

# ENVIRONMENTAL ASSESSMENT DUNMORE HARD ROCK QUARRY

DA 470-11-2003

Modification 6

Prepared for Boral Resources (NSW) Pty Limited | November 2012





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## Dunmore Hard Rock Quarry Environmental Assessment

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## Dunmore Hard Rock Quarry Environmental Assessment

Final

Report J11024RP1 | Prepared for Boral Resources (NSW) Pty Limited | 19 November 2012

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# 1 Introduction

## 1.1 Overview

Dunmore Hard Rock Quarry is located at 38 Tabbita Road in Shellharbour local government area (LGA) and is owned and operated by Boral Resources (NSW) Pty Ltd. This environmental assessment (EA) has been prepared to accompany a modification application to the existing development consent for the quarry (Development Consent 470-11-2003).

It is proposed to modify the tonnage of material allowed to be transported by road and to extend the approved extraction area by approximately 2.03 hectares (ha). The proposed modification is sought under Section 75W of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

## 1.2 Background

In September 2004, the Minister Assisting the Minister of Infrastructure and Planning issued Development Consent 470-11-2003 under Part 4 of the EP&A Act, which allowed production at Dunmore Hard Rock Quarry to increase from 1.2 million tonnes per annum (Mtpa) to 2.5 Mtpa. The development was classified as State Significant Development, under section 76A(7) of the EP&A Act, because it is an extractive industry where the proposed rate of production exceeds the threshold limits specified in the Ministerial declaration of 3 August 1999.

Subsequent to issue of the consent, a number of modifications under Section 96 of the EP&A Act were approved. These were:

- Mod 172-11-2005 (approved in December 2005) which allowed for the construction of a new amenities block on the site;
- Mod 59-4-2006 (approved in June 2006) which amended the vegetation offset requirements and the approved transport route, extended the deadline for dam upgrade works, and removed the Croome Farm Catchment water management works;
- Mod 3 (approved in May 2008) which allowed for the construction of a new workshop, office and amenities buildings;
- Mod 470-11-2003 Mod 4 (approved in November 2008) which extended the approved extraction area on land owned by RailCorp by 2.82 ha and changed the stormwater management design criteria for the site; and
- Mod 5 (approved in November 2008) which allowed for a truck parking facility, including amenities, for company trucks that service the quarry.

The proposed modification the subject of this EA would be Mod 6.

## 1.3 Planning framework and approvals

Under Clause 8J(8) of the Environmental Planning and Assessment Regulations 2000, a development consent relating to State significant development that was granted by the Minister under Part 4 of the EP&A Act before 1 August 2005 is taken to be an approval under Part 3A of the EP&A Act, for the purposes of modification only, and section 75W of the EP&A Act applies to any modification of such a

consent. Under section 75W, the request for the Minister's approval for a modification is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements (EARs) with respect to the proposed modification that the proponent must comply with before the modification will be considered by the Minister or the Minister's delegate. The Department of Planning and Infrastructure (DP&I) were issued a briefing report on the proposed modification on 26 July 2011 and EARs were subsequently not issued for the proposed modification.

The Dunmore Quarry currently holds Environment Protection Licence (EPL) No. 77 which would not need to be varied under the modification.

## 1.4 Consultation

The proposed modification was discussed during the 17 August 2011 and 29 August 2012 meeting of Dunmore's Community Consultative Committee (CCC). An information sheet providing an overview of the proposed extension and application process will be prepared and circulated to all stakeholders that lodged a submission to the application for the proposed production increase in 2003. To date, no specific issues have been raised by either the CCC or stakeholders.

Consultation has been undertaken with government agencies including DP&I, Roads and Traffic Authority (RTA), Pacific National, the Office of Environment and Heritage (OEH) and Shellharbour City Council. Comments, where received by the agencies, were incorporated into the preparation of this EA.

## 2 Existing operations

### 2.1 Site description

The Dunmore Hard Rock Quarry is located at Boral's Dunmore landholdings on Tabbita Road approximately 12 km north-west of Kiama and 110 km south of Sydney (see Figure 1). In addition to the Hard Rock Quarry, the Dunmore site includes other Boral operations – the Dunmore Sand and Soil Quarry and the Dunmore Concrete Batching Plant. The Hard Rock Quarry is westernmost with the Sand and Soil Quarry adjacent to the Princes Highway and the Concrete Batching Plant located between them.

The Hard Rock Quarry property is 246.4 ha in size and contains nine cadastral lots:

- Lot 1 DP 213575;
- Lots 1 and 2 DP 224597 referred to as Croome Farm;
- Lot 4 DP 227046;
- Lot 1 DP 1002951;
- Lot 3 DP 1030504 the location of the original Dunmore Quarry;
- Lot 4 DP 1030504;
- Lot 4 DP 571406; and
- Lot 6 DP 1001931.

Lot 1 DP 1002951 is owned by Rail Corp with the remaining land owned by Boral. Within these nine lots, there is an approved disturbance area of 97.85 ha.

The Hard Rock Quarry includes a processing plant which is located south of the original Dunmore Quarry. The site's rail siding runs parallel to Tabbita Road, beginning east of the processing plant and passing under the Princes Highway before connecting to the Illawarra Railway Line. The original Dunmore Quarry is currently being used as a stockpiling area with active extraction occurring on the RailCorp land and the Boral owned land known as Croome Farm. Products to be despatched by rail are generally stockpiled south of the rail siding.

### 2.2 Existing environment

The topography of the site is sloped downwards from the north-west to the south-east of the site with elevations between 164 m Australian height datum (AHD) in the RailCorp extraction area and 10 m AHD around the processing plant and rail siding.

Boral has been collecting meteorological data since July 2002 from a meteorological monitoring station north-west of the Croome Farm extraction area within the property boundary. Wind speed and direction data from September 2009 to August 2010 showed predominant wind speeds from a south-westerly direction all year round with also a strong influence from the north-east during summer periods. This has been a fairly consistent pattern for the data collected from the met station at Dunmore since 2002.

Average monthly rainfall data collected from the met station between January 2002 and June 2011 is 81.24 mm with an average eight rain days per month.

## 2.3 Surrounding environment

Access to the Dunmore site is from Tabbita Road which can only be accessed from the Princes Highway. Tabbita Road only provides access to the Dunmore Site and does not provide access to any residences or other land uses.

Surrounding residential suburbs within 10 km of the site are Shell Cove, Minnamurra and Kiama Downs. Surrounding land uses are primarily rural, rural residential and industrial. The closest residential receivers for the quarry are the McParland Residence to the south-west and the Creagan residence, the Stocker Residence, and Dunmore Lakes Estate, which are located 350 m to 1 km south-east of the Dunmore site.

Boral currently holds a negotiated agreement with the Creagan residence located 350 m south-east of the site which allows reasonable exceedances of noise levels above specified noise goals at this property.

## 2.4 Extraction operations

Hard rock has been extracted from the quarry for approximately 90 years. The quarry has an extensive resource and, due to its ability to rail product into the Sydney metropolitan market, is a key asset for Boral. Total resources within the approved extraction are estimated at 31.6 Mt of latite and 2.5 million m<sup>3</sup> of breccia agglomerate. Breccia agglomerate and latite are hard rocks used in road, rail and engineering applications. Due to its superior strength and structure, latite is used mainly as rail ballast, in sea walls, and other aggregate applications, whereas breccia agglomerate is used in fill or in a blend for road base. As mentioned in Section 1.2, Boral has approval under Development Consent 470-11-2003 for the production of 2.5 Mtpa of quarry products which is between 5,000 and 12,000 tonnes of rock extracted per day.

Existing extraction operations are based on the following design parameters:

- All face heights – approximately 15 m.
- Final bench widths – 20 m on the eastern and southern sides and 10 m on the western side.
- Extraction faces – typically 80° to the horizontal (ie almost vertical).
- Benches – slope eastwards, coinciding with the natural slope of the latite flows.

## 2.5 Product transportation

Dunmore Quarry is part of Boral's integrated quarry and distribution network that supplies quarry products to the Greater Sydney Region, which includes Metropolitan Sydney and the outer lying regional areas of the Hunter, Lower Blue Mountains, Illawarra, Southern Highlands and Southern Tablelands. Dunmore Quarry currently supplies products to the local Illawarra and Southern Highland markets by road and eastern metropolitan Sydney by rail for direct use on site or road distribution.

The Dunmore Quarry currently has approval to transport up to 2.5 Mtpa of quarry products by road and rail, with road transport limited to 1 Mtpa. Two train deliveries carrying approximately 1,600 t each of aggregates and manufactured sand from the Sand and Soil Quarry depart to Sydney each day. Currently quarry products are railed to Boral's terminals at Enfield and St Peters. Enfield has the capacity to receive up to 0.5 Mtpa while St Peters has capacity to receive up to 1 Mtpa.

The remainder of product is trucked along Tabbita Road and then onto the Princes Highway primarily by six axle truck and dog trailer combination vehicles, each carrying approximately 33 t of material per load. Approximately 87.5% of truck deliveries are currently to the north with the remainder (12.5%) to the south. The majority of current road deliveries to the north supply the local Illawarra and Southern Highland markets.

## 2.6 Hours of operation and employment

The approved hours for extraction and processing activities at the Dunmore Quarry are 6 am to 10 pm Monday to Saturday. Drilling activities during the evening period (ie between 6 pm and 10 pm) are confined to the second or third bench levels and blasting is undertaken between 9 am and 5 pm Monday to Saturday, as approved by OEH. Product transfer to stockpiles is allowed between 6 am to Midnight Monday to Saturday. Maintenance can be undertaken 24 hours Monday to Sunday.

Approved hours for distribution of material by road are 24 hours Monday to Saturday with distribution on Sundays allowed between 8 am and 6 pm for 15 Sundays per year. Distribution by rail can be undertaken 24 hours Monday to Sunday.

Around 30 people are currently employed at the quarry as well as 10 road truck drivers for deliveries.







## 3 Proposed modification

### 3.1 Overview

Dunmore Quarry is a dominant source of hard rock product in the Illawarra and Southern Highlands, as well as in the Sydney region. Changes to the Boral's rail terminals in Sydney and the emergence of local supply gaps has meant that a renewed focus on local markets is essential for the economic viability of the quarry. As a consequence, an increase in the amount of material to be transported by road is being sought.

It is proposed to make the following modifications to Development Consent 470-11-2003:

- increase the amount of material approved for road transport from 1 Mtpa to 1.5 Mtpa; and
- extend the approved extraction area by 2.03 ha to allow lateral extraction of the lower latite flow (referred to as the southern access area – see Figure 1).

The main drivers for the above modifications are in response to the following:

- an increased local demand for road base products including breccia agglomerate;
- a need to fill road base product supply gaps from:
  - the closure of Boral's Burrier Quarry in 2014; and
  - the reduction in supply of slag based aggregates from Australian Steel Mill Services (ASMS) at Port Kembla caused by the decommissioning of Blast Furnace No. 6 at BlueScope's Port Kembla Steelworks;
- a shift in Boral's rail terminal network in Sydney which will mean that rail transport from Dunmore will be constrained to 1 Mtpa (see Section 3.3.2).

These drivers are discussed in more detail below.

There would be no changes to hours of operation under the modification. An additional five truck drivers would be required to accommodate the increased road transport.

### 3.2 Proposed extraction operations

The extension to the approved extraction area south of the original Dunmore Quarry is required to provide lateral access, an economical way of extracting the high quality lower latite flow. There would be no change to the current extraction operations described in Chapter 2, the approved rate of extraction, or the hours of operation.

The extension area is approximately 2.03 ha of mostly cleared and disturbed land south of the original Dunmore Quarry stockpiling area and north of the processing plant. This area is already included within the approved area of disturbance and, therefore, wouldn't increase the area of disturbance within the property from 97.85 ha. The elevation of this area is currently 30 m AHD and the maximum face height would be 15 m (ie between 15 m AHD and 30 m AHD following extraction).

The extension would require the clearing of approximately 1.3 ha of vegetation as well as the removal of soil and overburden. The area would be stripped by a bulldozer or excavator and the vegetation, soil and overburden loaded into haul trucks and transported either directly to areas being rehabilitated or stockpiled for later use in rehabilitation activities. The southern access area would then be constructed through blasting with rock removed by front-end loader.

### 3.3 Proposed product transportation

#### 3.3.1 Details of modification

Boral is seeking a modification to increase the road transport limit at Dunmore Quarry from 1 Mtpa to 1.5 Mtpa to meet demand in peak market conditions in Sydney and the Illawarra/Southern Highlands regions. The additional truck deliveries will continue, as per current practice, to travel via the Princes Highway. However, the distribution of product will shift due with 60% dispatched north and 40% dispatched south. This shift in distribution is in response to the changing local market and an increased demand in the Shoalhaven region, south of the quarry.

An enlarged truck fleet would be needed to transport the additional product. This would result in approximately five additional truck drivers being employed by Boral.

#### 3.3.2 Need for modification

##### i Network shift due to Peppertree Quarry

In 2014, Boral's largest hard rock quarry at Emu Plains will come to the end of its operational life. In preparation for this, Boral recently commenced construction of Peppertree Quarry at Marulan South which is scheduled to be operational in mid-2013. All products from Peppertree Quarry will be transported from the site by rail in accordance with its Project Approval (PA06\_0074). The majority of Peppertree's products will be railed to the recently approved Maldon Rail Terminal, near Picton, for dispatch by road to south-western and western Sydney. The remainder will be railed to the Enfield Rail Terminal to maximise production capacity from Peppertree to support and justify the significant capital investment (approximately \$200 million) required to establish the quarry and associated infrastructure.

When Peppertree Quarry becomes operational in mid-2013, Dunmore Quarry will no longer be able to transport 0.5 Mtpa of quarry product by rail to Enfield, as the rail terminal will be at full capacity. This, together with the current limit on road transport of 1 Mtpa would constrain Dunmore Quarry's capacity to meet market demand in peak times. The remaining 0.5 Mtpa of product cannot be railed to the St Peters Rail Terminal as the two currently available rail paths each day supply product of the maximum capacity of this rail terminal which is 1 Mtpa.

##### ii Illawarra market shift

In 2014, Boral's Burrier Quarry west of Nowra will close leaving a supply gap of 0.127 Mtpa. All quarry products from Burrier are currently transported by road to the local Illawarra, Shoalhaven and Southern Highlands markets. Dunmore Quarry's location and capacity make it ideal to fill this future supply gap.

Aggregates made from blast furnace slag have been used in Illawarra for concrete and road sealing applications in place of natural aggregates. Due to the recent closure of BlueScope's Blast Furnace No. 6 at Port Kembla, there has been a reduction in the amount of slag based aggregates being produced, creating a supply gap in the Illawarra, Shoalhaven and Southern Highlands markets. It is estimated that initially approximately 0.3 Mtpa of aggregates will be needed to fill this gap, reducing to 0.1 Mtpa when



Peppertree Quarry starts operating in approximately 2014. All slag based products from Blast Furnace No. 6 were transported to the local market by road.

Dunmore Quarry can supply products to meet both of these supply gaps. However, the proposed increase to the volume of road product transport would be required.

### iii Local supply of breccia agglomerate

To allow access to the high quality latite flows within the southern access area, as discussed in Section 3.2, a large amount of breccia agglomerate (inter-burden) will need to be processed. It is intended that this inter-burden will supply the existing Illawarra market with approximately 0.2 Mtpa of breccia aggregate. Boral anticipates a growing local demand for this product, which is used as fill and blended for road base. In fulfilling these market demands, the resulting access to the lower latite flow will strengthen the long-term economic viability of Dunmore Quarry.

### 3.3.3 Alternatives considered

The only current option to supply local markets in the Illawarra and Southern Highlands is by road, and therefore an increase in the road haulage volumes is essential to allow Boral access to the local market.

Boral has consulted with Pacific National Rail about the availability of additional rail paths to rail product to the St Peter's terminal. Pacific National indicated that they were unable to identify a suitable additional train path (see correspondence from Pacific National in Appendix A). As mentioned previously, the Enfield Rail terminal will be at capacity once the Peppertree Quarry commences operations.

Boral has and will continue to explore opportunities to find alternative rail terminal sites in Sydney, however, industrially zoned sites with rail access in Sydney are scarce.



## 4 Impact assessment

### 4.1 Traffic

#### 4.1.1 Introduction

The proposal will result in additional truck traffic movements on Tabbita Road, the Princes Highway, and the F6 Southern Freeway. A traffic impact assessment has been prepared by EMM (Appendix B) to characterise the existing traffic environment and assess the potential impacts on traffic from the proposed modification.

The additional road transport of 0.5 Mtpa is required as rail transport is currently not feasible due to terminal and rail pathway capacity constraints. Further, to meet increasing local demand and supply gaps transport of product by road would be required since transport by rail to local customers is not possible. Further discussion on the need for the increased road transport is provided in Section 3.3.

#### 4.1.2 Existing environment

Substantial upgrades of the Princes Highway have been undertaken since the issue of Development Consent 470-11-2003 in 2004. These upgrades include the North Kiama Bypass and the Oak Flats to Dunmore Bypass which have provided a new dual carriage way for both northbound and southbound traffic in the Kiama, Minnamurra, Dunmore and Shellharbour areas. As a result, the road network, for which a limit of 1 Mtpa road transported material was required in 2004, has now increased sufficiently in capacity to allow the additional product to be transported without significant impacts. A grade separated intersection is now provided on the Princes Highway at Tabbita Road which provides safe and delay free access for the quarry trucks travelling to and from the north. However, the grade separated intersection has no southbound on-ramp, so quarry trucks travelling to the south have to first travel northbound on the Princes Highway from Tabbita Road to Shellharbour Road before exiting the highway, crossing the freeway on the bridge and re-joining the southbound highway traffic from Shellharbour Road.

Tabbita Road is a relatively lightly trafficked local road which carries approximately 550 vehicle movements daily (76 vehicle movements in the mid day peak hour) from a combination of Boral Hard Rock Quarry traffic, Boral Sand and Soil Quarry traffic and Boral Concrete Batching Plant traffic. This traffic is a combination of light and heavy vehicle traffic and comprises approximately 220 car/utility vehicle movements and about 330 truck movements daily.

Existing daily traffic volumes on Princes Highway between 2000 and 2006 are shown in Table 2.1. To the north of Dunmore Quarry, traffic growth on the Princes Highway has been generally steady, attributed to population growth in the Kiama and Shellharbour areas. South of Dunmore Quarry, traffic growth has been less consistent with a decrease between 2003 and 2006.

The Princes Highway bypasses most townships in the Illawarra region, except for the township of Albion Park Rail, approximately 4 km north of Dunmore Quarry, where there a number of traffic signal and roundabout controlled intersections. The current morning and afternoon peak hour traffic volumes on the Princes Highway at Albion Park have been determined from an intersection count undertaken at the Princes Highway and Creamery Road intersection. These traffic counts (Table 4.1) were analysed using the SIDRA intersection analysis program. The current morning and afternoon peak hour Level of Service (LOS) for traffic on the Princes Highway at the intersection is LOS B (morning peak hour) and LOS D (afternoon peak hour).

**Table 4.1 RTA historical traffic volume data for the Princes Highway**

| Locality    | Location                    | AADT   |        |        |        |
|-------------|-----------------------------|--------|--------|--------|--------|
|             |                             | 2000   | 2003   | 2005*  | 2006*  |
| Albion Park | At Macquarie Rivulet Bridge | 44,635 | 48,648 | 48,842 | 49,708 |
| Albion Park | South of Illawarra Highway  | 37,869 | 41,413 | 41,595 | -      |
| Oak Flats   | North of Tongarra Road      | 30,152 | 27,835 | 34,103 | -      |
| Oak Flats   | East of Tongarra Road       | 40,689 | 31,749 | 38,290 | -      |
| Dunmore     | North of Shellharbour Road  | 20,928 | 22,571 | -      | -      |
| Dunmore     | South of Shellharbour Road  | 27,956 | 29,518 | -      | -      |
| Kiama       | At Bombo Railway Station    | 28,768 | 29,713 | -      | 27,757 |
| Kiama       | At Saddleback               | 15,081 | 15,865 | -      | -      |

*Note* At many locations, survey data more recent than 2003 is not available\*

### 4.1.3 Impact assessment

The transport of an additional 0.5 Mtpa of product by road will generate an additional 55 truck loads daily, which equates to an additional 10 vehicle movements per hour (6 north and 4 south) on both inbound and outbound routes during peak traffic periods. These additional traffic movements would generate a less than 0.2% increase in traffic on the Princes Highway northbound and 0.15% increase southbound for either total daily or peak hour traffic. The traffic impact assessment (Appendix B) concluded that this additional traffic will have minimal or negligible impact on the existing road network and will not significantly affect the performance or LOS of existing traffic intersections on the Princes Highway (eg the Princes Highway/Creamery Road intersection at Albion Park) (see Table 4.2).

**Table 4.2 LOS traffic impact assessment at Princess Highway/Creamery Road intersection**

| Scenario                                               | am peak |       |            |                      | pm peak |       |            |                      |
|--------------------------------------------------------|---------|-------|------------|----------------------|---------|-------|------------|----------------------|
|                                                        | LOS     | DOS   | AVD (secs) | Max queue length (m) | LOS     | DOS   | AVD (secs) | Max queue length (m) |
| Existing                                               | B       | 0.773 | 20.2       | 235                  | D       | 1.001 | 46.0       | 558                  |
| Future with Dunmore modification                       | B       | 0.775 | 20.2       | 236                  | D       | 1.004 | 46.7       | 565                  |
| Future with Dunmore modification & Bass Point 2.4 Mtpa | B       | 0.784 | 20.1       | 242                  | D       | 1.010 | 48.4       | 580                  |
| Future with Dunmore modification & Bass Point 4.0 Mtpa | B       | 0.788 | 19.9       | 245                  | D       | 1.012 | 48.9       | 584                  |

*Source:* SIDRA Intersection Analysis.

*DOS:* degree of saturation.

*AVD:* average vehicle delay.

The traffic impact assessment also considered the cumulative impact of the proposed Dunmore modification and the traffic generated by Hanson's proposed Bass Point Quarry Expansion (under both the 2.4 Mtpa and 4.0 Mtpa scenarios) which is currently being considered for determination by DP&I. For the purposes of the assessment, it was assumed that the additional traffic generated by the Bass Point Quarry Expansion would also pass through the Princes Highway/Creamery Road intersection at Albion Park. The cumulative traffic impact at the intersection was assessed and it was concluded that the

cumulative additional truck traffic would not significantly affect the performance of this intersection which would continue to operate at LOS B during the am peak period and LOS D during the pm peak period (see Table 4.2).

#### 4.1.4 Truck management practices

Boral's truck drivers, including contract drivers, are required to adhere to the company's driving policies and standards which includes provisions for road safety and minimal disruption to residences. Trucks are required to drive in a safe and responsible manner so that they minimise any noise disruption, particularly in residential areas. Dust emissions are minimised through the use of a wheel wash and covers for all loads.

Boral fleet vehicles are fitted with electronic monitoring systems which allow the review of a number of factors including journey routes, speeds recorded and trip duration. Regular reviews of these systems are carried out to ensure Boral drivers are meeting their obligations under the company's driving policies and standards. Breaches are dealt with through Boral's disciplinary arrangements. Complaints from other road users can also be verified through reviewing these systems.

## 4.2 Noise

### 4.2.1 Introduction

A noise impact assessment has been undertaken by EMM (Appendix C) to quantify the potential impacts associated with the following aspects of the proposed modification:

- increased truck movements; and
- quarrying activities in the southern access area.

### 4.2.2 Existing environment

The closest residential receivers for the quarry are the McParland Residence, the Stocker Residence, Creagen Residence and the Dunmore Lakes Estate, which are located 500 m to 1 km south of the quarry. Noise limits under the consent and the quarry's EPL apply to these receivers. Records have shown a steady decline in noise related complaints since the issue of the development consent in 2004 with no noise complaints since 2008.

The receiver locations for the quarry are specified in Development Consent (DA 470-11-2003) along with their relevant noise impact assessment criteria, as reproduced in Table 4.3.

**Table 4.3 Operational noise assessment criteria**

| Receiver Locations                | $L_{eq}$ (15-minute) (dB(A))  |         |       |          | $L_1$ (1-minute) |          |
|-----------------------------------|-------------------------------|---------|-------|----------|------------------|----------|
|                                   | Day                           | Evening | Night | Shoulder | Night            | Shoulder |
| Location A - McParland Residence  | 35                            | 35      | 35    | 35       | 45               | 45       |
| Location J - Creagen Residence    | Negotiated agreement in place |         |       |          |                  |          |
| Location K - Stocker Residence    | 49                            | 44      | 38    | 47       | 48               | 55       |
| Location O - Dunmore Lakes Estate | 49                            | 44      | 38    | 47       | 48               | 55       |

### 4.2.3 Impact assessment

#### i Operational noise

The prediction of noise from the quarry was undertaken using the Environmental Noise Model (ENM) prediction software. Results of the noise modelling (Table 4.4) show that the proposed activities in the southern access area alone will be below relevant noise criteria for all assessed receivers. Additionally, the cumulative noise emissions from worst case existing operations and from activities in the southern access area is expected to meet relevant criteria at all but one receiver (Stocker) where emissions during prevailing meteorological conditions result in a marginal and indiscernible 1 dB(A) exceedance.

**Table 4.4 Noise modelling summary – existing operations and southern access area**

| Location                             | Existing operations <sup>1</sup> ,<br>L <sub>eq</sub> (dB(A)) | Southern resource<br>L <sub>eq</sub> (dB(A)) | Cumulative<br>L <sub>eq</sub> (dB(A)) | L <sub>eq</sub> criteria, dB(A) |         |
|--------------------------------------|---------------------------------------------------------------|----------------------------------------------|---------------------------------------|---------------------------------|---------|
|                                      |                                                               |                                              |                                       | Day                             | Evening |
| Calm meteorological conditions       |                                                               |                                              |                                       |                                 |         |
| Location A - McParland Residence     | 26                                                            | 25                                           | 29                                    | 35                              | 35      |
| Location J - Creagan Residence       | 30                                                            | 41                                           | 41                                    | N/A                             | N/A     |
| Location K - Stocker Residence       | 36                                                            | 39                                           | 41                                    | 49                              | 44      |
| Location O - Dunmore Lakes Estate    | 26                                                            | 31                                           | 32                                    | 49                              | 44      |
| Prevailing meteorological conditions |                                                               |                                              |                                       |                                 |         |
| Location A - McParland Residence     | 23                                                            | 22                                           | 26                                    | 35                              | 35      |
| Location J - Creagan Residence       | 39                                                            | 48                                           | 49                                    | N/A                             | N/A     |
| Location K - Stocker Residence       | 41                                                            | 43                                           | 45                                    | 49                              | 44      |
| Location O - Dunmore Lakes           | 29                                                            | 38                                           | 39                                    | 49                              | 44      |

Notes: 1. an adjustment of -3 dB has been made to this level to account for existing fleet being utilised in the southern access area.

Noise levels at the Creagan Residence, for which there is a negotiated agreement in place, would meet the criteria of similar located residences (eg Location K).

The blast overpressure and vibration levels from blasting within the proposed southern access area will meet the relevant criteria at all receivers and satisfy Condition 17 of Development Consent 470-11-2003.

#### ii Road traffic noise

The potential impacts of traffic noise resulting from both construction and operational related traffic on public roads have been assessed against criteria defined in the *Road Noise Policy* (DECCW 2011a). Site related traffic will use routes that are currently relatively heavily trafficked and part of the broader road network. The relevant project assessment noise criteria has been set as 60 dB(A) L<sub>eq,15hr</sub> (daytime) and 55 dB(A) L<sub>eq,9hr</sub> (night time) adopting the 'principal haulage route' methodology. The US Environment Protection Agency's method was used to predict the L<sub>eq</sub> noise levels from traffic travelling along Princes Highway at adjacent residences. The maximum traffic movements to and from site (110 road truck movements daily or 10 movements per hour) were adopted in the noise assessment for both day and night periods.

Traffic noise associated with the increase in road transport is expected to be marginal (<2 dB) and below the relevant criteria as shown in Table 4.5.

**Table 4.5** Project road traffic noise criteria levels at 150 m from Princes Highway

| Period            | Assessment criteria | Current calculated site traffic noise | Calculated additional site traffic noise (proposed) | Existing + future site combined | Existing Princes Hwy traffic | Total | Change |
|-------------------|---------------------|---------------------------------------|-----------------------------------------------------|---------------------------------|------------------------------|-------|--------|
| Leq period, dB(A) |                     |                                       |                                                     |                                 |                              |       |        |
| Day               | 60                  | 40.3                                  | 38.3                                                | 42.4                            | 55                           | 55.2  | 0.2    |
| Night             | 55                  | 42.3                                  | 40.3                                                | 44.9                            | 50                           | 51.1  | 1.1    |

## 4.3 Air quality

### 4.3.1 Emission sources

The proposed increase in truck movements and construction of the southern access area has the potential to impact air quality through dust generation from the following sources:

- increased numbers of trucks travelling on unpaved surfaces; and
- drilling and blasting of rock within the proposed southern access area.

These sources are existing dust emission sources at the quarry and no additional sources would be created.

As development of the southern access area will be managed in accordance with current air quality measures at the quarry, it is expected that there would be a negligible increase in dust emissions from the proposed modification.

The proposed modification would not increase the amount or rate of production and so would not increase dust generation from sources such as crushing and screening of rock within the processing plant and wind erosion from stockpiles. The levels of dust generated from the loading and unloading of material would remain constant under the modification as the same amount of material that is currently loaded to trains would instead be loaded to trucks.

### 4.3.2 Receiving environment

The existing and surrounding environment are described in Sections 2.3 and 2.4 of this report respectively.

There are a number of other potential non-Project-related dust emission sources in the area including activities at the adjacent Boral operations: the existing Readymix and Cleary Brothers hard rock quarries at Albion Park; sea salt; and traffic-related dust from Princes Highway and the local road network.

### 4.3.3 Air quality monitoring and criteria

There are four deposited dust measuring gauges located in the area surrounding the quarry. A high volume air sampler (HVAS) was also installed at the quarry in 2005, directly south of the processing plant. Air quality goals for the site have been adopted from the NSW Department of Environment and Conservation (DEC) 2005 guidelines and the National Health and Medical Research Council (NHMRC) goal for total suspended particulates (TSP).



**Table 4.6 NSW DECC air quality goals for particulates and dust deposition**

| Air quality indicator          | Averaging period | Maximum increase          | Maximum level             |
|--------------------------------|------------------|---------------------------|---------------------------|
| Deposited dust or dust fallout | Annual           | 2 g/m <sup>2</sup> /month | 4 g/m <sup>2</sup> /month |
| TSP                            | Annual           | -                         | 90 µg/m <sup>3</sup>      |
| PM <sub>10</sub>               | 24 hour          | -                         | 50 µg / m <sup>3</sup>    |
|                                | Annual           | -                         | 30 µg / m <sup>3</sup>    |

Sources: DEC 2005a, NHMRC

The deposited dust goal of 4 g/m<sup>2</sup>/month is for all insoluble solids. Deposited dust samples are non-discriminate (ie material from all sources is collected and not just that of the quarry) and also can include organic material such as leaf litter and insects. The ash content of a sample, which is more indicative of the material processed onsite, is therefore used in the quarry's monitoring records to help determine the quarry's contribution to deposited dust in the surrounding area. Therefore, if an exceedance is detected in insoluble solids but the ash content remains below the assessment criteria it is deemed that the quarry contribution is compliant.

Past deposited dust samples have generally remained below the guidelines of 4 g/m<sup>2</sup>/month with only minor exceedances mostly due to external influences. For example, monitoring records for 2009 to 2010 show that exceedances of the 4 g/m<sup>2</sup>/month were during months where dominant winds were not from the direction of the quarry, or were during summer months where increased insect deposition is characteristic.

The results of HVAS monitoring also indicate that suspended particulars have generally remained below the air quality goals despite the monitor being located very close to the quarry operations. Only occasional exceedances have been recorded since 2005 where the recorded wind speeds and directions did not indicate that the quarry operations were the contributing factor to the elevated readings. In 2009 to 2010 the annual average was 8.05 µg/m<sup>3</sup>, which is well under the long term impact assessment criteria of 30 µg/m<sup>3</sup>, and the highest reading was 44.88 µg/m<sup>3</sup>, which is below the 24 hour impact assessment criteria of 50 µg/m<sup>3</sup>.

#### 4.3.4 Air quality management

The following dust management measures are already in place at the quarry and will continue to be implemented during the proposed modification:

- regular wet down of unsealed surfaces using a water truck;
- wet down as required on blasted rock haul roads and stockpiles;
- collection or dampening down on drill rig cuttings to reduce the quantity of dust released to the atmosphere during a blast;
- where possible, confining traffic to identified haul road routes;
- removal and rehabilitation of unnecessary roads;
- exposed areas kept to a minimum;
- watering of haul roads;

- cleaning of areas which could become sources of dust;
- review of meteorological conditions prior to blasting to minimise dust emissions; and
- controlling stockpiles of fine material with water sprays.

The quarry purchased a wheel wash in 2011 which reduces the potential for material to be deposited by trucks onto Tabbita Road and Princes Highway and can result in dust emissions.

#### 4.3.5 Air quality impact assessment

As discussed above, the dust emissions from the existing operations are generally compliant and it is considered that the proposed modification would result in a negligible increase to current dust emissions. The frequency of blasts will not increase with the quarry being limited to a maximum of two blasts per day under its current consent. There are existing blast management procedures as described above and blasting in the proposed southern area will follow these same procedures. The increase in truck movements is not expected to affect the air quality of the site since, as with blasting, there are existing management procedures for unsealed and sealed trafficked areas at the quarry.

Provided the management measures described above are implemented, it is considered that exceedance of the air quality goals would not result from the proposed modification. Therefore, the proposed modification would not have a significant impact on air quality.

This conclusion is supported by the air quality assessment undertaken by Holmes Air Sciences in 2003 that covered operations in the southern access area.

#### 4.3.6 Greenhouse gas emissions

The air quality assessment prepared by Homes Air Sciences in 2003 included a calculation of greenhouse gas emissions for the production rate of 2.5 Mtpa at the quarry. Quarry activities that would result in emissions include the combustion of diesel fuel used primarily in diesel-powered equipment (Scope 1 emissions) and greenhouse emissions from the use of electricity to power quarrying equipment (Scope 2 emissions). These are the only significant sources of greenhouse gases at the quarry and the proposed modification will not create additional sources. Scope 1 emissions will decrease under the proposed modification despite the increased road transport volumes due to the decreased use of diesel fuel in trucks (due to shorter distance of travel) and trains (due to decreased train trips). Scope 2 emissions will not increase under the proposed modification as there will be no increase in electricity use.

The CO<sub>2</sub>-equivalent (CO<sub>2</sub>-e) emission rates for the existing and proposed quarry operations have been calculated in Table 4.7. The proposed modification would result in a 0.0004% decrease in state and 0.00123% decrease in national CO<sub>2</sub>-e emissions which represents a positive outcome for CO<sub>2</sub> emissions.

**Table 4.7 Greenhouse gas emissions calculations**

|                                             | Existing operations | Proposed operations |
|---------------------------------------------|---------------------|---------------------|
| <b>Scope 1 emissions</b>                    |                     |                     |
| <i>Diesel equipment</i>                     |                     |                     |
| Diesel usage by on-site equipment (L/month) | 166,667             | 166,667             |
| Diesel usage by on-site equipment (L/y)     | 2,000,004           | 2,000,004           |
| <i>Diesel trains</i>                        |                     |                     |

**Table 4.7**      **Greenhouse gas emissions calculations**

|                                                                                             | Existing operations | Proposed operations |
|---------------------------------------------------------------------------------------------|---------------------|---------------------|
| Diesel usage by trains (L/trip)                                                             | 1,500               | 1,500               |
| Train trips per year                                                                        | 1,192               | 795                 |
| Diesel usage by trains (L/y)                                                                | 1,788,000           | 1,192,500           |
| <i>Diesel trucks</i>                                                                        |                     |                     |
| Diesel usage by road trucks (L/km)                                                          | 0.5                 | 0.5                 |
| Road truck return travel distance (km)                                                      | 200                 | 60                  |
| Tonnes per year by truck (t/y)                                                              | 1,000,000           | 1,500,000           |
| Tonnes per truck load (t)                                                                   | 33                  | 33                  |
| Truck trips per year                                                                        | 30,303              | 45,455              |
| Diesel usage by road trucks (L/y)                                                           | 3,030,303           | 1,136,364           |
| Total diesel usage (L/y)                                                                    | 6,818,307           | 4,328,868           |
| Energy content factor (GJ/L)*                                                               | 0.0386              | 0.0386              |
| CO <sub>2</sub> -e equivalent emission factor (t/GJ)*                                       | 0.0692              | 0.0692              |
| Scope 1 CO <sub>2</sub> -e emissions (t/y)                                                  | 18,213              | 11,563              |
| <b>Scope 2 emissions</b>                                                                    |                     |                     |
| Electricity usage per year (kWh/y)                                                          | 7,000,000           | 7,000,000           |
| CO <sub>2</sub> -e emissions factor from electricity usage (t/kWh) <sup>1</sup>             | 0.00089             | 0.00089             |
| Scope 2 CO <sub>2</sub> -e emissions (t/y)                                                  | 6,230               | 6,230               |
| <b>TOTAL</b>                                                                                |                     |                     |
| Total CO <sub>2</sub> -e emissions from operations (t/y)                                    | 24,442.52           | 17,793              |
| Estimated NSW CO <sub>2</sub> -e emissions 2009 (t) <sup>2</sup>                            | 160,600,000         | 160,600,000         |
| CO <sub>2</sub> -e emission as % of NSW 2011 CO <sub>2</sub> -e emissions                   | 0.0152              | 0.0111              |
| Estimated national CO <sub>2</sub> -e emissions for 2011 (t)                                | 542000000           | 542000000           |
| CO <sub>2</sub> -e emission as % of national 2011 CO <sub>2</sub> -e emissions <sup>3</sup> | 0.00451             | 0.00328             |

Notes: 1. Taken from National Greenhouse Factors July 2011, Commonwealth Department of Climate Change and Energy Efficiency.

2. Taken from National Greenhouse Gas Accounts - State and Territory Greenhouse Gas Inventories 2009, Commonwealth Department of Climate Change and Energy Efficiency.

3. Quarterly Update of Australia's National Greenhouse Gas Inventory March Quarter 2011, Commonwealth Department of Climate Change and Energy Efficiency.

## 4.4 Ecology

### 4.4.1 Introduction

In order to gain an appreciation of the ecology of the site, previous studies completed within the quarry site and its surrounds were reviewed. A search of relevant databases and other literature sources was also undertaken to determine the likelihood that listed threatened species, populations and communities to occur within the site and its surrounds.

A site inspection was carried out on the 26 September 2011 by EMM. The proposed southern access area was traversed on foot using the random meander survey technique (Cropper 1993). No dedicated fauna surveys were undertaken within the site as initial results considered it unlikely to provide suitable habitat for any threatened fauna species. Notes were made on site regarding the potential for threatened flora and fauna habitat to occur.

#### 4.4.2 Existing environment

The study area is governed by the then Department of Environment, Climate Change and Water (DECCW)'s *Strategy for Conservation and Management of Biodiversity in Dunmore – Shellharbour* (the Biodiversity Strategy) released in 2011. The strategy aims to provide a long-term vision to maintain and improve biodiversity in the area, while recognising the significant mineral resources and agricultural productivity of the area (DECCW 2011b).

Dunmore Quarry occurs within the Illawarra region within the Sydney Basin Bioregion, which is one of the most biologically diverse regions in NSW. The Dunmore – Shellharbour Hills area, where the quarry is located, contains the largest remaining patches of native vegetation on the Illawarra foothills and coastal plain (DECCW 2011b).

The proposed southern access area occurs on a steep slope between existing quarrying activity areas. The isolated vegetated remnants have been degraded over time and are subject to weed invasion and disturbance from edge effects.

##### i Vegetation communities

The *Vegetation Offset Strategy and Flora and Fauna Management and Rehabilitation Plan* (Cumberland Ecology 2009) for the quarry mapped the site as 'Largely cleared/ Pasture' with small areas of 'Illawarra Grassy Woodland' and 'Lantana camara thicket'.

The proposed southern access area was found to support a modified community dominated by weeds and opportunistic and hardy native species during the survey. Photograph 4.1 shows typical vegetation and the weedy nature of the southern access area. The tall shrub layer contains lantana (*Lantana camara*), black wattle (*Acacia mearnsii*), maiden's wattle (*Acacia madenii*), sweet pittosporum (*Pittosporum undulatum*) and the occasional red ash (*Alphitonia excelsa*). Occasional native rosella (*Hibiscus heterophyllus*) and Australian indigo (*Indigofera australis*) also occur. A weedy groundcover occurs with fireweed (*Senecio madagascariensis*), Scotch thistle (*Onopordum acanthium*), cobblers pegs (*Bidens pilosa*), whisky grass (*Andropogon virginicus*), white clover (*Trifolium repens*) and kikuyu (*Pennisetum clandestinum*).



**Photograph 4.1**      **The proposed southern access area looking east**

The slope on the eastern side of the extension area contains a number of climbers and remnant rainforest species including red ash (*Alphitonia excelsa*), native hibiscus, cheese tree (*Glochidion ferdinandi*), sweet pittosporum, wonga vine (*Pandorea pandprana*), weeds such as small-leaf privet (*Ligustrum sinense*), blackberry (*Rubus fruticosus*), and crofton weed (*Ageratina adenophora*).

A recent aerial photograph (Photograph 4.2) shows the open nature of the vegetation within this area as a result of past disturbance.





**Photograph 4.2** Aerial of southern access area (black outline) and existing approved extraction boundary (pink outline). The location of the Illawarra Zieria population is shown as a red circle and the maximum extent of the remnant *Melaleuca armillaris* Tall Shrubland is shown in yellow

## ii Threatened ecological communities

Under the NSW *Threatened Species Conservation Act 1995* (TSC Act), four listed threatened ecological communities are known to occur within the Dunmore-Shellharbour area according to the Biodiversity Strategy (DECCW 2011). These are:

- *Melaleuca armillaris* Tall Shrubland;
- Illawarra Lowlands Grassy Woodland;
- Swamp Oak Floodplain Forest; and
- Illawarra Subtropical Rainforest.

The vegetation within the proposed southern access site is not considered to meet the description of any of these communities due to the lack of any characteristic canopy species, the dominance of weeds and regenerating natives (mainly *Acacia maiden*), and past disturbance from quarrying activities within the area. To the north-west of the proposed site, outside of the proposed southern access area, a small patch of remnant *Melaleuca armillaris* Tall Shrubland occurs in a degraded condition.

### iii Fauna habitat

The vegetation in this area provides limited foraging opportunities for common birds and small reptiles. The open, shrubby structure offers habitat opportunities for fauna, including:

- Flowering and fruiting shrubs: The abundance of flowering plants such as sweet pittosporum, wattles and lantana provides foraging habitat for a range of birds.
- Ditches and drains: Provide habitat for common and opportunistic amphibian species including the common eastern froglet (*Crinia signifera*) which was heard calling during the current survey.

### iv Threatened flora species

In the Flora and Fauna Assessment prepared for the original environment impact statement (EIS) (Kevin Mills & Associates 2003), the TSC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened species Illawarra Zieria (*Zieria granulata*), shown in Photograph 4.3, was recorded in three locations within the quarry, all outside of the proposed southern access area. A small population (approximately four individuals) was recorded during the current survey to the north-west of the proposed southern access within a remnant stand of *Melaleuca armillaris* Tall Shrubland (Photograph 4.2). This area will not be impacted by the proposal or current quarry activities.



**Photograph 4.3** A sample of the Illawarra Zieria recorded onsite

No threatened flora species were recorded within the proposed footprint of the southern access. The likelihood of other threatened flora species to occur within the site was assessed (Appendix D). The site is unlikely to contain suitable habitat for any of the threatened plants known to occur within the locality.



A search of OEH's National Parks and Wildlife Atlas and NSW Threatened Species databases determined that six fauna species listed under the TSC Act and/or the EPBC Act have been recorded within the locality. Habitat assessment was completed for each species during the field survey to determine the potential likelihood of occurrence of these threatened fauna species within the study area (see Appendix D). The site is unlikely to contain suitable habitat for any of the threatened fauna species known to occur within the locality.

Very limited foraging opportunities are present for the grey-headed flying-fox (*Pteropus poliocephalus*) with flowering species such as wattles and acacias. Suitable habitat is not present for this species to roost at the site. A maternity camp of this species is known approximately 3 km to the south of the site within a large rainforest remnant.

#### v Migratory and marine species

The database search determined that potential habitat exists for eight migratory and marine species listed under the EPBC Act within a 10 km radius of the site. The potential for these species to occur on the site is assessed in Table 4.8. Since no significant habitat for marine or migratory species is present within the proposed southern access or surrounds, no further assessments were considered required.

**Table 4.8** Migratory and marine species potential for occurrence

| Species name                                              | Status under the EPBC Act | Potential for occurrence                                                                                                                               |
|-----------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| White-bellied sea-eagle<br><i>Haliaeetus leucogaster</i>  | Marine                    | Nil. May fly over site but generally rely on coastal waterways or inland waterways. No suitable habitat will be removed as part of the proposed works. |
| White-throated needletail<br><i>Hirundapus caudacutus</i> | Marine                    | Nil. This species does not occur in habitats that will be impacted by the proposed works.                                                              |
| Rainbow bee-eater<br><i>Merops ornatus</i>                | Marine                    | Nil. This species does not occur in habitats that will be impacted by the proposed works.                                                              |
| Black-faced monarch<br><i>Monarcha melanopsis</i>         | Migratory                 | Nil. Habitat is not present in the area. This species occurs in wetter habitats.                                                                       |
| Satin flycatcher<br><i>Myiagra cyanoleuca</i>             | Migratory                 | Nil. Habitat is not present in the area. This species occurs at higher altitudes.                                                                      |
| Orange-bellied parrot<br><i>Neophema chrysogaster</i>     | Migratory                 | Nil. Habitat is not present in the area. This species forages in wetter habitats.                                                                      |
| Rufous fantail<br><i>Rhipidura rufifrons</i>              | Migratory                 | Nil. This species does not occur in habitats that will be impacted by the proposed works.                                                              |
| Regent honeyeater<br><i>Xanthomyza phrygia</i>            | Migratory                 | Nil. This species does not occur in habitats that will be impacted by the proposed works.                                                              |

#### 4.4.3 Impact assessment

Potential impacts are ecological impacts predicted to occur as a result of unmitigated project activities, and consider the ecological values identified within and adjacent to the site. Potential impacts for the project include:

- loss of native vegetation and fauna habitat;

- edge effects and weed invasion;
- key threatening processes; and
- indirect impacts on threatened species and communities.

#### i Loss of native vegetation

The proposal requires the removal of approximately 1.3 ha of disturbed remnant and regenerating vegetation. The vegetation to be removed is common within the quarry area and its surrounds and is not considered ecologically significant.

None of the vegetation to be removed is considered to meet the description of any threatened ecological communities. The site is in a very degraded condition and is unlikely to contain a native soil seedbank, with future regeneration into a functional native community unlikely due to the number of weed species currently occupying the site.

#### ii Loss of fauna habitat

Approximately 1.3 ha of potential habitat for fauna will be removed to facilitate the proposed upgrade. This involves the removal of habitat features such as flowering and fruiting shrubs and small trees which provide foraging opportunities to a range of birds and flying mammals. The removal of this is unlikely to have adverse impacts on common birds and flying mammals, due to the abundance of foraging resources remaining within and outside the wider study area.

The proposed upgrade removes potential foraging habitat for the grey-headed flying-fox and threatened microbats. This is unlikely to have a significant impact upon these species as their foraging range within the study area would only be reduced minimally. Assessments of significance were completed under the TSC Act and EPBC Act (Appendix E).

#### iii Key threatening processes

Clearing of native vegetation is listed as a key threatening process under the TSC Act and EPBC Act, where it is referred to as land clearing. Clearing, as defined by the NSW Scientific Committee's determination, refers to the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation. There are numerous impacts as a result of clearing native vegetation, including (DEC 2005b):

- destruction of habitat causing a loss of biological diversity, and may result in total extinction of species or loss of local genotypes;
- fragmentation of populations resulting in limited gene flow between small isolated populations, reduced potential to adapt to environmental change and loss or severe modification of the interactions between species;
- riparian zone degradation, such as bank erosion leading to sedimentation that affects aquatic communities;
- disturbed habitat which may permit the establishment and spread of exotic species which may displace native species; and
- loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.

Clearing for the proposed access would not cause a loss of biodiversity to such an extent that local extinctions would occur. No riparian zones are present within the area. The proposed southern access area may disturb degraded vegetation communities such that exotic species will establish and spread. However, specific measures have been recommended to monitor and control noxious weeds during and after construction.

#### iv Indirect impacts on threatened species and communities

A number of noxious and environmental weeds occur within the site and its surrounds. Of note, lantana and blackberry were observed within the proposed southern access area. These are Class 4 Noxious Weeds listed under the NSW *Noxious Weeds Act* 1993 (NW Act). Under the NW Act, the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

There is the potential for the spread and invasion of weeds as a result of the works into the remnant *Melaleuca armillaris* Tall Shrubland remnant which contains the threatened Illawarra zieria. The proposed works could also have indirect impacts resulting from changes in microclimate, wind and dust as a result of the proposed access on this sensitive area. It is possible that the works will also result in the further isolation and fragmentation of this remnant which may lead to its long-term survival being at risk.

Assessments of significance were undertaken to determine the significance of any potential impacts on this threatened ecological community and threatened plant species. The assessments are included as Appendix E. The assessments concluded that the proposed southern access area will not have a direct impact on these significant ecological features and any indirect impacts will be minimised through the implementation of mitigation measures, such that the proposed works would not have a significant impact on these, such that the local occurrence of the community and plant would be at risk. Therefore a species impact statement is not required for the proposal.

#### 4.4.4 Mitigation measures

As part of the *Flora and Fauna Management and Rehabilitation Plan* (Cumberland Ecology 2009), the following vegetation clearing protocol will be implemented during clearing:

- induction for all personnel involved in vegetation clearing;
- sediment and erosion control devices in place where appropriate;
- protective fencing around vegetation to be retained;
- provisions for progressive clearing; and
- protocols in place for the capture and release of small mammals if they are detected during clearing.

In addition to these measures, the following mitigation measures are recommended to minimise any potential impacts to significant ecological features within the study area.

- No stockpiling or parking of construction vehicles within the north-western remnant which contains the *Melaleuca armillaris* Tall Shrubland remnant and the Illawarra zieria;

- Weed management to control, suppress and avoid further spread of weeds during and after construction, with particular emphasis on the control of noxious weeds such as lantana and blackberry.

## 4.5 Water quality

### 4.5.1 Surface water

The existing site drainage is separated by the position of the extraction boundaries on spurs and ridges. This means that water entering the site is only from rain and all runoff within the extraction and infrastructure areas is contained within the site. Potentially sediment-laden runoff flows into a dedicated stormwater dam located to the southeast of the processing area. This dam, known as the Lower Dam, has a capacity of between 15 and 20 ML. All runoff outside of the extraction areas is clean and flows directly into the tributaries of Rocklow Creek.

A Water Management Plan was prepared for the quarry by Evans & Peck. This plan involved upgrades to the water management system described in the original EIS and involved a major upgrade of the water management system with upgrades to the Lower Dam to take it 'off-line' from Rocklow Creek. It also included the construction of two new dams (one in Croome Farm and one in the Original Dunmore Quarry), alterations to drainage and discharge, and construction of a system of pumped transfers between dams.

Discharge from the quarry is from the Lower Dam to Rockflow Creek and occurs after water has resided in the Lower Dam for sufficient time to allow settlement to occur. Discharge is via a bio-filtration swale to meet the discharge criteria under the EPL of TSS <50 mg/L and pH 6.5 to 8.5.

The proposed southern access area is within the existing catchment area and would not affect the capacity of the current water management system. A transfer system which pumps water via a pump between the Original Dunmore Quarry and Lower Dams and the processing plant water tank is located along the northern boundary of the southern access area. This transfer will be relocated during extraction in the access area.

The proposed modification does not require an increase in water use and will not affect the existing quarry's site water balance.

### 4.5.2 Groundwater

Boreholes drilled during the various evaluation phases for the existing quarry design and development have not encountered any significant groundwater inflows at the proposed extraction depths with only minor inflows occurring within the Croome Farm extraction area (Corkery 2008). The proposed access area is outside of the Croome Farm and does not involve extraction below the existing depths. The proposed modification is, therefore, not expected to encounter groundwater inflows.

### 4.5.3 Flooding and coastal erosion

The quarry is located within the Rocklow Creek water catchment partially within a low lying flood plain. As discussed previously, extraction within the southern access area would not be below the existing AHD levels at the quarry. There are no floodplain risk management plans currently in place for this area. No river banks or watercourses would be affected by the proposed modification. Therefore, the flood risk of the site would not be increased by the proposed modification.

The quarry is located approximately 2.5 km west of the coast and will not contribute towards coastal erosion.

## 4.6 Heritage

### 4.6.1 Aboriginal heritage

The project application for the quarry expansion in 2003 included an Aboriginal Heritage Assessment (Robert Paton Archaeological Studies 2003) for the Dunmore Quarry site which included the proposed extension area subject of this modification. Aboriginal artefact surveys of the site have previously been conducted by Brayshaw and Associates (1986), Navin Officer (1992) and Robert Paton Archaeological Studies (2003). These surveys identified only two items within the site: an artefact scatter and a scarred tree in the Croome Farm area. Consent to destroy the artefact scatter was granted by National Parks and Wildlife Service in 1996 and the scarred tree from the Department of Environment and Conservation in 2005.

Due to the highly disturbed nature and steep land present in the extension area, the presence of unidentified artefacts is highly unlikely. However, measures are in place to notify employees of legislative requirements should artefacts be identified on site. Operators will be instructed to keep a visual surveillance for potential items during stripping of the extension area.

### 4.6.2 Non-Aboriginal heritage

There are no recorded non-Aboriginal heritage items within the Dunmore Quarry property boundary. There are five heritage listed items within a 2 km radius of the quarry. These are all locally registered items listed on the National Trust, Shellharbour LEP 2000 and Illawarra Regional Environmental Plan No 1. The Dunmore Railway Station and Residence which is located approximately 1 km north-east of quarry is also listed under the NSW *Heritage Act 1977*. The closest of these to the quarry is the Former Minnamurra School (also known as the Peterborough Estate) Residence and Grounds which is located 500 m south-east on the Stocker property.

The operations of the Dunmore Quarry have been previously assessed as not having any adverse impacts upon nearby items of non-Aboriginal heritage. The proposed modification would not have adverse impacts on these items as the changes to ground vibration and airblast from the extension to the extraction boundary and the increase in truck movements would be negligible.

## 4.7 Visual

A visual impact assessment was undertaken for the original EIS by Sinclair Knight Merz in 1994. The existing visual character of the site and surrounds has not changed substantially and continues to be a combination of rural, rural residential, extractive industry. Residential areas including Dunmore Village and Kiama Downs have low elevation and views from the north-east and east of the quarry respectively. The quarry is not visible from the Minnamurra residential area due to topography.

The southern access area cannot be viewed from nearby residential areas due to topography and can only be viewed from within Boral owned land. The proposed modification therefore would not have any visual impact.

## 4.8 Waste

Existing waste management processes for the quarry would continue under the proposed modification. All extracted material is currently broken up and stockpiled according to different specifications. This material is then sold or used for site rehabilitation activities. Non-production wastes are separated, stored and removed by licensed waste contractors.



## 5 Conclusion

The proposed modification is necessary to allow the quarry to continue to produce and transport 2.5 Mtpa of material. An increase in road transport is necessary due to capacity constraints in the southern railway network, as well as the emergence of local market supply gaps. While truck numbers from the quarry will increase, there will be a negligible proportional increase in current vehicle movements along the Princes Highway and is unlikely to have significant impacts in terms of intersection performance, air quality or road traffic noise.

The extension to the approved extraction area is required to access existing and approved material resources located within the Original Dunmore Quarry. The construction of the southern access area will require the clearing of a small area of vegetation which is unlikely to have significant impacts on threatened species or communities. The approved area of disturbance within the quarry will not increase and therefore impacts on air quality and water management will not be significant. Noise and vibration emissions from operations within the southern access area are not expected to increase above prescribed criteria. The access area is located away from nearby residential areas and visual impacts will be non-existent.

The proposed modification is considered to be in the community's interest as it allows the continued utilisation of an existing and approved resource and infrastructure with minimal environmental impact.



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