

## Section 5

# Assessment of Key Environmental Issues

### 5.1 INTRODUCTION

The information within the following subsections relate principally to the components of the existing environment within and surrounding the Quarry that would change throughout Stage 2 of the Quarry. For the purposes of this document, the key environmental issues that require management throughout Stage 2 are:

- Traffic;
- Air Quality;
- Noise and Blasting; and
- Surface Water.

Relevant information is provided on groundwater, ecology and bushfire management. It is noted that, the extent of information provided is limited for these issues given the full extent of disturbance during Stage 1 has been completed and no further disturbance is proposed during Stage 2. This section concludes with an assessment of the socio-economic factors relevant to Stage 2 of the Quarry.

For each of the key issues, the proposed design and/or operational management and mitigation measures are presented, followed by an assessment of the predicted impacts the Proposal would have after implementation of these measures. The bulk of the design and/or operational management and mitigation measures outlined in this section are already being implemented, and would continue to be implemented by PBM throughout Stage 2. Any additional measures to be implemented beyond those already adopted are clearly identified in each section. Where appropriate, existing monitoring programs are reviewed.

### 5.2 TRAFFIC

#### 5.2.1 Introduction

The Traffic Assessment for the proposal was undertaken by Constructive Solutions Pty Ltd. The full assessment is presented in **Appendix 4** and is referenced throughout this section as Constructive Solutions (2015). This subsection addresses both the existing road network and the proposed network following the upgrade of the Pacific Highway between Failford Road and Tritton Road at Possum Brush.

## 5.2.2 Existing Road

### 5.2.2.1 Roads

Road access to the Quarry is via the Quarry Access Road within the PBM property which connects the internal road network to the external road network namely, Possum Brush Road and the Pacific Highway. **Figure 5.1** displays the existing road network servicing the Quarry.

#### Quarry Access Road

The Quarry Access Road is a two lane private road at least 8m wide with a sign-posted 40km/h speed limit. The road has an asphalt seal from its front gate for a distance of 1.4km to the internal entrance gate adjacent to the bulk fuel storage area. The front gate is located 50m from its intersection with Possum Brush Road and is locked outside approved operational hours.

#### Possum Brush Road

Possum Brush Road is a local road servicing the Quarry, a number of local rural residential properties, a rural retreat and State Forest logging sites. The road comprises two lanes approximately 3.0m to 3.25m wide with 0.3m to 0.5m sealed shoulders. The sign-posted speed limit on the road is 80km/h.

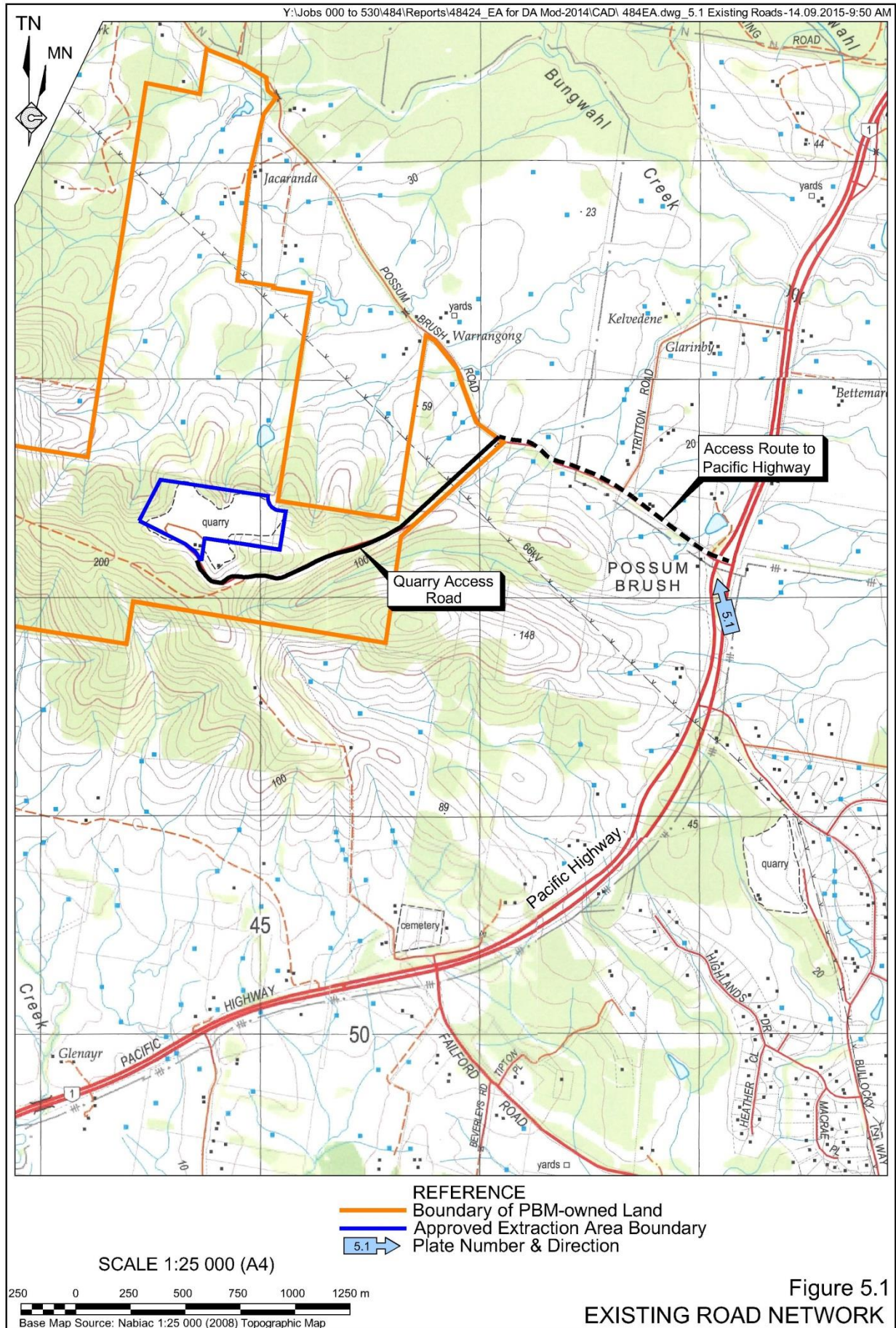
Possum Brush Road was rehabilitated substantially in 2006 with a contribution of \$390,000 to Greater Taree City Council by PBM. The road is sealed from the Pacific Highway to a point approximately 30m beyond the intersection with the Quarry Access Road. Constructive Solutions (2015) has visually assessed that the pavement condition along Possum Brush Road is fair to reasonable with some evidence of rutting and pot holes in an isolated area approximately 200m east of the Quarry Access Road.

Six property entrances are located along the section of Possum Brush Road between the Pacific Highway and the Quarry Access Road. The intersection between Tritton Road and Possum Brush Road is located approximately 0.55km from the Pacific Highway. This intersection is a standard T intersection with priority along Possum Brush Road. Sight distance at this intersection is estimated 190m to the west and greater than 400m to the east.

Constructive Solutions (2015) have identified there are numerous trees in the clear zone adjacent to Possum Brush Road, some of which diminish visibility for motorists. Possum Brush Road is marked with a centre line and edge lines with guideposts although the delineation of line marking is currently faded. Reinstatement of the line marking is the responsibility of Council.

#### Pacific Highway

The Pacific Highway at Possum Brush comprises a dual lane northbound carriageway constructed along the previous alignment of the Pacific Highway in the 1980s. The southbound dual lane carriageway was constructed with an improved alignment compared with the northbound carriageway. The sign-posted speed limits for the northbound and southbound carriageways are 90km/h and 100km/h respectively. The intersection of Possum Brush Road and the highway is “at grade” with a connecting 40m long section between the northbound and southbound carriageways from Possum Brush Road which also provides for a U turn provision for motorists travelling in both directions along the highway.





### 5.2.2.2 Traffic Volumes

Traffic volumes on Possum Brush Road and the Pacific Highway are drawn from counts undertaken by Greater Taree City Council and RMS respectively.

Detailed traffic counts on Possum Brush Road were undertaken between 11 July 2015 and 19 July 2015 which provided a breakdown of heavy and light vehicles on an hourly basis during the counting period. Constructive Solutions (2015) reviewed the traffic count data for Possum Brush Road and traffic movements generated from Quarry weighbridge records and established from the count data the existing traffic volumes along Possum Brush Road without Quarry traffic (see **Table 5.1**). Details of the daily and hourly traffic movements are presented in Appendix A of Constructive Solutions (2015).

**Table 5.1**  
**Existing Traffic Volumes without Quarry Traffic**

| Road  | Site                         | Existing Traffic#  |                    |       |
|---|------------------------------|--------------------|--------------------|-------|
|   |                              | Light Vehicle (LV) | Heavy Vehicle (HV) | Total |
| Possum Brush Road <sup>#</sup>  | 150m west of Pacific Highway | 175                | 5                  | 180   |
| Pacific Highway (northbound)  | Bungwahl Creek Bridge        | 5 037              | 1 705              | 6 742 |
| Pacific Highway (southbound)  | Bungwahl Creek Bridge*       | 5 215              | 1 345              | 6 560 |
| <sup>#</sup> Existing traffic for Possum Brush Road is an estimate of background traffic based on quarry activities on the 16 July 2015 (i.e. without any vehicles travelling to and from the quarry) |                              |                    |                    |       |
| * Bungwahl Creek Bridge is located 1.3km north of the Possum Brush Road intersection with the Pacific Highway   |                              |                    |                    |       |
| Source: Constructive Solutions (2015) – Table 3 (modified)  |                              |                    |                    |       |

Traffic levels on the Pacific Highway near Possum Brush were recorded by RMS near the Bungwahl Creek Bridge approximately 1.3km north of Possum Brush Road.

### 5.2.2.3 Intersections

#### Quarry Access Road / Possum Brush Road

The Quarry Access Road forms a T intersection with Possum Brush Road with vehicles travelling on Possum Brush Road with the right of way. The intersection is controlled by duplicated stop signs and a hold line. A raised threshold is present in the mouth of the Quarry Access Road approach to the stop signs. Constructive Solutions (2015) have identified that insufficient widening is adjacent to the northern side of Possum Brush Road to meet the right turn for trucks entering from the Quarry Access Road. It is however noted that Possum Brush Road has been constructed in accordance with plans approved by Greater Taree City Council.

The sight distance from the Quarry Access Road along Possum Brush Road is estimated to be 110m to the west and 150m to the east which is less than the SISD for 80km/h of 181m. The sight distance in both directions is limited due to its horizontal alignment and roadside vegetation.

### **Possum Brush Road / Pacific Highway**

**Plate 5.1** displays an oblique aerial photograph of the highway and its intersection with Possum Brush Road. Possum Brush Road intersects with the northbound carriageway of the highway and connects to the southbound carriageway via a 40m section of two way road. This section of road which is controlled by a give way sign for east-bound traffic and a stop sign for west-bound traffic is used by product trucks entering and leaving the southern lanes of the highway and by motorists undertaking a U turn at this location.

Slip lanes of less than 40m are provided for turning traffic proceeding north or south along the highway. Deceleration lanes are provided for vehicles turning into Possum Brush Road from either the northbound or southbound carriageways. Constructive Solutions (2015) have established that the sight distances for the turning manoeuvres when turning from or crossing the northbound carriageway are currently below the available safe sight distance, often due to the presence of vegetation within the road reserve.



**Plate 5.1**      **Possum Brush Road / Pacific Highway Intersection Configuration**  
**(Google Earth 2013)**  
**(Source: Appendix 4, Figure 3)**

#### **5.2.2.4      Crash Data**

Constructive Solutions (2015) reviewed crash data for a distance of approximately 1km north and south of the intersection of Possum Brush Road and Pacific Highway. The data displays a cluster of accidents just north of Possum Brush Road in the northbound lanes. RMS has increased the level of signage in the vicinity to reduce the occurrence of traffic accidents in this area.

PBM is aware of only two traffic-related incidents related to the Quarry since 1999 i.e.

1. a product truck running off Possum Brush Road 150m east of the Quarry Access Road – the driver advised that the brakes had failed; and
2. a tailgate of a product truck came ajar on the Pacific Highway near Taree.

PBM has received occasional complaints from residents with accesses from Possum Brush Road beyond the Quarry Access Road that not all truck drivers obey the stop sign at the end of the Quarry Access Road before turning right onto Possum Brush Road. No accidents have occurred at this intersection throughout the life of the Quarry.

### 5.2.3 Future Network

The suboptimal configuration of the Possum Brush Road / Pacific Highway intersection and the alignment of the Pacific Highway between Failford Road and Tritton Road has been recognised for some time. The RMS has plans to upgrade this section of the highway prior to about 2020. **Figure 5.2** displays the configuration of the proposed road network between Failford Road and Tritton Road. In brief,

- the existing northbound lanes will become a service road between Possum Brush Road and Failford Road;
- the existing southbound lanes will become the highway's northbound lanes; and
- new northbound lanes will be constructed adjacent to the southbound lanes along the same general alignment.

No changes are proposed to Possum Brush Road in the future. It is noted, however, that traffic from Tritton Road will be unable to access the northbound and southbound lanes of the highway and will gain access to the highway via Possum Brush Road and the new service road.

### 5.2.4 Management and Mitigation Measures

As a result of the assessment undertaken by Constructive Solutions (2015), the following management and mitigation measures would continue to be implemented.

#### General Measures

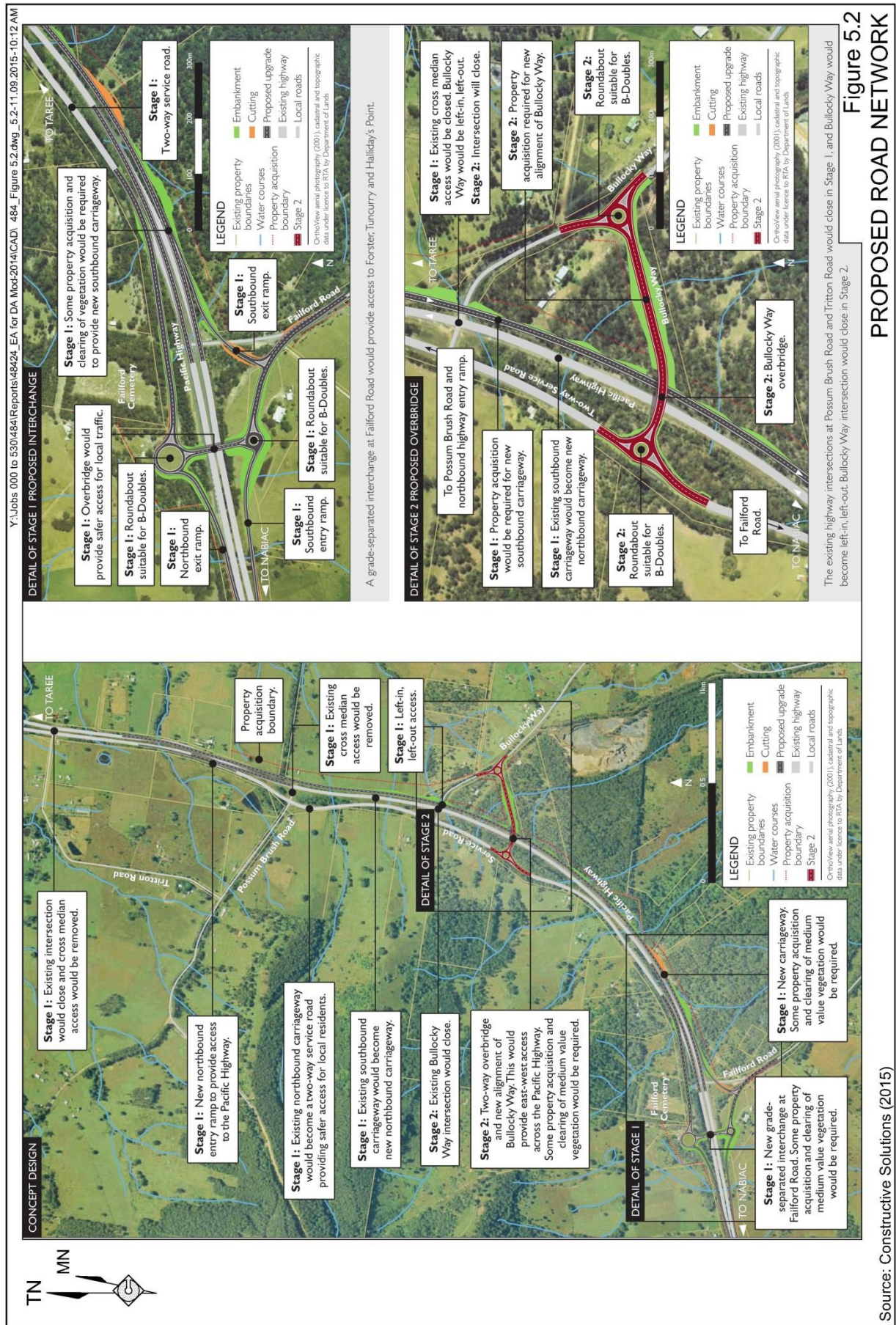
##### ***Existing Measures – to be continued***

1. All trucks would continue to be covered to prevent products from falling onto the roadway or generating dust.
2. PBM would continue to ensure that no trucks leave the Quarry overloaded.

##### ***New Measures – to be implemented***

3. A Code of Conduct would be prepared for all drivers to sign to ensure they are aware of the commitments / expectations for their behaviour. The Code would be introduced within 3 months of the modification of DA 283/97.





## Possum Brush Road

### ***Existing Measures – to be continued***

1. Contributions would continue to be paid to Greater Taree City Council for the ongoing maintenance and rehabilitation of Possum Brush Road, when required. It is noted that PBM's contributions to the maintenance of the 1.4km section of Possum Brush Road has already accumulated \$172,727 since 2008 with negligible funds spent to date by Council on Possum Brush Road maintenance.
2. PBM would continue to liaise with Council to ensure all road markings / line work is appropriately maintained.
3. PBM would continue to liaise with Council to ensure all vegetation limiting visibility for motorists along the edge of Possum Brush Road is removed / trimmed, as required.

### ***New Measures – to be implemented***

4. The requirement for all drivers to stop at the intersection between the Quarry Access Road and Possum Brush Road would be reinforced (as part of the Driver's Code of Conduct) and through visual monitoring.

## Possum Brush Road / Pacific Highway Intersection

### ***New Measures – to be implemented***

1. PBM would liaise with RMS to ensure vegetation in the median adjacent to the northbound lanes is removed to maximise the available sight distance for stationery vehicles exiting the U Turn Bay.
2. PBM would liaise with RMS to ensure truck turning signs on the northbound approach to the intersection meet relevant standards.
3. PBM would liaise regularly with the school bus operator to ensure relevant information regarding children pick-up and drop-off times and locations are recorded in the driver's Code of Conduct.
4. The intersection performance would be reassessed in 2025 in the event the Highway upgrade has not been undertaken by that time.

## **5.2.5 Assessment of Impacts upon the Existing Road Network**

### **5.2.5.1 Traffic Volumes**

The assessments of impact of future traffic levels is based upon average and maximum loads per day of 140 and 210 respectively, i.e. 280 and 420 truck movements, i.e. when annual production reaches 500 000tpa – see **Table 3.5**.

**Tables 5.2 and 5.3** display the current background traffic levels together with the projected average and maximum level of Quarry-related traffic on both Possum Brush Road and the Pacific Highway.



**Table 5.2**  
**Existing Background and Quarry-related Traffic at Average Daily Despatch Levels<sup>^</sup>**

|  | Current Traffic <sup>#</sup> |       | Additional Quarry Traffic |     | Combined Traffic           |       | Combined Total<br>(LV & HV) |
|--|------------------------------|-------|---------------------------|-----|----------------------------|-------|-----------------------------|
| Road   | LV                           | HV    | LV                        | HV  | LV                         | HV    |                             |
| Possum Brush Road  | 175                          | 5     | 88                        | 280 | 263                        | 285   | 548                         |
| Pacific Highway (northbound)   | 5 736                        | 1 896 | 44                        | 140 | 5 780                      | 2 036 | 7 816                       |
| Pacific Highway (southbound)   | 5 941                        | 1 482 | 44                        | 140 | 5 985                      | 1 622 | 7 607                       |
| LV=Light Vehicle Movements   |                              |       |                           |     | HV=Heavy Vehicle Movements |       |                             |
| ^ Based upon maximum annual sales of 500 000tpa  |                              |       |                           |     |                            |       |                             |
| # Current traffic is an estimate of background traffic without existing quarry traffic |                              |       |                           |     |                            |       |                             |
| Source: Modified after Constructive Solutions (2015) – Table 5                         |                              |       |                           |     |                            |       |                             |

**Table 5.3**  
**Existing Background and Quarry-related Traffic at Maximum Daily Despatch Levels<sup>^</sup>**

|  | Current Traffic <sup>#</sup> |       | Additional Quarry Traffic |     | Combined Traffic           |       | Combined Total<br>(LV & HV) |
|--|------------------------------|-------|---------------------------|-----|----------------------------|-------|-----------------------------|
| Road   | LV                           | HV    | LV                        | HV  | LV                         | HV    |                             |
| Possum Brush Road  | 175                          | 5     | 88                        | 420 | 263                        | 425   | 688                         |
| Pacific Highway (northbound)   | 5 736                        | 1 896 | 44                        | 210 | 5 780                      | 2 106 | 7 886                       |
| Pacific Highway (southbound)   | 5 941                        | 1 482 | 44                        | 210 | 5 985                      | 1 692 | 7 677                       |
| LV=Light Vehicle Movements   |                              |       |                           |     | HV=Heavy Vehicle Movements |       |                             |
| ^ Based upon maximum annual sales of 500 000tpa  |                              |       |                           |     |                            |       |                             |
| # Current traffic is an estimate of background traffic without existing quarry traffic |                              |       |                           |     |                            |       |                             |
| Source: Constructive Solutions (2015) – Table 5  |                              |       |                           |     |                            |       |                             |

PBM anticipates the maximum traffic level would rarely be reached. Rather, there would be a greater number of days with a higher number of truck movements than the average level and there would be an increased payload during periods of above average sales. The heavy vehicle movements from the Quarry would continue to be the major source of traffic on Possum Brush Road whereas the product trucks on the Pacific Highway would represent 2.7% of the overall traffic and 11.1% of heavy vehicles.

### 5.2.5.2 Intersections

Constructive Solutions (2015) undertook an assessment of the performance of the Possum Brush Road / Pacific Highway intersection using SIDRA modelling based upon 48 product trucks travelling through the intersection per hour and 20 other vehicles per hour which could either be Quarry-related traffic or other background traffic. This level of heavy vehicle movements is greater than PBM's proposed 36 movements per hour. Therefore, the assessments conducted are recognised as conservative.

The modelling reviewed four performance indicators namely, Level of service, Degree of Saturation, maximum queue length and average delay per vehicle.

The results of the SIDRA analysis established that a Level of Service (B) (acceptable) relates to northbound traffic from Possum Brush Road with a Level of Service (A) (good) for all other intersection manoeuvres. The degree of saturation for all turning manoeuvres is relatively low. The greatest delays are experienced by vehicles waiting to turn into, or cross, the northbound lanes of the highway from Possum Brush Road.

### 5.2.5.3 School Bus Services

PBM would liaise with the school bus operator to ensure that the Driver's Code of Conduct includes instructions for drivers when travelling through the intersection at the relevant pick-up and drop-off times. The low level of impact upon the current bus service is likely to continue.

### 5.2.5.4 Pedestrians and Cyclists

PBM would monitor the use of Possum Brush Road by pedestrians and cyclists and, if required, additional signage would be installed and the Driver's Code of Conduct adjusted.

## 5.2.6 Assessment of Impacts upon the Future Road Network

**Table 5.4** displays the forecast traffic levels on Possum Brush Road and the Pacific Highway in 2025 with the projected maximum level of Quarry-related traffic, i.e. through an annual 2% increase in background traffic levels. During this period, it is programmed the Pacific Highway upgrade near Possum Brush would be completed.

**Table 5.4**  
**Future Background and Quarry-related Traffic at Maximum Daily Despatch Levels**

|  | Forecast Traffic |       | Additional Quarry Traffic |     | Combined Traffic           |       | Combined Total |
|--|------------------|-------|---------------------------|-----|----------------------------|-------|----------------|
| Road   | LV               | HV    | LV                        | HV  | LV                         | HV    | (LV & HV)      |
| Possum Brush Road  | 213              | 6     | 88                        | 420 | 301                        | 426   | 727            |
| Pacific Highway (northbound)   | 6 992            | 2 312 | 44                        | 210 | 7 036                      | 2 522 | 9 558          |
| Pacific Highway (southbound)   | 7 242            | 1 806 | 44                        | 210 | 7 286                      | 2 016 | 9 302          |
| LV=Light Vehicle Movements   |                  |       |                           |     | HV=Heavy Vehicle Movements |       |                |
| * Daily production traffic levels invariably exceed average levels by a factor of two  |                  |       |                           |     |                            |       |                |
| # Current traffic is an estimate of background traffic without existing quarry traffic |                  |       |                           |     |                            |       |                |
| Source: Constructive Solutions (2015) – Table 6  |                  |       |                           |     |                            |       |                |

The heavy vehicle movements on Possum Brush Road would continue to be the major source of traffic. The product trucks on the Pacific Highway would represent up to 2.2% of the overall traffic and 9.1% of heavy vehicles.

The use of the service road to provide access to and from Possum Brush Road would improve the safety of product trucks and all other vehicles travelling through the Possum Brush Road / Pacific Highway intersection.

The ongoing maintenance and rehabilitation of Possum Brush Road using funds provided by PBM would ensure that the road remains at an acceptable standard for all motorists.

## 5.2.7 Conclusion

Whilst it is acknowledged that the current configuration of the Possum Brush Road / Pacific Highway intersection is suboptimal, the experience of PBM and the truck drivers travelling to and from the Quarry, support the conclusion that the existing configuration would continue to

be acceptable subject to the adoption of the mitigation measures outlined in Section 5.2.4. The optimal longer term road network will benefit all motorists. If the upgrade of the Pacific Highway proceeds as planned by 2020, the new access arrangements would be in place for 25 years of the 30 year approval period for the Quarry.

## 5.3 AIR QUALITY

### 5.3.1 Introduction

The air quality assessment for the Proposal was undertaken by Ramboll Environ Australia Pty Ltd (September 2015) and is reproduced in full as **Appendix 5** of this document and is referred to as Ramboll Environ (2015). The assessment includes a comparison between the approved and proposed activities to determine the potential impacts of the proposed modification at the surrounding privately-owned residences in the vicinity of the Quarry Site.

### 5.3.2 Existing Air Quality

The following sources contribute to background particulate matter emissions in the vicinity of the Quarry.

- Dust entrainment due to vehicle movements along unsealed and sealed public roads.
- Diesel emissions from vehicle movements along unsealed and sealed public roads.
- Wind generated dust from exposed areas within the surrounding region.
- Dust and diesel emissions from agricultural activities on neighbouring properties.
- Seasonal emissions from household wood burning fires.
- Episodic emissions from vegetation (e.g. bush and grass) fires.
- Sea salts contained in sea breezes.
- Dust storms and bushfires.

Two other quarries operate in vicinity of the Quarry, namely the Jandra Quarry (4.5km northeast) and the Failford Quarry (3km south-southeast). Results of dispersion modelling for the Jandra Quarry indicate that particulate matter concentrations would be very low beyond 2km from site boundary. Dispersion modelling has not been undertaken for the Failford Quarry although it is understood dust dispersion from this quarry has not been an issue within the surrounding rural-residential area. Consequently, it is considered that significant cumulative impacts between emissions from the Quarry and the two nearby neighbouring quarries are unlikely to occur. There are no other air emission sources listed by the National Pollutant Inventory (NPI) or EPA within 10km of the Quarry.

The Korora RTA air quality monitoring dataset (gathered during the Environmental Assessment of the Pacific Highway upgrade between Sapphire and Woolgoolga) has been adopted to represent background particulate matter (PM) concentrations for the area surrounding the Quarry. The use of the Korora RTA monitoring dataset is considered appropriate for the



representation of PM concentrations in coastal, rural NSW within this assessment. It is considered that the adoption of the Korora RTA monitoring dataset will provide a conservative estimate of baseline air quality in area surrounding the Quarry, as presented in **Table 5.5**.

**Table 5.5**  
**Korora RTA PM<sub>10</sub> Monitoring Dataset Statistics – October 2005 to January 2006**

| Monitoring Statistic                     | PM <sub>10</sub>    | PM <sub>2.5</sub>     |
|--|---------------------|-----------------------|
| Number of Measurements                   | 98                  | 80                    |
| Minimum                                  | 2µg/m <sup>3</sup>  | 4.0µg/m <sup>3</sup>  |
| Maximum                                  | 37µg/m <sup>3</sup> | 15.0µg/m <sup>3</sup> |
| Average                                  | 18µg/m <sup>3</sup> | 7.9µg/m <sup>3</sup>  |
| 25th Percentile                          | 13µg/m <sup>3</sup> | 7.0µg/m <sup>3</sup>  |
| 50th Percentile                          | 17µg/m <sup>3</sup> | 6.0µg/m <sup>3</sup>  |
| 75th Percentile                          | 23µg/m <sup>3</sup> | 7.0µg/m <sup>3</sup>  |
| Inter-quartile Range                     | 10µg/m <sup>3</sup> | 9.0µg/m <sup>3</sup>  |
| Source: Ramboll Environ (2015) – Table 6 |                     |                       |

### 5.3.3 Air Quality Criteria

Air quality limits for PM are typically given for various particle sizes, including TSP, PM<sub>10</sub> and PM<sub>2.5</sub>. PM<sub>10</sub> and PM<sub>2.5</sub> require specific consideration due to their health impact potential. Air quality criteria issued by Federal and NSW governments for particulates are given in **Table 5.6**.

**Table 5.6**  
**Impact Assessment Criteria for Airborne Particulates**

| Pollutant                                | Averaging Period | Concentration (µg/m <sup>3</sup> ) |
|--|------------------|------------------------------------|
| TSP                                      | Annual           | 90                                 |
| PM <sub>10</sub>                         | 24-hour          | 50                                 |
|  | 24-hour          | 50                                 |
|  | Annual           | 30                                 |
| PM <sub>2.5</sub>                        | 24-hour          | 25                                 |
|  | Annual           | 8                                  |
| Source: Ramboll Environ (2015) – Table 2 |                  |                                    |

### 5.3.4 Management and Mitigation Measures

The processing area is well shielded with considerable topographic relief to the north, east and south. The plant itself is fitted with a range of sprays positioned on the delivery hopper, four crushers and conveyor discharge points. Dust suppression on the plant uses approximately 8ML of water per year.

The 1.4km Quarry Access Road from its intersection with Possum Brush Road to the asphalt plant is sealed with asphalt.

Dust suppression on the internal unsealed roads and processing area, amongst other operational areas of the Quarry, is achieved through the regular use of a water cart. Up to approximately 21ML of water is used annually to suppress dust on the internal unsealed road network and operational areas.

PBM would continue to operate the Quarry in a manner that will achieve the necessary levels of efficiency to minimise the generation of greenhouse gases. This particularly relates to optimising the use of diesel and electrical power.

No additional measures are proposed to control the generation of dust within the Quarry.

### 5.3.5 Assessment of Impacts

Ramboll Environ (2015) assessed the impacts of the existing quarry operations and future operations through modelling two scenarios using the CALPUFF (Version 6.2) modelling system.

Scenario 1: current operations at the average production level of 240 000tpa.

Scenario 2: proposed future operations at a maximum production level of 500 000tpa.

The modelling predicted concentrations of TSP, PM<sub>10</sub> 24 hour, PM<sub>10</sub> Annual Average, PM<sub>25</sub> 24 hour and PM<sub>2.5</sub> Annual Average and annual average dust deposition levels.

The results of the modelling are displayed graphically in Ramboll Environ (2015) – Annexure 3 and presented in **Table 5.7** for eight representative residences around the Quarry (see **Figure 4.3** for residence locations).

The results of the air quality impact assessment are as follows.

- The predicted ground-level concentrations and deposition rates from the current operations at the Quarry are well within NSW EPA assessment criteria for all pollutants and averaging periods modelled.
- The proposed increase in annual extraction and production to 500 000tpa is predicted to increase air quality impacts at all surrounding residences albeit at levels well below the applicable criteria for both scenarios at all residences.
- The incremental concentrations predicted by Ramboll Environ (2015) are minor in comparison with the indicative ambient background concentration.

On the basis of the modelling conducted, adverse air quality impacts arising from particular matters from the Proposal are considered unlikely.

The primary source of greenhouse gas emissions at the Quarry would continue to be the consumption of diesel fuel by the on-site mobile equipment and product trucks and the use of electrical power to operate the processing plant. PBM's ongoing use of measures to optimise the use of diesel and purchased electrical power would ensure that Quarry-related greenhouse gas emissions are minimised.

**Table 5.7**  
**Predicted particulate matter concentration/deposition results – Maximum Production**

| Residence  | Concentration/Deposition due to Quarry in Isolation |   |  |  |   |  | Cumulative Concentration/Deposition due to Quarry + Background Air Quality (b) |   |  |  |   |
|--|---|---|--|--|---|--|--|---|--|--|---|
|  | TSP Annual Average $\mu\text{g}/\text{m}^3$         | PM <sub>10</sub> Maximum 24-hr $\mu\text{g}/\text{m}^3$ | PM <sub>10</sub> Annual Average $\mu\text{g}/\text{m}^3$ | PM <sub>2.5</sub> Maximum 24-hr $\mu\text{g}/\text{m}^3$ | PM <sub>2.5</sub> Annual Average $\mu\text{g}/\text{m}^3$ | Deposition Annual Average $\text{g}/\text{m}^2/\text{month}$ | TSP Annual Average $\mu\text{g}/\text{m}^3$                                    | PM <sub>10</sub> Maximum 24-hr $\mu\text{g}/\text{m}^3$ | PM <sub>10</sub> Annual Average $\mu\text{g}/\text{m}^3$ | PM <sub>2.5</sub> Maximum 24-hr $\mu\text{g}/\text{m}^3$ | PM <sub>2.5</sub> Annual Average $\mu\text{g}/\text{m}^3$ |
| <b>Criteria</b>  | <b>NA</b>   | <b>NA</b>   | <b>NA</b>  | <b>NA</b>  | <b>NA</b>   | <b>2</b>   | <b>90</b>  | <b>50</b>   | <b>30</b>  | <b>25<sup>(a)</sup></b>                                  | <b>8<sup>(a)</sup></b>                                    |
| R1   | 0.7   | 4.1   | 0.3  | 0.8  | 0.1   | 0.1  | 43.7   | 41.1  | 17.3   | 15.8   | 7.1   |
| R2   | 0.4   | 2.0   | 0.2  | 0.4  | <0.1  | 0.1  | 43.4   | 39.0  | 17.2   | 15.4   | 7.0   |
| R4   | 0.7   | 1.3   | 0.3  | 0.2  | 0.1   | 0.1  | 43.7   | 38.3  | 17.3   | 15.2   | 7.1   |
| R8   | 0.2   | 1.0   | 0.1  | 0.2  | <0.1  | <0.1   | 43.2   | 38.0  | 17.1   | 15.2   | 7.0   |
| R10  | 0.2   | 0.6   | 0.1  | 0.1  | <0.1  | <0.1   | 43.2   | 37.6  | 17.1   | 15.1   | 7.0   |
| R11A   | 0.4   | 0.9   | 0.2  | 0.2  | <0.1  | 0.1  | 43.4   | 37.9  | 17.2   | 15.2   | 7.0   |
| R11B   | 0.3   | 0.8   | 0.1  | 0.1  | <0.1  | 0.1  | 43.3   | 37.8  | 17.1   | 15.1   | 7.0   |
| R14  | 0.2   | 1.1   | 0.1  | 0.2  | <0.1  | <0.1   | 43.2   | 38.1  | 17.1   | 15.2   | 7.0   |
| NA – Not applicable. Criteria are applicable to cumulative concentrations.<br>a) The NEPM Advisory Reporting Standards for PM <sub>2.5</sub> are referenced for screening assessment purposes.<br>b) The maximum cumulative value is a sum of the maximum increment and the maximum baseline concentrations. |   |   |  |  |   |  |  |   |  |  |   |
| Source: Ramboll Environ (2015) –Table 9  |   |   |  |  |   |  |  |   |  |  |   |



### 5.3.6 Monitoring

As the predicted air quality impacts generated by the Quarry would continue to be low and unlikely to exceed air quality criteria, monitoring cannot be justified. It is noted that EPL 3393 for Possum Brush Quarry has no air quality monitoring requirements.

## 5.4 NOISE

### 5.4.1 Introduction

The noise assessment of the Proposal was undertaken by Spectrum Acoustics Pty Ltd. The full assessment is presented in **Appendix 6** and is referenced throughout this section as Spectrum Acoustics (2015). The assessment predicts noise levels under a worst case scenario from both operational and road traffic sources as a result of the proposal.

### 5.4.2 Existing Noise Climate

#### 5.4.2.1 Introduction

The existing meteorological and acoustic environment surrounding the Quarry has been reviewed in order to determine the atmospheric conditions under which noise modelling is required. The following subsections provide a summary of the existing noise sources, meteorological conditions and background noise levels against which noise criteria are set.

#### 5.4.2.2 Existing Noise Sources

The principal noise source contributing to the background noise levels experienced at surrounding residences is traffic travelling on the Pacific Highway, i.e. approximately 12 000 cars and 4 000 trucks per day. Other noise sources include traffic on local roads, agricultural equipment, equipment used on rural-residential properties, stock, birds and wind in trees. The background noise levels attributed to these sources are discussed in Section 5.4.2.3.

#### 5.4.2.3 Background Noise Levels

Ambient noise levels were measured at three residences surrounding the Quarry during August and September 2015. These residences, which are the closest to the Quarry and the most potentially affected by noise emissions from its operation, are also used for compliance noise monitoring as nominated within Environment Protection Licence (EPL) 3393. The measured ambient noise levels are shown in **Table 5.8**.

**Table 5.8**  
**Measured Ambient Noise Levels (Spectrum Acoustics 2015) - dB(A)**

| Receiver                                    | Day |     | Evening |     | Night |     |
|---|-----|-----|---------|-----|-------|-----|
|   | L90 | Leq | L90     | Leq | L90   | Leq |
| 1. 5 St Peters Close                        | 33  | 46  | 33      | 48  | 31    | 48  |
| 2. 175 Possum Brush Road                    | 32  | 52  | 33      | 45  | 29    | 41  |
| 3. 55 Possum Brush Road                     | 38  | 51  | 40      | 47  | 32    | 51  |
| Source: Spectrum Acoustics (2015) – Table 4 |     |     |         |     |       |     |

It is noted that these measurements are marginally lower than those recorded during previous surveys conducted by Spectrum Acoustics and Heggies Pty Ltd (see Spectrum Acoustics, 2015).

#### 5.4.2.4 Meteorological Conditions

Data from Taree Airport weather station has previously been presented in Section 4.2.1. This data was analysed to develop meteorological scenarios for use in the noise model. Relevant prevailing meteorological conditions are as follows.

- Winds at speeds up to 3m/s from the west-northwest occur for more than 30% of the time during the evening and night in winter and during the evening in autumn. No other winds were found to occur for more than 30% of the time.
- Extremes of relative humidity are rarely experienced. It is anticipated that temperature inversions are a prevailing site feature at night in winter.
- The topography of the area immediately surrounding the Quarry is dissected with a number of hills, ridges and valleys. The Quarry is at a higher elevation than the nearest residences to the north, northeast and southeast. To assess the worst case, a 1m/s drainage wind from the southwest associated with a temperature inversion was modelled.

#### 5.4.3 Noise Criteria

##### 5.4.3.1 Operational Noise Criteria

The Quarry currently operates under operational noise criteria detailed in Environment Protection Licence (EPL) 3393 as shown in **Table 5.9**.

**Table 5.9**  
**EPL 3393 Noise Criteria**

| Location  | L <sub>eq</sub> (15 min) (dBA) | L <sub>max</sub> (dBA) |
|---|--------------------------------|------------------------|
| Receiver 1 – 5 St Peters Close  | 39                             | 45                     |
| Receiver 2 – 175 Possum Brush Road  | 38                             | 45                     |
| Receiver 3 – 55 Possum Brush Road   | 37                             | 45                     |
| Note: L <sub>Aeq</sub> limits apply at all times, L <sub>max</sub> limits apply to night time operations only (10pm-7am, 10pm-8am Sunday and Public Holidays) |                                |                        |
| Source: Spectrum Acoustics (2015) – Table 2   |                                |                        |

These noise criteria were derived from noise modelling results presented in a noise compliance assessment undertaken by Heggies Pty Ltd in April 2010. The Heggies assessment modelled noise levels as a result of the typical operation of the quarry and asphalt plant during the day, evening and night.

Based on the measured ambient noise levels detailed in **Table 5.8**, the Project Specific Noise Levels for each location, derived in accordance with the procedures in the INP, would be as shown in **Table 5.10**.

**Table 5.10**  
**Project Specific Noise Levels (Based on 2015 measured noise levels) as dB(A)**

| Receiver  | Day          | Evening         | Night        |
|---|--------------|-----------------|--------------|
|   | Leq (15 min) | Leq (15 min)    | Leq (15 min) |
| 1. 5 St Peters Close  | 38           | 38              | 36           |
| 2. 175 Possum Brush Road  | 37           | 37 <sup>1</sup> | 35           |
| 3. 55 Possum Brush Road   | 43           | 43 <sup>1</sup> | 37           |
| 1. PSNG for evening and night cannot be higher than day (per INP) |              |                 |              |
| Source: Spectrum Acoustics (2015) – Table 5                       |              |                 |              |

#### 5.4.3.2 Sleep Disturbance Criteria

Based on the measured night time background noise levels detailed in **Table 5.8**, the sleep disturbance criterion for each monitoring location is detailed in **Table 5.11**.

**Table 5.11**  
**Sleep Disturbance Criteria as dB(A)**

| Receiver                                    | Night<br>L1 (1 min) |
|---|---------------------|
| 1. 5 St Peters Close                        | 46                  |
| 2. 175 Possum Brush Road                    | 45                  |
| 3. 55 Possum Brush Road                     | 47                  |
| Source: Spectrum Acoustics (2015) – Table 6 |                     |

#### 5.4.3.3 Traffic Noise Criteria

For the current assessment, Possum Brush Road is considered to be a local road and the Pacific Highway is considered as a freeway/arterial road as defined within the NSW Road Noise Policy (RNP). As such, the relevant traffic noise criteria are shown in **Table 5.12**. It is noted that the day-time assessment criteria in **Table 5.12** will apply for the truck movements between 7:00am and 6:00pm whereas the night-time assessment criteria will apply between 6:30am and 7:00am.

**Table 5.12**  
**NSW Road Noise Policy (RNP) Assessment Criteria**

| Type of Project   | Assessment Criteria – dB(A)           |                                       |
|---|---------------------------------------|---------------------------------------|
|   | Day (7am – 10pm)                      | Night (10pm – 7am)                    |
| 3. Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments. | 60 L <sub>eq</sub> (15hr)<br>External | 55 L <sub>eq</sub> (9 hr)<br>External |
| 6. Existing residences affected by additional traffic on existing local roads generated by land use developments                          | 55 L <sub>eq</sub> (1hr)<br>External  | 50 L <sub>eq</sub> (1hr)<br>External  |
| Source: Spectrum Acoustics – Table 7  |                                       |                                       |



It is noted that all traffic noise generated from transport of quarry products on private roads within the Quarry Site is assessed under the NSW Industrial Noise Policy (INP) as a contribution to operational noise.

#### 5.4.4 Management and Mitigation Measures

PBM would continue to adopt the following mitigation measures which have been effective in controlling noise from all on-site activities. Importantly, the key factor in controlling noise is the topography surrounding the key noise sources and the barriers created by the existing extraction faces.

##### ***Existing Measures – to be continued***

- All mobile equipment would continue to be fitted with mid-frequency reversing alarms.
- The Quarry Access Road would continue to be maintained to a high standard to minimise truck body noise.
- Truck movements between 6:30am and 7:00am would continue to be confined to 10 or less with emphasis placed upon PBM-based trucks departing the Quarry before 7:00am.
- All mobile equipment would continue to be maintained mechanically to ensure the sound power levels are comparable with those listed in Table 9 in Spectrum Acoustics (2015).
- Truck drivers would continue to be instructed to reduce use of compression braking wherever possible (see **Plate 5.2**), to limit changing of gears, and maintain vehicles to an acceptable standard to minimise noise emissions - drivers that do not comply with these directions are not permitted to return to the Quarry.
- Noise complaints would continue to be thoroughly investigated and followed up, where appropriate.

No additional measures would be required for the control of noise within the extraction area.

##### ***New Measures – to be implemented***

- A driver's Code of Conduct will be introduced to formalise the standards required for truck drivers travelling to and from the Quarry.
- All truck drivers would be instructed to contain their vehicle speed on Possum Brush Road to  $\leq 50$ kph. This requirement would be included in the Driver's Code of Conduct.



Plate 5.2 Roadside sign approaching the stockpile area adjacent to the Quarry Access Road  
(Photo Ref. E484M\_093)

## 5.4.5 Assessment of Impacts

### 5.4.5.1 Operational Noise Impacts

In order to assess the impacts of the Proposal, Spectrum Acoustics (2015) modelled the proposed activities near the end of Stage 1 (see **Figure 3.4**). Through the use of RTA Technologies Environmental Noise Model (ENM) v3.06. Each of the items of fixed or mobile plant was considered in the model in a typical operating location in that stage. For the purposes, of the noise assessment, the Stage 1 assessment is considered to be a worst case assessment as the mobile plant would be operating at topographically higher locations than in subsequent stages.

The modelling was undertaken under three meteorological scenarios, namely:

- **Scenario 1** – 20<sup>0</sup>C, 70% R.H., calm conditions (neutral atmospheric).
- **Scenario 2** – 20<sup>0</sup>C, 70% R.H., 3m/s wind from 292.5° (WNW wind, prevailing atmospheric), and
- **Scenario 3** – 10<sup>0</sup>C, 70% R.H., +3°/100m temperature gradient (temperature inversion) and 1m/s wind from the south west.

The results of the modelling show that under the assessed operational and meteorological conditions, there will be no exceedance of the operational noise criteria as a result of the modelled noise emissions from the quarry, as shown in **Table 5.13**. Additionally, received noise levels will be significantly lower than the criteria at all receivers under the modelled neutral atmospheric and west-northwest wind and temperature inversion conditions.

**Table 5.13**  
**Predicted Noise Levels dB(A)**

| Residence Location                           | Scenario 1 | Scenario 2 | Scenario 3 | Project Specific Noise Levels (Day/Evening/Night) |
|--|------------|------------|------------|---|
| 1. 5 St Peters Close                         | 31         | 36         | 35         | 38/38/36  |
| 2. 175 Possum Brush Road                     | 32         | 33         | 35         | 37/37/35  |
| 3. 55 Possum Brush Road                      | 35         | 37         | 37         | 43/43/37  |
| Source: Spectrum Acoustics (2015) – Table 11 |            |            |            |   |

#### 5.4.5.2 Traffic Noise Impacts

The noise impacts of traffic travelling to and from the Quarry have been assessed by Spectrum Acoustics on Possum Brush Road and the Pacific Highway for both the 6:30am to 7:00am (night-time) period and 7:00am to 6:00pm (day-time) period. As displayed in **Table 5.12**, the noise criterion for the night-time period is more stringent than for the day-time period.

**Table 5.14** displays that the  $L_{eq(1hr)}$  50dB(A) criterion before 7:00am would continue to be satisfied for heavy vehicles travelling on Possum Brush Road whilst the number of heavy vehicles is 10 or less in that half hour period. As discussed previously in Section 3.9.2, PBM is able to restrict movements during this period by focussing on despatching PBM trucks base at the Quarry during the first half hour and restricting incoming heavy vehicles until after 7:00am.

**Table 5.14**  
**Road Traffic Noise – Possum Brush Road (Night)**

|  | Night |
|--|-------|
| Typical Operating Sound Power @ 50 km/h dB(A)  | 105   |
| Distance Loss to Receiver (25m) dB(A)          | 36    |
| Received Maximum Noise dB(A)                   | 71    |
| Traffic Volume (vehicles per hour)             | 10    |
| Time each vehicle audible at 50 km/h (mins)    | 0.18  |
| Background Noise Level dB(A)                   | 35    |
| Calculated Traffic Noise dB(A)( $L_{eq 1hr}$ ) | 50    |
| Criterion dB(A) ( $L_{eq 1hr}$ - Night)        | 50    |
| Source: Spectrum Acoustics (2015) – Table 16   |       |

On any day throughout Stage 2 beyond 7:00am, there would be up to 36 heavy vehicle movements per hour, and a maximum of 420 heavy vehicles over the 11.5 hour period to 6:00pm. The majority of this traffic will travel on the Pacific Highway for most of the transport route. **Table 5.15** displays that the  $L_{eq(1hr)}$  55dB(A) criterion between 7:00am and 6:00pm would continue to be satisfied for heavy vehicles on Possum Brush Road whilst the number of heavy vehicles is 36 or less in each hour and that their speed is 50km/hr or less. This prediction is based upon the closest residence being 25m from the centreline of Possum Brush Road.



**Table 5.15**  
**Road Traffic Noise – Possum Brush Road (Day)**

|   | <b>Day</b> |
|---|------------|
| Typical Operating Sound Power @ 50 km/h dB(A) | 105        |
| Distance Loss to Receiver (25m) dB(A)         | 36         |
| Received Maximum Noise dB(A)                  | 71         |
| Traffic Volume (vehicles per hour)            | 36         |
| Time each vehicle audible at 50 km/h (mins)   | 0.18       |
| Background Noise Level dB(A)                  | 35         |
| Calculated Traffic Noise dB(A)( $L_{eq}$ 1hr) | 55         |
| Criterion dB(A) ( $L_{eq}$ 1 hr - Day)        | 55         |
| Source: Spectrum Acoustics (2015) – Table 15  |            |

**Table 5.16** also shows that traffic noise levels attributable to the heavy vehicles travelling to and from the Quarry would be below the relevant criterion for a freeway/arterial road at the façade of all noise receivers greater than 30m from the centre of the Pacific Highway.

**Table 5.16**  
**Road Traffic Noise – Pacific Highway**

|  | <b>Day</b> |
|--|------------|
| Typical Operating Sound Power, @ 80 km/h dB(A)     | 110        |
| Distance Loss to Receiver (30m) dB(A)              | 37         |
| Received Maximum Noise dB(A)                       | 73         |
| Traffic Volume, (vehicles/11.5hrs)                 | 500        |
| Time each vehicle audible at 80 km/h (mins)        | 0.08       |
| Background Noise Level dB(A)                       | 35         |
| Calculated Traffic Noise, dB(A)( $L_{eq}$ 11.5 hr) | 60         |
| Criterion dB(A) ( $L_{eq}$ 15 hr)                  | 60         |
| Source: Spectrum Acoustics (2015) – Table 14       |            |

#### 5.4.6 Monitoring

Noise monitoring would continue to be undertaken annually at three residences namely R1, R2 and R3 which are considered to best assess noise impacts at residences surrounding the Quarry. Measurements would continue to be taken before 7:00am, during the day-time period and of an evening when the asphalt plant is operating. The current program of noise monitoring reflects input from the EPA, Council and the local community through the Quarry's Community Consultative Committee (CCC), and as such is considered appropriate for ongoing operations under the Proposal for modification.

## 5.5 BLASTING

### 5.5.1 Introduction

The blasting assessment of the Proposal was completed by Spectrum Acoustics. The full report is presented in **Appendix 6** and is referenced throughout this section as Spectrum Acoustics (2015). The assessment predicts vibration and airblast overpressure levels at the three representative residences around the Quarry.

### 5.5.2 Record of Performance

Blast monitoring has demonstrated no exceedances of vibration and overpressure criteria for the life of the Quarry. An analysis of the results of blast monitoring from 123 blasts shows ground vibration criteria has not been exceeded at any time, with a maximum recorded ground vibration of 2.63mm/s. One allowable exceedance of overpressure criteria was recorded in 1998-1999. The measured overpressure on this occasion was 116.1dB(L), while the criterion was 115dB(L). This result was included in the 5% allowable exceedance category, and was below the maximum allowable level of 120dB(L). This was measured at the quarry boundary and not at a residence.

### 5.5.3 Blasting Criteria

The quarry currently operates under noise criteria detailed in Environment Protection Licence (EPL) 3393 as shown in **Table 5.17**.

**Table 5.17**  
**EPL 3393 Blasting Criteria**

| Criteria   | Ground Vibration<br>(mm/s) | Overpressure<br>(dB linear peak) |
|--|----------------------------|----------------------------------|
| Maximum allowable criteria                             | 10                         | 120                              |
| Level at which 5% of total number of blasts may exceed | 5                          | 115                              |

### 5.5.4 Management and Mitigation Measures

Blasting will continue to be designed to comply with ground vibration and overpressure criteria prescribed in EPL 3393. Monitoring will continue to be carried out in a manner consistent with current practice, to confirm blasts are complying with criteria. Approximately 15 blasts will be initiated each year, considered a relatively low number. Blasts will be carried out between the hours specified in EPL 3393, as is current practice. Residents who have previously requested notification regarding blasting at the Quarry will continue to be notified.

### 5.5.5 Assessment of Impacts

The following resultant overpressure and vibration impacts at surrounding areas are calculated to approximate a worst case blasting scenario. The results in **Table 5.18** show that received noise and vibration levels from typical blasting operations will not exceed the relevant criteria at the nearest receivers. As all other receivers are more distant from the quarry, further assessment of impacts at these receivers is not considered warranted.

**Table 5.18**  
**Predicted Blast Noise and Vibration Levels**

| Distance | PPV (mm/s) | OP dB Linear |
|----------|------------|--------------|
| 800m     | 1.0        | 114          |
| 1 000m   | 0.7        | 112          |
| 1 500m   | 0.0.4      | 108          |
| 2 000m   | 0.2        | 105          |

### 5.5.6 Monitoring

Considering the Quarry's high level of compliance with blasting criteria over the life of the project, and the relatively small number of blasts per year, current blast monitoring activities are considered appropriate for ongoing evaluation of blasting impacts under the Proposal.

## 5.6 SURFACE WATER

### 5.6.1 Introduction

This subsection describes the context of the Quarry within the surrounding drainage system and the existing surface water management regime within the Quarry. It is noteworthy, that there would be negligible change to the existing management of surface water throughout Stage 2 of the Quarry's operations.

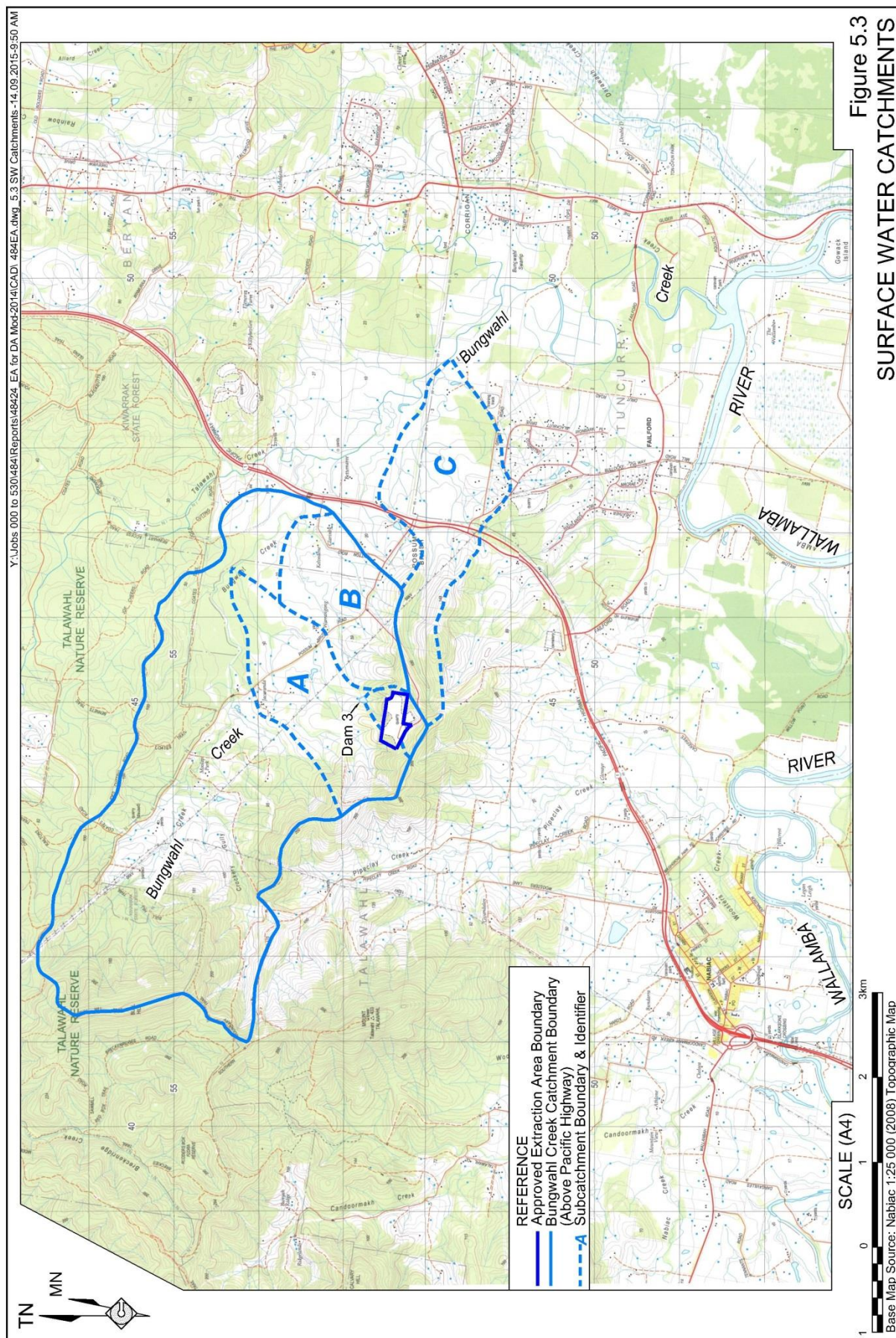
### 5.6.2 Existing Environment

The Quarry lies within the catchment of Bungwahl Creek, a tributary of the Wallamba River, which in turn flows into the northern end of Wallis Lake near Forster.

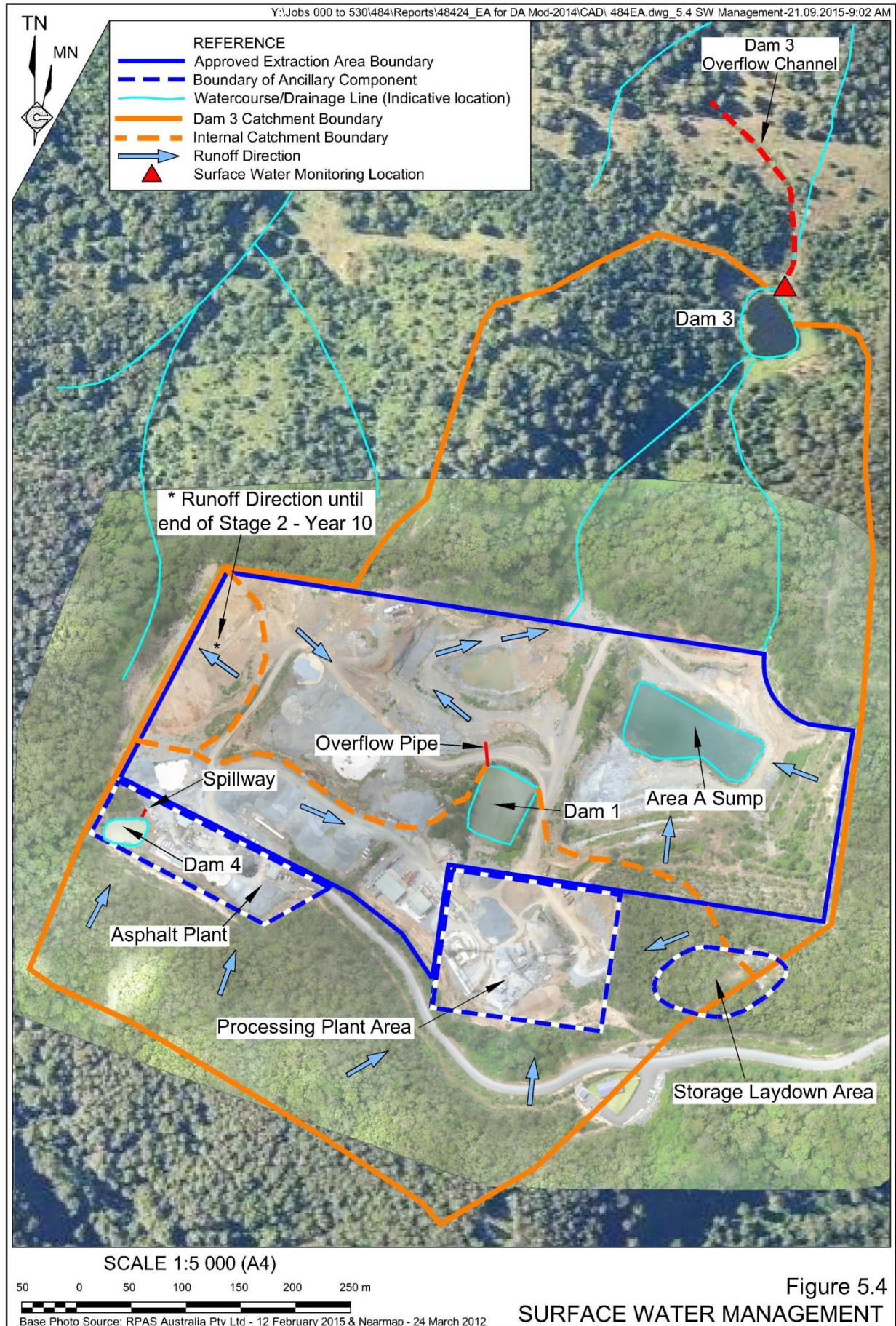
**Figure 5.3** displays the local surface water catchments relevant to the Quarry, namely, the catchment of Bungwahl Creek upstream from the Pacific Highway and three small catchments (A, B and C) in which the Quarry components are located.

The entire extraction area, processing area and asphalt plant lie within the headwaters of Catchment Area A, a catchment of approximately 2.5km<sup>2</sup>. The bulk of the extraction area lies within a smaller catchment within Catchment Area A, i.e. of Dam 3 (see also **Figure 5.4**). The western part of the existing extraction area currently drains to the west toward a small first order stream which in turn flows northeasterly towards Bungwahl Creek, 2.8km from the extraction area. Runoff from this section of the extraction area would cease in about Year 10 (end of Stage 2) (see **Figure 5.3**) as the extraction area would be fully internally draining.











The lower 0.5km of the Quarry Access Road lies within Catchment B, a catchment of approximately 2km<sup>2</sup>. Runoff from this section of road flows largely to the northwest towards a first order stream which crosses Possum Brush Road, 1.3km north of the Quarry Access Road / Possum Brush Road intersection.

The Quarry Administration Office (**Figure 5.4**) and a 0.5km section of the Quarry Access Road lies within Catchment C. Virtually, all of the surface area of these components are sealed and therefore generate negligible sediment-laden runoff.

The Quarry operates with a single licenced discharge point for surface water, i.e. the overflow from Dam 3 (see **Figure 5.3**). EPL 3393 requires the monitoring of the overflow within 24 hours of the commencement of overflow. Overflow from Dam 3 typically occurs between 0 and 6 times per year depending upon rainfall conditions and the operational water requirements. **Table 5.19** presents the results of surface water quality monitoring at the Dam 3 overflow throughout 2015. The results in **Table 5.19** confirm the quality of water overflowing from Dam 3 satisfied the limits nominated in EPL 3393. No exceedances in the EPL limits have occurred during any previous years.

**Table 5.19**  
**Surface Water Quality Results – Dam 3 Overflow**

| Date  | pH  | TSS* | Oil or Grease |
|---|-----|------|---------------|
| 21/01/15  | 7.2 | 10   | Not Visible   |
| 28/01/15  | 6.7 | 37   | Not Visible   |
| 23/03/15  | 7.1 | 18   | Not Visible   |
| 03/05/15  | 7.4 | 8    | Not Visible   |
| 23/05/15  | 7.2 | 8    | Not Visible   |
| * TSS = Total Suspended Solids                        |     |      |               |
| Source: PBM 2014-2015 Environmental Management Report |     |      |               |

### 5.6.3 Management and Mitigation Measures

PBM would continue to operate the Quarry in a management of sediment-laden runoff manner that results in all runoff generated within the extraction area and surrounds reporting to the dams and sumps within the extraction area or elsewhere on the Company's property. **Figure 5.4** displays the watercourses surrounding the Quarry and the key surface water management structures used to ensure all sediment-laden water is retained within the Company's property. **Plates 5.3 to 5.8** show each of the dams, sump and sediment basin on site.

All watercourses within the Company's property are poorly defined and typically do not display an incised channel. Further, the watercourses are often well vegetated. PBM has previously constructed a contour bank from the overflow of Dam 3 to convey any overflow to the northwest at the request of a neighbour more than 20 years ago.

Within the Quarry, PBM relies upon three dams, a sump in Area A and a sediment basin in Area B. All structures effectively collect sediment-laden water from disturbed areas, much of which is used for on-site dust suppression or the manufacture of blended products or asphalt. Details of each of the structures are as follows.

## ENVIRONMENTAL ASSESSMENT

### Section 5 – Assessment of Key Environmental Issues

## PACIFIC BLUE METAL PTY LTD

### Possum Brush Quarry Stage 2 and Modification Report No. 484/24



**Plate 5.3**    **Dam 1**  
**(E484M\_038)**



**Plate 5.4**    **Dam 3**  
**(E484M\_062)**



**Plate 5.5**    **Overflow Channel from Dam 3**  
**(E484M\_010)**



**Plate 5.6**    **Dam 4**  
**(E484M\_039)**



**Plate 5.7**    **Area A Sump**  
**(E484M\_011)**



**Plate 5.8**    **Western Sediment Basin**  
**(E484M\_045)**

Reliance will continue to be made principally upon recovering water within Dam 1 for on-site uses. Water would be pumped from Dam 3 and/or the sump within Area A to Dam 1 during dry periods when the water level is low in Dam 1.

Dam 1 is a dam largely excavated within Extraction Area A with a retained dam wall. The dam collects runoff from the southern side of the Quarry incorporating the processing plant, asphalt plant, product stockpile areas and internal roads. The dam is fitted with a 0.9m diameter overflow steel pipe in the northwestern corner of the dam. Dam 1 has a capacity of approximately 15ML with a pump positioned to distribute water to the on-site water truck and the dust suppression system within the processing plant.

Dam 3 has a capacity of approximately 15ML and overflows to the northwest via a 200m long overflow channel to a point where runoff discharges to a stabilised area away from the nearby watercourses. The licenced discharge point from the Quarry is located at the start of the vegetated overflow channel (see **Figure 5.4**). This dam receives runoff principally from overflow from northern side of Extraction Area A and the overflow from Dam 1.

Dam 4 has a capacity of approximately 6ML and effectively collects upslope runoff above the asphalt plant and the excavated slopes adjacent to the dam storage. This dam has largely been excavated with a small dam wall constructed on its southeastern side. A rock-lined spillway is positioned on the northwestern corner of the dam wall. Overflow from this dam reports to Dam 1. Water from this dam is used within the asphalt plant and is required to provide deluge water for the asphalt gas tank via the two high pressure hydrants at both ends of the gas tank.

A sump has been developed in the northeastern corner of Extraction Area A in an area extracted to approximately 90mAHD. The sump collects runoff from Area A and its elevated surrounds. This water is retained within the sump given it is a suitable back-up supply in the event Dam 1 requires a top-up during dry periods.

PBM would continue to manage hydrocarbons on site through the use of bunded and self-bunded tanks and drums and the use of procedures to clean up any spillages on site.

#### **5.6.4 Water Balance**

##### **Water Uses**

The key quantities of water used annually on site are as follows, i.e. with ranges provided reflecting the annual sales of 370 000tpa (average) and 500 000tpa (maximum).

- Dust suppression (via the 22 000L on-site water truck) = 16ML to 21ML
- Dust suppression (on the processing plant) = 7.4ML to 10ML
- Pugmill/wetmix plant usage = 6.6ML to 10ML

In total, approximately 30ML to 41ML would be used annually. For the purposes of the water balance, evaporation from the on-site dams and the Area A sump (a combined 14 000m<sup>3</sup> surface area) would be approximately 1m/yr and assuming evaporation factor of 70% of 1 423mm/yr.



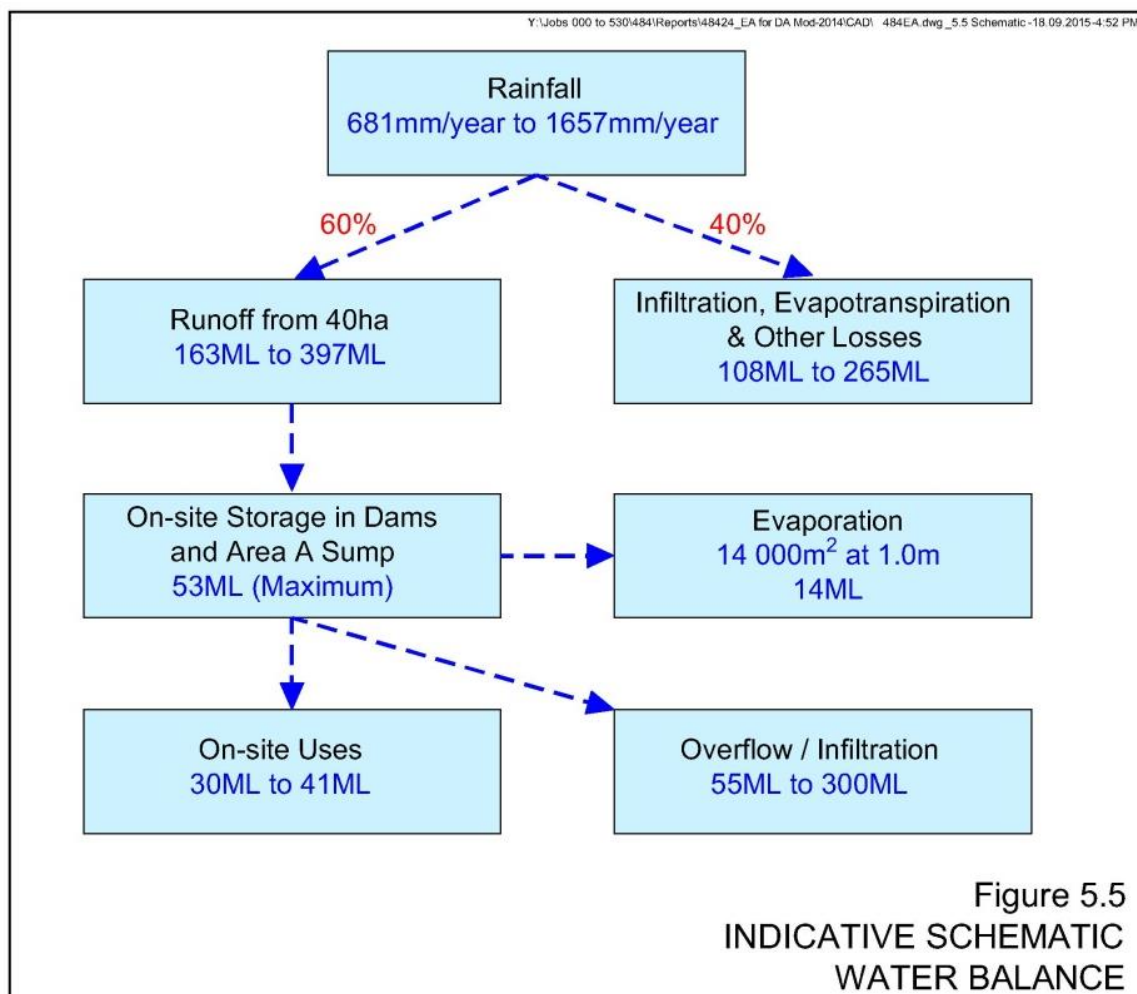
### Water Availability

Water for the above uses is preferentially recovered from Dam 1 with the input from the other dams and Area A sump, as required. The approximate capacities of the dams and sump collecting sediment-laden runoff on site area as follows.

- Dam 1 = 15ML
- Dam 3 = 15ML
- Dam 4 = 6ML
- Area A sump = 17ML

Given the combined catchment of all three dams and Area A totals approximately 40ha (see **Figure 5.4**), runoff from this area during a dry year (681mm in 2013-2014) and wet year (1657mm in 2007-2008) would yield between approximately 163ML and 397ML of runoff respectively, assuming a 60% runoff coefficient, a comparatively high level attributable to the high proportion of cleared land within the catchment.

**Figure 5.5** presents an indicative schematic of the water balance displaying the input, usage and losses. This schematic reflects PBM's experience on site particularly during the extreme years of 2007-2008 and 2013-2014. It is noteworthy, that PBM has not experienced any water shortages to date and the current storage capacity of 53ML on site would provide a high level of availability for the water requirements in the event annual sales approached 500 000tpa.



### 5.6.5 Harvestable Rights Dam Capacity

PBM's harvestable right dam capacity for its 284ha property is 31.24ML which more than accounts for the combined capacity within Dams 3 and 4 although it is noted that these dams periodically receive sediment-laden water, however, for the bulk of the time, the water in these dams can be considered "clean" water. All other water collected on site is sediment-laden.

### 5.6.6 Assessment of Impacts

The existing Quarry has developed to the stage where the existing surface water management and mitigation measures have proven to be most adequate to manage sediment-laden water and to supply the water requirements for on-site dust suppression and processing.

It is concluded that Stage 2 of the Quarry would not adversely affect water quality within the surrounding environment nor the availability of water in the surrounding surface water system.

### 5.6.7 Monitoring

PBM would continue to monitor any discharges from the overflow from Dam 3 at the designated monitoring point nominated in EPL 3393. The results of the monitoring would be presented in each Annual Review.

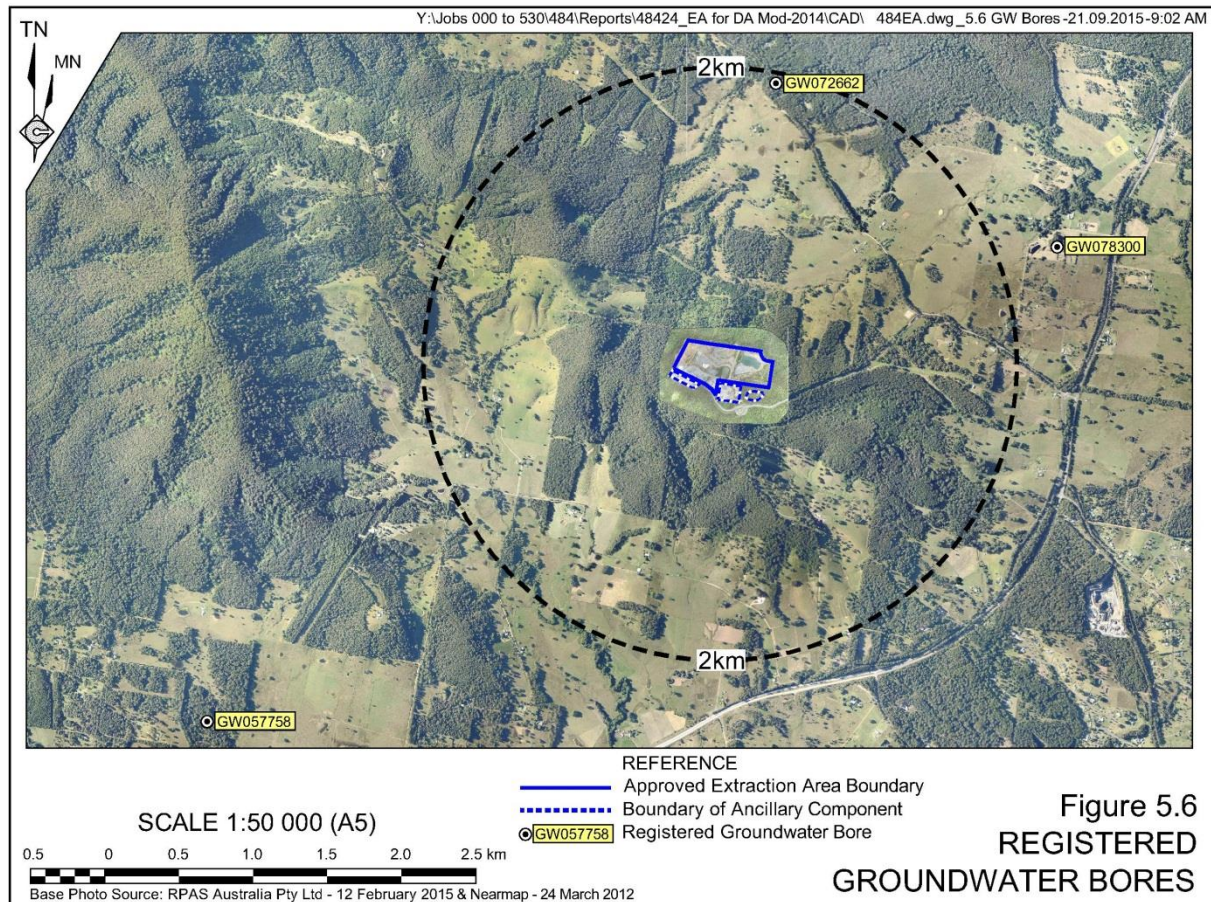
## 5.7 GROUNDWATER

### 5.7.1 Introduction

The geological investigations undertaken to identify and define the extent of the greywacke resource did not identify the presence of the regional groundwater table within Extraction Areas A and B. Small quantities of water infiltrate into the extraction area following protracted rainfall and some minor outflows occur through the fractures exposed on some of the Quarry walls for short periods. In many cases, this seepage eventually evaporates.

### 5.7.2 Existing Environment

A review of surrounding registered groundwater bores on the groundwater atlas maintained by DPI – Water (<http://allwaterdata.water.nsw.gov.au/water.stm>) identified three bores within a 4km radius of the extraction area, i.e. GW 057758, GW 072662 and GW 078300 the locations of which are displayed on **Figure 5.6**.



All surrounding registered groundwater bores occurred within the comparatively flat, agricultural land to the northeast and southwest of the Quarry, with **Table 5.20** listing the groundwater bores collar heights, depths and water-bearing zones.

**Table 5.20**  
**Surrounding Groundwater Bores**

| Groundwater Bore ID * | Collar Height (m AHD) | Bore Depth (m AHD) / Use       | Standing Water Level (m AHD) | Yield (L/sec) |
|-----------------------|-----------------------|--------------------------------|------------------------------|---------------|
| GW 057758             | 25                    | 7 / Stock, Irrigation (Lapsed) | -                            | -             |
| GW 072662             | 30                    | 22 / Domestic                  | 16                           | 1.0           |
| GW 078300             | 22                    | 10 / Stock (Abandoned)         | 17                           | 0.6           |

Source: <http://allwaterdata.water.nsw.gov.au/water.stm>

\* See Figure 5.7

Based upon the information presented in **Table 5.19**, it has been established that the regional groundwater within the Possum Brush area is approximately 17m AHD beneath the flat agricultural land and no doubt increasing locally beneath elevated areas, such as around the Quarry.



### 5.7.3 Mitigation and Management Measures

Given the maximum depth of the Quarry during Stage 2 would be 45m AHD, it is recognised that the final extraction area would remain approximately above the regional groundwater table and not intersect any regional aquifers. Hence, the need for management and mitigation measures is limited.

The main mitigation already in place within the Quarry to protect the regional groundwater table is the management of hydrocarbons and procedures for the clean-up of hydrocarbon pillages. All hydrocarbons are appropriately stored on site in bunded or self-bunded tanks or drums and PBM has procedures for clean-up of hydrocarbon spillages within the Quarry.

### 5.7.4 Assessment of Impacts

Based upon the vertical clearance between the base of quarrying operations and the regional groundwater table and the continued implementation of hydrocarbon management practices, the Proposal poses no significant additional risk to groundwater.

## 5.8 VISIBILITY

### 5.8.1 Existing Environment

The Possum Brush Quarry is well located with respect to visibility as the extraction area, processing plant and all internal roads are not visible from any surrounding residence or Possum Brush Road, principally due to topography and intervening vegetation. **Plate 5.9** displays the view from Possum Brush Road (near 175 Possum Brush Road) towards the visible exposed face adjacent to the asphalt plant. It is noted that the vegetation in the area adjacent to Extraction Area B is continuing to grow and the extent of the existing exposed face is likely to diminish in the future.



**Plate 5.9** A view to the southwest from Possum Brush Road towards the only exposure visible from Possum Brush Quarry (near the Asphalt Plant).  
(Photo Ref. E484M\_080)



### **5.8.2 Mitigation Measures**

PBM has been and would continue to be vigilant in retaining as much vegetation as possible around the Quarry's operational area in order to minimize visual access for surrounding neighbours and motorists travelling on Possum Brush Road.

PBM would continue to ensure the more visual areas of its operation, i.e. front gate and lower section of the Quarry Access Road, remain tidy at all times.

### **5.8.3 Assessment of Impacts**

It is assessed that the visual impacts of Stage 2 operations at surrounding residences and Possum Brush Road would be negligible given shielding achieved of all key operational areas. The main visible impacts of the Quarry's operation would be the pressure of highway trucks travelling along Possum Brush Road, towards and from the Quarry via the front gate and lower section of the Quarry Access Road.

## **5.9 ECOLOGY**

### **5.9.1 Introduction**

Coverage of ecological issues in this document is limited given the fact that the extraction area (both Areas A and B) are cleared of vegetation, as approved in the Development Consent DA 283/97. This subsection addresses the status of the wildlife corridor also required by Development Consent DA 283/97.

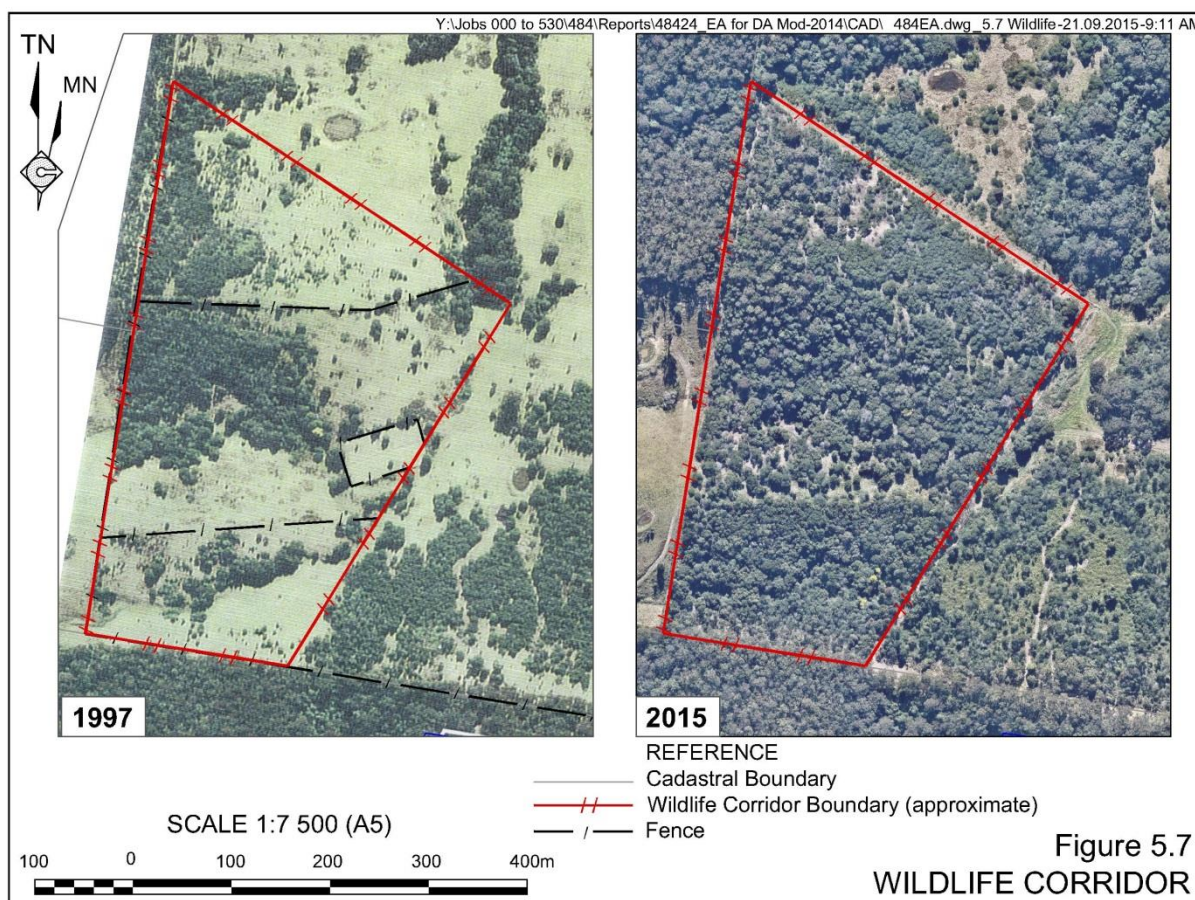
### **5.9.2 Existing Environment**

Four main vegetation communities were recorded around the Quarry (ERM 1997) namely, Dry Open Forest, Depauperate Rainforest, Acacia Woodland, and Grassland. None of these communities are identified as threatened ecological communities. It is noted that *Eucalyptus rudderi* (Rudder's box) was identified as a rare species occurring in Dry Open Forest (ERM 1997), however, Rudder's Box is no longer listed as threatened under the Threatened Species Conservation Act 1995 or EPBC Act 1999.

The native vegetation beyond the cleared areas within the Quarry has continued to thrive since Development Consent DA 283/97 was approved with no clearing other than for agricultural/property management purposes, e.g. for fencing/fire breaks, etc. It is therefore expected that the range of fauna species previously recorded in 1997 would still have access to suitable habitat. In fact, the progress with the rehabilitation/revegetation of the wildlife corridor (see Section 5.9.3) has substantially enhanced the corridor between substantial areas of remnant vegetation within and surrounding PBM's property.

### 5.9.3 Management and Mitigation Measures

PBM manages a vegetated wildlife corridor and a 50 m buffer zone directly to the north of the extraction area. Ongoing programs of weed control are regularly carried out in both areas. PBM has re-introduced native vegetation in the wildlife corridor to support ongoing growth and natural recolonisation of vegetation, with an emphasis on planting Rudders Box. Considerable success has been achieved over the life of the Quarry in improving the ecological value of the wildlife corridor, as displayed in **Figure 5.7**, showing the improvement in vegetation cover from 1997 to present. The wildlife corridor will continue to be managed by PBM, with the aim to further improve its ecological value, providing better habitat and allowing for greater mobility for local fauna through the area.



Other activities to manage vegetation that have been or will continue to be undertaken by PBM include:

- roadside vegetation maintenance and weed spraying;
- maintenance of interim revegetation of the upper southern and eastern extraction faces;
- revegetation of the outer surface final western perimeter bund;
- maintenance of fencing within PBM owned land to prevent stock access to areas including the wildlife corridor.

#### **5.9.4 Assessment of Impacts**

Given the Proposal will not modify the approved extraction boundaries, there will be no additional clearing of vegetation within the extraction area. As such, there will not be any additional adverse impacts to flora and fauna surrounding the Quarry. The ongoing management of vegetation and weeds and continued improvement of the wildlife corridor and 50m buffer would ensure the objectives for the ecological values relating to the Quarry would continue to be achieved.

#### **5.10 BUSHFIRE**

The proposed modification would not result in additional infrastructure being constructed in the vicinity of vegetated areas. All ongoing operations would occur within previously cleared land with the exception of part of the southeast corner of Area A requiring the removal of some vegetation previously planted as part of rehabilitation program.

Firefighting equipment would continue to be provided within the mobile equipment on site and within designated areas of the Quarry.

As a result of the Proposal, there would be no significant increase in the bushfire potential within or surrounding the Quarry.

#### **5.11 SOCIO-ECONOMIC CLIMATE**

##### **5.11.1 Introduction**

A description of the socio-economic setting within the Possum Brush area and the assessment of socio-economic impacts of the existing Quarry and its ongoing operation throughout Stage 2 has been undertaken by RWC with input from PBM.

##### **5.11.2 Existing Setting**

The Quarry is located within the Possum Brush locality near the southern boundary of the Greater Taree Local Government Area (LGA), with Taree and Forster being the largest and regionally significant surrounding towns, located approximately 20km to the north and southeast of the Quarry respectively.

The Possum Brush locality is located largely west of the Pacific Highway in an area that comprises a range of landholding sizes reflecting past (and present) agricultural pursuits and an increasing proportion of lifestyle blocks. It is notable that since the Quarry first commenced operations, the number of lifestyle blocks has increased with more residences constructed within 2km of the Quarry.

The Possum Brush community has little social cohesion in that there is no local school, community hall, shops and few community facilities. Residents invariably travel to their workplaces and for shopping/social events or are retired/semi-retired and only travel, when

required. Residents of the Possum Brush Community make use of facilities in nearby Nahiab as does PBM who maintains its postal box for mail at Nahiab Post Office. The schools and shopping in both Taree, Forster-Tuncurry are the main destinations for these activities.

The 2011 Census identified the following statistics in relation to the Greater Taree LGA. Data relating to the Possum Brush State Suburb in which the Quarry is located was identified to be inappropriate for this document.

- Greater Taree LGA had a population in 2011 of 45 541 persons.
- The unemployment rate in Taree LGA in 2011 was 9.3% compared with the average for the State of 5.3%, with agriculture, education, hospital care and hospitality being the four dominant industries comprising 5.9% to 4.2% of the workforce.
- Median household income in Taree LGA in 2006 was \$1 478 per week, slightly less than the median incomes for the NSW as a whole.

For the purpose of assessing potential socio-economic impacts, the local setting has been categorised as follows.

- Adjoining landowners – includes the owners of properties that adjoin the land owned by PBM and/or front onto Possum Brush Road between the Quarry Access Road and the Pacific Highway. The adjoining landowners are predominantly using their land for lifestyle purposes with supplementary agricultural pursuits. The larger properties to the west are used for agricultural enterprises although some properties have substantial areas of native vegetation which limits agricultural production.
- The local community – includes nearby landowners, residents of Possum Brush west of the Quarry Access Road and/or who are considered to have an interest in the Proposal due to their proximity to the Quarry or its transport routes to their homes. Many of these landowners also use their land for lifestyle purposes.
- The wider community in the Taree and Forster-Tuncurry area in which PBM's workforce reside and business/facilities are located to support the operation of the Quarry.

The attributes of the local setting that both the adjoining landowners and local community embrace relate to its rural nature with a reasonable proportion of remnant native vegetation. The presence of the Pacific Highway nearby provides excellent access to the nearby towns although it does contribute to elevated background noise levels in a rural area. Notwithstanding, the highways presence, the amenity of the area in terms of noise, air quality and rural visual appeal is important to the adjoining landowners and the local community.

### **5.11.3 Impacts of the Existing Quarry**

The existing impacts of the Quarry on the adjoining landowners, local community and wider community relate both to impacts upon local amenity and the financial contributions, i.e. over and above the benefits derived from the sale and use of the quarry products and asphalt from the Quarry.



PBM has endeavoured to maintain the amenity within the local community through the design of the Quarry and the adoption of a range of operational controls and mitigation measures and thereby co-exist with the surrounding amenity. PBM receives positive feedback about its methods of operations and environmental controls from a number of persons within the local community during the open day at the Quarry on 29 August 2015.

From an economic perspective, PBM is a worthwhile contributor to the local and wider communities through its payments for a wide range of goods and services. For example, in 2014-2015 PBM spent in excess of \$12 million comprising the following individual expenses.

- Annual Wages - \$1,350,000
- Fuel, Power and Maintenance - \$6,600,000
- Haulage Contracting - \$2,330,000
- Drill and Blast Contracting - \$275,000
- Rehabilitation Contracting - \$65,000
- Council Rates, Levies etc. - \$130,000
- Community Donations - \$25,000
- Other Local Business Purchases - \$2,000,000 (Estimated).

It is noted that, as a corporate citizen, PBM donated approximately \$25,000 in 2014-2015 to local organisations, groups, projects and events. Examples of PBM's corporate philanthropy are donations to the Forster Keys Fun Day and Car Show, Nabitac Swimming Pool and Skipjacks Social Bowls Club – Forster.

The ongoing operation of the Possum Brush Quarry would continue to ensure that the economic benefits outlined above benefit the local and wider communities, providing economic stimulus to the local economy. The Quarry would also continue to provide an opportunity for training and development of local persons.

#### **5.11.4 Impacts of the Stage 2 Quarry**

PBM is confident that its emphasis placed on a high standard of environmental performance would continue to manage the amenity for its adjoining neighbours and local community.

The ongoing operations of the Quarry would enable PBM to supply its high quality road pavement materials, aggregates and asphalt for the ongoing upgrade of the Pacific Highway and numerous other local projects.

Overall, it is anticipated that the ongoing operation of the Quarry would continue to provide a net overall benefit to the local and wider communities through its ongoing economic contribution and high standard of environmental performance.

## **5.12 CONCLUSION**

The assessment of the key environmental and other issues relating to Possum Brush Quarry has established that the Proposal would continue to have an acceptable level of impact on the surrounding community particularly given the adoption of a range of mitigation and management measures. The Quarry is sufficiently distant to the surrounding residences (and often with intervening topography) to ensure that the ongoing operation of the Quarry, in the manner proposed, would not cause an incompatibility with the surrounding land uses.