmore Park Quarry (the Project Site) is situated at 5152 Oallen Ford Road, approximately 4 km south of the village of Bungonia in the New South Wales Tablelands. **Figure 1** shows the regional setting of the Project Site. **Figure 2** shows the Quarry Layout of the Modification.

2.1 Sensitive Receptors

A number of non-Quarry related residential dwellings are situated in the area surrounding the Project Site. The nearest dwellings were identified as sensitive receptor locations to be taken into account during the assessment of potential noise impacts due to the Modification.

A list of the assessable noise sensitive receivers is provided in **Table 1**.

Figure 3 illustrates the location of the surrounding receptors in relation to the Project Site.

Figure 1 Regional Setting of Ardmore Park Quarry

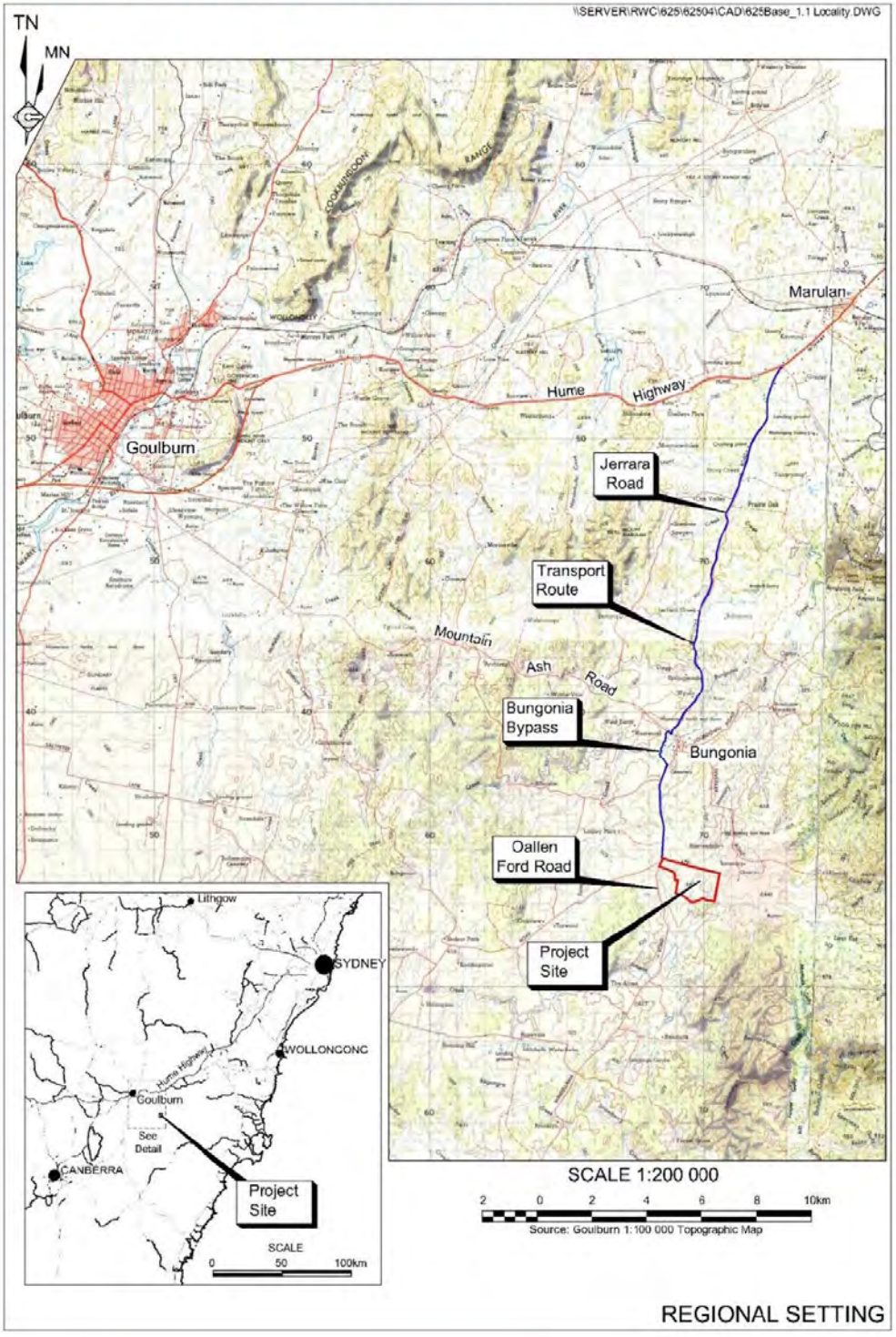


Figure 2 Modified Quarry Layout

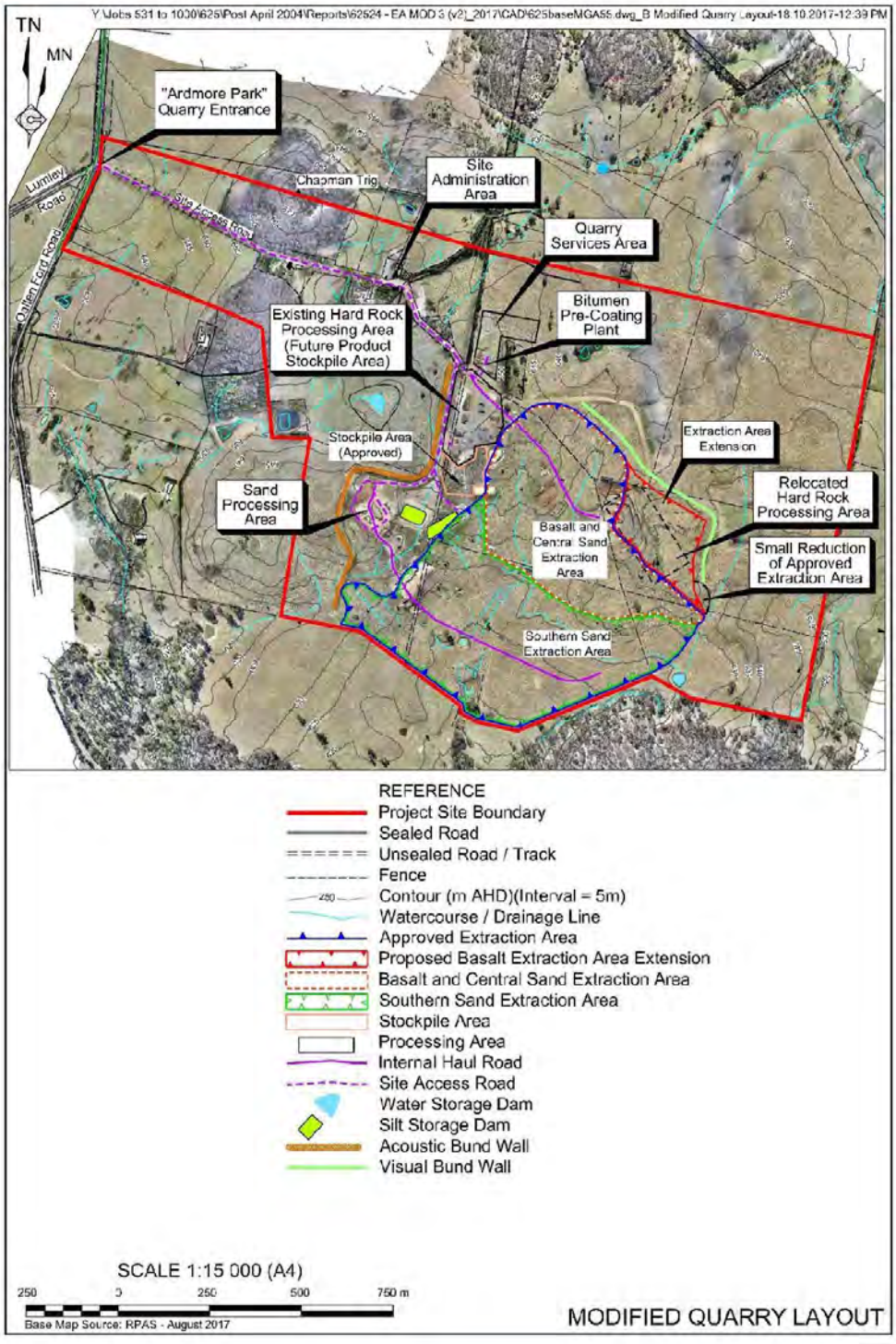


Figure 3 Sensitive Receptor Locations

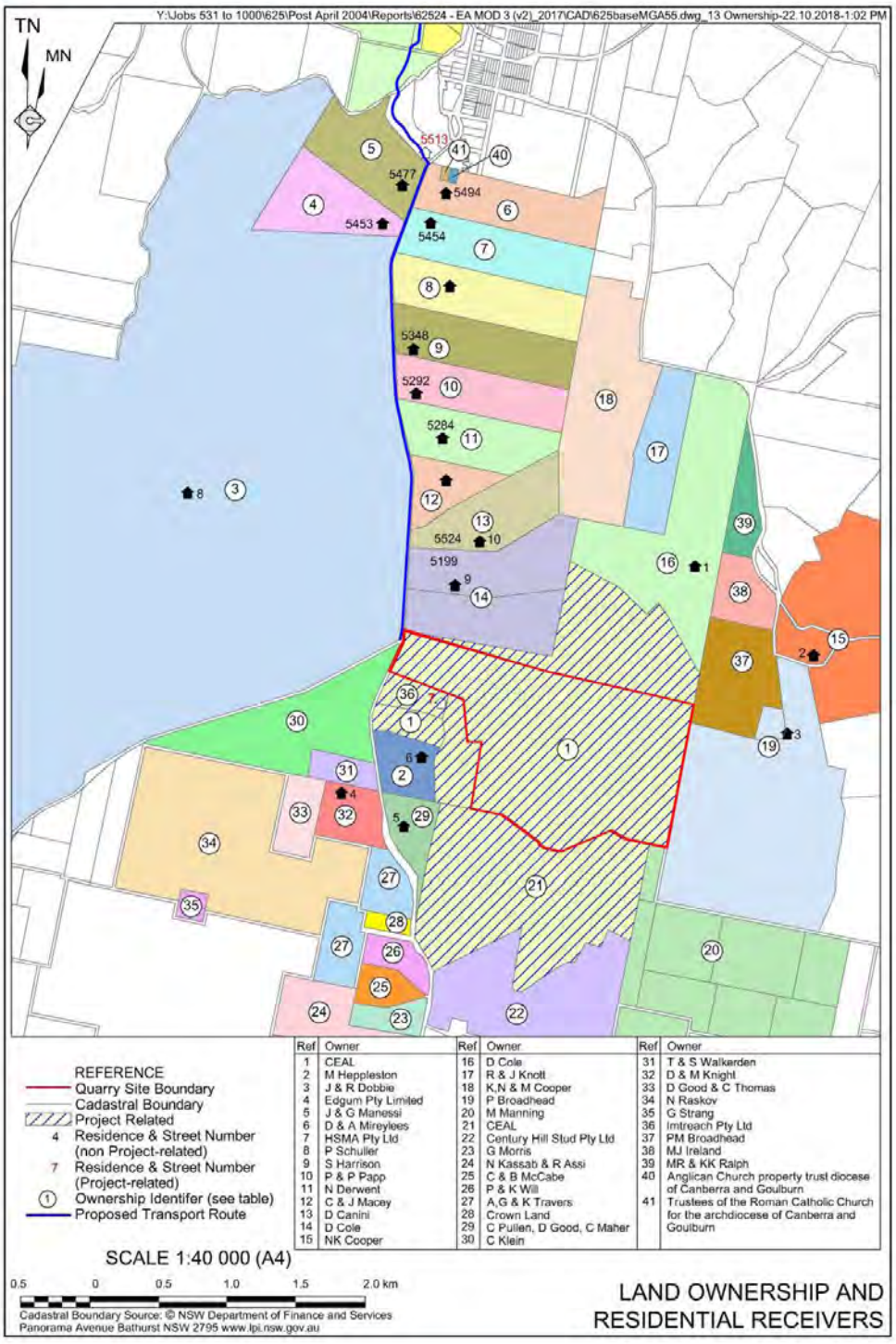


Table 1 Surrounding Sensitive Receptor Locations

Receiver Location	Land Owner	NSW INP Noise Amenity Area
Residence 1	D. Cole	Rural
Residence 2	N.K. Cooper	
Residence 3	P. Broadhead	
Residence 4	D. & M. Knight	
Residence 5	C. Pullen, D. Good & C. Maher	
Residence 6	M. Heppleston	
Residence 7[1]	Multiquip	
Residence 8	J. & R. Dobie	
Residence 9	D. Cole	
Residence 10	D. Canini	

Note 1: This property is Quarry related.

3 Existing Ardmore Park Quarry Operations

3.1 Overview of the Existing Quarry Operations

The Quarry is located approximately 4 km south of the village of Bungonia and is accessed off Oallen Ford Road at the intersection with Lumley Road. A site map showing the layout of the Quarry (Processing Plant and Quarry Extension Areas, currently operating in Southern Sand Extraction Area and Basalt Extraction Area) is presented in **Figure 2**.

The noise bunds required by the Project Approval to attenuate noise transmission from the Quarry activities have been constructed and are approximately 4 m high.

3.2 Existing Project Approval

With respect to noise emissions, Multiquip Quarries has consent to operate the Quarry in accordance with the following approval requirements:

- Project Approval PA 07_0155 (as modified) issued by Minister for Planning dated 20 September 2009 and administrated by the NSW Government Department of Planning (attached as **Appendix A**).
- Environment Protection Licence (EPL) No 13213 issued by the Environment Protection Authority, issued date 21 August 2013.

In addition, NSW Work Cover Dangerous Goods Licences describe noise specifications for individual equipment, for health and safety purposes.

3.3 Noise Mitigation and Management Measures

The Noise Monitoring Programme (NMP) was prepared in accordance with Condition 6, Schedule 3 of the Project Approval requirements. The NMP describes the current noise monitoring and management activities at the Quarry.

3.3.1 Noise Monitoring Programme

The NMP includes a number of noise mitigation measures including the use of Best Achievable Technology together with Best Environmental Management Practices.

In general terms, Best Achievable Technology includes the following engineering based treatments:

- **Source Mitigation**, including variation to the operating method or design and the modification or replacement of plant and equipment.
- **Propagation Path Mitigation**, including the use of barriers (or isolation) in close proximity to the source of emission or at the receiver.
- **Receiver Mitigation**, including permanent treatment of a dwelling to the satisfaction of the occupant.

Best Environmental Management Practices includes the following procedures:

- Siting high noise (or vibration) generating plant and equipment at remote locations.
- Scheduling high noise (or vibration) generating operations to occur during late morning and afternoon only.
- Monitoring, reporting and community liaison programmes.

3.4 Noise Compliance Summary

The NMP requires noise compliance monitoring at the Quarry. Operator-attended noise monitoring is used to assess for compliance against the Project Approval Operational Noise Assessment Criteria.

Operator-Attended Noise Monitoring

Operator-attended noise monitoring undertaken in September 2015 and March 2018 has demonstrated compliance with the Project Approval Operational Noise Assessment Criteria. A summary of the findings of the operator-attended noise compliance monitoring undertaken since the Quarry was approved (20 September 2009) is provided in **Table 2**.

Table 2 Summary of Operated-Attended Noise Compliance Monitoring

Year	Noise Compliance Status	Receiver Location	L_{Aeq} Noise Emission at Receiver
2015	Compliant[1]	Residence 6	27
	Compliant[1]	Residence 9	34
2018	Compliant[2]	Residence 3	<16, <15, <20
	Compliant[2]	Residence 1	<15, <15, <20
	Compliant[2]	Residence 6	<36, <35, <34, <36
	Compliant[2]	Residence 9	<31, <31
	Compliant[2]	5477 Oallen Ford Road	41
	Compliant[2]	328 Jerrara Road	50

Note 1: Noise emission levels were measured under a south to south-westerly wind of 3 m/s to 5 m/s, which are likely to have increased the noise emissions from the Quarry.

Note 2: Noise emission levels were measured under an east to east-south-easterly wind of 4 m/s to 6 m/s, which are likely to have increased the noise emissions from the Quarry.

Onsite Noise Plant and Equipment Noise Emissions

During the September 2015 noise monitoring an onsite noise survey was conducted of the combined mobile crusher and excavator operation. The survey found that the onsite noise emissions (ie Sound Power Levels, SWLs) were approximately 8 dB lower than the corresponding plant SWLs considered in the NIA for the Project Approval.

Performance Against Project NIA

The Project NIA predicted noise emissions of 32 dBA and 31 dBA (under calm conditions) at Residence 6 and Residence 9, respectively. The actual performance of the Quarry is estimated to be approximately 1 dBA to 4 dBA below the Project NIA predicted noise emissions.

3.5 Noise Complaints Summary

Multiquip records any complaints received in accordance with their Environmental Management Strategy and annual reporting requirement for the Quarry, prepared in accordance with Schedule 5, Condition 5 and 5B of the Project Approval. Since operations commenced at the Project Site, Multiquip has been advised of audible noise from the Project Site. A summary of the noise complaints for the period September 2009 to July 2018 is provided in **Table 3**.

Table 3 Register of Noise Related Complaints

Year	Complaints	Complaint Type
2009 - 2012	Nil	-
2013	1 x noise emissions	Complaint from resident of 5094 Oallen Ford Road regarding noise levels. *Multiquip commissioned noise monitoring (not completed until September 2015 due to lack of quarry activity prior to this) which indicated compliance with noise criteria.*
2014	Nil	-
2015	1 x Noise Emissions	Short duration high level events caused by unusual noise enhancing winds, plus low level lulls in background noise caused Quarry to be clearly discernible on occasion. However, the Quarry remained below Project Approval Noise Criteria at all times.
2016	1 x noise emissions (22 August)	Call to EPA complaints line. Notes provided by EPA as follows. *Noise affecting caller at home. Decibels about 50 (alleged) when crushing is occurring. ... . On still days or when easterlies are blowing it sounds like constant thunder. Noise bad for last fortnight. When really bad caller can't hear the television. No more peace and quite in the house yard. Caller has complained direct to the quarry.* Multiquip responded to EPA on 26 August 2016 as follows: *I have been advised that on Tuesday there was no crushing equipment being operated.* *However, on Tuesday our mechanic was conducting Repair and Maintenance on one of the machines for about an hour and it would have involved hammering pins which being metal on metal would have made significant noise and might have been the type of noise that carries. However, it could not have caused both noise and vibration.*

Year	Complaints	Complaint Type
		Our neighbour has raised vibration issues before and we had the issue investigated independently. Considering the geology, and in particular the sand and clay that separates our neighbours property and the crushing operations it is difficult to determine how vibration can carrying such a distance. Neither the residence at Ardmore Park (being used as office) nor the residential property located nearby situated between the crushing area and our neighbours property experience any vibration when crushing is being conducted. So we are a bit of a loss as to what is allowing such vibration to occur.
2017	May 2017 (Noise)	Complaint related to reversing alarm noted at Community Consultative Committee meeting. *Multiquip noted these are a safety requirement, however, they have committed to investigating the use of alternative alarm systems.*
	May 2017 (Vibration)	Complaint raised at May 2017 Community Consultative Committee meeting of excessive vibration. *Multiquip investigated the complaint and confirmed that the Quarry was not operating at the time of the noted vibration.*
	June 2017 (Noise	Noise from a diesel pump operating overnight. *Multiquip ceased overnight pumping.*
2018	19 January	Relayed concerns of a resident of Jerrara Road that a Mack truck was using its engine brakes. *The Proponent instructed the driver to avoid using engine brakes near residences.*
	12 March	Neighbour complained about audible noise at residence. *Proponent determined noise was coming from loose fittings on the scalper. Rectified.*
	15 March	Neighbour complained about noise and dust from quarry. *Proponent assessed activities and visited Quarry Site boundary between the activities and complainant's residence. Minimal dust observed, noise levels deemed typical.*
	April -July 2018	Numerous complaints received from one resident on Inverary Road alleging excessive noise. Numerous investigations by Multiquip found that the noise emissions were not intrusive, although audible at a low level.

The following comments can be made with regard to the noise complaints:

- The noise complaints (prior to 2018) relate to unusual noise enhancing conditions together with lulls in the background noise levels.
- More recently (2018), complaints have been received more regularly from a single neighbour. Noise monitoring has been undertaken which suggests the Quarry is operating compliant with noise criteria (see Section 3.4).

Reportable Incidents

No environmental incidents were reported relating to noise emissions from the Quarry during the period September 2009 to November 2017. Complaints regarding noise were responded to in accordance with the Quarry's Complaint Response Protocol.

4 Proposed Modification to Ardmore Park Quarry Operations

4.1 Existing and Proposed Hours of Operation

The existing and proposed operating hours are summarised in **Table 4**.

Table 4 Existing Quarry and Proposed Modification Hours of Operation

On-Site Operation	Existing Quarry (Approved)	Modification
Construction work	7.00 am to 6.00 pm (Monday to Friday) 8.00 am to 1.00 pm (Saturday)	Unchanged
Quarrying and processing (including overburden removal)	7.00 am to 6.00 pm (Monday to Friday) 7.00 am to 1.00 pm (Saturday)	Unchanged
Product transportation	7.00 am to 6.00 pm (Monday to Friday) 7.00 am to 1.00 pm (Saturday)	5.00 am to 10.00 pm (Monday to Friday) 5.00am to 5.00pm (Saturday)
Other activities[1]	24 hour a day 7 day a week[2]	Unchanged

Note 1: "Other activities" include those activities associated with the extraction operation but exclude other site activities which are the subject to their own approvals and/or licences e.g. workshop activities.

Note 2: According to the Project Approval, the following activities may be carried out at the premises outside the hours specified in **Table 4**.

a) The delivery of materials as requested by Policy or other authorities for safety reasons;
b) Emergency work to avoid the loss of lives, property and/or to prevent environmental harm;
c) Workshop activities and other maintenance work inaudible at the nearest affected receiver.

4.2 Description of the Modification

The increase in production rate will be achieved through increased plant efficiency, product mix and truck upgrades and increased offsite truck movements. Further, mobile fleet numbers operating onsite are expected to remain unchanged.

The proposed Modification operations are shown in **Figure 2**.

The equipment used in the current quarry operations and the proposed quarry Modification operations are summarised in **Table 5**, together with the equipment proposed in original Quarry EA.

Table 5 EA, Existing and Proposed Modification Operations

On-Site Operation	Original Quarry EA	Current Quarry Operations	Modification
Processing Plants	Fixed hard rock processing plant Mobile Processing Plant Sand Washing Plant	Mobile hard rock and Sand Washing Processing Plant only	Addition of: Pre-Coat Plant[1]

On-Site Operation	Original Quarry EA	Current Quarry Operations	Modification
Extraction Area	100t Excavator 70t Excavator D9 CAT Dozer 30t Dump Truck 50t Dump Truck FEL-962 CAT Loading Hopper 12G CAT Grader CAT 773 Water Cart	70t Excavator 45t Excavator 20t Excavator D9 CAT Dozer 2 x 40t Dump Truck FEL-HL770 FEL-WA470 FEL-WA430 CAT 773 Water Cart	Additional 2 40t Dump Trucks considered for concurrent sand and basalt extraction
Extraction Rate	400,000 tpa	Unchanged	580,000 tpa
Off-site Road Transport	Maximum 88 vehicles per day	Unchanged	Maximum 124 vehicles per day

5 Noise Criteria and Noise Affected Receivers

5.1 Project Approval Operational Noise Assessment Criteria

The potentially most noise affected residences are identified in **Table 1**.

The noise criteria nominated in Schedule 3 of the Project Approval (refer to **Appendix B**) are as follows:

Operational Noise Assessment Criteria

2. *The Proponent shall ensure that the noise generated by the project, including the bypass road, does not exceed the noise impact assessment criteria in Table 1 at any residence or on more than 25 per cent of any privately-owned land.*

Table 1: Noise Impact Assessment Criteria

Noise Assessment Location	*Noise Limits $L_{Aeq(15minute)}$*
Residence 1	*35*
Residence 2	*35*
Residence 3	*35*
Residence 4	*35*
Residence 5	*35*
Residence 6	*36*
Residence 8	*35*
Residence 9	*36*
Residence R1	*35*
Residence R2	*35*
Residence R3	*36*

Noise Assessment Location	Noise Limits $L_{Aeq(15minute)}$
Residence R4	35
Residence V1	38
Residence V2	36

Notes:

- *To interpret the locations referred to Table 1, see the figures in Appendix 3.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

5.2 Noise Policy for Industry

The Quarry was originally assessed and approved under the Environment Protection Authority's (EPA's) *NSW Industrial Noise Policy* (INP). However, on October 2017 the EPA released the *Noise Policy for Industry* (NPfI) to replace the now withdrawn INP. In order to ensure an orderly and transparent transition from the INP to the NPfI, the EPA also released the *Implementation and transitional arrangements for the Noise Policy for Industry (2017)* (ITA NPfI) on October 2017. In accordance with the ITA NPfI, it is appropriate to also present an assessment against the NPfI to allow the Department of Planning and Environment (DPE) and EPA to consider the Project noise emissions under the NPfI and to facilitate the modification to the Project Approval and Environment Protection Licence (EPL 13213) for the Project.

Under the NPfI, the Project noise limits are replaced by the Project Noise Trigger Levels.

The Project Noise Trigger Levels (Project Intrusive and Amenity Noise Levels) for the surrounding residential premises are presented in **Table 6**. These criteria are nominated for the purpose of assessing potential noise impacts from the Project in accordance with the NPfI.

The Project Intrusiveness Noise Level essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dBA above the measured Rating Background Level (RBL) or NPfI minimum assumed RBL, over any 15-minute period.

The Project Amenity Noise Level corresponds to the recommended amenity noise level for rural residences presented in Table 2.2 of the NPfI minus 5 dBA.

The night-time sleep disturbance maximum noise level event assessment is required if either of the following trigger level conditions are met:

- $L_{Aeq(15\ minute)}$ > 40 dBA and RBL plus 5 dBA
- L_{AFmax} > 52 dBA and RBL plus 15 dBA

For each assessment period, the more stringent of the project amenity or intrusive noise levels are adopted as the Project Noise Trigger Levels as marked in bold in **Table 6**.

Table 6 NPfI Project Noise Trigger Levels

Receiver	Time of Day	Recommended Amenity Noise Level $L_{Aeq(period)}$	RBL[1] $L_{A90(15minute)}$	Project Noise Trigger Level $L_{Aeq(15minute)}$		Sleep Disturbance Trigger Level	
				Intrusive[1]	Amenity	$L_{A90(15minute)}$	L_{AFmax}
All Surrounding Residences	Day	50	35	**40**	45	-	-
	Evening	45	30	**35**	40	-	-
	Night	40	30	**35**	35	**40**	**52**

Note 1: Minimum assumed RBLs (Rating Background Levels) and corresponding minimum Project Intrusive Noise Levels in accordance with NPfI Table 2.1.

5.3 Voluntary Land Acquisition and Mitigation Assessment Criteria

In addition, the Department of Planning and Environment (DPE) has released the Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments (VLAMP) (2014) which formalises the NSW Government practice in relation to land acquisition and mitigation associated with State Significant Developments. Voluntary mitigation rights would apply where the $L_{Aeq(15minute)}$ noise emission from the Quarry exceed the Project Approval Nosie Limits by 3 dBA or more at any residence on privately owned land. Voluntary Land Acquisition rights would apply where the $L_{Aeq(15minute)}$ noise emission from the Quarry exceed the Project Approval Nosie Limits by more than 5 dBA at any residence on privately owned land.

Further, with regard to vacant land, the VLAMP indicates that the consent authority should grant voluntary land acquisition rights only where the noise generated by the development would contribute exceedances of the recommended maximum noise levels in Table 2.1 of the INP on more than 25% of any privately owned land, and a dwelling could be built on that land under existing planning controls. Based on the VLAMP guidance, the residential rural daytime maximum recommended ($L_{Aeq(11hour)}$) noise amenity level would be 55 dBA.

5.4 Construction Noise Assessment Criteria

It is noted that the Quarry is currently operating and all haul roads, acoustic bunding and fixed plant have been constructed. The Modification includes the introduction and periodic use of mobile processing equipment, with no proposed construction phase to be undertaken. The grading of hardstand areas and the relocation of the mobile processing plant is considered to be part of the normal operations of the Quarry. Accordingly, no construction assessment is required for the Modification.

6 EXISTING METEOROLOGICAL ENVIRONMENT

6.1 Project Approval Assessable Weather Conditions

Section 5.3 of the INP (EPA, 2000) provides the following regarding wind effects:

> *Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season.*

An assessment of prevailing wind conditions was derived from the meteorological data recorded from the onsite meteorological station for the period September 2013 to September 2016. The seasonal wind speeds and directions over the 36 month period (to the end of September 2016) were analysed in accordance with a methodology consistent with the requirements of the INP.

Based on this analysis, the prevailing winds less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30% and considered to be relevant to the Quarry in accordance with the INP, are presented in **Table 7**.

Table 7 Prevailing Wind Conditions in Accordance with the INP

Season	Winds ±45 degrees ≤ 3 m/s with Frequency of Occurrence ≥ 30%		
	Daytime	Evening	Night-Time
Annual	Nil	Nil	Nil
Summer	Nil	Nil	Nil
Autumn	Nil	Nil	Nil
Winter	Nil	Nil	Nil
Spring	Nil	Nil	Nil

Section 5.2 of the INP (EPA, 2000) provides the following regarding temperature inversions:

> *Where inversion conditions are predicted for at least 30% (or approximately two nights per week) of total night-time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment.*

An assessment of atmospheric stability conditions has also been prepared from the meteorological data recorded from the on-site weather station for the period September 2013 to September 2016. The frequency of occurrence of atmospheric stability classes are presented in **Table 8**, together with estimated Environmental Lapse Rates (ELR).

Table 8 Atmospheric Stability Frequency of Occurrence – Winter Evening and Night-Time

Stability Class	Frequency of Occurrence					Estimated ELR °C/100 m	Qualitative Description
	Annual	Summer	Autumn	Winter	Spring		
A	0.0%	0.0%	0.0%	0.0%	0.0%	<-1.9	Lapse
B	0.0%	0.0%	0.0%	0.0%	0.0%	-1.9 to -1.7	Lapse
C	0.0%	0.0%	0.0%	0.0%	0.0%	-1.7 to -1.5	Lapse
D	37.8%	36.5%	33.9%	43.7%	37.1%	-1.5 to -0.5	Neutral
E	25.1%	28.2%	24.2%	19.9%	28.1%	-0.5 to 1.5	Weak inversion
F	18.6%	19.6%	19.8%	16.3%	18.6%	1.5 to 4	Moderate inversion
G	18.6%	15.7%	22.2%	20.1%	16.2%	>4.0	Strong inversion
F+G	37.1%	35.3%	42.0%	36.4%	34.8%	>1.5	Moderate to Strong Inversion

°C = degrees Celsius.

In accordance with the INP, the frequency of occurrence of moderate to strong (ie >1.5°C/100 m inclusive) temperature inversions is greater than 30% during winter in the combined evening and night-time period, and is therefore considered to be a feature of the area. Consequently, it is likely that temperature inversions may be present during the early morning (5am to 7am) loading operations of the product trucks. Accordingly, temperature inversions are considered during the early morning loading operations of the product trucks.

The findings of the weather analysis are consistent with those presented in the NVIA (Heggies, 2008). Accordingly, the assessable weather conditions remain unchanged ie noise limits apply under calm (no wind) conditions only, with the exception of the F-class temperature inversions which apply during the night-time period corresponding to the extended operating hours associated with the product transportation.

6.2 Noise Policy for Industry Assessable Weather Conditions

The NPfI nominates meteorological conditions under which the Project Noise Trigger Levels (and any Project noise limits) will apply, rather than stipulating the noise modelling parameters that must be used in the noise assessment. This is to ensure that compliance against noise requirements in consents and licences are able to be determined under a range of meteorological conditions.

The NPfI nominates both Standard Meteorological Conditions (ie not noise-enhancing) and Noise-Enhancing Meteorological Conditions in Table D1 of the policy. For the purpose of assessing the Quarry under the NPfI, it is appropriate to adopt the NPfI Noise-Enhancing Meteorological Conditions for the modelling parameters, ie source to receiver wind speeds of 3 m/s during the daytime, evening and night-time and F-class temperature inversions with wind speeds up to 2 m/s at night-time.

The NPfI also identifies a noise limit to be adopted in consents and licences for 'very noise-enhancing meteorological conditions' which is set based on the limit derived under standard or noise-enhancing conditions plus 5 dB. This is to ensure that the development is subject to noise limits under all meteorological conditions ie wind speeds up to 5 m/s and temperature inversions up to G-class during all periods.

7 NOISE PREDICTION METHODOLOGY

7.1 Noise Prediction Procedure

The Quarry noise model was prepared using Braunstein and Berndt GmbH SoundPLAN v7.3 Industrial Module, with noise predictions performed by implementing the CONCAWE algorithm.

Noting that basalt and sand extraction operations are not undertaken concurrently, noise modelling of two scenarios (one for basalt extraction and one for sand extraction) was initially undertaken. **Figure 4** and **Figure 5** present the locations of noise sources modelled for these two scenarios. The noise modelling takes into account source sound level emissions and locations, screening effects, receiver locations, meteorological effects, ground topography and noise attenuation due to spherical spreading and atmospheric absorption. Both the Acoustic Bund Wall (4m to 6m high) and the Visual Bund Wall (2m to 3m high) have been included in the modelling. Site topographical data was provided by RWC.

Following exhibition of the EA and NIA, an additional scenario which considers concurrent extraction from the sand and basalt extraction areas has been included. In order to complete this scenario, the mobile equipment located in the two extraction areas shown on **Figure 4** and **Figure 5** were all included as operational noise sources in the model.

Figure 4 Basalt Extraction

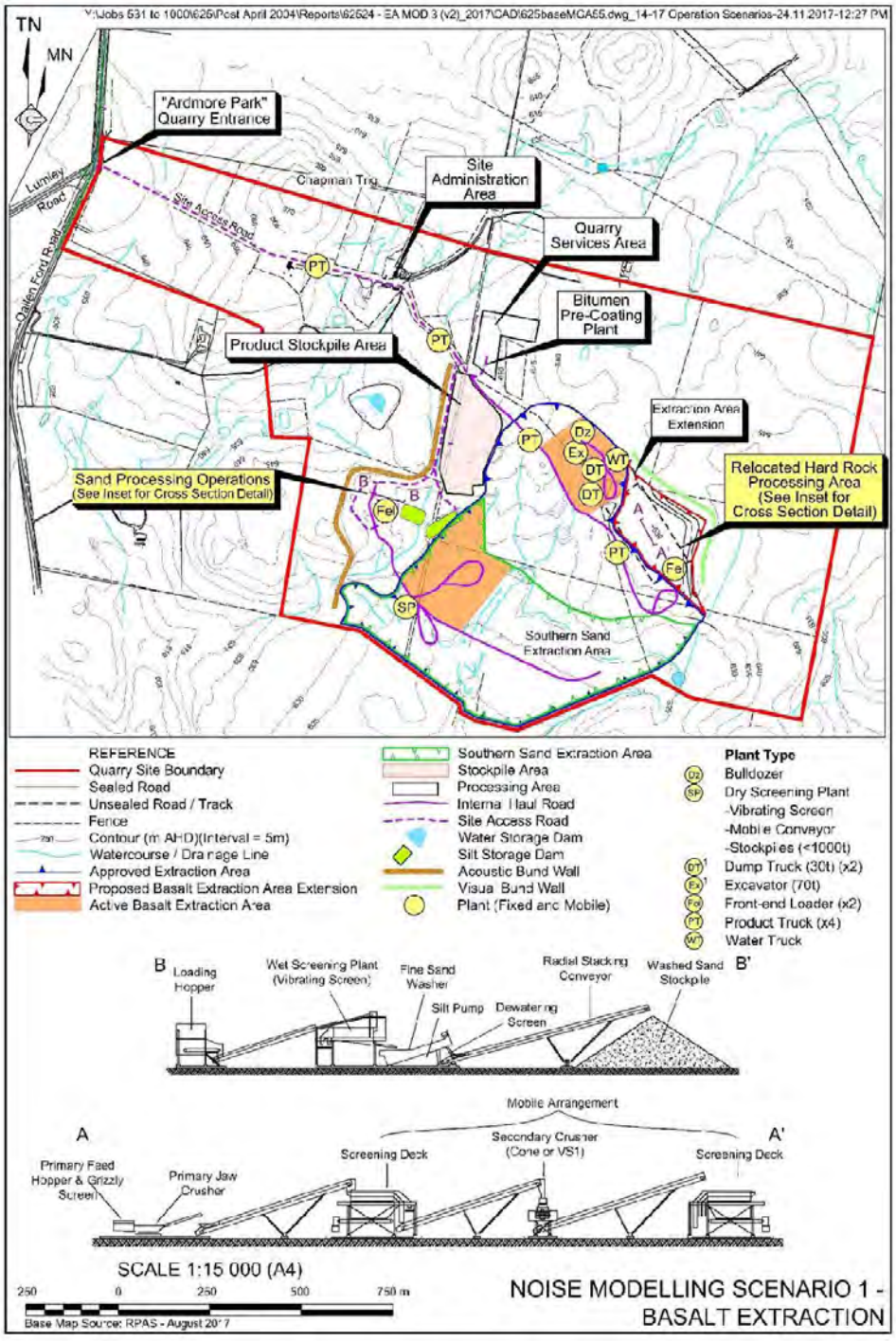
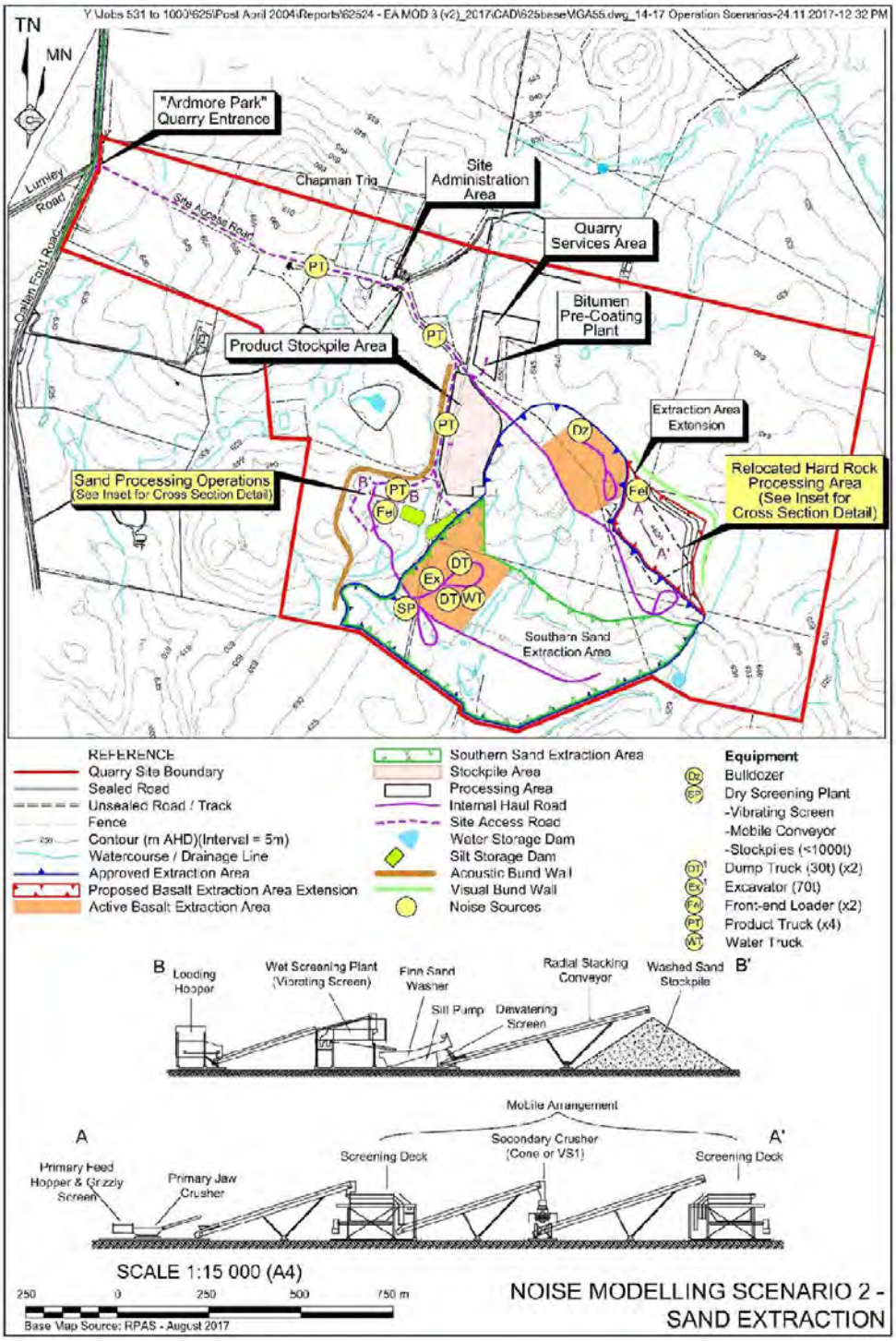


Figure 5 Sand Extraction



7.2 Sound Power Levels

The potential for machinery to emit noise is quantified as the sound power level (SWL) expressed in A-weighted decibels (dBA) re 1 pW. At the receptor, the received noise is quantified as the sound pressure level (SPL) expressed in dBA re 20 µPa. The INP's energy equivalent (L_{eq}) assessment parameters has introduced greater mathematical rigour to the prediction of received noise levels as it enables the use of L_{eq} SWL as noise model inputs. In general terms, any variation in quarry site L_{eq} SWL will produce a similar variation in the $L_{eq(15minute)}$ sound pressure level at the receiver.

Comparative equipment fleets are presented in **Table 9** together with the overall quarry site L_{eq} SWLs from the Quarry as predicted in the NIA, the current as built Quarry, and the proposed Modification.

Table 9 Ardmore Park Quarry NIA, Current as built, and Modification Equipment Fleets

On-Site Operation	Equipment	Quarry NIA (Approved)		Current Quarry Operation (Approved)		Modification	
		No of Items	SWL	No of Items	SWL per item	No of Items	SWL per item
Mobile Fleet	Excavator - 100t	1	110	-	-	-	-
	Excavator - 70t	1	112	1	110[1]	1	110[1]
	Excavator - 45t	-	-	1	110	1[2]	110
	Excavator - 20t	-	-	1	110	1[2]	110
	Excavator - 20t - hammer	-	-	1	119	1	119
	Dozer - D9 CAT	1	114	1	114	1	114
	Dump Truck - 30t	1	116	-	-	-	-
	Dump Truck - 40t	-	-	2	117	4[3]	117
	Dump Truck - 50t	1	118	-	-	-	-
	FEL - CAT 962	1	112	-	-	-	-
	FEL - HL770	-	-	1	112	1	112
	FEL – WA470	-	-	1	112	1	112
	FEL – WA430	-	-	1	112	1	112
Support Fleet	Grader - CAT 12G	1	114	-	-	-	-
	Scraper – CAT 637	-	-	1	114	1	114
	Water Cart - CAT 773	1	116	1	116	1	116
Product Fleet	Product Truck - 38t	4	113	4	113	-	-
	Product Truck - 50t	-	-	-	-	4	113[4]
Hard Rock Processing Plant	Grizzly Screen – enclosed	1	110	-	-	-	-
	Primary Feed Hopper	1	104	-	-	-	-
	Primary Jaw Crusher	1	113	-	-	-	-
	Enclosed Vibrating Screen	1	100	-	-	-	-
	Secondary Cone Crusher	1	108	-	-	-	-
	Tertiary Cone Crusher	1	102	-	-	-	-
	Quaternary Cone Crusher	1	99	-	-	-	-

On-Site Operation	Equipment	Quarry NIA (Approved)		Current Quarry Operation (Approved)		Modification	
		No of Items	SWL	No of Items	SWL per item	No of Items	SWL per item
	Secondary Feed Hopper	1	104	-	-	-	-
	Conveyor Drives	1	91	-	-	-	-
Hard Rock Processing Plant	Jaw Crusher	-	-	1	110	1	110
	Scalper	-	-	1	106	1	106
	Cone Crusher			1	108	1	108
	Screen	-	-	1	114	1	114
	Precision Stacker	-	-	1	98	1	98
Sand Washing Plant	Primary Feed Hopper	1	104	-	-	-	-
	Wet Screening Plant	1	108	-	-	-	-
	Silt Pump	1	97	-	-	-	-
	Fine Sand Washer	1	108	-	-	-	-
	De-watering Screen	1	114	-	-	-	-
	Radial Stacking Conveyor Drive	1	91	-	-	-	-
	Conveyor Drives	1	91	-	-	-	-
Sand Washing Plant	Screen and Feeder	-	-	1	104	1	104
	Sand Wash Plant	-	-	1	108	1	108
	Precision Screen Stacker	-	-	1	114	1	114
	Generator	-	-	1	89	1	89
Mobile Plant	Mobile Crusher & Screen	1	128	1	120[1]	-	-
	Dry Screening Plant	-	-	1	114	1	114
Pre-Coat Plant	Mobile Pre-Coat Plant	-	-	-	-	1	114
Total		**29**	**130**	**27**	**128**	**28**	**128**

Note 1: SWL based on latest measured on-site plant noise levels (15 September 2015).

Note 2: More than one excavator only required if both basalt and sand extraction are undertaken concurrently.

Note 3: Two additional dump trucks would be required if both basalt and sand extraction are undertaken concurrently.

Note 4: The SWL of the larger trucks is not expected to be greater than the currently approved smaller capacity trucks due to the use of trucks which are compliant with the United Nations – Economic Commission for Europe Regulation No. 51.

As shown above, the overall maximum sound power levels of the Modification (128 dBA) is the same as the current Project Site sound power level. However, the introduction of a low noise mobile processing plant and quieter excavator since the commencement of the Quarry operations has resulted in a minor (2 dBA) total site sound power level reduction by comparison with the approved Quarry NIA operations.

7.3 Noise Model Validation

A noise model validation process was undertaken to calibrate the Quarry noise model against the measured noise emission performance of the Quarry. The validation process included modifying the Quarry noise model to represent the weather and operating conditions at the time of the March 2018 noise compliance survey, SWLs presented in **Table 9**, number and location of operating plant and equipment and current ground topography.

7.3.1 Modifying Factor Adjustments

Section 4 of the INP was withdrawn and the modifying factor adjustments outlined in the EPA's Noise Policy for Industry (2017, NPfI) – Fact Sheet C are to be used when assessing the characteristics of a noise source. Fact Sheet C nominates modifying factor corrections of up to 10 dBA for noise sources that contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, that can cause greater annoyance than other noise at the same noise level.

Based on the Quarry noise surveys conducted to date (refer to **Section 3.4**) the noise emissions from the Quarry site do not contain any annoying noise characteristics. Also, based the complaints received to date (refer to **Section 3.5**) there may have potentially been noise emissions with annoying noise characteristics on one-off occasions which were dealt with promptly and were unusual occurrences. Accordingly, noise emissions from the Quarry do not have annoying noise characteristics and consequently no modifying factor adjustments have been applied in this assessment.

7.4 Operational Noise Assessment

7.4.1 Daytime Operations

Based on the SWLs presented in **Table 9**, the predicted Modification $L_{Aeq(15minute)}$ intrusive noise emissions at the nearest receivers are presented in **Table 10** to **Table 12** for daytime operations under calm weather conditions, together with the corresponding Project Approval noise limits and a statement of compliance. Also shown in the tables are the predicted noise emissions under the NPfI Noise Enhancing Weather Conditions, together with the corresponding NPfI Project Noise Trigger Levels and a statement of compliance.

Table 10 Predicted Daytime Noise Emissions - Basalt Extraction Area

Residences	Modification $L_{Aeq(15minute)}$ (INP Prevailing Conditions)	Project Approval $L_{Aeq(15minute)}$ Noise Limit	Assessment Against Project Approval	Modification $L_{Aeq(15minute)}$ (NPfI Noise Enhancing Weather Conditions)	NPfI Project Noise Trigger Level $L_{Aeq(15minute)}$	Assessment Against NPfI
Residence 1	28	35	Complies	35	40	Complies
Residence 2	26	35	Complies	33	40	Complies
Residence 3	28	35	Complies	35	40	Complies
Residence 4	31	35	Complies	38	40	Complies
Residence 5	32	35	Complies	38	40	Complies
Residence 6	35	36	Complies	40	40	Complies
Residence 8	21	35	Complies	29	40	Complies
Residence 9	36	36	Complies	41	40	1 dB above
Residence 10	35	35	Complies	40	40	Complies

Table 11 Predicted Daytime Noise Emissions - Sand Extraction Area

Residences	Modification $L_{Aeq(15minute)}$ Intrusive Noise Emission	Project Approval $L_{Aeq(15minute)}$ Noise Limit	Assessment Against Project Approval	Modification $L_{Aeq(15minute)}$ (NPfI Noise Enhancing Weather Conditions)	NPfI Project Noise Trigger Level $L_{Aeq(15minute)}$	Assessment Against NPfI
Residence 1	28	35	Complies	35	40	Complies
Residence 2	26	35	Complies	33	40	Complies
Residence 3	29	35	Complies	35	40	Complies
Residence 4	32	35	Complies	38	40	Complies
Residence 5	33	35	Complies	38	40	Complies
Residence 6	35	36	Complies	40	40	Complies
Residence 8	21	35	Complies	28	40	Complies
Residence 9	35	36	Complies	40	40	Complies
Residence 10	34	35	Complies	39	40	Complies

Table 12 Predicted Daytime Noise Emissions - Cumulative Operations

Residences	Modification $L_{Aeq(15minute)}$ Intrusive Noise Emission	Project Approval $L_{Aeq(15minute)}$ Noise Limit	Assessment Against Project Approval	Modification $L_{Aeq(15minute)}$ (NPfI Noise Enhancing Weather Conditions)	NPfI Project Noise Trigger Level $L_{Aeq(15minute)}$	Assessment Against NPfI
Residence 1	29	35	Complies	36	40	Complies
Residence 2	27	35	Complies	34	40	Complies
Residence 3	30	35	Complies	36	40	Complies
Residence 4	33	35	Complies	39	40	Complies
Residence 5	34	35	Complies	40	40	Complies
Residence 6	35	36	Complies	40	40	Complies
Residence 8	21	35	Complies	29	40	Complies
Residence 9	36	36	Complies	41	40	1 dB above
Residence 10	35	35	Complies	39	40	Complies

7.4.2 Night-time Operations

Based on the SWLs presented in **Table 9**, the predicted Modification $L_{Aeq(15minute)}$ intrusive noise emissions at the nearest receivers are presented in **Table 13** to **Table 14** for night-time operations under calm and F-class temperature inversion weather conditions, together with the corresponding Project Approval noise limits and a statement of compliance. Also shown in the tables are the predicted noise emissions under the NPfI Noise Enhancing Weather Conditions, together with the corresponding NPfI Project Noise Trigger Levels and a statement of compliance.

Table 13 Predicted Night-time Noise Emissions - Basalt Product Area

Residences	Modification $L_{Aeq(15minute)}$ Intrusive Noise Emission		Project Approval $L_{Aeq(15minute)}$ Noise Limit	Assessment Against Project Approval	Modification $L_{Aeq(15minute)}$ (NPfI Noise Enhancing Weather Conditions)	NPfI Project Noise Trigger Level $L_{Aeq(15minute)}$	Assessment Against NPfI
	Calm	Inversion					
Residence 1	21	27	35	Complies	28	35	Complies
Residence 2	18	25	35	Complies	25	35	Complies
Residence 3	21	27	35	Complies	28	35	Complies
Residence 4	23	29	35	Complies	30	35	Complies
Residence 5	23	29	35	Complies	30	35	Complies
Residence 6	28	32	36	Complies	34	35	Complies
Residence 8	15	23	35	Complies	23	35	Complies
Residence 9	29	34	36	Complies	35	35	Complies
Residence 10	28	32	35	Complies	34	35	Complies

Table 14 Predicted Night-time Noise Emissions - Sand Product Area

Residences	Modification $L_{Aeq(15minute)}$ Intrusive Noise Emission		Project Approval $L_{Aeq(15minute)}$ Noise Limit	Assessment Against Project Approval	Modification $L_{Aeq(15minute)}$ (NPfI Noise Enhancing Weather Conditions)	NPfI Project Noise Trigger Level $L_{Aeq(15minute)}$	Assessment Against NPfI
	Calm	Inversion					
Residence 1	20	25	35	Complies	26	35	Complies
Residence 2	16	22	35	Complies	22	35	Complies
Residence 3	18	24	35	Complies	24	35	Complies
Residence 4	24	29	35	Complies	30	35	Complies
Residence 5	23	27	35	Complies	28	35	Complies
Residence 6	30	34	36	Complies	34	35	Complies
Residence 8	16	22	35	Complies	22	35	Complies
Residence 9	32	35	36	Complies	36	35	1 dB above
Residence 10	31	34	35	Complies	34	35	Complies

7.5 Summary of Operational Noise Results

7.5.1 Project Approval Noise Limits

The predicted noise levels show that, subject to operations being undertaken in accordance with the scenarios modelled and the implementation of the proposed noise management measures, the Modification would comply with the current Project Approval noise limits at all residences. The noise levels at all identified receivers are expected to remain approximately the same as the current operations.

7.5.2 NPfI Project Noise Trigger Levels

When Noise Enhancing Weather Conditions were modelled and compared to the NPfI Project Noise Trigger Levels, compliance with the day time trigger levels is predicted at all but Residence 9 (1 dB exceedance) under the cumulative sand and basalt extraction scenario. For night time operations, compliance is predicted when product loading is from the basalt product stockpiles and at all but Residence 9 when loading is from the sand product stockpiles (1 dB exceedance).

7.5.3 Voluntary Land Acquisition and Mitigation Assessment

Both the Voluntary Acquisition and Voluntary Mitigation Criteria are complied with at all residences on privately owned land. Further, the $L_{Aeq(15minute)}$ noise level from the Modification is not anticipated to exceed 55 dBA beyond the Project Site Boundary. Accordingly, the 55 dBA $L_{Aeq(11hour)}$ noise emission level from the Modification is anticipated to be well below 25% of land area of all privately owned land and therefore not trigger the Voluntary Land Acquisition Criteria.

8 OFF-SITE ROAD TRANSPORT NOISE

8.1 Traffic Noise Criteria

The noise criteria nominated in Schedule 3 of the Project Approval (refer to **Appendix B**) are as follows:

Traffic Noise Impact Assessment Criteria

3. *The Proponent shall take all reasonable and feasible measures to ensure that the traffic noise generated by the project (after commencement of quarrying operations) does not exceed the traffic noise impact assessment criteria in Table 2.*

Table 2: Traffic noise criteria dB(A) $L_{Aeq\ (1\ hour)}$

Roads	*Day/Evening*
Oallen Ford Road *Mountain Ash Road* *Jerrara Road* *Tarago Road* *Windellama Road*	*55*

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in the EPA's Environmental Criteria for Road Traffic Noise.

It is noted that the Project Approval was granted based on the EA NIA road traffic noise assessment based on the EPA's 'Environmental Criteria for Road Traffic Noise' (ECRTN) policy for vehicle movements on a local road. On this basis, under the ECRTN policy, the appropriate road traffic noise criterion for vehicle movements proposed to occur during the night-time period (10pm to 7am) would be 50 dBA $L_{Aeq(1hour)}$.

However, the ECRTN was replaced by the EPA's NSW Road Noise Policy (NSW RNP) in July 2011. Accordingly, the NSW RNP is now the relevant policy for the assessment of road noise in NSW, replacing the ECRTN policy that was originally utilised within the EA NIA.

The NSW RNP adopts a classification scheme for assessing noise impacts on an existing road network from additional traffic generated by a development as presented in **Table 15**. Due to the designation of the Approved Quarry Transport Route classification of 'principal haulage route' the appropriate assessment criteria for the Modification are the $L_{Aeq(period)}$ criteria presented in **Table 15**.

Table 15 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road	Type of Project and Land Use	Total Traffic Noise Criteria[1,3]	Relative Increase Criteria[2,3]
Oallen Ford Road Bungonia By-pass Mountain Ash Road Jerrara Road Tarago Road Windellama Road	Existing residences affected by additional traffic on existing freeways, arterial and subarterial roads and principal haulage routes generated by land use development.	Daytime 60 $L_{Aeq(15hour)}$	Existing $L_{Aeq(15hour)}$[4] plus 12 dBA
		Night-time 55 $L_{Aeq(9hour)}$	Existing $L_{Aeq(9hour)}$[4] plus 12 dBA

Note 1: Total traffic noise level from the approved quarry operations and Modification related traffic for comparison with the criteria.
Note 2: Relative increase noise level generated by the Modification for comparison with the criteria.
Note 3: Daytime 0700 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.
Note 4: Where the existing $L_{Aeq(period)}$ road traffic noise level is found to be less than 30 dBA, it is deemed to be 30 dBA.

In relation to situations where exceedances of the road traffic noise assessment criteria are predicted, the NSW RNP relevantly provides:

> *Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.*
>
> *In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.*
>
> ...
>
> *For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.*

In practice, noise level increases of less than 2 dBA are generally achieved when the Project-related percentage increase to the existing light and heavy traffic is no greater than 60%.

8.2 Traffic Noise Assessment Methodology

The NSW Road Noise Policy describes a number of process steps for applying the criteria. In general accordance with these steps, this assessment has:

- Identified a study area, which has been defined as the transport route between the quarry access road entrance on Oallen Ford Road and Hume Highway (refer to **Figure 6**).
- All receivers (ie residences and other sensitive land uses) in the vicinity of the study area have been identified (refer to **Figure 7**).
- Calculated noise levels associated with existing traffic and Project-related traffic and compared the predicted increase against the Relative Increase Criteria (**Table 15**).
- Compared predicted noise levels against the Total Traffic Noise Criteria (**Table 15**).

The US Environment Protection Agency's method (EPA Report 550/9-74-004, modified based on equations in Appendix A-13 and Calculation of Road Traffic Noise algorithm (CoRTN) amendments) has been used for the prediction of the L_{Aeq} noise levels for the offset distances to the closest residences adjacent to the Approved Quarry Transport Route.

The US EPA's method for prediction of the L_{Aeq} noise levels from traffic is an internationally accepted theoretical traffic noise prediction model which takes into account the L_{Amax} vehicle noise levels (light and heavy), receiver offset distance, passby duration, vehicle speed, ground absorption (based on the ratio of soft ground and average height of propagation), number of hourly vehicle movements, receiver height, truck exhaust height and the height and location of any intervening barriers.

8.3 Traffic Movements

The posted speed limit along the approved transport route is presented in **Table 16**, together with the maximum truck speed committed to by the Proponent and the range of offset distances to the non-Quarry related residences.

Table 16 Approved Transport Route Speed Limits

Road	Design Speed Limit	Truck Speed Limit	Off Set Distance to Residences	
			Nearest	Farthest
Oallen Ford Road	100 km/h	80 km/h	50 m	290 m
Bungonia By-pass	N/A	60 km/h	400 m	600 m
Mountain Road	50 km/h	50 km/h	N/A	N/A
Jerrara Road	100 km/h	80 km/h	35 m	350 m

The Modification includes increased hours of transportation to allow for allow for both increased quarry production and scheduling to minimise, where practical, truck movements during the periods 8:00 am to 9:00 am and 3:00 pm to 4:00 pm during school days. The Proponent has identified a number of scheduling options which are summarised in **Table 17**.

The existing 2006 traffic movements on Oallen Ford Road and Jerrara Road were reported in the EA. Subsequently, in the 2013 the traffic movements on Oallen Ford Road were updated and reported in the Mod 2 Environmental Assessment. A comparison of the 2008 and 2013 traffic on Oallen Ford Road found that the traffic volume had increased by 20%. A comparable growth rate of the traffic volume on Jerrara Road has been assumed. Accordingly, the approved Quarry, existing (2013) traffic movements and the proposed maximum hourly truck movements associated with the Modification product transport operations are presented in **Table 18** and **Table 19** for Oallen Ford Road and Jerrara Road, respectively.

Figure 6 Quarry Transport Route

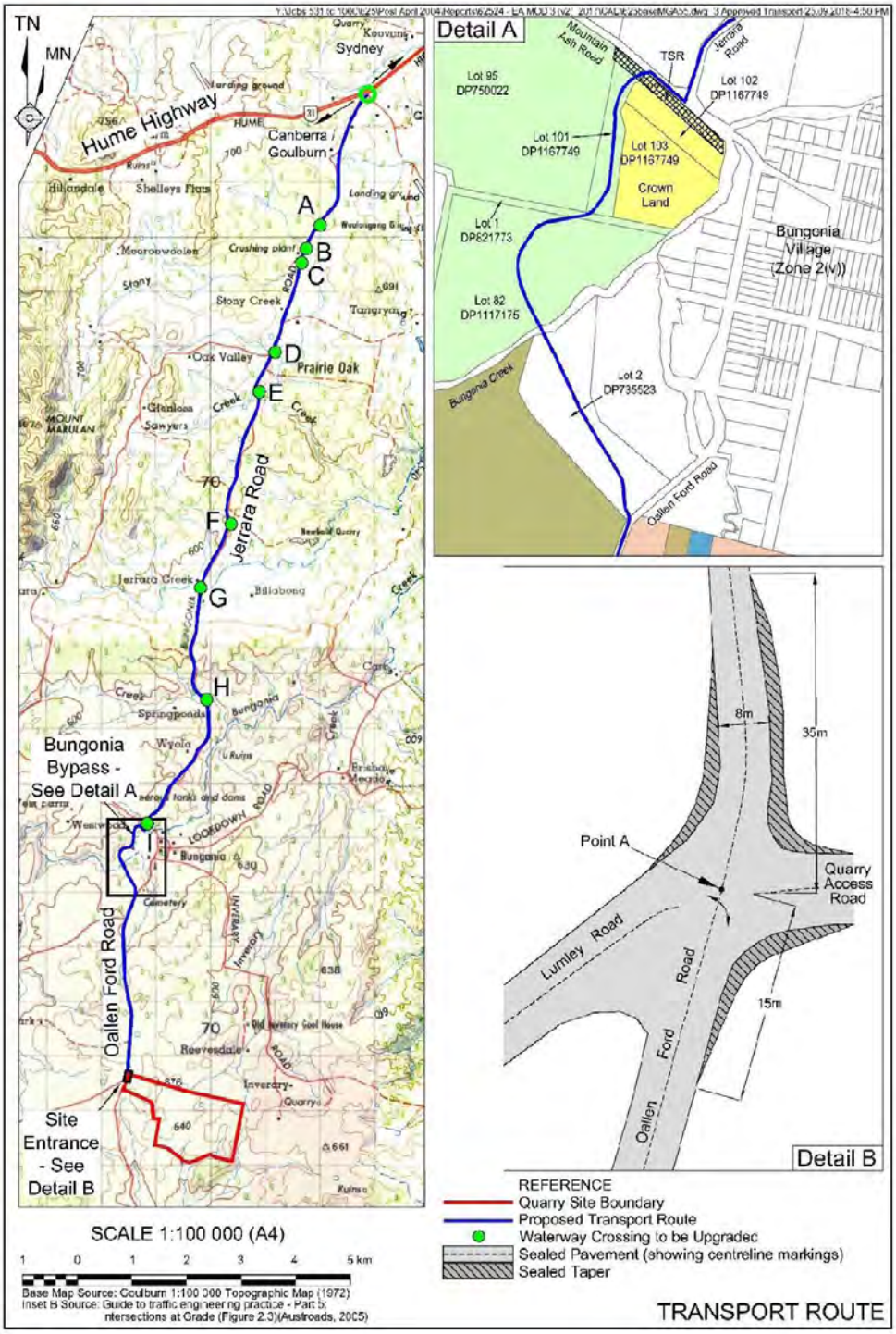
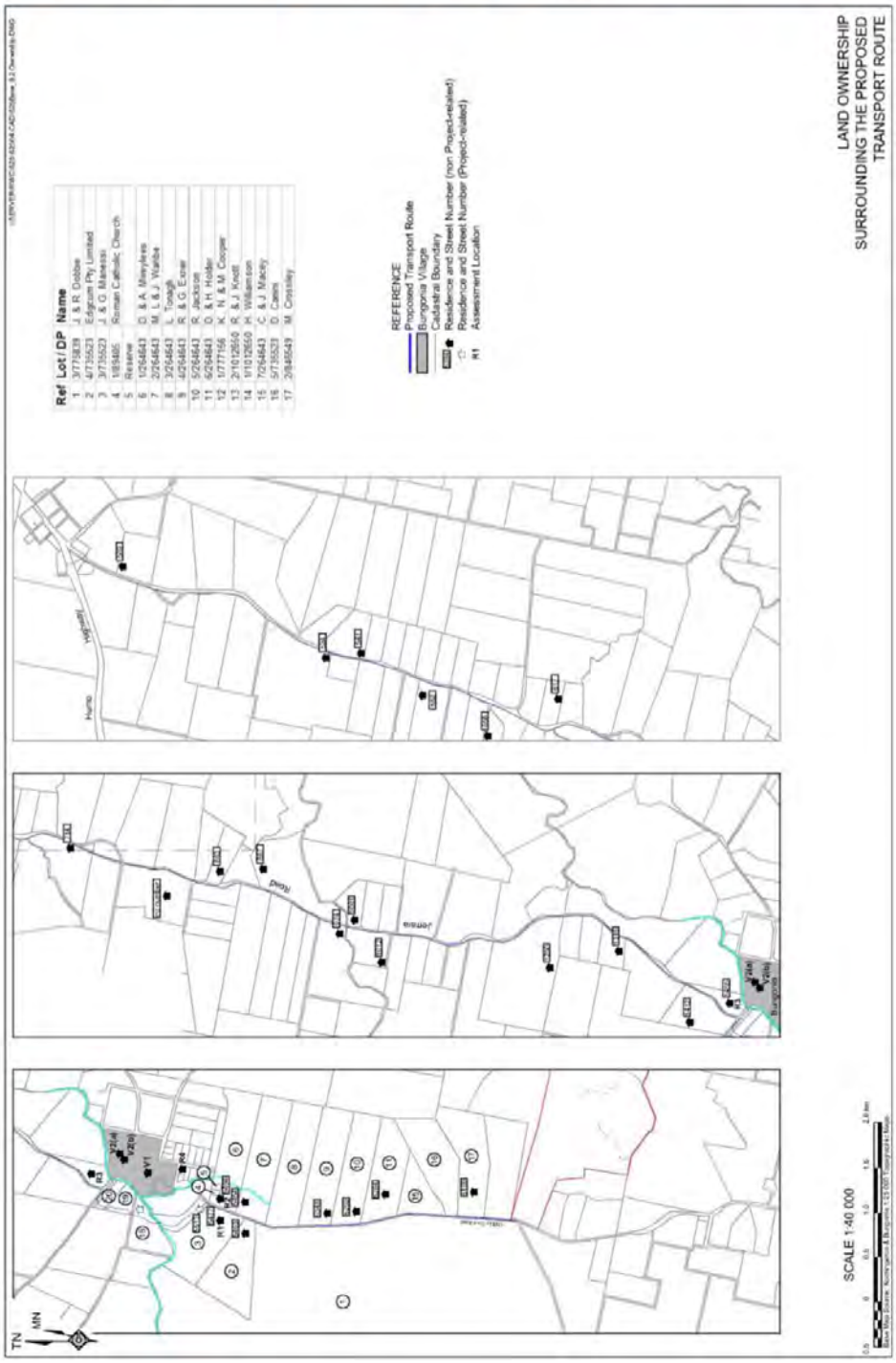


Figure 7 Land Ownership Surrounding the Approved Quarry Transport Route



While noting there has been no major traffic generating activities or development in the local area since 2013, the currency of these 2013 traffic volumes has been queried by the DP&E. Consequently, Multiquip undertook a traffic survey on Jerrara Road on 14 December 2017 to assess the current traffic volumes. While the volumes were still very low, the traffic survey identified an increase in heavy vehicle traffic during the daytime period (in particular between 7:00 am and 6:00 pm)[1] and light vehicle traffic between the hours of 5:00 am and 7:00 am[2] when compared to the 2013 volumes (of **Table 19**).

Considering the approximately 2.5% per year growth in traffic on Oallen Ford Road between 2008 and 2013, and the lack of traffic generating activities in the local setting (excluding the Quarry) since 2013, 2017 traffic volumes have been projected by applying a further 2.5% increase annually.

Based on the above, additional (2017) traffic volumes and the proposed maximum hourly truck movements associated with the Modification are presented in **Table 20** and **Table 21** for Oallen Ford Road and Jerrara Road, respectively.

8.4 Traffic Noise Impact Assessment

Assessment Against Existing (2013) Traffic Volume

A prediction of traffic noise levels at the closest residences to the Approved Quarry Transport Route generated by the Modification based on the existing (2013) traffic volumes is given in **Table 22** and **Table 23**. The predictions provide for the daytime ($L_{Aeq(15hour)}$) and night-time (5:00 am to 7:00 am morning shoulder ($L_{Aeq(2hour)}$) periods respectively.

Assessment Against Existing (2017) Traffic Volume

A prediction of traffic noise levels at the closest residences to the Approved Quarry Transport Route generated by the Modification based on 2017 traffic volumes (observed for Jerrara Road and extrapolated from 2013 for Oallen Ford Road) is given in **Table 24** and **Table 25**. These predictions also provide for the daytime ($L_{Aeq(15hour)}$) and morning shoulder ($L_{Aeq(2hour)}$ periods respectively.

In both cases, the traffic noise modelling includes an accumulation of the maximum hourly truck movement from the Quarry (ie 194 trucks movements during the daytime period, not the restricted 124 trucks per day) and is therefore very conservative. Notwithstanding, the predicted total traffic noise levels, inclusive of all existing Quarry and local traffic, plus the additional vehicles due to the Modification, are below both the daytime (60 $L_{Aeq(15hour)}$) and night-time (55 $L_{Aeq(9hour)}$) total traffic noise criteria at all identified residential receivers near to the Approved Quarry Transport Route, based on both the existing (2013) and existing (2017) traffic flows. The increase in traffic noise levels due to the Modification is also below the Relative Increase Criteria during both the daytime and morning shoulder periods.

There is a negligible (1 dBA or less) difference between the predicted noise level from all traffic (existing local plus proposed Quarry) based on the use of the existing (2013) or existing (2017) traffic flows.

Based on local traffic growth of approximately 2.5% per annum and the restricted 124 truck movements per day, the predicted traffic noise levels won't be reached until approximately 2040.

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[1] Multiquip notes that this heavy vehicle traffic is potentially influenced by trucks delivering materials for the current Jerrara Road upgrade and therefore the background volumes are considered conservatively high.

[2] Multiquip notes that the 5:00 am to 7:00 am light vehicle traffic is likely to include a significant number of vehicle movements by Multiquip personnel travelling to the Quarry Site and therefore the background volumes are considered conservatively high.

Table 17 Quarry Truck Movements Scheduling Options

Period[1]	Current Approved Movements[2]	Approved Transport Schedule (Indicative)[6]	Proposed Movements (Indicative Day)[5]	High Production Day (Indicative)[5]	Maximum Production Day (Indicative)[5]	Maximum Movements used for Assessment
12 am - 1 am	-	-	-	-	-	-
1 am - 2 am	-	-	-	-	-	-
2 am - 3 am	-	-	-	-	-	-
3 am - 4 am	-	-	-	-	-	-
4 am - 5 am	-	-	-	-	-	-
5 am - 6 am	-	-	6	8	10	10
6 am - 7 am	-	-	6	8	10	10
7 am - 8 am	14	14	8	10	10	14
8 am - 9 am	14	14	8	10	10	14
9 am - 10 am	14	14	8	10	12	14
10 am - 11 am	14	6	8	8	12	14
11 am - 12 pm	14	6	6	8	10	14
12 pm - 1 pm	14	6	6	8	10	14
1 pm - 2 pm	14	8	6	8	10	14
2 pm - 3 pm	14	8	6	8	8	14
3 pm - 4 pm	14	4	6	8	8	14
4 pm - 5 pm	14	4	4	4	4	14
5 pm - 6 pm	14	4	4	6	4	14
6 pm - 7 pm	-	-	2	4	4	10
7 pm - 8 pm	-	-	2	2	2	10
8 pm - 9 pm	-	-	1	1	2	10
9 pm - 10 pm	-	-	1	1	2	10
10 pm - 11pm	-	-	-	-	-	-
11 pm - 12 am	-	-	-	-	-	-
Total Movements	**154 (88)[3]**	**88**	**88**	**110**	**124**	**194 (124)[4]**
Daytime (15 hour)	**154 (88)[3]**	**88**	**76**	**96**	**104**	**174 (124)[4]**
Night-time (9 hour)	**0**	**0**	**12**	**16**	**20**	**20**
Morning Shoulder (2 hours, 5am-7am)	**0**	**0**	**12**	**16**	**20**	**20**

Note 1: Daytime (7am to 10pm), Night-time (10pm to 7am), Morning Shoulder (5am to 7am).

Note 2: Presented as hourly maximums.

Note 3: Product deliveries are restricted to 88 movements per day.

Note 4: Product deliveries would be restricted to an absolute daily maximum of 124 movements per day.

Note 5: Total average loads not to exceed 44 (ie 88 movements) per day over a month).

Note 6: The scheduling is based on high demand for early delivery of construction materials.

Table 18 Existing (2013) and Proposed Traffic Movements – Oallen Ford Road

Period[1]	Existing Traffic						Proposed Traffic			
	Local		Approved Quarry[2]		All		Additional Quarry[2]	All Quarry[2]		All Traffic
	Light	Heavy	Light	Heavy	Light	Heavy	Heavy	Light	Heavy	Heavy
12 AM - 1 AM	2	-	-	-	2	0	-	-	-	-
1 AM - 2 AM	1	-	-	-	1	0	-	-	-	-
2 AM - 3 AM	0	-	-	-	0	0	-	-	-	-
3 AM - 4 AM	1	-	-	-	1	0	-	-	-	-
4 AM - 5 AM	2	-	-	-	2	0	-	4	-	-
5 AM - 6 AM	5	1	-	-	5	1	10	-	10	11
6 AM - 7 AM	10	2	12	-	22	2	10	10	10	12
7 AM - 8 AM	17	2	10	14	27	16	-	10	14	16
8 AM - 9 AM	26	2	-	14	26	16	-	-	14	16
9 AM - 10 AM	21	3	-	14	21	17	-	-	14	17
10 AM - 11 AM	29	2	-	14	29	16	-	-	14	16
11 AM - 12 PM	25	2	-	14	25	16	-	-	14	16
12 PM - 1 PM	24	2	2	14	26	16	-	2	14	16
1 PM - 2 PM	24	2	2	14	26	16	-	2	14	16
2 PM - 3 PM	29	2	-	14	29	16	-	-	14	16
3 PM - 4 PM	31	3	4	14	35	17	-	4	14	17
4 PM - 5 PM	31	3	6	14	37	17	-	6	14	17
5 PM - 6 PM	25	2	8	14	33	16	-	6	14	16
6 PM - 7 PM	17	1	8	-	25	1	10	6	10	11
7 PM - 8 PM	8	1	-	-	8	1	10	-	10	11
8 PM - 9 PM	9	1	-	-	9	1	10	-	10	11
9 PM - 10 PM	6	-	-	-	6	0	10	-	10	10
10 PM - 11 PM	3	-	-	-	3	0	-	4	-	-
11 PM - 12 AM	3	-	-	-	3	0	-	-	-	-
Daytime (15 hour)	**322**	**28**	**40**	**154 (88)[3]**	**362**	**182 (116)[3]**	**40**	**36**	**194 (124)[4]**	**218 (152)[4]**
Night-time (9 hour)	**27**	**3**	**12**	**0**	**39**	**3**	**20**	**18**	**20**	**23**
Morning Shoulder (2 hours, 5am-7am)	**15**	**3**	**12**	**0**	**27**	**3**	**20**	**10**	**20**	**23**

Note 1: Daytime (7am to 10pm), Night-time (10pm to 7am), Morning Shoulder (5am to 7am).

Note 2: Presented as hourly maximums.

Note 3: Product deliveries are restricted to 88 movements per day.

Note 4: Product deliveries would be restricted to an absolute daily maximum of 124 movements per day.

Table 19 Existing (2013) and Proposed Traffic Movements – Jerrara Road

Period[1]	Existing Traffic						Proposed Traffic			
	Local		Approved Quarry[2]		All		Additional Quarry[2]	All Quarry[2]		All Traffic
	Light	Heavy	Light	Heavy	Light	Heavy	Heavy	Light	Heavy	Heavy
12 AM - 1 AM	1	0	0	0	1	0	0	0	0	0
1 AM - 2 AM	1	0	0	0	1	0	0	0	0	0
2 AM - 3 AM	1	0	0	0	1	0	0	0	0	0
3 AM - 4 AM	1	0	0	0	1	0	0	0	0	0
4 AM - 5 AM	1	0	0	0	1	0	0	4	0	0
5 AM - 6 AM	4	0	0	0	4	0	10	0	10	10
6 AM - 7 AM	11	2	12	0	23	2	10	10	10	12
7 AM - 8 AM	13	2	10	14	23	16	0	10	14	16
8 AM - 9 AM	20	4	0	14	20	18	0	0	14	18
9 AM - 10 AM	20	2	0	14	20	16	0	0	14	16
10 AM - 11 AM	20	2	0	14	20	16	0	0	14	16
11 AM - 12 PM	19	1	0	14	19	15	0	0	14	15
12 PM - 1 PM	16	1	2	14	18	15	0	2	14	15
1 PM - 2 PM	14	1	2	14	16	15	0	2	14	15
2 PM - 3 PM	16	2	0	14	16	16	0	0	14	16
3 PM - 4 PM	22	4	4	14	26	18	0	4	14	18
4 PM - 5 PM	22	4	6	14	28	18	0	6	14	18
5 PM - 6 PM	23	2	8	14	31	16	0	6	14	16
6 PM - 7 PM	18	1	8	0	26	1	10	6	10	11
7 PM - 8 PM	12	0	0	0	12	0	10	0	10	10
8 PM - 9 PM	8	1	0	0	8	1	10	0	10	11
9 PM - 10 PM	7	0	0	0	7	0	10	0	10	10
10 PM - 11 PM	2	0	0	0	2	0	0	4	0	0
11 PM - 12 AM	5	0	0	0	5	0	0	0	0	0
Daytime (15 hour)	**250**	**27**	**40**	**154 (88)[2]**	**290**	**181 (115)[3]**	**40**	**36**	**194 (124)[4]**	**221 (151)[4]**
Night-time (9 hour)	**27**	**2**	**12**	**0**	**39**	**2**	**20**	**18**	**20**	**22**
Morning Shoulder (2 hours, 5am-7am)	**15**	**2**	**12**	**0**	**27**	**2**	**20**	**10**	**20**	**22**

Note 1: Daytime (7am to 10pm), Night-time (10pm to 7am), Morning Shoulder (5am to 7am).

Note 2: Presented as hourly maximums.

Note 3: Product deliveries are restricted to 88 movements per day.

Note 4: Product deliveries would be restricted to an absolute daily maximum of 124 movements per day.

Table 20 Existing (2017) and Proposed Traffic Movements – Oallen Ford Road

Period[1]	Existing Traffic						Proposed Traffic			
	Local		Approved Quarry[2]		All		Additional Quarry[2]	All Quarry[2]		All Traffic
	Light	Heavy	Light	Heavy	Light	Heavy	Heavy	Light	Heavy	Heavy
12 AM - 1 AM	2	0	0	0	2	0	0	0	0	0
1 AM - 2 AM	1	0	0	0	1	0	0	0	0	0
2 AM - 3 AM	0	0	0	0	0	0	0	0	0	0
3 AM - 4 AM	1	0	0	0	1	0	0	0	0	0
4 AM - 5 AM	2	0	0	0	2	0	0	4	0	0
5 AM - 6 AM	6	1	0	0	6	1	10	0	10	11
6 AM - 7 AM	11	2	12	0	23	2	10	10	10	12
7 AM - 8 AM	19	2	10	14	29	16	0	10	14	16
8 AM - 9 AM	29	2	0	14	29	16	0	0	14	16
9 AM - 10 AM	23	3	0	14	23	17	0	0	14	17
10 AM - 11 AM	32	2	0	14	32	16	0	0	14	16
11 AM - 12 PM	28	2	0	14	28	16	0	0	14	16
12 PM - 1 PM	26	2	2	14	28	16	0	2	14	16
1 PM - 2 PM	26	2	2	14	28	16	0	2	14	16
2 PM - 3 PM	32	2	0	14	32	16	0	0	14	16
3 PM - 4 PM	34	3	4	14	38	17	0	4	14	17
4 PM - 5 PM	34	3	6	14	40	17	0	6	14	17
5 PM - 6 PM	28	2	8	14	36	16	0	6	14	16
6 PM - 7 PM	19	1	8	0	27	1	10	6	10	11
7 PM - 8 PM	9	1	0	0	9	1	10	0	10	11
8 PM - 9 PM	10	1	0	0	10	1	10	0	10	11
9 PM - 10 PM	7	0	0	0	7	0	10	0	10	10
10 PM - 11 PM	3	0	0	0	3	0	0	4	0	0
11 PM - 12 AM	3	0	0	0	3	0	0	0	0	1
Daytime (15 hour)	**356**	**28**	**40**	**154 (88)[4]**	**396**	**182 (116)[3]**	**40**	**36**	**194 (124)[4]**	**222 (152)[4]**
Night-time (9 hour)	**29**	**3**	**12**	**0**	**41**	**3**	**20**	**18**	**20**	**24**
Morning Shoulder (2 hours, 5am-7am)	**17**	**3**	**12**	**0**	**29**	**3**	**20**	**10**	**20**	**23**

Note 1: Daytime (7am to 10pm), Night-time (10pm to 7am), Morning Shoulder (5am to 7am).

Note 2: Presented as hourly maximums.

Note 3: Product deliveries are restricted to 88 movements per day.

Note 4: Product deliveries would be restricted to an absolute daily maximum of 124 movements per day.

Table 21 Existing (2017) and Proposed Traffic Movements – Jerrara Road

Period[1]	Existing Traffic						Proposed Traffic			
	Local		Approved Quarry[2]		All		Additional Quarry[2]	All Quarry[2]		All Traffic
	Light	Heavy	Light	Heavy	Light	Heavy	Heavy	Light	Heavy	Heavy
12 AM - 1 AM	1	0	0	0	1	0	0	0	0	0
1 AM - 2 AM	1	0	0	0	1	0	0	0	0	0
2 AM - 3 AM	1	0	0	0	1	0	0	0	0	0
3 AM - 4 AM	1	0	0	0	1	0	0	0	0	0
4 AM - 5 AM	1	0	0	0	1	0	0	4	0	0
5 AM - 6 AM	13	2	0	0	13	2	10	0	10	12
6 AM - 7 AM	27	2	12	0	39	2	10	10	10	12
7 AM - 8 AM	25	5	10	14	35	19	0	10	14	19
8 AM - 9 AM	19	7	0	14	19	21	0	0	14	21
9 AM - 10 AM	18	5	0	14	18	19	0	0	14	19
10 AM - 11 AM	14	1	0	14	14	15	0	0	14	15
11 AM - 12 PM	17	5	0	14	17	19	0	0	14	19
12 PM - 1 PM	13	2	2	14	15	16	0	2	14	16
1 PM - 2 PM	20	2	2	14	22	16	0	2	14	16
2 PM - 3 PM	16	1	0	14	16	15	0	0	14	15
3 PM - 4 PM	14	3	4	14	18	17	0	4	14	17
4 PM - 5 PM	32	6	6	14	38	20	0	6	14	20
5 PM - 6 PM	28	3	8	14	36	17	0	6	14	17
6 PM - 7 PM	20	3	8	0	28	3	10	6	10	13
7 PM - 8 PM	11	0	0	0	11	0	10	0	10	10
8 PM - 9 PM	8	0	0	0	8	0	10	0	10	10
9 PM - 10 PM	4	0	0	0	4	0	10	0	10	10
10 PM - 11 PM	2	0	0	0	2	0	0	4	0	0
11 PM - 12 AM	5	0	0	0	5	0	0	0	0	0
Daytime (15 hour)	**259**	**43**	**40**	**154 (88)[2]**	**299**	**197 (131)[3]**	**40**	**36**	**194 (124)[4]**	**237 (167)[3]**
Night-time (9 hour)	**52**	**4**	**12**	**0**	**64**	**4**	**20**	**18**	**20**	**24**
Morning Shoulder (2 hours, 5am-7am)	**40**	**4**	**12**	**0**	**52**	**4**	**20**	**10**	**20**	**24**

Note 1: Daytime (7am to 10pm), Night-time (10pm to 7am), Morning Shoulder (5am to 7am).

Note 2: Presented as hourly maximums.

Note 3: Product deliveries are restricted to 88 movements per day.

Note 4: Product deliveries would be restricted to an absolute daily maximum of 124 movements per day.

Table 22 Predicted Quarry Traffic Noise Contribution - Existing (2013) - Daytime[1]

House Number	Offset Distance	Predicted Traffic Noise Level LAeq(15hour)							Modification Assessment	
		Existing (2013)			Proposed					
		Local	Approved Quarry[2]	All	Additional Quarry [2]	All Quarry[2]	All Traffic	Increase in All Traffic	All Traffic LAeq(15hour) (<60dBA)	Relative Increase (<12dBA)
Oallen Ford Road										
5199	290 m	37	34	39	30	36	39	0.6	Complies	Complies
5284	270 m	37	35	39	30	36	40	0.6	Complies	Complies
5292	150 m	41	39	43	34	40	43	0.6	Complies	Complies
5348	140 m	41	39	43	35	40	44	0.6	Complies	Complies
5453	140 m	41	39	43	35	40	44	0.6	Complies	Complies
5454	170 m	40	38	42	33	39	43	0.6	Complies	Complies
5477	110 m	43	41	45	36	42	46	0.6	Complies	Complies
5494	115 m	43	40	45	36	42	45	0.6	Complies	Complies
Jerrara Road										
1455	120 m	37	40	42	36	41	43	1.0	Complies	Complies
1412	350 m	29	33	35	29	34	36	1.0	Complies	Complies
1316	160 m	35	38	40	34	40	41	1.0	Complies	Complies
1250	510 m	27	31	32	26	32	33	1.0	Complies	Complies
1012	330 m	30	33	35	29	35	36	1.0	Complies	Complies
1001	90 m	38	42	44	38	43	45	1.0	Complies	Complies
989	35 m	45	48	50	44	50	51	1.0	Complies	Complies
974	100 m	38	41	43	37	43	44	1.0	Complies	Complies
887	210 m	33	36	38	32	38	39	1.0	Complies	Complies
863	160 m	35	38	40	34	40	41	1.0	Complies	Complies
Unknown	270 m	31	35	36	30	36	37	1.0	Complies	Complies
714	60 m	41	45	46	40	46	47	1.0	Complies	Complies
656	350 m	29	33	35	29	34	36	1.0	Complies	Complies
617	290 m	31	34	36	30	36	37	1.0	Complies	Complies
562	160 m	35	38	40	34	40	41	1.0	Complies	Complies
541	70 m	40	44	45	39	45	46	1.0	Complies	Complies
524	70 m	40	44	45	39	45	46	1.0	Complies	Complies
509	130 m	36	40	41	35	41	42	1.0	Complies	Complies

Note 1: Daytime period (7.00am – 10.00pm).

Note 2: Based on hourly maximums presented in **Table 18** and **Table 19**.

Table 23 Predicted Quarry Traffic Noise Contribution - Existing (2013) - Morning Shoulder[1]

House Number	Offset Distance	Predicted Traffic Noise Level LAeq(shoulder)							Modification Assessment	
		Existing (2013)			Proposed					
		Local	Approved Quarry[2]	All[3]	Additional Quarry[2]	All Quarry[2]	All Traffic	Increase in All Traffic[2]	All Traffic LAeq(shoulder) (<55dBA)	Relative Increase (<12dBA)
Oallen Ford Road										
5199	290 m	29	0	29	35	35	36	5.7	Complies	Complies
5284	270 m	29	0	29	35	35	36	6.2	Complies	Complies
5292	150 m	33	0	33	39	39	40	6.9	Complies	Complies
5348	140 m	34	0	34	40	40	41	6.9	Complies	Complies
5453	140 m	34	0	34	40	40	41	6.9	Complies	Complies
5454	170 m	32	0	32	38	38	39	6.9	Complies	Complies
5477	110 m	35	0	35	41	41	42	6.9	Complies	Complies
5494	115 m	35	0	35	41	41	42	6.9	Complies	Complies
Jerrara Road										
1455	120 m	34	0	34	40	40	41	7.5	Complies	Complies
1412	350 m	27	0	27	33	33	34	4.1	Complies	Complies
1316	160 m	32	0	32	38	38	39	7.5	Complies	Complies
1250	510 m	24	0	24	31	31	32	1.6	Complies	Complies
1012	330 m	27	0	27	34	34	34	4.5	Complies	Complies
1001	90 m	36	0	36	42	42	43	7.5	Complies	Complies
989	35 m	42	0	42	48	48	49	7.5	Complies	Complies
974	100 m	35	0	35	41	41	42	7.5	Complies	Complies
887	210 m	30	0	30	37	37	37	7.4	Complies	Complies
863	160 m	32	0	32	38	38	39	7.5	Complies	Complies
Unknown	270 m	28	0	28	35	35	36	5.8	Complies	Complies
714	60 m	38	0	38	45	45	46	7.5	Complies	Complies
656	350 m	27	0	27	33	33	34	4.1	Complies	Complies
617	290 m	28	0	28	34	34	35	5.3	Complies	Complies
562	160 m	32	0	32	38	38	39	7.5	Complies	Complies
541	70 m	37	0	37	44	44	45	7.5	Complies	Complies
524	70 m	37	0	37	44	44	45	7.5	Complies	Complies
509	130 m	33	0	33	40	40	41	7.5	Complies	Complies

Note 1: Shoulder period (5.00am – 7.00am).

Note 2: Based on hourly maximums presented in **Table 18** and **Table 19**.

Note 3: Accordance with NSW RNP, where the existing LAeq(period) road traffic noise level is found to be less than 30 dBA, it is deemed to be 30 dBA.

Table 24 Predicted Quarry Traffic Noise Contribution - Existing (2017) - Daytime[1]

House Number	Offset Distance	Predicted Traffic Noise Level LAeq(15hour)							Modification Assessment	
		Existing (2017)			Proposed					
		Local	Approved Quarry[2]	All	Additional Quarry [2]	All Quarry[2]	All Traffic	Increase in All Traffic	All Traffic LAeq(15hour) (<60dBA)	Relative Increase (<12dBA)
Oallen Ford Road										
5199	290 m	32	34	36	30	36	37	0.9	Complies	Complies
5284	270 m	32	35	37	30	36	38	0.9	Complies	Complies
5292	150 m	36	39	41	34	40	41	0.9	Complies	Complies
5348	140 m	36	39	41	35	40	42	0.9	Complies	Complies
5453	140 m	36	39	41	35	40	42	0.9	Complies	Complies
5454	170 m	35	38	40	33	39	41	0.9	Complies	Complies
5477	110 m	38	41	43	36	42	44	0.9	Complies	Complies
5494	115 m	38	40	42	36	42	43	0.9	Complies	Complies
Jerrara Road										
1455	120 m	37	40	42	36	41	43	0.9	Complies	Complies
1412	350 m	30	33	35	29	34	36	0.9	Complies	Complies
1316	160 m	36	38	40	34	40	41	0.9	Complies	Complies
1250	510 m	28	31	32	26	32	33	0.9	Complies	Complies
1012	330 m	31	33	35	29	35	36	0.9	Complies	Complies
1001	90 m	39	42	44	38	43	45	0.9	Complies	Complies
989	35 m	46	48	50	44	50	51	0.9	Complies	Complies
974	100 m	39	41	43	37	43	44	0.9	Complies	Complies
887	210 m	34	36	38	32	38	39	0.9	Complies	Complies
863	160 m	36	38	40	34	40	41	0.9	Complies	Complies
Unknown	270 m	32	35	37	30	36	38	0.9	Complies	Complies
714	60 m	42	45	47	40	46	47	0.9	Complies	Complies
656	350 m	30	33	35	29	34	36	0.9	Complies	Complies
617	290 m	32	34	36	30	36	37	0.9	Complies	Complies
562	160 m	36	38	40	34	40	41	0.9	Complies	Complies
541	70 m	41	44	46	39	45	46	0.9	Complies	Complies
524	70 m	41	44	46	39	45	46	0.9	Complies	Complies
509	130 m	37	40	41	35	41	42	0.9	Complies	Complies

Note 1: Daytime period (7.00am – 10.00pm).

Note 2: Based on hourly maximums presented in **Table 20** and **Table 21**.

Table 25 Predicted Quarry Traffic Noise Contribution - Existing (2017) - Morning Shoulder[1]

House Number	Offset Distance	Predicted Traffic Noise Level LAeq(shoulder)							Modification Assessment	
		Existing (2017)			Proposed					
		Local	Approved Quarry[2]	All[3]	Additional Quarry[2]	All Quarry[2]	All Traffic	Increase in All Traffic[2]	All Traffic LAeq(shoulder) (<55dBA)	Relative Increase (<12dBA)
Oallen Ford Road										
5199	290 m	29	0	29	35	35	36	5.7	Complies	Complies
5284	270 m	29	0	29	35	35	36	6.2	Complies	Complies
5292	150 m	33	0	33	39	39	40	7.0	Complies	Complies
5348	140 m	34	0	34	40	40	41	7.0	Complies	Complies
5453	140 m	34	0	34	40	40	41	7.0	Complies	Complies
5454	170 m	32	0	32	38	38	39	7.0	Complies	Complies
5477	110 m	35	0	35	41	41	42	7.0	Complies	Complies
5494	115 m	35	0	35	41	41	42	7.0	Complies	Complies
Jerrara Road										
1455	120 m	37	0	37	40	40	42	4.9	Complies	Complies
1412	350 m	30	0	30	33	33	35	4.9	Complies	Complies
1316	160 m	35	0	35	38	38	40	4.9	Complies	Complies
1250	510 m	27	0	27	31	31	32	2.4	Complies	Complies
1012	330 m	30	0	30	34	34	35	4.9	Complies	Complies
1001	90 m	39	0	39	42	42	44	4.9	Complies	Complies
989	35 m	45	0	45	48	48	50	4.9	Complies	Complies
974	100 m	38	0	38	41	41	43	4.9	Complies	Complies
887	210 m	33	0	33	37	37	38	4.9	Complies	Complies
863	160 m	35	0	35	38	38	40	4.9	Complies	Complies
Unknown	270 m	32	0	32	35	35	37	4.9	Complies	Complies
714	60 m	42	0	42	45	45	47	4.9	Complies	Complies
656	350 m	30	0	30	33	33	35	4.9	Complies	Complies
617	290 m	31	0	31	34	34	36	4.9	Complies	Complies
562	160 m	35	0	35	38	38	40	4.9	Complies	Complies
541	70 m	41	0	41	44	44	46	4.9	Complies	Complies
524	70 m	41	0	41	44	44	46	4.9	Complies	Complies
509	130 m	36	0	36	40	40	41	4.9	Complies	Complies

Note 1: Shoulder period (5.00am – 7.00am).

Note 2: Based on hourly maximums presented in **Table 20** and **Table 21**.

Note 3: Accordance with NSW RNP, where the existing LAeq(period) road traffic noise level is found to be less than 30 dBA, it is deemed to be 30 dBA.

Assessment Against Hourly Road Traffic Noise Criteria (ECRTN)

PA 07_0155 was granted based on a traffic noise assessment undertaken in accordance with Environmental Criteria for Road Traffic Noise (ECRTN), the road noise guideline current at the time. Under the ECRTN, the appropriate assessment criterion at the time was an $L_{Aeq(1hour)}$ of 55 dBA. The corresponding $L_{Aeq(1hour)}$ criteria for the morning shoulder period would be 50 dBA.

An assessment of the hourly traffic noise generated by the maximum volume of hourly Quarry traffic has been undertaken which predicts that the Modification would be compliant with the Project Approval daytime road traffic noise criterion of 55 $L_{Aeq(1hour)}$ at all residences located along the product delivery route. With the exception of the residence at 989 Jerrara Road, the Modification is also predicted to be compliant against the morning shoulder road traffic noise criterion of 50 $L_{Aeq(1hour)}$.

With respect to the predicted road traffic noise received at 989 Jerrara Road, the following is noted:

- Compliance is predicted during the period 5:00 am to 6:00 am.
- During the period of 6:00 am to 7:00 am, an $L_{Aeq(1hour)}$ of 50.7 dBA is predicted. This is the accumulation of:
  - Background road traffic noise 46.0dBA; and
  - Quarry traffic noise (10 truck movements, 10 light vehicles) 49.0 dBA.
- The predicted road traffic noise reduces to 50.2 dBA and 49.6 dBA when the number of truck movements from the Quarry is limited to 8 and 6 respectively.

9 SUMMARY OF FINDINGS

RW Corkery & Co Pty Limited (RWC), on behalf of CEAL Limited Pty Ltd (trading as Multiquip Quarries), has commissioned VMS Australia Pty Ltd (VMS) to conduct a noise impact assessment for the proposed modification of activities at the Quarry.

The Quarry is currently operating with an approved annual extraction rate of 400,000 tpa and the Proponent is seeking approval to increase the extraction rate to 580,000 tpa. The proposed increase in the approved annual extraction rate would primarily be achieved through increased utilisation of current operational lulls.

The Modification also includes extending the extraction area, extending the hours of transport operations, incorporating additional campaign processing operations, accepting ENM for backfilling the extraction area and extending the quarry life to 2047.

Accordingly, the noise emissions from the Modification to all surrounding receivers are expected to be comparable to the existing emissions from the Ardmore Park Quarry.

Operating Noise Impact Summary

The noise assessment has found that the calculated daytime and night-time $L_{Aeq(15minute)}$ intrusive noise emission level at all the potentially noise affected residences comply with the Project Approval noise limits. There is the potential for a negligible (1 dBA) exceedance under night-time temperature inversion conditions if four product dispatch trucks are operated within any 15 minute period. Accordingly, it is recommended that no more than three product trucks are dispatched per 15 minute during the night-time period.

An assessment against the EPA's *Noise Policy for Industry* (NPfI) has also been undertaken since the NPfI replaces the now withdrawn *Industrial Noise Policy* under which the Project Approval was initially granted. The assessment was undertaken against the NPfI derived Project Noise Trigger Levels (PNTLs) and Noise-Enhancing Meteorological Conditions. Compliance with the day time PNTLs is predicted at all residences except for a negligible 1 dBA exceedance at Residence 9 under during basalt extraction activities. For night-time operations, compliance is predicted at all residences except Residence 9 (1 dB exceedance) when loading is from the sand product stockpiles. Under cumulative night-time operations, exceedances of 2 dB, 3 dB and 2 dB are predicted at Residences 6, 9 and 10.

It is recommended that night-time cumulative loading operations are not undertaken when temperature inversion conditions are present or winds are blowing from the east or southeast.

The Voluntary Land Acquisition and Mitigation rights are not triggered at any surrounding privately owned land.

Road Traffic Noise Impact Summary

The existing Approved Quarry Transport Route would remain the primary access to the Project Site. The total number of Quarry-related heavy vehicle movements on public roads is not proposed to change due the Modification, however, the period over which these trucks operate and daily maximum would increase. It is noted that Multiquip has committed to an average daily number of truck movements of 88, and maximum of 124. The overall traffic noise level contribution, including the Quarry operations, would remain well below the corresponding daytime and night-time noise limits. Also, the increase in traffic noise levels due to the Modification would remain below the Relative Increase Criteria.

Appendix A
Acoustic Terminology
10-1414

Terminology Relating to Noise and Vibration

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Power	Sound Power is the rate at which sound energy is emitted, reflected, transmitted or received, per unit time. Unlike sound pressure, sound power is neither room-dependent nor distance-dependent.
Sound Pressure Level (SPL)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Sound Power Level (SWL)	The Sound Power Level is the sound power relative to a standard reference pressure of 1pW ($20x10^{-12}$ Watts) on a decibel scale. The SWL of a simple point source may be used to calculate the SPL at a given distance (r) using the following formula: $SPL = SWL - 10 \times Log_{10}(4 \times \pi \times r^2)$ Note that the above formula is only valid for sound propagation in the free-field (see below).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dBA	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Leq,T	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Lmax,T	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L90,T	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.
DnT,w	The single number quantity that characterises airborne sound insulation between rooms over a range of frequencies.
Rw	Single number quantity that characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
Reverberation	The persistence of sound in a space after a sound source has been stopped.
PPV	The particles of a medium are displaced from their random motion in the presence of a vibration wave. The greatest instantaneous velocity of a particle during this displacement is called the Peak Particle Velocity (PPV) and is typically measured in the units of mm/s.
Hertz, Hz	The unit of Frequency (or Pitch) of a sound or vibration. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
Acceleration	Acceleration is defined as the rate of change of Velocity of a particle over a period of time and is typically measured in the units of m/sec^2.
Vibration Dose, VDV	When assessing intermittent vibration it is necessary to use the vibration dose value (VDV), a cumulative measurement of the vibration level received over an 8-hour or 16-hour period. The VDV formulae uses the RMS Acceleration raised to the fourth power and is known as the Root-mean-quad method. This technique ensures the VDV is more sensitive to the peaks in the acceleration levels. VDVs are typically measured in the units of $m/s^{1.75}$.


Appendix B
Ardmore Park Quarry – Project Approval (as Modified)
10-1414

Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

I approve the project referred to in Schedule 1, subject to the conditions set out in Schedules 2 to 5.

These conditions are required to:
- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for on-going environmental management of the project.

Hon Kristina Keneally MP
Minister for Planning

Sydney 2009

SCHEDULE 1

Project Application:	07_0155	
Proponent:	CEAL Limited trading as Multiquip Quarries	
Approval Authority:	Minister for Planning	
Land:	Extraction Area	Lot 24, DP 1001312, Oallen Ford Road, Bungonia
	Bypass Road	Lot 2 DP 735523, Lot 82 DP 750022, Lot 7005 DP 1002591 and Lot 7006 DP 1002591
Project:	Ardmore Park Project	

Red type represents October 2010 Modification.
Blue type represents November 2013 Modification.

TABLE OF CONTENTS

DEFINITIONS

AEMR	Annual Environmental Management Report
Bypass Road	Private road between Oallen Ford Road and Mountain Ash Road
Council	Goulburn Mulwaree Shire Council
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department of Planning and Infrastructure (or nominee)
DPI	Department of Primary Industries
DRE	Division of Resources and Energy within the Department of Trade and Investment, Regional Services and Infrastructure
EA	Environmental Assessment for the project titled *Environmental Assessment for the Modified "Ardmore Park" Quarry Project and, Specialist Consultant Studies Compendium*, dated July 2008, prepared by RW Corkery and Co, including the response to submissions
EA (Mod 1)	Environmental Assessment titled *Ardmore Park Quarry – Supporting Documentation for a Request to Modify Project Approval PA 07_0155*, dated May 2010, prepared by RW Corkery and Co, including the response to submissions dated August 2010 and letter dated 30 August 2010
EA (Mod 2)	Modification application 07_0155 Mod 2 and supporting documentation titled *Environmental Assessment to support a S75W Modification of PA 07_0155*, dated June 2013, prepared by R.W. Corkery & Co Pty Ltd, including the response to submissions dated September 2013
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence issued under the *Protection of the Environment Operations Act 1997*
Extraction Area	The land described as the extraction area in Appendix 1
Feasible	Feasible relates to engineering considerations and what is practical to build
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Principal local haulage route	The product transport route as outlined in the EA (Mod 2) and Appendix 6
Minister	Minister for Planning and Infrastructure, or delegate
NOW	NSW Office of Water within DPI
OEH	Office of Environment and Heritage
Privately owned land	Land not owned by a public agency or a quarry company (or its related companies)
Project	The development as described in the EA
Proponent	CEAL Limited trading as Multiquip Quarries, or its successors in title
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Response to Submissions	The Proponent's response to issues raised in submissions, dated December 2008, prepared by RW Corkery and Co, and subsequent submissions to the Department dated 2 February 2009, 30 March 2009 and 15 April 2009
RMS	Roads and Maritime Services
Site	Land to which the project application applies
Stage 1 road upgrade works	Road upgrades described in items 5.1 to 5.8 of the Statement of Commitments (Table B) in Appendix 2, as amended to provide for a minimum 7.0 metre sealed carriageway along the entire transport route (comprising 2 x 3.0 metre lanes and 2 x 0.5 metre shoulders, plus 2 x 0.5 metre unsealed shoulders), apart from the bypass road and the bridge crossings identified as the Stage 2 and Stage 3 road upgrade works, unless otherwise agreed by Council.
Stage 2 road upgrade works	Road upgrades described in items 5.9 to 5.12 of the Statement of Commitments (Table B) in Appendix 2, as amended to provide for a minimum 8.0 metre sealed carriageway along the entire transport route (comprising 2 x 3.5 metre lanes and 2 x 0.5 metre shoulders, plus 2 x 0.5 metre unsealed shoulders), apart from the bypass road and the bridge crossings identified as the Stage 3 road upgrade works, unless otherwise agreed by Council.
Stage 3 road upgrade works	Road upgrades described in items 5.13 to 5.14 of the Statement of Commitments (Table B) in Appendix 2.
Statement of Commitments	The Proponent's commitments in Appendix 2

VENM	Virgin Excavated Natural Material, as defined in the *Protection of the Environment Operations Act 1997*

SCHEDULE 2
ADMINISTRATIVE

Obligation to Minimise Harm to the Environment

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

Terms of Approval

2. The Proponent shall carry out the project generally in accordance with the:
   (a) EA;
   (a1) EA (Mod 1);
   (a2) EA (Mod 2);
   (b) statement of commitments; and
   (c) conditions of this approval.

   Notes:
   - *The layout of the project is shown in the figure in Appendix 1; and*
   - *The statement of commitments is included in Appendix 2.*

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.

4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, plans, programs or correspondence that are submitted in accordance with the conditions of this approval; and
   (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

Limits on Approval

5. Extraction and processing operations may take place until 30 July 2039.

   Note: Under this approval, the Proponent is required to rehabilitate the site to the satisfaction of the Director-General. Consequently this approval will continue to apply in all other respects other than the right to conduct extraction and processing operations until the site has been rehabilitated to a satisfactory standard.

6. The Proponent shall not transport more than 400,000 tonnes of product a year from the site by road.

   Note: Truck movements are further restricted under condition 25 of schedule 3.

Management Plans / Monitoring Programs

7. With the approval of the Director-General, the Proponent may submit any management plan, program or strategy required by this approval on a progressive basis.

Structural Adequacy

8. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

   Notes:
   - *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works;*
   - *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

Demolition

9. The Proponent shall ensure that all demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures*, or its latest version.

Protection of Public Infrastructure

10. The Proponent shall:
    (a) repair, or pay all reasonable costs associated with repairing, any public infrastructure that is damaged by the project; and

(b) relocate, or pay all reasonable costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

Operation of Plant and Equipment

11. The Proponent shall ensure that all plant and equipment used at the site is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient condition.

Crown Land

12. The Proponent shall not commence any development authorised by this approval on Crown land without the prior approval of the Department of Lands.

Section 94 Contributions

13. The Proponent shall pay Council a monthly contribution of 4.43 cents per kilometre per tonne of material trucked from the site for the upgrade and maintenance of roads in accordance with *Goulburn Mulwaree Section 94 Development Contributions Plan 2009 Amendment No. 2* in force at the date of this approval. The contribution amount shall be adjusted annually to account for the effects of inflation (Consumer Price Index).

SCHEDULE 3
ENVIRONMENTAL PERFORMANCE

GENERAL EXTRACTION AND PROCESSING PROVISIONS

Identification of Boundaries

1. Within 3 months of the date of this approval, or as otherwise agreed by the Director-General, the Proponent shall:
   (a) engage an independent registered surveyor to survey the boundaries of the approved limit of extraction and the approved ancillary work areas;
   (b) submit a survey plan of these boundaries to the Director-General; and
   (c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

   Note: The limit of extraction and ancillary areas is shown conceptually on the layout plans in Appendix 1.

ACQUISITION OF AFFECTED PROPERTIES

Acquisition Upon Request

1A. Prior to the commencement of any extraction the Proponent shall make a firm and binding offer to acquire Lot 23 DP 1001312 ("Residence 7" in Appendix 3) in accordance with the terms of the agreement, dated 14 July 2008, as amended, between the Proponent and the owners of this property, unless otherwise agreed by the Director-General.

NOISE

Operational Noise Assessment Criteria

2. The Proponent shall ensure that the noise generated by the project, including the bypass road, does not exceed the noise impact assessment criteria in Table 1 at any residence or on more than 25 per cent of any privately-owned land.

Table 1: Noise Impact Assessment Criteria

Noise Assessment Location	$L_{Aeq\ (15\ minute)}$
Residence 1	35
Residence 2	35
Residence 3	35
Residence 4	35
Residence 5	35
Residence 6	36
Residence 8	35
Residence 9	36
Residence R1	35
Residence R2	35
Residence R3	36
Residence R4	35
Residence V1	38
Residence V2	36

Notes:

- *To interpret the locations referred to Table 1, see the figures in Appendix 3.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*

Traffic Noise Impact Assessment Criteria

3. The Proponent shall take all reasonable and feasible measures to ensure that the traffic noise generated by the project (after commencement of quarrying operations) does not exceed the traffic noise impact assessment criteria in Table 2.

Table 2: Traffic noise criteria dB(A) $L_{Aeq\ (1\ hour)}$

Roads	Day/Evening
Oallen Ford Road Mountain Ash Road Jerrara Road Tarago Road Windellama Road	55

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in the EPA's Environmental Criteria for Road Traffic Noise.

Operating Hours

4. The Proponent shall comply with the operating hours in Table 3.

Table 3: Operating Hours

Activity	Day	Time
Construction work	Monday - Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and Public Holidays	None
Quarrying, processing (including overburden removal) and product transportation	Monday – Friday	7.00am to 6.00pm
	Saturday	7.00am to 1.00pm
	Sunday and Public Holidays	None

Notes:

- *Maintenance activities may be conducted outside the hours in Table 3 provided that the activities are not audible at any privately-owned residence beyond the boundary of the site.*
- *This condition does not apply to delivery of material if that delivery is required by police or other authorities for safety reasons, and/or the operation or personnel or equipment are endangered. In such circumstances, notification is to be provided to EPA and the affected residents as soon as possible, or within a reasonable period in the case of emergency.*

Additional Noise Mitigation Measures

5. The Proponent shall construct the western earth mound and acoustic barrier prior to the commencement of any extraction (apart from overburden extraction for the purpose of constructing the mound) or processing activities to the east of the earth mound and acoustic barrier, unless otherwise agreed by the Director-General.

Noise Monitoring

6. The Proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the Director-General. This plan must:
   (a) be prepared in consultation with EPA, and be submitted to the Director-General for approval prior to carrying out any development on site; and
   (b) include details of how the noise performance of the project would be monitored, and include a noise monitoring protocol for evaluating compliance with the relevant noise limits in this approval.

AIR QUALITY

Impact Assessment Criteria

7. The Proponent shall ensure that dust generated by the project does not cause exceedances of the criteria listed in Tables 4, 5 and 6 at any residence or on more than 25 per cent of any privately owned land.

Table 4: Long term impact assessment criteria for particulate matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 5: Short Term impact assessment criterion for particulate matter

Pollutant	Averaging period	Criterion

Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 6: Long Term impact assessment criterion for particulate matter

Pollutant	***Averaging period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Operating Conditions

8. The Proponent shall ensure any visible air pollution generated by the project is assessed regularly, and that quarrying operations are relocated, modified, and/or stopped as required to minimise air quality impacts on privately owned land.

Air Quality Monitoring

9. The Proponent shall prepare and implement an Air Quality Monitoring Program for the project to the satisfaction of the Director-General. This program shall:
   (a) be prepared in consultation with EPA, and be submitted to the Director-General for approval prior to carrying out any development on site;
   (b) include details of how the air quality performance of the project would be monitored, and include a protocol for evaluating compliance with the relevant air quality criteria in this approval.

METEOROLOGICAL MONITORING

10. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

WATER

Water Supply

11. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of operations to match its water supply.

Note: The Proponent is required to obtain necessary water licences for the project under the Water Act 1912 and/or Water Management Act 2000.

Discharges

12. The Proponent shall not discharge any water from the quarry or its associated operations except in accordance with an EPL.

Water Management and Monitoring

13. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
   (a) be prepared in consultation with NOW, EPA and SCA, and be submitted to the Director-General for approval prior to carrying out any development on site; and
   (b) include a:
      - Site Water Balance;
      - Erosion and Sediment Control Plan;
      - Surface Water Monitoring Program;
      - Groundwater Monitoring Program; and
      - Surface and Groundwater Response Plan.

14. The Site Water Balance must:
   (a) include details of:
      - sources and security of water supply;
      - water use on site;
      - water management on site, including the location and capacity of water storages on site and the means of access;
      - off-site water transfers; and
      - reporting procedures; and
   (b) investigate and describe measures to minimise water use by the project.

15. The Erosion and Sediment Control Plan must:
    (a) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
    (b) identify activities that could cause soil erosion and generate sediment;
    (c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
    (d) principles for the design and construction of waterway crossings along the transport route, in consultation with DPI;
    (e) describe the location, function, and capacity of erosion and sediment control structures;
    (f) demonstrate that the design capacity of basins intended to collect storm runoff will not be compromised by storage of operational water; and
    (g) describe what measures would be implemented to maintain (and if necessary decommission) the structures over time.

16. The Surface Water Monitoring Program must include:
    (a) detailed baseline data on surface water flows and quality in downstream watercourses that could be affected by the project;
    (b) surface water quality and stream health impact assessment criteria, including trigger levels for investigating any potentially adverse surface water impacts;
    (c) a program to monitor:
        - surface water flows, quality, and impacts on water users;
        - stream health; and
        - channel stability.

17. The Groundwater Monitoring Program must include:
    (a) detailed baseline data on groundwater levels, flows and quality in the region, and particularly any groundwater bores, springs and seeps (including spring and seep fed dams) that may be affected by operations on site;
    (b) groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts; and
    (c) a program to monitor:
        - groundwater levels and quality in new and existing monitoring bores;
        - the impacts of the project on:
            - any groundwater bores, springs and seeps (including spring and seep fed farm dams) on privately-owned land; and
            - any groundwater dependent ecosystems.

18. The Surface and Groundwater Response Plan must include:
    (a) a protocol for the investigation, notification and mitigation of any exceedances of the surface and ground water impact assessment criteria;
    (b) measures to mitigate and/or compensate potentially affected landowners, including provision of alternative long-term supply of water to the affected landowner that is equivalent to the loss attributed to the project; and
    (c) the procedures that would be followed if any unforeseen impacts are detected during the project.

LANDSCAPE MANAGEMENT

Rehabilitation

19. The Proponent shall progressively rehabilitate the site, in a manner that:
    (a) is generally consistent with the concept final landform in the EA (as reproduced in Appendix 4); and
    (b) provides at least 14.7 hectares of Yellow Box – Red Gum Woodland,
    to the satisfaction of the Director-General

Landscape Management Plan

20. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with OEH by suitably qualified expert/s whose appointment/s have been approved by the Director-General, and be submitted to the Director-General for approval prior to the commencement of quarrying operations; and
    (b) include a:
        - Rehabilitation Management Plan; and
        - Quarry Closure Plan.

    Note: The Department accepts that the initial Landscape Management Plan may not include a detailed Quarry Closure Plan. However, the initial plan must include an outline and a timetable for completion of the detailed Quarry Closure Plan.

Rehabilitation Management Plan

21. The Rehabilitation Management Plan must include:
    (a) the rehabilitation objectives for the site;
    (b) a description of the short, medium, and long term measures that would be implemented to:
        - rehabilitate the site; and
        - maintain and enhance existing site vegetation outside the disturbance area;
    (c) detailed performance and completion criteria for the site rehabilitation;
    (d) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:
        - progressively rehabilitating disturbed areas;
        - protecting vegetation and soil outside the disturbance areas;
        - rehabilitating creeks and drainage lines on the site to ensure no net loss of stream length and aquatic habitat;
        - undertaking pre-clearance surveys;
        - managing impacts on fauna;
        - landscaping the site to minimise visual impacts, including a landscape plan for the visual/noise bund and other boundaries of the site;
        - conserving and reusing topsoil;
        - VENM quality assurance;
        - collecting and propagating seed for rehabilitation works;
        - salvaging and reusing material from the site for habitat enhancement;
        - controlling weeds and feral pests;
        - controlling access; and
        - bushfire management;
    (e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
    (f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
    (g) details of who would be responsible for monitoring, reviewing, and implementing the plan.

Quarry Closure Plan

22. The Quarry Closure Plan must:
    (a) include provision for certification from a qualified geotechnical engineer that the final proposed landform is stable;
    (b) define the objectives and criteria for closure of the quarry;
    (c) investigate options for the future use of the site, including any final void;
    (d) describe the measures that would be implemented to minimise or manage the ongoing (post closure) environmental effects of the project; and
    (e) describe how the performance of these measures would be monitored over time.

Rehabilitation Bond

23. Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a rehabilitation and offset bond for the project with the Director-General. The sum of the bond shall be calculated at:
    - $2.50/m^2 for the area of new disturbance in each 3 year review period;
    - $1.00/m^2 for the total area of land previously disturbed by the quarry,

    or as otherwise directed by the Director-General.

    Notes:
    - *If the rehabilitation is completed to the satisfaction of the Director-General, the Director-General will release the bond.*
    - *If the rehabilitation is not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the bond, and arrange for the satisfactory completion of the relevant works.*

ABORIGINAL HERITAGE

24. The Proponent shall prepare and implement an Aboriginal Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with the OEH, and be submitted to the Director-General for approval prior to carrying out any development on site; and
    (b) include a:
        - description of the subsurface test pit investigations that would be implemented in the extraction area to determine if archaeological material is present and the significance of any such material;
        - description of the measures that would be implemented if any new Aboriginal objects or relics are discovered during the project; and
        - protocol for the ongoing consultation and involvement of the Aboriginal communities in the conservation and management of Aboriginal cultural heritage on the site.

TRAFFIC AND TRANSPORT

Transport Route Upgrades

25. Subject to condition 25A, the Proponent shall:
    (a) restrict all product transport from the site until it has completed the Stage 1 road upgrade works, to the satisfaction of Council;
    (b) restrict product transport to a maximum of 20 truck movements (in + out) per day Monday to Friday, and 12 truck movements per day on Saturdays, until it has completed the Stage 2 road upgrade works, to the satisfaction of Council;
    (c) restrict product transport to a maximum of 56 truck movements (in + out) per day Monday to Friday, and 30 truck movements per day on Saturdays, until it has completed the Stage 3 road upgrade works, to the satisfaction of Council;
    (d) restrict truck movements associated with the project to a maximum of 88 truck movements (in + out) per day Monday to Friday, and 42 truck movements per day on Saturdays, upon completion of the Stage 3 road upgrade works.

    Notes:
    - *The road upgrade stages are defined in Schedule 1 of this approval.*
    - *The restrictions on product transport in this condition do not apply to any product transport to and from the road upgrade sites.*

25A. The Proponent shall, in relation to the principal local haulage route:
    (a) restrict all product transport from the site until it has completed the quarry access intersection upgrade works;
    (b) restrict product transport to 20,000 tonnes per annum, to be transported at a maximum rate of five laden trucks per day and to be delivered to customers located only within 100km of the site;
    (c) adhere to limits on weight-restricted bridges and roads at all times;
    (d) avoid use of the western section of Lumley Road, west of Windellama Road during and after periods of heavy rain;
    (e) ensure no truck movements occur by Windellama Public School between the hours of 8:00 am to 9:30 am and 2:30 pm to 4:00 pm and also ensure that trucks adhere to a speed limit of 40 km/h in the vicinity of the school during school hours; and
    (f) consult and enter into arrangements with drivers of local school buses along the route to minimise heavy vehicles on the road during school bus pick up and drop off times.

26. The Proponent shall:
    (a) upgrade the acceleration lane for northbound traffic on the Hume Highway at its junction with Jerrara Road, to the satisfaction of the RMS, prior to undertaking any product transport from the site; or
    (b) restrict any product transport from the site until a suitable grade separated interchange is operational at the junction of the Hume Highway and Jerrara Road,

    unless otherwise agreed by the RMS.

    Note: The restrictions on product transport in this condition do not apply to any product transport to and from the road upgrade works required by this approval.

Traffic Management Plan

27. The Proponent shall prepare and implement a Traffic Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with Council and the RMS by suitably qualified independent expert/s whose appointment/s have been approved by the Director-General, and be submitted to the Director-General for approval prior to carrying out any development on site;
    (b) provide for Road Safety Audits prior to the commencement of each stage of road upgrade works in accordance with RTA's *Accident Reduction Guide Part 2 Road Safety Audits (August 2005)*;
    (c) include a program for an action plan and outline the measures to be implemented to address any issues identified by the Road Safety Audit;
    (d) include traffic control plans to describe proposed traffic control measures during construction activities on public roads;
    (e) include a protocol for the management of quarry vehicles on the bypass road, including the prevention of trucks from queuing on Mountain Ash Road to enter the bypass road;
    (f) identify arrangements with school bus drivers including any restrictions on activities during school bus pick up/drop off times and provision of any other measures (e.g. bus bays); and
    (g) include a driver's Code of Conduct.

    Note: The Department accepts that the initial Traffic Management Plan would only include the findings of the first Road Safety Audit. Subsequent revisions of the Traffic Management Plan may be submitted on completion of subsequent Road Safety Audits.

Road Haulage

28. The Proponent shall ensure that:
    (a) all loaded vehicles entering or leaving the site are covered; and
    (b) all loaded vehicles leaving the site are cleaned of materials that may fall on the road, before they leave the site.

29. No project-related heavy vehicles shall use King Street to get to or from the site, except in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Haulage Records

30. The Proponent shall record and maintain a log of the extraction quantities and traffic movement in and out of the site, available for inspection at the request of the Director-General or Council.

VISUAL

Visual Amenity

31. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

Visual Impact Mitigation

32. Within 6 months of this approval, the Proponent shall prepare a report that:
    (a) identifies the privately-owned residences that are likely to experience significant visual impacts during the construction and operation of the project; and
    (b) describes (in general terms) the additional mitigation measures that could be implemented to reduce the visibility of the quarry from these residences,
    to the satisfaction of the Director-General.

33. Within 3 months of the Director-General approving this report, the Proponent shall advise all owners of privately-owned residences identified in the report that they are entitled to additional mitigation measures to reduce the visibility of the quarry from their properties.

34. Upon receiving a written request from an owner of a residence identified in this report, the Proponent shall implement additional visual impact mitigation measures (such as landscaping treatments or vegetation screens) in consultation with the landowner, and to the satisfaction of the Director-General.

    These mitigation measures must be reasonable and feasible.

    If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

    Note: The additional visual impact mitigation measures must be aimed at reducing the visibility of the quarry from significantly affected residences and do not necessarily require measures to reduce visibility of the quarry from other locations on the affected properties. The additional visual impact mitigation measures do not necessarily have to include measures on the affected property itself (i.e. the additional measures may consist of measures outside the affected property boundary that provide an effective reduction in visual impacts).

Lighting Emissions

35. The Proponent shall:
    (a) take all practicable measures to mitigate off-site lighting impacts from the project; and
    (b) ensure that all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting,*
    to the satisfaction of the Director-General.

Advertising

36. The Proponent shall not erect or display any advertising structure(s) or signs on the site without the written approval of the Director-General.

    Note: This does not include traffic management and safety or environmental signs.

WASTE MANAGEMENT

Waste Minimisation

37. The Proponent shall:
    (a) only import VENM to the site; and
    (b) minimise the amount of waste generated by the project to the satisfaction of the Director-General.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

38. The Proponent shall ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

Safety

39. The Proponent shall secure the project to ensure public safety to the satisfaction of the Director-General.

Bushfire Management

40. The Proponent shall:
    (a) ensure that the project is suitably equipped to respond to any fires on-site; and
    (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire on site.

PRODUCTION DATA

41. The Proponent shall:
    (a) provide annual production data to the DRE using the standard form for that purpose; and
    (b) include a copy of this data in the AEMR.

SCHEDULE 4
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in Schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, then the Proponent shall notify the Director-General and the affected landowners and/or existing or future tenants (including tenants of quarry owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the relevant criteria.

INDEPENDENT REVIEW

2. If a landowner of privately-owned land considers that the quarrying operations are exceeding the impact assessment criteria in Schedule 3, then he/she may ask the Director-General in writing for an independent review of the relevant impacts of the project on his/her land.

   If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 3 months of the Director-General advising that an independent review is warranted:
   (a) consult with the landowner to determine his/her concerns;
   (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to determine whether the project is complying with the relevant criteria in Schedule 3, and identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
   (c) give the Director-General and landowner a copy of the independent review.

3. If the independent review determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

4. If the independent review determines that the quarrying operations are not complying with the relevant criteria in Schedule 3, and that the quarry is primarily responsible for this non-compliance, then the Proponent shall:
   (a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria; and
   (b) conduct further monitoring to determine whether these measures ensure compliance; or
   (c) secure a written agreement with the landowner to allow exceedances of the relevant criteria in schedule 3,

   to the satisfaction of the Director-General.

   If the additional monitoring referred to above subsequently determines that the quarrying operations are complying with the relevant criteria in Schedule 3, then the Proponent may discontinue the independent review with the approval of the Director-General.

   If the Proponent is unable to finalise an agreement with the landowner, then the Proponent or landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 5).

5. If the landowner disputes the results of the independent review, either the Proponent or the landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 5).

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, MONITORING, REPORTING & AUDITING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy shall be submitted to the Director-General prior to carrying out any development on site, and must;
   (a) provide the strategic context for environmental management of the project;
   (b) identify the statutory requirements that apply to the project;
   (c) describe in general how the environmental performance of the project would be monitored and managed;
   (d) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the construction, operation and environmental performance of the project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the life of the project;
      - respond to any non-compliance;
      - manage cumulative impacts; and
      - respond to environmental incidents and emergencies; and

   (e) describe the role, responsibility, authority, and accountability of the key personnel involved in the environmental management of the project.

ENVIRONMENTAL MONITORING PROGRAM

2. The Proponent shall prepare an Environmental Monitoring Program for the project to the satisfaction of the Director-General. This program must be submitted to the Director-General prior to carrying out any development on site, and consolidate the various monitoring requirements in Schedule 3 of this approval into a single document.

REPORTING

Incident Reporting

3. Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.

4. Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that:
   (a) describes the date, time, and nature of the exceedance/incident;
   (b) identifies the cause (or likely cause) of the exceedance/incident;
   (c) describes what action has been taken to date; and
   (d) describes the proposed measures to address the exceedance/incident.

Annual Reporting

5. Within 12 months of the commencement of construction activities, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies. This report must:
   (a) identify the standards and performance measures that apply to the project;
   (b) describe the works carried out in the last 12 months, and the works that will be carried out in the next 12 months;
   (c) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;
   (d) include a summary of the monitoring results for the project during the past year;
   (e) include an analysis of these monitoring results against the relevant:
      - impact assessment criteria/limits;
      - monitoring results from previous years; and
      - predictions in the EA;

   (f) identify any trends in the monitoring results over the life of the project;
   (g) identify any non-compliance during the previous year; and
   (h) describe what actions were, or are being, taken to ensure compliance.

Revision of Strategies, Plans and Programs

5A. Within 3 months of:
   (a) the submission of an incident report under condition 4 above;
   (b) the submission of an AEMR under condition 5 above;
   (c) the submission of an audit report under condition 7 below; or
   (d) any modification to this approval,

the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.

Management Plan Requirements

5B. The Applicant shall ensure that the Management Plans required under this consent are prepared in accordance with any relevant guidelines, and include:
(a) detailed baseline data;
(b) a description of:
- the relevant statutory requirements (including any relevant approval, licence or lease conditions);
- any relevant limits or performance measures/criteria; and
- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
(d) a program to monitor and report on the:
- impacts and environmental performance of the development; and
- effectiveness of any management measures (see (c) above);

(e) a contingency plan to manage any unpredicted impacts and their consequences;
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;
(g) a protocol for managing and reporting any:
- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria; and

(h) a protocol for periodic review of the plan.

Note: The Director-General may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

INDEPENDENT ENVIRONMENTAL AUDIT

6. Within 2 years of the date of the commencement of quarrying operations, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
(a) be conducted by a suitably qualified, experienced, and independent person(s) whose appointment has been approved by the Director-General;
(b) include consultation with the relevant agencies;
(c) assess the environmental performance of the project, and its effects on the surrounding environment;
(d) assess whether the project is complying with the relevant standards, performance measures and statutory requirements; and
(e) review the adequacy of any strategy/plan/program required under this approval, and, if necessary, recommend measures or actions to improve the environmental performance of the project, and/or any strategy/plan/program required under this approval.

Note: The person(s) conducting the audit should have expertise in the fields of traffic management, hydrogeology and quarry rehabilitation.

7. Within 6 weeks of completion of each Independent Environmental Audit, the Proponent shall submit a copy of the audit report to the Director-General, with a response to any of the recommendations in the audit report.

8. Within 3 months of submitting a copy of the audit report to the Director-General, the Proponent shall review and if necessary revise the sum of the Rehabilitation Bond (see Schedule 3), to consider:
- the effects of inflation;
- any changes to the total area of disturbance; and
- the performance of the revegetation against the completion criteria of the Rehabilitation Management Plan,

to the satisfaction of the Director-General.

COMMUNITY CONSULTATIVE COMMITTEE

9. The Proponent shall establish and operate a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in general accordance with the Department's *Guideline for Establishing and Operating Community Consultative Committees for Mining Projects*. The CCC must

be established within 3 months of the date of this approval, unless otherwise agreed by the Director-General.

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.*
- *In accordance with the Guideline, the Committee should comprise an independent chair and appropriate representation from the Proponent, Council, adjoining landholders, residents of Bungonia village and resident/s along the haulage route.*

ACCESS TO INFORMATION

10. Within 1 month of the approval of any plan/strategy/program required under this approval (or any subsequent revision of these plans/strategies/programs), or the completion of the audits or AEMR required under this approval, the Proponent shall:
    (a) provide a copy of the relevant document/s to the relevant agencies and to members of the general public upon request; and
    (b) ensure that a copy of the relevant document/s is made publicly available on its website and at the Proponent's office.

11. During the project, the Proponent shall:
    (a) make a summary of monitoring results required under this approval publicly available on its website and at the site office; and
    (b) update these results on a regular basis (at least every 3 months).

Adaptive Management

12. The Applicant shall assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

    Where any exceedance of these criteria and/or performance measures has occurred, the Applicant shall, at the earliest opportunity:
    (a) take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;
    (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
    (c) implement remediation measures as directed by the Director-General;
    to the satisfaction of the Director-General.

APPENDIX 1
GENERAL LAYOUT OF PROJECT

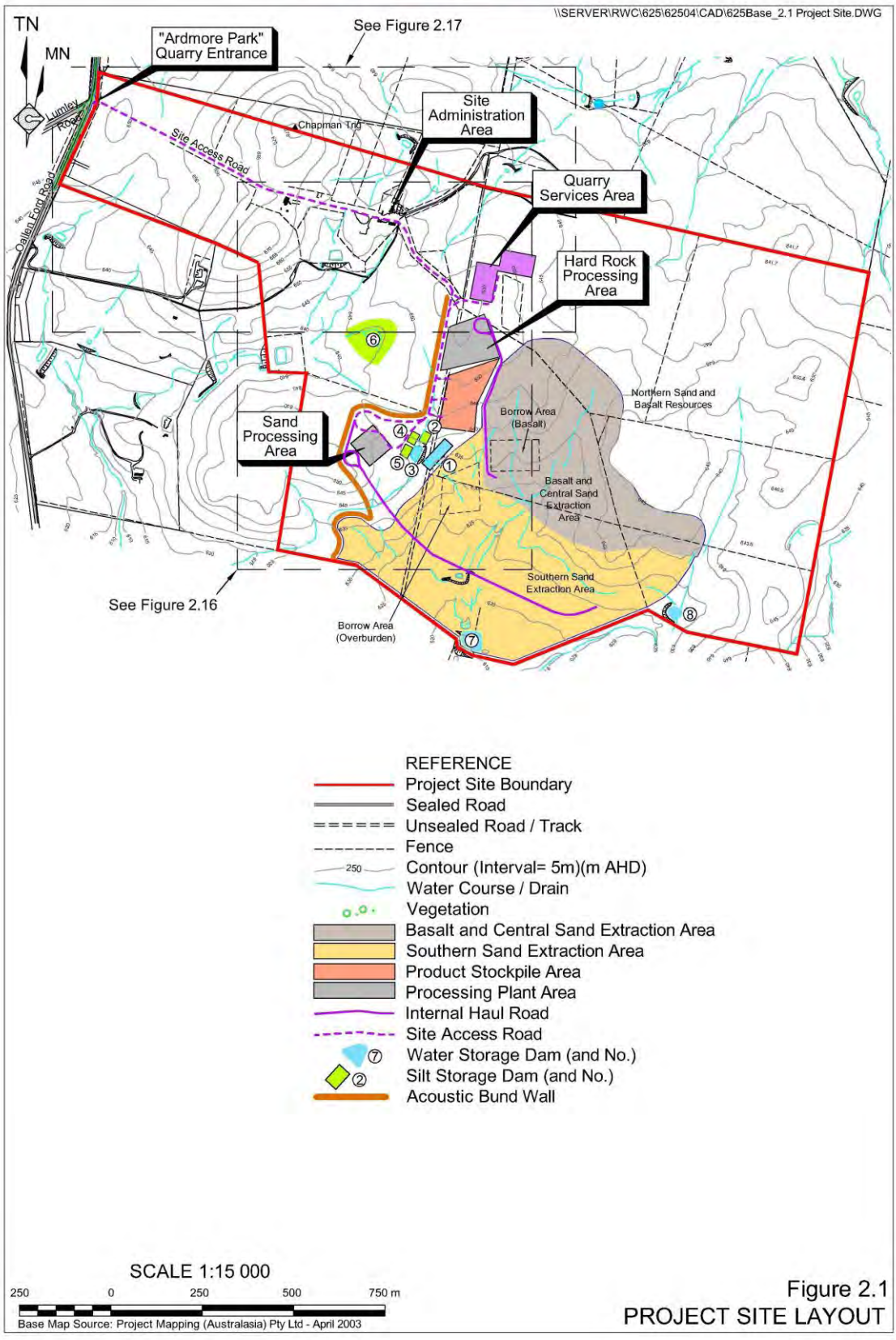


Figure 2.1
PROJECT SITE LAYOUT

APPENDIX 2

STATEMENT OF COMMITMENTS

Table A Statement of Commitments for Project Site Operations and Management

Desired Outcome	Action		Timing
1. Area of Activities			
All approved activities are undertaken in the area(s) nominated on the approved plans and figures (unless moved slightly to avoid individual trees).	1.1	Survey and mark the boundaries of the areas of disturbance on the ground.	Prior to any vegetation clearing.
	1.2	Survey and peg the centre line of the Site Access Road.	Prior to construction of the Site Access Road.
2. Operating Hours			
Management of construction and operational activities in accordance with the approved operating hours.	2.1	Undertake all activities within the hours of: 7.00am to 6.00pm / Monday to Friday and 7.00am to 1.00pm / Saturday.	Ongoing.
3. Waste Management			
Minimisation of general waste creation and maximisation of recycling, wherever possible.	3.1	Place all paper and general wastes originating from the Administration and Quarry Services Area, together with routine maintenance consumables from the daily servicing of equipment in garbage bins located adjacent to the various buildings.	Ongoing.
Minimisation of the potential risk of environmental impact due to waste creation, storage and/or disposal.	3.2	Collect general waste bins daily and place contents in large waste skip bins positioned adjacent to the heavy vehicle maintenance building to await removal by licensed contractor.	Daily
	3.3	Organise the regular collection of industrial wastes.	Monthly
	3.4	Store waste oils and grease at the maintenance workshop for collection by a licensed waste recycling contractor.	Monthly
	3.5	Collect all parts and packaging and transfer to the maintenance workshop for disposal or recycling.	As required.
	3.6	Store potentially hydrocarbon-contaminated water in the oil/water separator for regular removal from site by a licensed contractor.	As required.
	3.7	Install adequate toilet and ablution facilities within the Administration and Quarry Services Area for the site workforce and visitors.	During site establishment.
	3.8	Direct sewage to either the existing septic system of the "Ardmore Park" property or a bio-cycle (or equivalent system) within the Administration and Quarry Services Area with effluent irrigation to land.	Ongoing.
4. Rehabilitation			
The creation of a stable final landform, available for the proposed future use(s) of agriculture and/or nature conservation.	4.1	Adopt a progressive approach to rehabilitation to ensure that completed areas are quickly shaped and vegetated to provide a stable landform.	Ongoing during rehabilitation activities.
	4.2	Stabilise earthworks, drainage lines and disturbed areas no longer required for quarry-related activities.	As areas become available.
	4.3	Blend the created landform with the surrounding land fabric.	As areas become available.
	4.4	Maintain a number of water storages to facilitate the subsequent use of the land for agricultural purposes.	Prior to quarry closure.
	4.5	Replant native vegetation along reinstated drainage lines and lower lying areas of the Project Site totalling approximately 14.7ha.	Ongoing during rehabilitation activities.

Desired Outcome	Action		Timing
	4.6	Utilise native tree, shrub and grass species that would promote the re-establishment of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland, and link existing areas of native vegetation to the southeast and northwest of the Project Site.	Ongoing during rehabilitation activities.
	4.7	Retain cleared trees and branches for use in stabilising slopes identified for rehabilitation with native woodland communities.	Ongoing during rehabilitation activities.
	4.8	Report each year's rehabilitation within an Annual Environmental Management Report (AEMR).	Annually.
	4.9	Undertake a targeted weed spraying programs, to eliminate or control noxious weeds currently occurring on the Project Site.	Annually.
5. Groundwater			
Prevention of groundwater contamination.	5.1	Securely store all hydrocarbon products within designated and bunded areas.	Ongoing.
	5.2	Refuel all of the project fleet within designated areas of the Project Site.	Ongoing.
	5.3	Undertake all maintenance activities within designated areas of the Project Site facilities area, ie. maintenance workshop.	Ongoing.
	5.4	Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	Ongoing.
	5.5	Ensure all storage tanks are either self-bunded tanks or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.	Ongoing.
	5.6	Collect samples of groundwater in all monitoring wells on a 12-month basis and submit to a NATA registered laboratory for the testing of pH, Electrical conductivity (EC), Total Dissolved Solids (TDS) and the determination of major anions, major cations, iron and hydrocarbons.	Annually.
	5.7	Measure water levels on a monthly basis up to and throughout the extraction phase from Bores BHAP1, BHAP5, BHAP7 and BHAP10.	Monthly.
	5.8	Replace the bores that are destroyed during the staged extraction process with strategically positioned and suitably installed new monitoring wells where appropriate.	As required.
	5.9	(In the event that monitoring indicates a decreasing SWL trend attributable to the proposed extraction of groundwater), reduce pumping rates, initially through reducing water provided for ongoing stock watering and if required through a reduced processing rate at the sand washing plant.	In the event that monitoring indicates a decreasing SWL trend attributable to the proposed extraction of groundwater.
Prevention of any reduction in the availability of groundwater flows to local springs.	5.10	Assess the flow rate and water quality of groundwater from the "Inverary Park" and Southern Spring against low flow records.	6 monthly.
	5.11	Establish photo points at representative spring ("Inverary Park", southern and western springs) and other locations to assess any changes in flow regimes and vegetation over time	Prior to the commencement of extraction.

Desired Outcome	Action		Timing
	5.12	(In the event of a deterioration of flow rates and/or water availability to below historic low flows) undertake one of the following options: (i) supply groundwater to the affected water user from Multiquip's proposed production bore (BHAP6) to the measured and documented loss and with a water quality commensurate or better; or (ii) provide monetary compensation to the affected water user; or (iii) install a replacement bore to provide the measured and documented loss of groundwater with a quality commensurate or better.	In the event of a deterioration of flow rates and/or water availability to below historic low flows.
Preparation of a contingency plan in the event that the availability or quality of groundwater is reduced for local groundwater users.	5.13	Undertake remedial action if the available drawdown attributable to the mine for the existing groundwater users is reduced by over 15%. The remedial actions that may be appropriate include the deepening of bores or replacement of bores to accommodate deeper, high lift pumps.	As required.
	5.14	Commission review of all monitoring results on an annual basis by a consulting hydrogeologist or other environmental professional and report in each AEMR.	Annually
6. Surface Water			
Diversion of clean water flows away from areas of project related disturbance.	6.1.	Construct diversion banks upstream of the extraction area and other related disturbance to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.2.	Construct clean water storage dam (Dam 8) at the discharge points of the main diversion structures.	Prior to disturbance in relevant catchment of the Project Site.
	6.3.	Inspect the diversion banks and storage dams on a monthly basis, or following rainfall of >25mm/24 hours, and undertake maintenance work as necessary.	Monthly or following rainfall of >25m/24hours.
Capture of dirty water flows from areas of project related disturbance.	6.4.	Construct catch banks downstream of disturbed ground to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.5.	Inspect the catch banks on a monthly basis, or following rainfall of >25mm/24 hours, and undertake maintenance work as necessary.	Monthly or following rainfall of >25mm/24 hours.
	6.6.	Construct sediment basins and clarification ponds as identified on **Figure 5.15** (in the EA) and to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.7.	Inspect the sediment basins on a monthly basis, or following rainfall of >25mm/24 hours, and clean out the sediment basins of consolidated sediment once capacity reduced by 20%.	Monthly or following rainfall of >25mm/24 hours.
	6.8.	Review general performance of catchment and settlement structures and upgrade the existing structures or install additional structures to ensure all dirty water is captured and settled prior to discharge.	Ongoing.
Discharged water quality to meet nominated criteria.	6.9.	Construct catchment and settlement structures 'in-line' such that overflow from one structure is directed to another downstream.	During construction.
	6.10.	Divert drainage in the final landform to Dams 7 and 8.	Prior to project completion.

Desired Outcome	Action		Timing
	6.11.	Ensure drainage paths between the catchment and settlement structures are well grassed.	Ongoing.
	6.12.	Ensure any water discharged meets the EPA Environment Protection Licence criteria, expected to be as follows. • TSS < 50mg/L. • pH: 5.5 to 8.5. • Oil & grease < 10mg/L. • Electrical conductivity < 350µS/cm	Ongoing.
Prevention of hydrocarbon contamination of water on the Project Site.	6.13.	Securely store all hydrocarbon products.	Ongoing
	6.14.	Refuel all but the less mobile mining equipment which would be refuelled within the open cut area, within designated areas.	Ongoing.
	6.15.	Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	Ongoing.
	6.16.	Ensure all storage tanks are either self-bunded tanks or bunded with an impermeable surface and have a capacity to contain a minimum 110% of the largest storage tank capacity.	When imported to site or constructed.
	6.17.	Implement a 3-phase remedial action plan in the event of a major hydrocarbon spill as follows. • **Phase 1 – Initial Recovery:** Recover as much as possible at the source by pumping free hydrocarbon from the surface and excavating hydrocarbon-contaminated materials. • **Phase 2 – Source Control:** Begin hydraulic control of the source to prevent spreading of contamination. • **Phase 3 – Recovery:** If necessary, install boreholes to remove and treat contaminated groundwater.	As required.
7. Noise			
All activities are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	7.1.	Construct an acoustic bund wall to the west of the internal road network and around the sand processing area.	During construction period.
	7.2.	Locate the mobile crushing plant and hard rock processing plant within a cut section of the Project Site, approximately 8m below surface level (to the east).	During construction period.
	7.3.	Commence extraction from the southern sand resource area at the northern extremity of Stage 1 and move progressively southward toward Stage 2.	As part of extraction operations.
	7.4.	Enclose the hard rock processing plant using Panel-Tech Thermaspan Colorbond panels, leaving openings only for plant conveyors.	During construction period.
	7.5.	Adhere to the nominated hours of operation, ie. no extraction, processing and associated activities would take place before 7:00am or after 6:00pm.	Ongoing.
	7.6.	Use equipment with lower sound power levels in preference to more noisy equipment.	Ongoing.
	7.7.	Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.

Desired Outcome	Action		Timing
	7.8.	Regularly service all equipment used on site to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	7.9.	Grade the internal road network to limit body noise from empty trucks travelling on the Project Site.	Ongoing.
	7.10.	Establish a noise monitoring program (NMP) to initially validate the predictions arising from the modelling and then record noise levels against the Project noise criteria. The NMP would include a noise monitoring protocol which would include the contingent measures to be followed should non-compliant noise levels be measured.	Within 6 months of project approval.
8. Air Quality			
Site activities are undertaken without exceeding EPA air quality criteria or goals.	8.1.	Minimise clearing ahead of construction and operational activities.	Ongoing.
	8.2.	Undertake soil stripping at a time when there is sufficient soil moisture to prevent significant lift-off of dust.	Ongoing.
	8.3.	Avoid stripping soil in periods of high wind.	Ongoing.
	8.4.	Use water application to increase soil moisture should stripping occur during periods of high wind or low soil moisture.	Ongoing.
	8.5.	Apply water to the hard rock processing plant feed hopper and crushers.	Ongoing.
	8.6.	Install bund walls and wind breaks as required.	Ongoing.
	8.7.	Locate the mobile crushing plant within the cut section of the hard rock processing area.	During construction and initial production phase.
	8.8.	Enclose the dust generating components of the hard rock processing plant with limited openings to allow entry and exit of conveyors and access by project personnel.	During construction.
	8.9.	Use a 10 000 litre water truck to regularly wet the active internal unsealed roads.	Ongoing.
	8.10.	Seed topsoil stockpiles, acoustic bund walls and areas where landform preparation is complete to assist in stabilising the exposed surface	Ongoing.
	8.11.	Minimise the drop heights between front-end loader buckets and trucks carrying sand/basalt or overburden through operator training and education on the management of dust	Ongoing.
	8.12.	Cover all trucks carrying quarry products with approved covers and securely fix the tailgates to prevent windblown dust emission or spillages.	Ongoing.
	8.13.	Undertake an air quality monitoring program to demonstrate compliance with the nominated goals. • Deposited dust at selected residences and strategic locations surrounding the Project Site. • Continuous wind speed and direction at the Project Site weather station.	Within 6 months of project approval.

Desired Outcome	Action		Timing
9. Flora and Fauna			
Minimisation of long term impact on flora and fauna on and around the Project Site.	9.1.	Construct the Project Site infrastructure to avoid where possible, remnant stands of vegetation.	During Construction.
	9.2.	Minimise clearing and consistent with operational requirements.	During clearing.
	9.3.	Undertake vegetation clearing on a campaign basis to provide for immediate extraction operations.	Ongoing.
	9.4.	Clearly define all areas to be cleared.	Prior to clearing.
	9.5.	Construct any additional internal roads required on the cleared lands well away from stands of native vegetation.	Ongoing.
	9.6.	(Where practicable), directly transfer soil material and biomass stripped to completed sections of the final landform for spreading	Ongoing
	9.7.	Carry out, where possible, tree removal, especially the mature trees in late spring and early autumn to avoid spring nesting birds and over-wintering bats.	Ongoing.
	9.8.	Retain felled trees for use in rehabilitation of the final landform.	Ongoing.
	9.9.	Ensure the quality of water discharged from the Project Site has a neutral or beneficial impact on the downstream catchment.	Ongoing.
	9.10.	Control noxious weeds at all times.	Ongoing.
	9.11.	Commence progressive rehabilitation of the open cut area, including establishment of Vegetation Offset Area as soon as possible.	During Year 1 of project.
	9.12.	Undertake landscape plantings to screen the proposed quarry and associated facilities from view, stabilise the soils and drainage lines and provide habitat for fauna	During first 3 years of the project.
	9.13.	Maintain the existing fences around the remnant forest communities associated with the knolls on the "Ardmore Park" property.	Ongoing.
10. Aboriginal Heritage			
Provide appropriate protection to identified Aboriginal artefacts.	10.1.	Ensure the in-situ protection of the identified artefacts through workforce education.	Ongoing
	10.2.	Apply for the relevant permit to undertake test pitting over the southern sand resource (in accordance with the recommendations of AASC (2008).	Prior to the commencement of extraction.
Minimise potential to impact upon unidentified Aboriginal artefacts.	10.3.	Invite Aboriginal monitors to site to review the results of test pitting activities.	Ongoing.
	10.4.	Cease work at any area if further Aboriginal objects are uncovered during the course of the Project, and contact the OEH (NPWS) for advice.	Ongoing.
Employees who are sensitive and respectful of possible identified Aboriginal sites and artefacts.	10.5.	Conduct a Cultural Heritage Awareness Induction Course for staff, contractors and any heritage monitors working on the Project Site.	Ongoing.
Notification of Aboriginal Sites under Part 6 s91 NPWS Act.	10.6.	Supply formal site cards for all identified Aboriginal artefacts to the OEH Aboriginal Heritage Information Management System (AHIMS) Registrar.	Following identification of an Aboriginal artefact or site.
11. Non-Aboriginal Heritage			
Provide appropriate protection to site of non-Aboriginal heritage significance.	11.1	Locate the Project Site entrance works at least 5.5m from the Larbert Tree and protect the tree from accidental damage during road construction and operation of the quarry.	Ongoing.

Desired Outcome	Action		Timing
	11.2	Prepare a Cultural Heritage Management Plan (CHMP) for the project which would: • be prepared in consultation with the NSW Heritage Office • include an inventory of all listed heritage items locally; • provide opportunity for further research as to any physical evidence of the Old Argyle Road; • include a protocol for surface disturbing activities in the vicinity of the recorded location of the Old Argyle Road; and • include a protocol to be followed in the event that archaeological material is exposed as a result of surface disturbing activities.	Prior to commencement of the project.
12. Visibility			
Reduce the impact of the project on the visual amenity of private and public vantage points.	12.1	Orient the various components of the Project Site in such a way that the existing topographical features would offer maximum screening of the Project Site.	Complete.
	12.2	Minimise the extent of land disturbance / clearing in advance of extraction.	Ongoing.
	12.3	Construct a 4m bund wall around the sand washing plant, along the internal product transport route and ultimately along the Project Site access road to the west of the "Ardmore Park" residence.	During construction activities.
	12.4	Seed the bund wall with native grass, shrub and tree species to act as an additional visual screen.	Following construction.
	12.5	Plant out the elevated areas immediately west of the processing plants and internal road network as part of an ongoing commitment to re-establish areas of native vegetation (particularly those of the White Box Yellow Box Blakely's Red Gum Woodland community).	Ongoing.
13. Soils, Land Capability and Agricultural Suitability			
Maintenance of soil value for rehabilitation and minimisation of soil loss though erosion.	13.1	Strip topsoil and subsoil to the depths nominated in the EA. Only those areas required for immediate construction or extraction activities would be stripped.	Ongoing.
	13.2	Provide mobile equipment operators with clear instructions to keep the topsoil and subsoil separate	Ongoing
	13.3	Transfer and respread directly stripped soil materials directly over areas to be rehabilitated following the first 18 to 24 months of mine operations.	Ongoing.
	13.4	Stockpile soil away from natural surface drainage lines.	Ongoing
	13.5	Seed any stockpile retained for in excess of three months with cereal and pasture species	As required.
	13.6	Cover long-term subsoil stockpiles with a cover of topsoil.	As required.
	13.7	Install erosion protection around soil stockpiles.	Ongoing.
	13.8	Divert surface water flow away from soil stockpile areas.	
	13.9	Monitor erosion from soil stockpiles or rehabilitated surfaces throughout the life of	Ongoing.

Desired Outcome	Action		Timing
		the Project with remedial works undertaken should erosion be observed.	
14. Bushfire Hazard			
Minimise potential for initiation of fire through combustion of fuel.	14.1	Undertake refuelling within designated fuel bays or within cleared area of the Project Site.	Ongoing.
	14.2	Turn vehicles off during refuelling.	Ongoing.
	14.3	Enforce no smoking policy in designated areas of the Project Site.	Ongoing.
	14.4	Maintain fire extinguishers within site vehicles.	Ongoing.
Manage potential and actual bushfire occurrences in accordance with local bushfire control plans.	14.5	Prepare a Bushfire Management Plan for the Project.	Within 6 months of the Project commencing.
	14.6	Regularly liaise with Goulburn Mulwaree Council personnel in relation to bushfire hazard.	Ongoing.

Table B
Statement of Commitments for Transport Operations and Management

Desired Outcome	Action		Timing
1. Area of Activities			
All approved activities are undertaken in the area(s) nominated on the approved plans and figures (unless moved slightly to avoid individual trees).	1.1	Peg the centre line of the Bungonia By-pass section of the transport route, specifically where a meander is to be created to avoid any mature native trees.	Prior to construction of the transport route.
	1.2	Survey and mark the boundaries of the areas of disturbance on the ground.	Prior to any vegetation clearing.
2. Operating Hours			
Management of transport operations in accordance with the approved operating hours.	2.1	Undertake road upgrade and construction operations within the hours of: 7.00am to 6.00pm / Monday to Friday and 7.00am to 1.00pm / Saturday.	During Construction and upgrading works along the Transport Route.
	2.2	Ensure no truck exits the site before 7.00am Monday to Saturday or enters the site after 6.00pm Monday to Friday and 1.00pm Saturday.	Ongoing
3. Waste Management			
Minimisation of general waste creation and maximisation of recycling, wherever possible.	3.1	Collect all waste materials in temporary skip bin(s) at the construction / upgrade site and transfer to local landfill as required.	During Construction of the Transport Route.
Minimisation of the potential risk of environmental impact due to waste creation, storage and/or disposal.	3.2	Undertake all vehicle refuelling within a bunded area of the Project Site or protected area in the vicinity of the construction site.	During Construction of the Transport Route.
	3.3	Install temporary toilet and ablution facilities away from natural drainage lines.	As required.
4. Rehabilitation			
The creation of a stable landform, available for the proposed future use(s) of agriculture and/or nature conservation.	4.1	Stabilise earthworks, drainage lines and disturbed areas no longer required for project-related activities.	Ongoing.
	4.2	Maintain aquatic and terrestrial habitat corridors along Bungonia Creek.	During Construction of the Transport Route.
	4.3	Avoid unnecessary disturbance to vegetation along the alignment of the Bungonia By-pass through the Crown land.	During Construction of the Transport Route.
5. Transport Route Construction and Upgrading – see Figures A, B & C below			
Stage 1 Roadworks. The completion of the construction of the Bungonia Bypass and the completion of specified intersection upgrades (see **Figure A** below).	5.1.	Construct the Project Site entrance with Oallen Ford Road (see **Detail A** below).	Throughout Stage 1 Roadworks.
	5.2.	Construct the Bungonia Bypass, including the crossing of Bungonia Creek (see **Detail B** below), as follows. • Two 2.5m lanes with 0.5m shoulder between Oallen Ford Road and the Crown	Throughout Stage 1 Roadworks.

Desired Outcome	Action		Timing
		land (see **Detail E** below). • Single lane bridge spanning Bungonia Creek as described in Section 3.2.4.5 and **Figure 3.6** in the EA. • A singe lane of 3.0m, with 0.5m shoulder on both sides, through the Crown land (see **Detail F** below). A pass-by bay would be included over already cleared land at both the Northern and Southern ends of this section of the by-pass.	
	5.3.	Construct the intersections of the Bungonia Bypass with Oallen Ford Road (see **Detail C** below) and Mountain Ash Road (see **Detail D** below).	
	5.4.	Upgrade the Mountain Ash Road – Jerrara Road intersection.	
	5.5.	Upgrade Water Course Crossing I as part of the Mountain Ash Road – Jerrara Road intersection upgrade (see **Detail D** below).	
	5.6.	Widen the carriageway of Jerrara Road at Water Course Crossings E (5.94km from the Hume Highway to accommodate an 8m sealed pavement).	
	5.7.	Install "Give Way" signs on the southbound approach to Water Course Crossings: - B (3.16km from the Hume highway); - C (3.43km from the Hume Highway); - D (5.12km from the Hume Highway); and - G (9.72km from the Hume highway).	
	5.8.	Install other road signage as required by Goulburn Mulwaree Council.	
Stage 2 Roadworks. The completion of pavement widening and public road upgrades (see **Figure B** below).	5.9.	The widening and minor realignment of the public roads of proposed transport route between the Project Site and the Hume Highway.	Throughout Stage 2 Roadworks.
	5.10.	The upgrade of Water Course Crossings A, F and H.	
	5.11.	Rehabilitate those sections of pavement identified as having a pavement life of less than 10 years.	
	5.12.	Complete centreline and edge marking over the entire length of the transport route.	Throughout Stage 2 Roadworks.
Stage 3 Road Works. Completion of remaining water course crossing upgrades (see **Figure C** below).	5.13.	Upgrade Water Course Crossings: - B (3.16km from the Hume highway); - C (3.43km from the Hume Highway); - D (5.12km from the Hume Highway); and - G (9.72km from the Hume highway); to provide a sealed pavement crossing of 8.0m.	Throughout Stage 3 Roadworks.
	5.14.	Remove "Give Way" signs from the southbound approach to these crossings once the Stage 3 roadworks are completed.	
		6. Product Transportation	
Product transportation is undertaken in such a manner as to minimise impacts for motorists travelling on the local road network and surrounding landholders and/or residents.	6.1.	Erect "Trucks Entering" signs on Oallen Ford Road on both the southbound and northbound approaches to the Project Site entrance and on Lumley Road 200m from the Project Site entrance.	Prior to the commencement of transport operations.
	6.2.	Establish a complaints register, advertised in the local telephone directory, to allow concerned residents to report any traffic related incidents, unsafe operation or general	Prior to commencement of transport operations and ongoing.

Desired Outcome	Action		Timing
		concern. Multiquip would thoroughly investigate all complaints.	
	6.3.	Restrict the number of truckloads exiting the Project Site to 10 per day until the Stage 2 road upgrade works are complete.	Following the completion of Stage 1 road works.
	6.4.	Restrict the number of truckloads exiting the Project Site to 28 per day until the Stage 3 watercourse crossing upgrades are complete.	Following the completion of the Stage 2 roadworks (see Commitments 5.9 to 5.12).
	6.5.	Following the completion of the Stage 3 roadworks (see Commitments 5.13 and 5.14) restrict the number of truckloads exiting the Project Site to 44 per day.	Ongoing following the completion of Stage 3 roadworks.
	6.6.	Adhere to the nominated hours of operation, ie. no vehicles would arrive at the Project Site before 7:00am or leave the Project Site after 6:00pm.	Ongoing
	6.7.	Enforce driver adherence to all speed limits. • 80km/hr on public roads. • 60km/hr on the Bungonia Bypass.	Ongoing.
	6.8.	Ensure each exiting truck uses an on-site weighbridge to ensure all legal weight restrictions are adhered to.	Ongoing.
	6.9.	Use only vehicles which employ the most up-to-date noise/emission reducing technology.	Ongoing.
	6.10.	Cover all loads to minimise dust and particulate matter and debris emissions	Ongoing.
	6.11.	Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.
	6.12.	Regularly service all trucks to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	6.13.	Prepare and implement a transport Code of Conduct developed for the project. The Code of Conduct would require drivers to obey all traffic signs, speed zones and to operate in a safe and courteous manner at all times.	Ongoing.
7. Surface Water			
Construction of appropriate roadside drainage.	7.1.	Complete specific roadside drainage upgrades as identified in **Table 6.9** (in the EA)	During Stages 2 and 3 roadworks.
	7.2.	Complete standard drainage upgrades on all drainage line crossings including: • extension of the pipes, culverts or bridges to facilitate the wider road; • raising of the pipe headwalls to accommodate higher batters; and/or • steepening batter slopes between the road pavement and the pipe headwall.	During Stages 2 and 3 roadworks.
	7.3.	Implement a standard suite of design measures on all piped and box culvert drainage line crossings, as follows. • All pipes and culverts would be provided with inlet protection (in accordance with Chapter 5.4.3 of Landcom (2004)) made from locally-sourced rock cobbles. • All pipes and culverts would be provided with outlet protection, ie. energy dissipators (in accordance with Standard Drawing 5-8 of Landcom (2004)), made from locally-sourced rock cobbles.	During Stages 2 and 3 roadworks.

Desired Outcome	Action		Timing
		• Excess accumulations of sediment or leaf litter would be removed from pipes and culverts as works progress. • Where table drains discharge into watercourses or drainage depressions, the outlet point will be provided with scour protection in the form of riprap (or equivalent). • Where drainage lines show evidence of gullying deeper than 1.0m within 20m of the road crossing, batters would be graded back to 6H:1V and stabilised using appropriate erosion control measures and native vegetation would be planted in and around energy dissipation structures.	
	7.4.	(Where the general crossing design works would require the construction of, or remedial work to, fill batters), undertake the works as follows. • Prevent stormwater runoff from drain down the fill batters. Where unavoidable, direct the water as sheet flow over sections of the fill batter vegetated using a hydromulch or equivalent erosion control measures. • Direct any concentrated flows via flumes constructed from suitably robust material, including flow arresting measures, and discharging onto an energy dissipater. • Fill batters would not exceed 2H:1V gradients. • Stabilise fill batters by compaction and use a hydromulch (or equivalent) to aid the establishment of grasses. • Install sediment fencing 1m from the toe of any batters.	During Stages 2 and 3 roadworks.
	7.5.	Install table drains to manage stormwater runoff from the road pavement as specified by SEEC Morse McVey (2008).	During Stages 2 and 3 roadworks.
Manage erosion and sediment control during the road upgrading and construction works.	7.6.	Minimise clearing of groundcover in advance of upgrading / construction activities.	During Stages 1 and 2 roadworks.
	7.7.	Install sediment fencing, in accordance with Standard Drawing SD 6-8 of Landcom (2004) down-slope of any construction area until works are complete.	During Stages 1 and 2 roadworks.
	7.8.	Strip and stockpile topsoil, in accordance with Standard Drawing SD 4-1 of Landcom (2004), for later re-use.	During Stages 1 and 2 roadworks..
	7.9.	Maintain upslope catchment length of exposed soil areas below 80m. Any slope length exceeding 80m should have a diversion bank, constructed in accordance with Standard Drawing SD 5-5 of Landcom (2004), to direct overland flows onto well-protected, vegetated lands.	During Stages 1 and 2 roadworks..
	7.10.	Restrict construction traffic access to the minimum required for efficient operation of activities.	During Stages 1 and 2 roadworks.
	7.11.	Construct diversion banks to divert "clean" runoff from upslope of any construction areas. Discharges would be onto a stabilised, well-vegetated area, preferably using a level spreader or sill.	During Stages 1 and 2 roadworks.
	7.12.	Protect areas of concentrated flow, eg. drainage pathways, table drains etc., using	As part of road upgrading and

Desired Outcome	Action		Timing
		appropriate erosion control measures such as a biodegradable Rolled Erosion Control Product (RECP), eg. coconut fibre matting or jute matting.	construction.
	7.13.	Stabilise batters following construction or reshaping with vegetation.	As part of road upgrading and construction.
Maintain a Vegetation Offset Area	7.14.	Progressively establish a Vegetation Offset Area (VOA) as part of Project Site rehabilitation activities. The VOA would: • cover an area of 14.7ha; • be established through a combination of hand seeding and tube stock planting; • focus plantings on the reinstated drainage lines and topographically lower areas of the Project Site; • involve a mix of native *Acacia, Eucalyptus* and *Casuarina* species, specifically targeting the re-establishment of the White Box Yellow Box Blakely's Red Gum woodland community in some areas; • be planted at a density of between 1 000 and 2 000 trees per hectare. • be protected from stock by fencing for at least two years; • be watered regularly to promote survival; and • have signage erected identifying the area as a vegetation offset planting area for the management of water quality within the Sydney Drinking Water Catchment.	Ongoing as part of rehabilitation activities.
8. Noise			
All transport operations are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	8.1.	Prevent product deliveries until construction of the Bungonia By-pass is complete.	During Stage 1 roadworks.
	8.2.	Restrict product delivery truck movements to 20 per day until the road upgrading works are completed.	Following completion of Stage 1 roadworks.
	8.3.	Adhere to the nominated hours of operation, ie. no vehicles would arrive at the Project Site before 7:00am or leave the Project Site after 6:00pm.	Ongoing.
	8.4.	Enforce driver adherence to all speed limits.	Ongoing.
	8.5.	Use only vehicles which employ the most up-to-date noise/emission reducing technology as part of transport fleet.	Ongoing.
	8.6.	Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.
	8.7.	Regularly service all trucks to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	8.8.	Ensure noise levels attributable to the construction and operation of the transport route, ie. product transportation, complies with the nominated noise criteria at residences fronting the transport route, within Bungonia village and within audible range of the Bungonia By-pass.	Ongoing.
9. Air Quality			
Transport Route construction and road upgrading activities are	9.1.	Minimise clearing ahead of construction.	During Stages 1 and 2 roadworks.

Desired Outcome	Action		Timing
undertaken without exceeding EPA air quality criteria or goals.	9.2.	Minimise the number of stockpiles and restrict access to a single working face.	During Stages 1 and 2 roadworks.
	9.3.	Compact stockpiles as material is removed or added to stockpiles.	During Stages 1 and 2 roadworks.
	9.4.	Restrict all vehicles to designated routes within the Bungonia By-pass construction area with a speed limit of 20km/h.	During Stages 1 transport operations.
	9.5.	Clean dirt tracked onto the public road network.	During Stage 1 roadworks.
Site activities are undertaken without exceeding EPA air quality criteria or goals.	9.6.	Stand down vehicles with smoky exhausts (more than 10 seconds) for maintenance.	Ongoing.
	9.7.	(During hot, dry and/or windy conditions) limit topsoil stripping activities to that required for the ensuing days construction.	During Stages 1 and 2 roadworks.
	9.8.	Avoid stripping soil in periods of high wind.	Ongoing.
	9.9.	Apply water using a water cart to exposed surfaces.	During Stages 1 and 2 roadworks.
10. Flora and Fauna			
Minimisation of long term impact on flora and fauna on and around the Project Site.	10.1.	Minimise clearing and consistent with operational requirements.	During clearing.
	10.2.	Inspect trees to be cleared prior to clearing to ensure no native fauna is in residence at the time	Prior to clearing
	10.3.	Undertake vegetation clearing on a campaign basis to provide for construction operations.	Ongoing.
	10.4.	Clearly define all areas to be cleared.	Prior to clearing.
	10.5.	Retain felled trees for use in rehabilitation of the final landform.	Ongoing.
	10.6.	Construct appropriate drainage and erosion and sediment control features and implement procedures to prevent water containing high sediment levels from discharging from the transport route.	During construction.
	10.7.	Control noxious weeds at all times.	Ongoing.
11. Aboriginal Heritage			
Provide appropriate protection to identified Aboriginal artefacts.	11.1.	Ensure the in-situ protection of the identified artefacts through workforce education.	Complete.
	11.2.	Align the Bungonia By-pass to avoid the identified sites containing Aboriginal artefacts.	Prior to commencement of construction activities.
	11.3.	Apply for the relevant permit to undertake test pitting over BPAD1 (in accordance with the recommendations of AASC (2008)).	Prior to commencement of construction activities.
Minimise potential to impact upon unidentified Aboriginal artefacts.	11.4.	Invite Aboriginal monitors to site to review results of test pitting activities.	Ongoing.
	11.5.	Cease work at any area if further Aboriginal objects are uncovered during the course of the project, and contact the OEH (NPWS) for advice.	Ongoing.
Employees who are sensitive and respectful of possible identified Aboriginal sites and artefacts.	11.6.	Conduct a Cultural Heritage Awareness Induction Course for staff, contractors and any heritage monitors working on the Project Site.	Ongoing.
Notification of Aboriginal Sites under Part 6 s91 NPWS Act.	11.7.	Supply formal site cards for all identified Aboriginal artefacts to the OEH Aboriginal Heritage Information Management System (AHIMS) Registrar.	Following identification of an Aboriginal artefact or site.

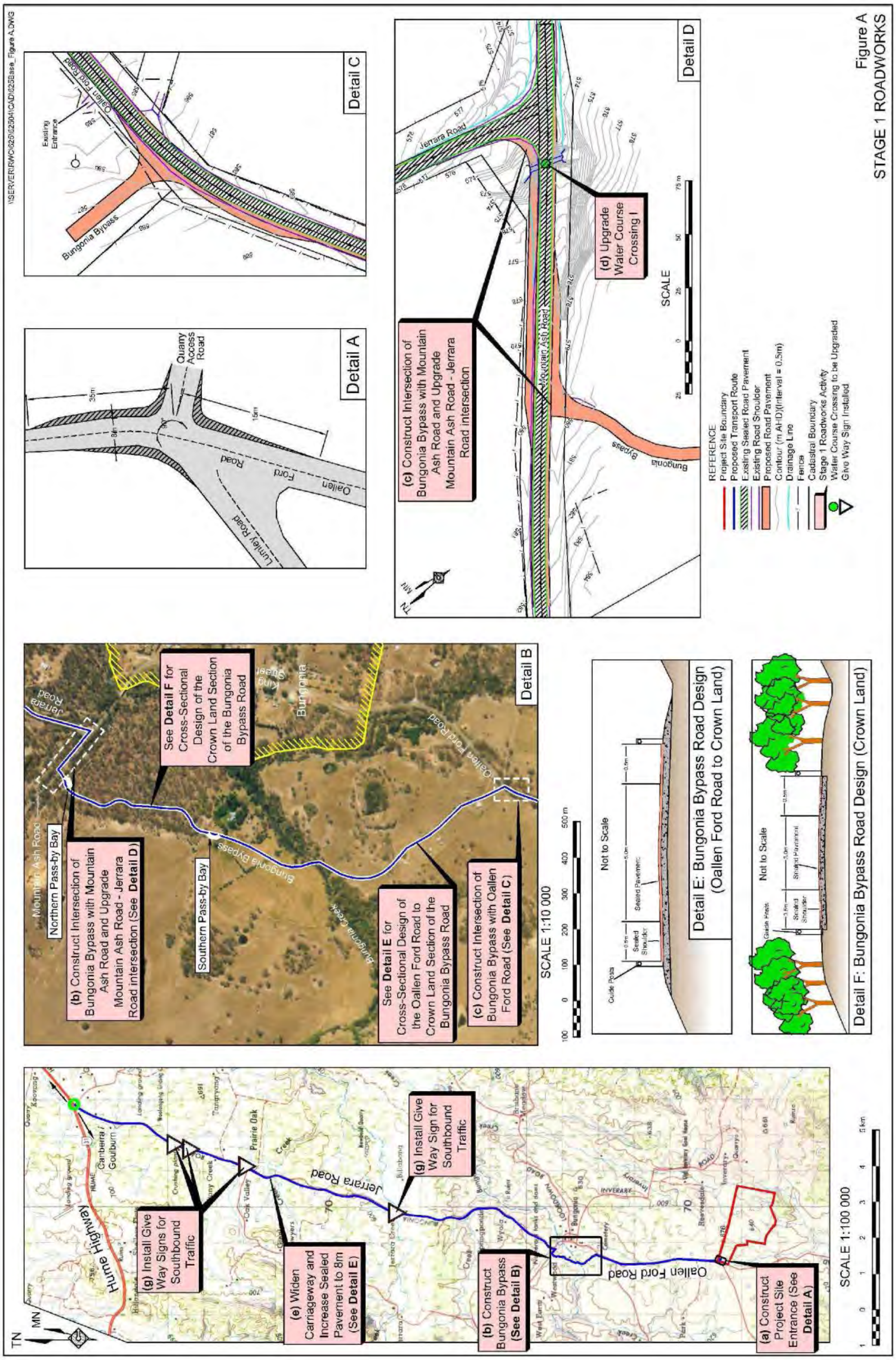
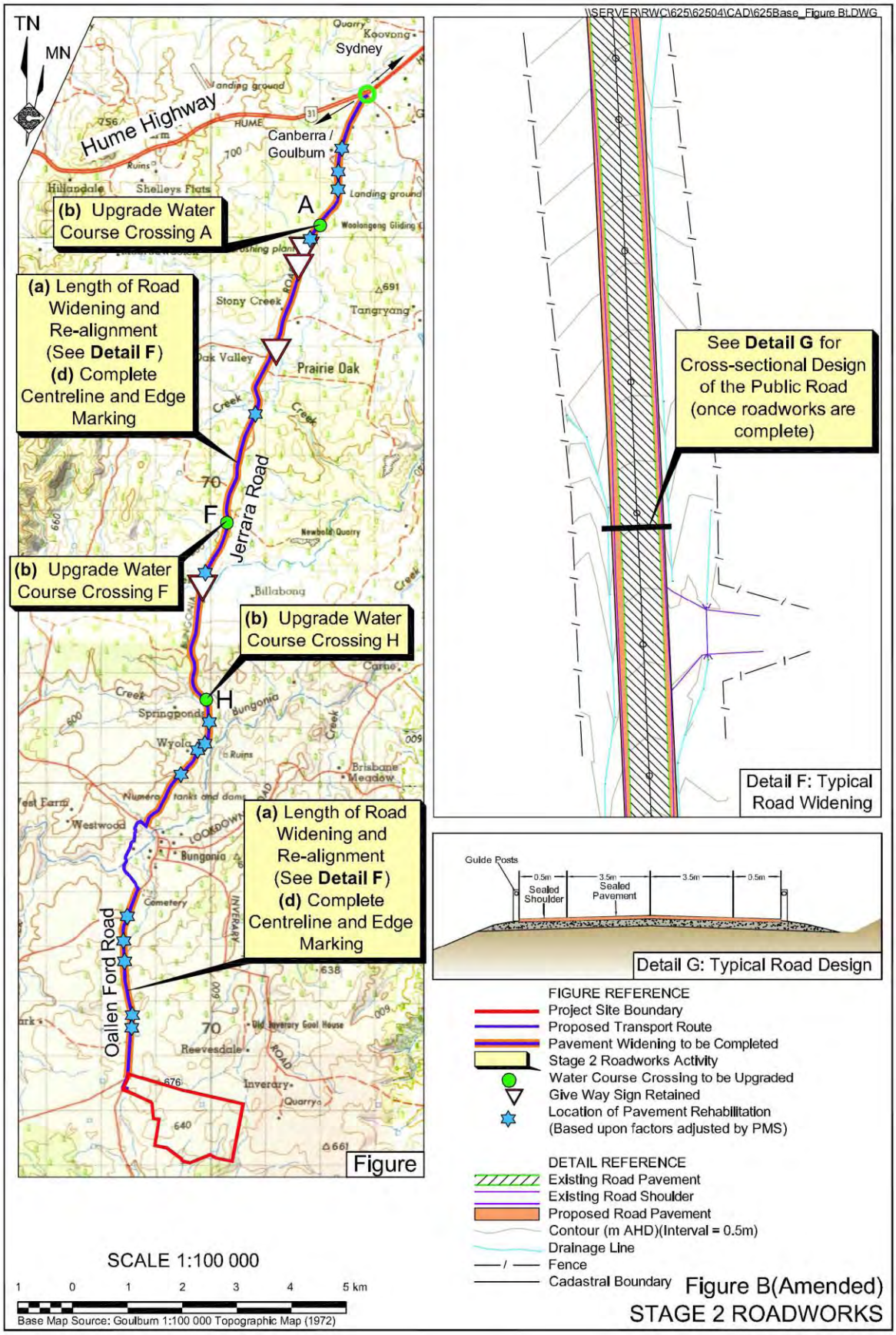
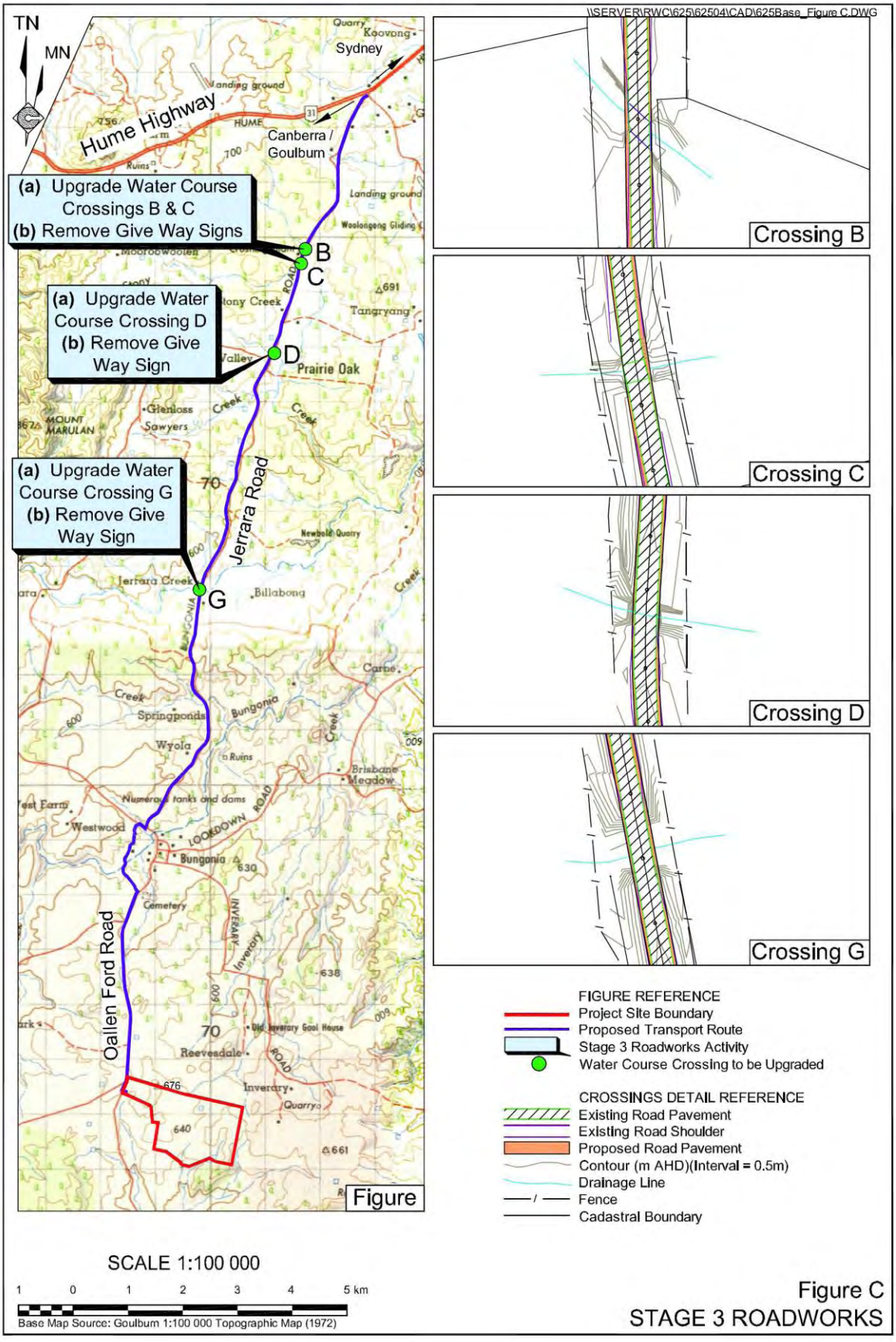
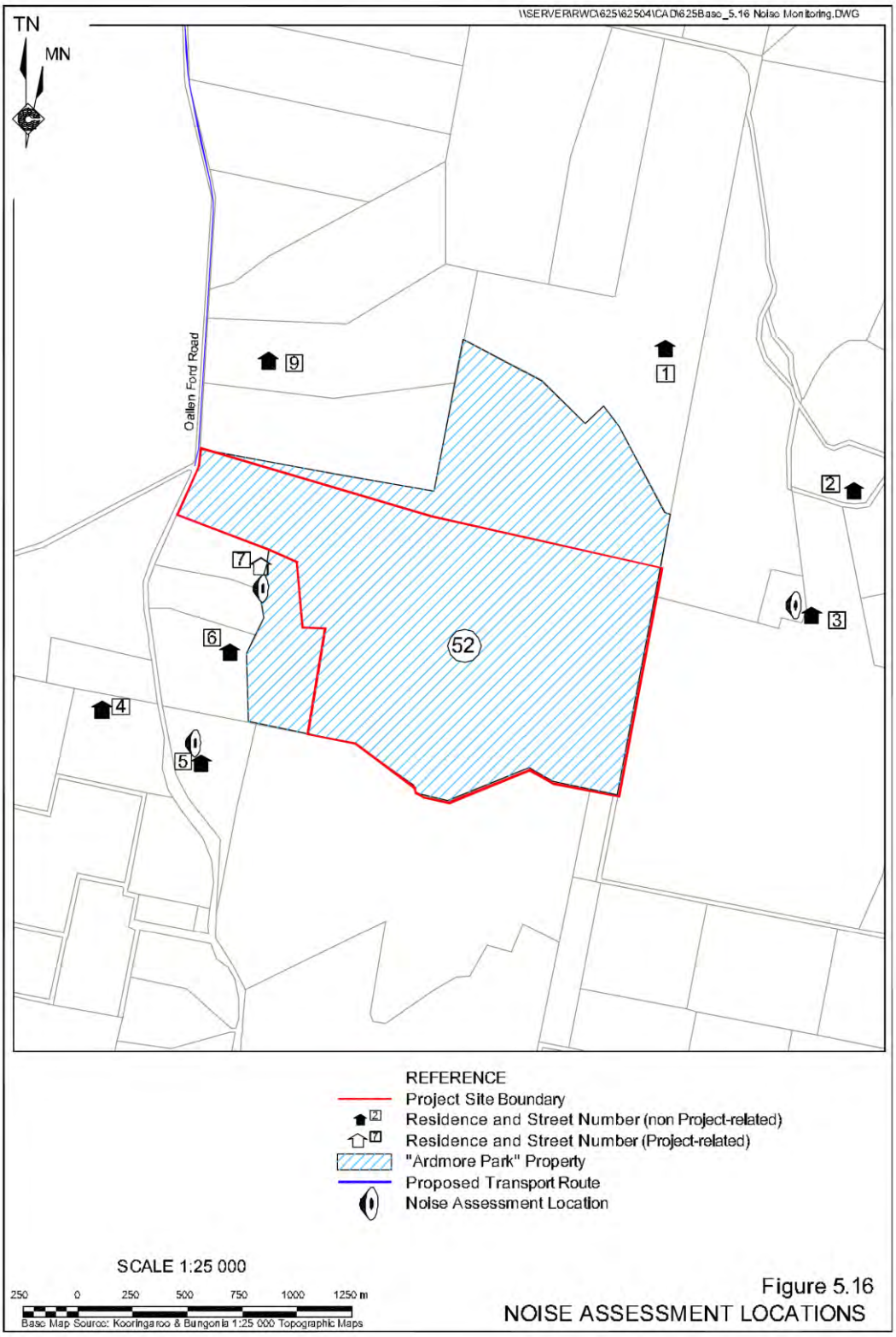


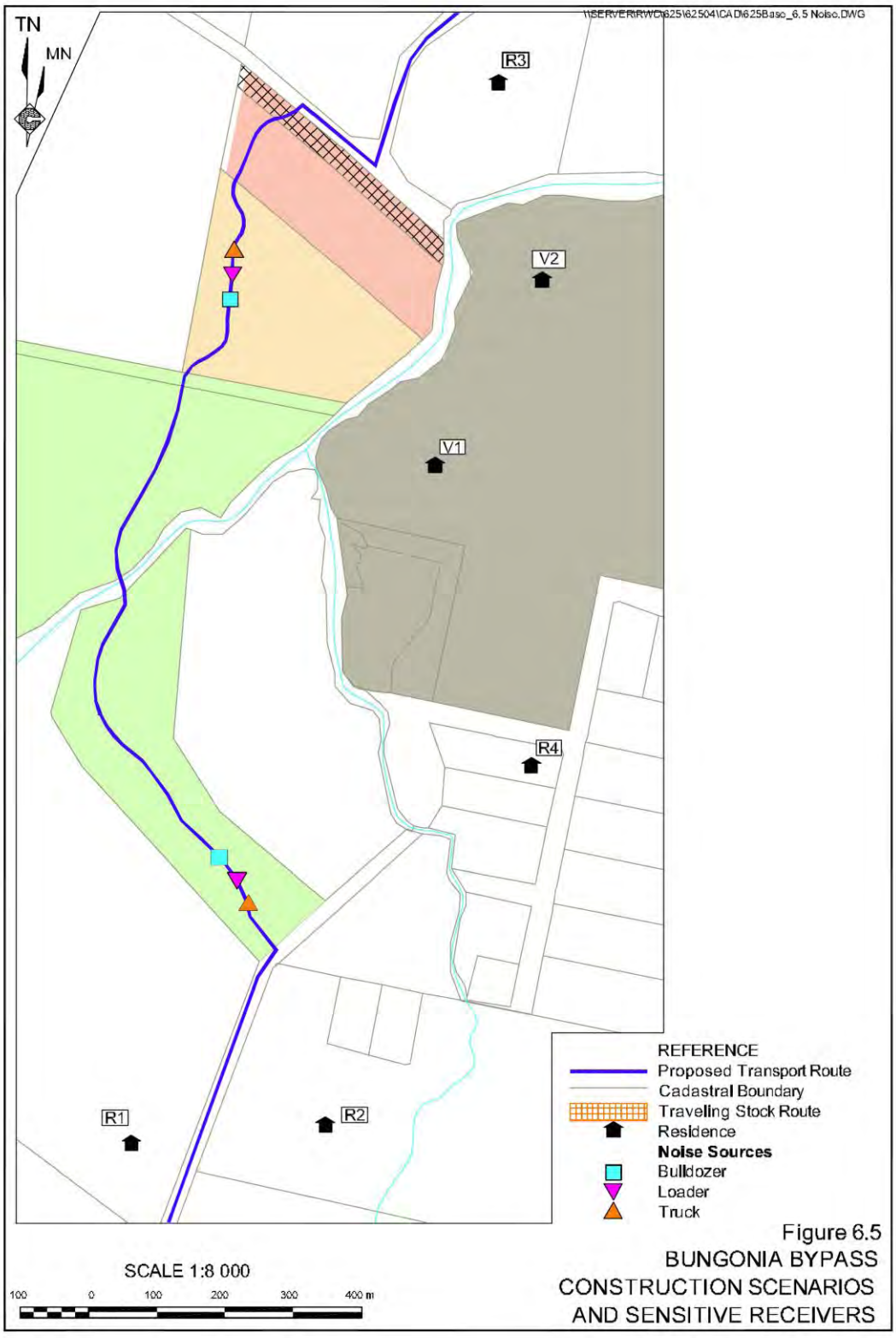
Figure A
STAGE 1 ROADWORKS
Detail A
Detail B
Detail C
Detail D
Detail E: Bungonia Bypass Road Design (Oallen Ford Road to Crown Land)
Detail F: Bungonia Bypass Road Design (Crown Land)
(a) Construct Project Site Entrance (See Detail A)
(b) Construct Bungonia Bypass (See Detail B)
(e) Widen Carriageway and Increase Sealed Pavement to 8m (See Detail E)
(g) Install Give Way Signs for Southbound Traffic
(g) Install Give Way Sign for Southbound Traffic
(b) Construct Intersection of Bungonia Bypass with Mountain Ash Road and Upgrade Mountain Ash Road - Jerrara Road intersection (See Detail D)
See Detail F for Cross-Sectional Design of the Crown Land Section of the Bungonia Bypass Road
See Detail E for Cross-Sectional Design of the Oallen Ford Road to Crown Land Section of the Bungonia Bypass Road
(c) Construct Intersection of Bungonia Bypass with Oallen Ford Road (See Detail C)
(c) Construct Intersection of Bungonia Bypass with Mountain Ash Road and Upgrade Mountain Ash Road - Jerrara Road intersection
(d) Upgrade Water Course Crossing I
Northern Pass-by Bay
Southern Pass-by Bay
Hume Highway
Jerrara Road
Oallen Ford Road
Bungonia Bypass
Mountain Ash Road
Lumley Road
Quarry Access Road
Existing Entrance
SCALE 1:100 000
SCALE 1:10 000
SCALE
Not to Scale
REFERENCE
Project Site Boundary
Proposed Transport Route
Existing Sealed Road Pavement
Existing Road Shoulder
Proposed Road Pavement
Contour (m AHD)(Interval = 0.5m)
Drainage Line
Fence
Cadastral Boundary
Stage 1 Roadworks Activity
Water Course Crossing to be Upgraded
Give Way Sign Installed


TN
MN
Hume Highway
Sydney
Canberra / Goulburn
(b) Upgrade Water Course Crossing A
A
(a) Length of Road Widening and Re-alignment (See Detail F)
(d) Complete Centreline and Edge Marking
Stony Creek
Tangryang
Prairie Oak
Jerrara Road
F
(b) Upgrade Water Course Crossing F
(b) Upgrade Water Course Crossing H
H
Billabong
Springponds
Wyola
Brisbane Meadow
Westwood
Bungonia
(a) Length of Road Widening and Re-alignment (See Detail F)
(d) Complete Centreline and Edge Marking
Oallen Ford Road
Reevesdale
Inverary
Figure
SCALE 1:100 000
1 0 1 2 3 4 5 km
Base Map Source: Goulburn 1:100 000 Topographic Map (1972)
\\SERVER\RWC\625\62504\CAD\625Base_Figure B.DWG
See Detail G for Cross-sectional Design of the Public Road (once roadworks are complete)
Detail F: Typical Road Widening
Guide Posts
0.5m
Sealed Shoulder
3.5m
Sealed Pavement
3.5m
0.5m
Detail G: Typical Road Design
FIGURE REFERENCE
Project Site Boundary
Proposed Transport Route
Pavement Widening to be Completed
Stage 2 Roadworks Activity
Water Course Crossing to be Upgraded
Give Way Sign Retained
Location of Pavement Rehabilitation
(Based upon factors adjusted by PMS)
DETAIL REFERENCE
Existing Road Pavement
Existing Road Shoulder
Proposed Road Pavement
Contour (m AHD)(Interval = 0.5m)
Drainage Line
Fence
Cadastral Boundary
Figure B(Amended)
STAGE 2 ROADWORKS


\\SERVER\RWC\625\62504\CAD\625Base_Figure C.DWG
TN
MN
Hume Highway
Sydney
Canberra / Goulburn
(a) Upgrade Water Course Crossings B & C
(b) Remove Give Way Signs
(a) Upgrade Water Course Crossing D
(b) Remove Give Way Sign
(a) Upgrade Water Course Crossing G
(b) Remove Give Way Sign
B
C
D
G
Prairie Oak
Tangryang
Jerrara Road
Jerrara Creek
Billabong
Springponds
Wyola
Bungonia
Oallen Ford Road
Reevesdale
Inverary
Crossing B
Crossing C
Crossing D
Crossing G
FIGURE REFERENCE
Project Site Boundary
Proposed Transport Route
Stage 3 Roadworks Activity
Water Course Crossing to be Upgraded
CROSSINGS DETAIL REFERENCE
Existing Road Pavement
Existing Road Shoulder
Proposed Road Pavement
Contour (m AHD)(Interval = 0.5m)
Drainage Line
Fence
Cadastral Boundary
SCALE 1:100 000
1 0 1 2 3 4 5 km
Base Map Source: Goulburn 1:100 000 Topographic Map (1972)
Figure C
STAGE 3 ROADWORKS

APPENDIX 3
NOISE ASSESSMENT LOCATIONS




TN
MN
\\SERVER\RWC\625\62504\CAD\625Base_6.5 Noise.DWG
R3
V2
V1
R4
R1
R2
REFERENCE
Proposed Transport Route
Cadastral Boundary
Travelling Stock Route
Residence
Noise Sources
Bulldozer
Loader
Truck
SCALE 1:8 000
100 0 100 200 300 400 m
Figure 6.5
BUNGONIA BYPASS
CONSTRUCTION SCENARIOS
AND SENSITIVE RECEIVERS

APPENDIX 4
FINAL LANDFORM PLANS

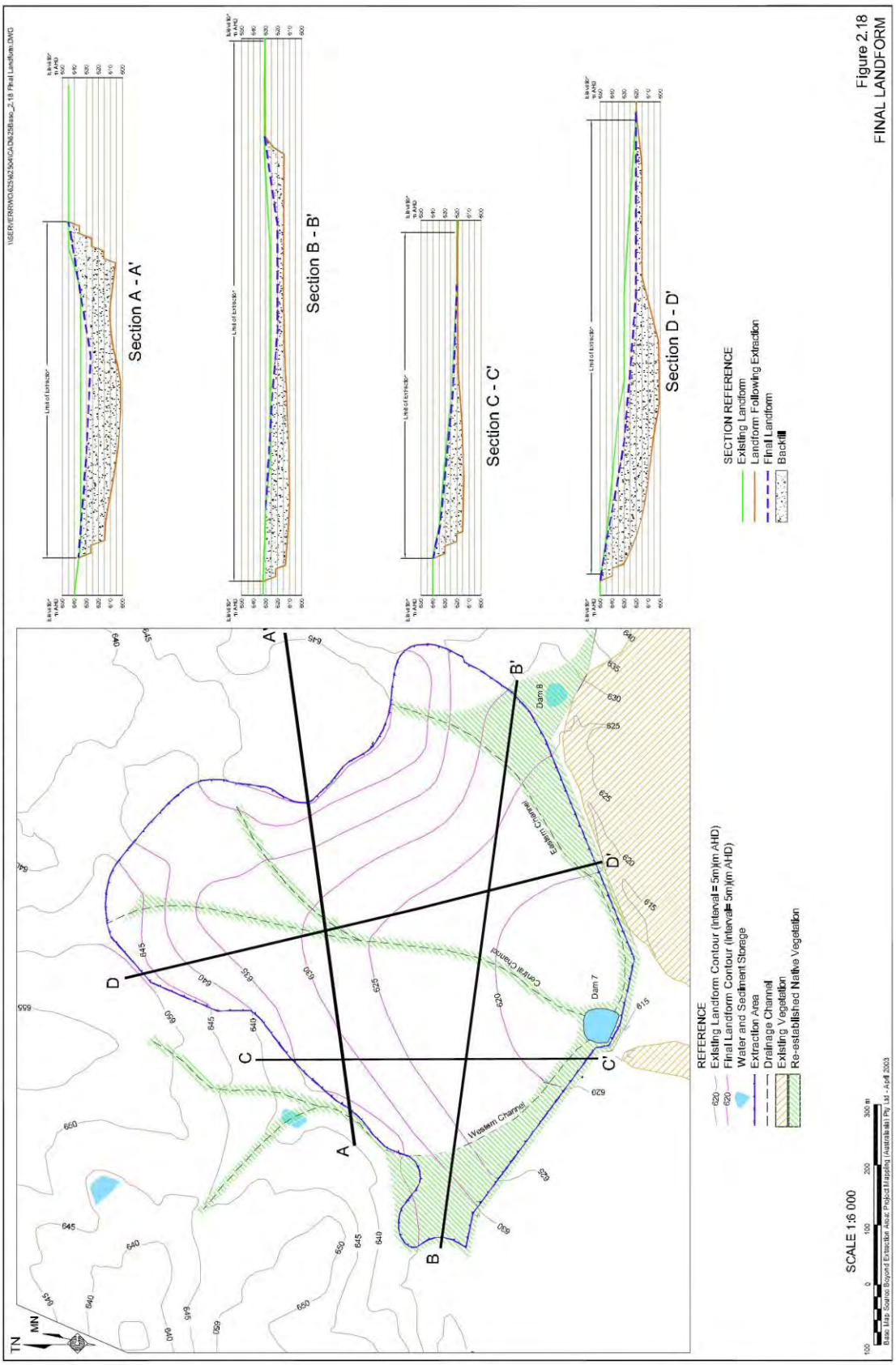
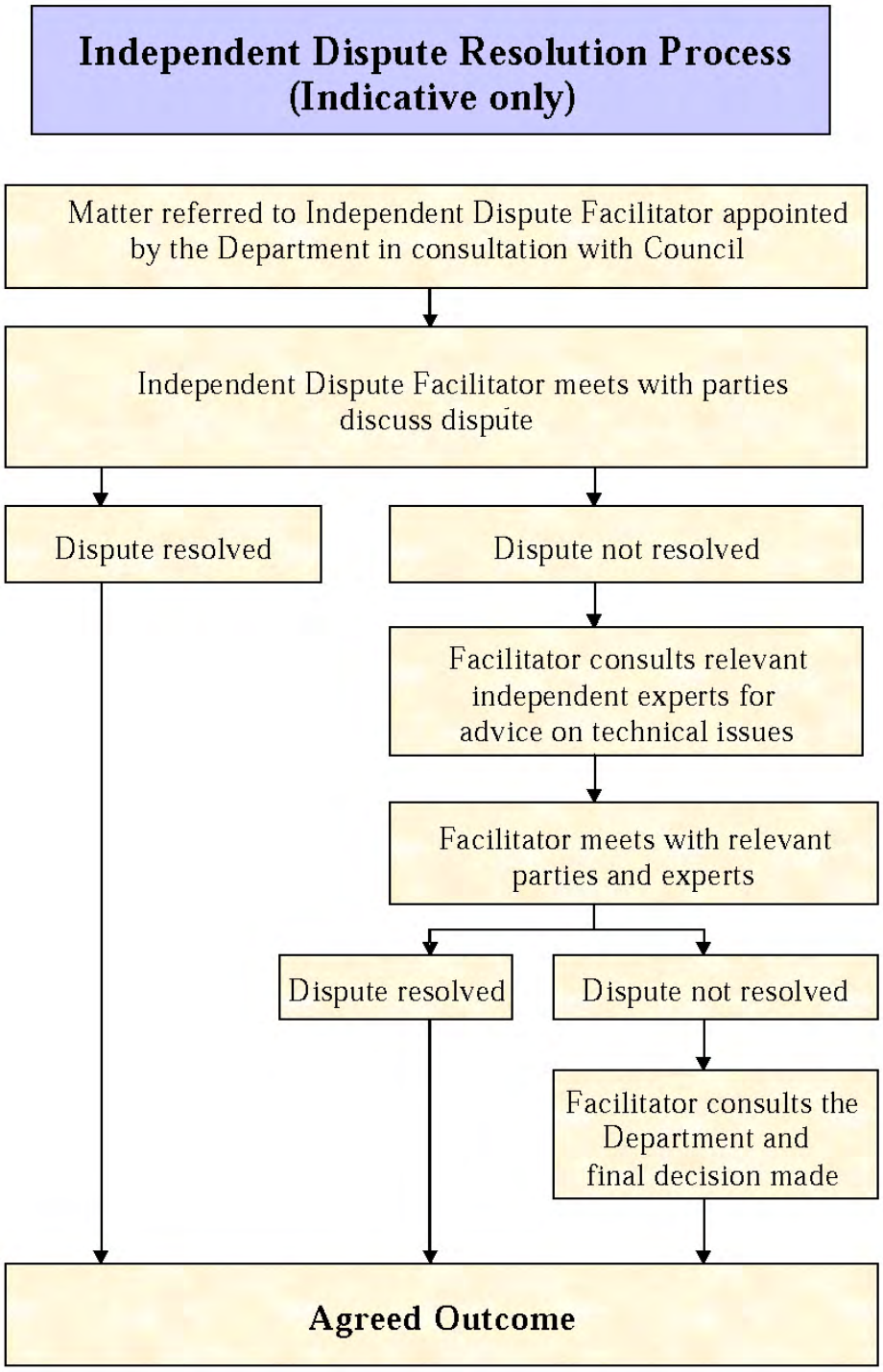


Figure 2.18
FINAL LANDFORM

NSW Government
Department of Planning

APPENDIX 5
INDEPENDENT DISPUTE RESOLUTION PROCESS



APPENDIX 6
PRINCIPAL LOCAL HAULAGE ROUTE