



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Referral of proposed action

Karuah East Quarry

Karuah, NSW

July 2014

Prepared by:



On behalf of:

Karuah East Quarry Pty Ltd

Referral of proposed action

Project title: Karuah East Quarry

1 Summary of proposed action

1.1 **Short description**

Karuah East Quarry Pty Ltd (the proponent) is referring an Action for the development of a quarry and associated infrastructure at Lot 12, and 13 DP 1024564, Pacific Highway, Karuah (**Attachment 1 – Figure 1**). The quarry and accompanying infrastructure, which is directly adjacent to an existing quarry operated by Hunter Quarries Pty Ltd (which owns Karuah East Quarry Pty Ltd), will occupy an area of approximately 31.6 ha and is expected to produce 1.5 million tonnes of andesite material per year for approximately 20 years.

1.2 **Latitude and longitude**

location point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
1	32	37	27.30	152	0	12.91
2	32	37	18.55	152	0	37.91
3	32	38	1.58	152	1	3.91
4	32	38	1.33	152	0	29.69

1.3 **Locality and property description**

The 31.6 ha subject site (Site area) to be developed is situated 3 km north east of Karuah, approximately 40 km north-east from the Newcastle CBD, NSW. The subject site is within a study area of approximately 74.3 ha. It is adjacent to an existing andesite quarry to the west with the Pacific Highway running along the southern boundary (**Figure 2**).

The site area is located on the Lower North Coast of NSW. The site overall is undulating, but varies in slope and aspect considerably. Numerous steep, sometimes rocky, slopes and creek gullies are evident. The site has an overall lower relief in the southern portion which is generally sloping toward the Pacific Highway in the south with a more meandering watercourse and drainage system.

1.4 **Size of the development footprint or work area (hectares)** 31.6 ha

1.5 **Street address of the site** 5887 Pacific Highway, Karuah, 2324

1.6 **Lot description**
Lot 12 and 13 DP 1024564

1.7 **Local Government Area and Council contact (if known)**
Great Lakes LGA
Lisa Schiff – Director of Planning & Environmental Services

1.8	Time frame		The proponent intends to commence establishment of the Karuah East Quarry immediately following determination of the Project Application.
1.9	Alternatives to proposed action	X	No, there are no alternative locations, timeframes or activities identified.
1.10	Alternative time frames etc	X	No, there are no alternative locations, timeframes or activities identified.
1.11	State assessment	X	Yes. Major Project Approval 09-0175
1.12	Component of larger action	X	No. The impacts quantified and assessed in this referral relate to all impacts generated from development of the Karuah East Quarry solely.
1.13	Related actions/proposals	X	No
1.14	Australian Government funding	X	No
1.15	Great Barrier Reef Marine Park	X	No

2 Detailed description of proposed action

2.1 Description of proposed action

Summary of Proposed Action

To secure a long term supply of hard rock resource (known as andesite), Karuah East Quarry Pty Ltd is proposing a new stand-alone hard rock quarry on adjacent to an existing quarry. The proposed quarry has three components:

- a quarry pit
- new infrastructure to accommodate the quarry works
- progressive rehabilitation of the quarry

The resource to be extracted is a hard blue rock known as 'andesite' which has a variety of uses including road base material, construction aggregate, aggregate used in concrete batching, drainage works, fill, landscaping and various other uses.

The Karuah East Quarry project will allow andesite material to be made available for critical infrastructure projects in the lower Hunter area for an extended period of time. Accordingly, the project is considered essential to the delivery of major infrastructure projects of state and national significance. Projects associated with the Newcastle Coal Infrastructure Group, Newcastle Port and Terminal Expansions, the Pacific Highway upgrade, the Hunter Expressway and Hunter Valley coal mines are driving market demand and have anticipated long term life spans.

The proposed quarry and related infrastructure will cover an area of 31.6 ha. The proposal involves the following key elements:

- staged extraction of approximately 29 million tonnes of 'andesite' over a 20 year period
- extraction of up to 1.5 million tonnes of andesite material per year
- removal and stockpiling of an estimated 380,000m³ of overburden (approximately 750,000 tonnes) from the quarry extraction area. Removal of overburden is not included in the proposed extraction rate of 1.5 million tonnes of andesite annually
- haulage of up to 1.5 million tonnes of andesite per year from the site to market by 25 to 30 tonne haul trucks via the Pacific Highway
- Up to 216 truck loads per day at maximum production
- Roadworks to secure access to the site including upgrade and extension of Blue Rock Lane, re-alignment of Andesite Road and Blue Rock Lane intersection and adjustment of road markings at the Branch Land and Andesite Road intersection
- Drilling and blasting activities on the quarry face and crushing and sorting of raw material ready for transport
- establishment of quarry operating building infrastructure including:
 - crushing plant
 - wash plant
 - pug mill
 - two (2) weight bridges and a weigh bridge office
 - admin/manager office
 - staff and visitor car parking areas
 - workshop
 - fuel and oil storage area
 - lab
- Implementation of water management and erosion and sediment control works to ensure no loss of sediment, dust minimisation and to control discharges from the site
- implementation of water quality control measures including the construction of two (2) new sediment dams

Progressive rehabilitation of worked quarry areas (where available) will occur at the site, with complete site rehabilitation to occur once quarrying has ceased. A rehabilitation management plan will be followed which specifies the following objectives:

- Minimise the environmental impact of the operation during the development and operational phases, ensuring that protection of water quality and erosion control works are key priorities, and to ensure progressive rehabilitation is completed as soon as possible.
- Ensure that site drainage and sedimentation structures remain stable and functional.
- Ensure that vegetative matter and topsoil is made available for the site rehabilitation as required.
- Guarantee that the resource is extracted and the site rehabilitated in a manner that will ensure the quality of surface runoff at all times.

- Produce a final “walk away” landform that is geotechnically stable that blends aesthetically into the surrounding landforms, yet as far as possible does not limit possible future land uses.
- Minimise visual impact of the operation during the operational phase as well as post-quarrying.

It is also proposed that the existing drainage line be reinstated as close as possible to its original path following completion of extraction activities at the quarry as part of the final rehabilitation of the site. The rehabilitation program seeks to achieve a long-term enhancement of the ecological value of the drainage line through the restoration of natural hydraulic conditions and appropriate revegetation of a riparian corridor.

Once operations have ceased, all buildings will be removed from the hardstand. These areas will be reshaped and ripped where necessary for topsoiling and revegetation. The broad objective of revegetation is to establish a similar landuse to that of the existing landuse on the disturbed areas with the exception of the final void. The topography of the final landform will consist of a large number of stepped benches formed in an amphitheatre configuration, each with a revegetated bench. It is proposed to re-establish a similar cover to the majority of the post-quarrying landform to that of the native open woodland currently located on the proposed quarry site.

Environmental Construction Considerations

The Karuah East Quarry proposal includes a water management program. The principle objectives of water management for the proposed quarry are to retain and reuse the water on-site, to manage run-off to reduce sedimentation and to install water quality management devices to control the water quality.

Two new water quality control measures will be established in accordance with the ‘Blue Book’. A sump will be established in the quarry to capture and temporarily store runoff generated in the active extraction area. A bund and sediment fence will be constructed along the southern boundary of the quarry to minimise the risk of sediment being washed downstream of the quarry.

The proposal involves the retention of bushland adjacent to the proposed quarry footprint. The extraction/forest interface will be delineated with fencing that will function as a clearly marked ‘exclusion’ boundary for the machinery operations during clearing operations to ensure that no clearing occurs outside of the individual extraction area.

All contractors conducting clearing, earth works or quarrying activities within the subject site will be informed of the restrictions to the clearing of vegetation outside the ‘exclusion fencing’. A construction protocol will be prepared requiring all earthworks, machinery and personnel be strictly controlled and be restricted to the extraction footprint. No storage of materials, vehicle parking or other disturbance will be undertaken outside the exclusion fencing. Contractors will be supplied with the construction protocol regarding the clearing restrictions through a work site induction program. Trees will be felled away from the refined bushland on the site back into the extraction areas. The removal of all identified hollow bearing trees will be undertaken with the presence of a qualified and suitably experienced fauna ecologist.

Environmental safeguards during construction and operation include:

- Operational and management procedures relating to hours of operation, hazards and blasting
- Erosion and sediment control measures
- Surface water management
- Progressive clearing and rehabilitation of disturbed areas
- Revegetation of the upper most bench on the western side of the quarry to minimise any potential for visual impact

- Consideration of possible archaeological finds
- Air quality and dust mitigation measures
- Noise monitoring.
- Measures to protect threatened flora and fauna, including a 129 ha dedicated vegetation conservation area to provide threatened species habitat and movement corridors. The conservation area is comprised of three land parcels adjacent and adjoining the site (**Figure 4**).

The environmental safeguards listed above will be incorporated into the Environmental Management and Rehabilitation Plan. Annual Environmental Management Reports will be required to ensure the mitigation measures continue to be effective.

As a result of consideration of potential environmental impacts, the proponent has made a number of improvements to the proposed Karuah East Quarry throughout the design phases to minimise any potential environmental impacts of the development. Principally, these changes involve an amended layout of the proposed plant, processing and stockpile area on Lot 13 DP 1024564 to significantly reduce potential impact on *Tetratheca juncea* and *Grevillea parviflora* subsp. *parviflora* which are both threatened species under the NSW TSC Act 1995 and Commonwealth EPBC Act 1999.

A relatively large area located within Lot 13, between the crushing plant and the southern stockpile area, will remain undisturbed during the quarry operations due to flora/fauna considerations in the area. Both the haul road to the west of this area and the entrance road to the site will be sealed and maintained as effective 'clean' catchments. As such, runoff from these areas will not need to report to one of the sediment dams to discharge from the site.

During construction sediment laden runoff from disturbed areas at the site will be managed by implementation of key erosion and sediment control principles. These include:

- Conducting best practice land clearing procedures for all proposed disturbance areas
- Minimising the disturbance footprint
- Coordinating construction sequences to minimise exposure of disturbed soils to the elements
- Separate/diversion of upslope 'clean' water catchment runoff prior to land disturbance
- Ensuring sediment-laden runoff is treated via designated sediment control devices
- Appropriate storage of topsoil stockpiles in areas away from roadways and other drainage lines
- Revegetation of disturbed areas as soon as possible following the completion of construction activities
- Implementing an effective maintenance period.

Water will be used on site, mainly for dust suppression activities, including in the crushing process, pug mill, and for dust suppression on the haul roads and product stockpiles. Water for these uses will be sourced preferentially from sediment dams onsite. A nominal amount of potable water will be required on-site, and will be trucked in from an external source.

There is the potential (following OEH consultation) to include a translocation program for *Tetratheca juncea* that will be impacted by the development (**Figure 3**). *Tetratheca juncea* has been translocated at other locations with moderate success and thus a salvage program is being investigated to minimise the loss of these plants earmarked for disturbance. The salvage program would require a Section 91 license from OEH and will be subject to a detailed Salvage Plan to be prepared by the proponent (and endorsed by OEH and DoPI) prior to commencement of the works.

2.2 Alternatives to taking the proposed action

In response to commentary from the NSW OEH an alternative quarry footprint has been designed, as discussed above, to avoid more threatened flora species than earlier designs (March 2013). The total proposed site area has subsequently been reduced from 35.0 ha to 31.6 ha. The alternative, amended design has resulted in a significantly reduced potential impact (over a 90% reduction on the initial impact submitted to OEH) on threatened flora species including *Tetratheca juncea* and *Grevillea parviflora* subsp. *parviflora*. Significantly, the proponent has invested substantial time and resources to arrive at an amended design, that has reduced the direct impact on *Tetratheca juncea* from 2,742 clumps (which is 42% of the local population) as previously proposed to 243 clumps (which is 3.7% of the local population). Specifically, the eastern extent of the site area on the central and southern sections of Lot 13 has been significantly reduced to facilitate a substantial decrease in the direct impact on threatened flora species, including complete avoidance of two distinct patches of threatened flora. The central stockpile area has been moved to now be located towards the northern and southern sections of Lot 13. Additional minor reconfigurations of the proposed quarry infrastructure have also been incorporated to ensure further avoidance of any threatened flora where possible.

2.3 Alternative locations, time frames or activities that form part of the referred action

There are no alternative locations, timeframes or activities identified. The quarry location is geologically controlled, that is the quarry is restricted to the occurrences of recoverable andesite and therefore alternative locations are not available. However, as mentioned above, the quarry infrastructure has been subject to redesigns aimed at avoidance of threatened flora and associated habitats.

2.4 Context, planning framework and state/local government requirements

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation that relates to the site and development. It provides a framework for the overall environmental planning and assessment of development proposals. Various legislative instruments, such as the NSW *Threatened Species Conservation Act 1995* (TSC Act), *Water Management Act 2000* (WM Act) and *Rural Fires Act (2007)* are integrated with EP&A Act and have been reviewed separately.

A substantial array of legislation, policies and guidelines apply to the site as listed below:

State

- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Environmental Planning and Assessment Regulation 2000
- Rural Fires Act 1997 (RF Act)
- Native Vegetation Conservation Act 1998
- Noxious Weeds Act 1993
- Threatened Species Conservation Act 1995 (TSC Act)
- Protection of the Environment Operations Act 1997 (POEO Act)
- National Parks and Wildlife Act 1974 (NPW Act)
- Heritage Act 1977
- Water Management Act 2000 (WM Act)
- Contaminated Land Management Act 1997
- Catchment Management Act 1989
- Local Government Act 1993 (LG Act)
- Local Government Amendment (Ecologically Sustainable Development) Act 1997
- Fisheries Management Act 1994 (FM Act)
- Soil Conservation Act 1938
- State Environmental Planning Policy No. 11 – Traffic Generating Development

- State Environmental Planning Policy No. 14 – Coastal Wetlands
- State Environmental Planning Policy No. 19 – Bushland in Urban Areas
- State Environmental Planning Policy No. 33 – Hazardous and Offensive Developments
- State Environmental Planning Policy No. 44 – Koala Habitat Protection
- State Environmental Planning Policy No. 55 – Remediation of Land
- State Environmental Planning Policy (Major Development) 2005
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Regional

- Lower Hunter Regional Strategy

Local

- Great Lakes Local Environmental Plan 2014 (LEP 2014)
- Great Lakes Development Control Plan 2014 (DCP 2014)
- Hunter Regional Environmental Plan 1989 (Hunter REP)

The proposed action was subject to assessment under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and was approved by the Planning Assessments Commission on 17 June 2014 (MP 09-0175) (see section 2.5).

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

The proposed development was assessed under Part 3A of the EP&A Act 1979. Whilst Part 3A of the Act was repealed it continued to apply to the proposal on the basis of transitional agreements. On 17 June 2014, the major project (approval number 09_0175) was approved by the planning assessment commission. Conditions of consent as part of this approval involve required preparation of several environmental based management plans (see **Attachment 4** page 21).

2.6 Public consultation (including with Indigenous stakeholders)

The proponent acknowledges the need for appropriate community consultation and sees stakeholder engagement as an integral component to environmental management at the site and will continue to communicate with the community and various stakeholders through the company website, internal communications, community consultation and a dedicated system of complaints management.

The proposed development was publically notified from 15 March 2013 to 19 April 2013. During the public exhibition period eight submissions were received from government agencies and sixty submissions were received from members of the public. A response to submissions (RTS) was submitted to the NSW DoPI on 31 May 2013, followed by an updated RTS dated 12 June 2013 (which superseded the 31 May 2013 submission).

Following the public exhibition the proposed layout of the quarry infrastructure was amended in response to commentary from the NSW OEH and also a number of public submissions in relation to ecological matters (as aforementioned).

Consultation with Indigenous stakeholders, Karuah Local Aboriginal Land Council, was conducted in January 2010 and March 2010 in accordance with the guidelines of the then Department of Conservation and Climate Change and Water (DECCW) Interim Community Consultation Requirements (2005).

No Aboriginal cultural heritage sites were identified during the consultation and subsequent survey.

2.7 A staged development or component of a larger project

The proposed development is a stand-alone project and is therefore not a staged development or a component of a larger action.

Hunter Quarries Pty Ltd (which owns the proponent Karuah East Quarry Pty Ltd) previously referred the existing, adjacent quarry on Lot 11 DP 10245664 in February 2004. Pursuant to section 75 of the EPBC Act 1999, it was decided by the Department that the proposed action was not a controlled action on 19 March 2004 (EPBC 2004/1358).

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

No World Heritage Properties occur within the vicinity of the proposed development.

Nature and extent of likely impact

N/A

3.1 (b) National Heritage Places

Description

No National Heritage Places occur within the vicinity of the proposed development.

Nature and extent of likely impact

N/A

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

Myall Lakes (declared Ramsar wetlands) occurs over 35km to the north east of the project site.

Nature and extent of likely impact

Given the project scale and the fact that the site is over 35km south west of the wetland no direct or indirect impacts are expected as a result of the development.

3.1 (d) Listed threatened species and ecological communities

Description

A total of fifty five (55) listed threatened species and two (2) endangered ecological communities were identified from the search of the Department of the Environment (the Department) online EPBC Act PMST (**Attachment 2**) as having the potential to occur within 10 km of the subject site (25 June 2014). The search was centred on the latitude -32.62611 and longitude 151.00583 with a 10 km buffer. An analysis of this list of species and ecological communities is provided below.

Nature and extent of likely impact

An ecological assessment has been completed for the site to determine the extent of ecological values and any impacts to matters of NES. The ecological assessment included:

- Review of all relevant literature
- Database searches of the online BioNet Atlas of NSW Wildlife (OEH) for threatened species, populations and communities (4 March 2011; December 2012; June 2013)
- Database search of the EPBC Protected Matters Search Tool for matters of NES (accessed 25 June 2014 – **Attachment 2**)
- Assessment of statutory requirements
- Detailed field validation and mapping of existing vegetation, threatened species and habitat condition (RPS March 2010, RPS August and November 2012, ELA June 2013)
- Targeted Threatened flora surveys were undertaken by RPS (2013) and ELA (2013) on the site and in the wider study area.

Using database or other records, presence or absence of suitable habitats, features of the proposed site, results of field surveys and professional judgement, the likelihood of occurrence of EPBC Listed species and communities has been determined and is presented in the tables below. Five terms for the likelihood of occurrence of species and communities used are defined as follows:

- “Known” = the species or ecological community was or has been observed on the site
- “Likely” = a medium to high probability that a species uses or the ecological community occurs on the site,
- “Potential” = suitable habitat for a species or ecological community occurs on the site, but there is insufficient information to categorise the species or ecological community as likely to occur, or unlikely to occur,
- “Unlikely” = a very low to low probability that a species uses the site or that an ecological community occurs on the site,
- “No” = habitat on the site and in the vicinity is unsuitable for the species or ecological community.

An analysis of the likely level of impact from the development on species and communities with a likelihood of occurrence of “potential” or “likely” or “known” (highlighted in blue) is presented below.

There are six (6) threatened species identified as potential, likely or known to occur within the site.

Threatened Ecological Communities

Community Name	EPBC listing status	Likelihood of Occurrence
Lowland Rainforest of Subtropical Australia	CE	No
Subtropical and Temperate Coastal Saltmarsh	V	No

All mapped vegetation communities (RPS 2013) are shown in **Attachments 3**. No threatened ecological communities were recorded at the site.

Birds

Scientific name	Common name	EPBC listing status	Likelihood of Occurrence
<i>Anthochaera phrygia</i> (aka <i>Xanthomyza phrygia</i>)	Regent Honeyeater	E & M	Potential
<i>Ardenna carneipes</i>	Flesh-footed Shearwater	J,K	Unlikely
<i>Ardea ibis</i>	Cattle Egret	C,J	Unlikely
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	Unlikely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	C,J,K	Unlikely
<i>Charadrius mongolus</i>	Lesser Sand-plover	C,J,K	Unlikely
<i>Calidris ruficollis</i>	Red-necked Stint	C,J,K	Unlikely
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	No
<i>Lathamus discolor</i>	Swift Parrot	E	Potential
<i>Diomedea epomophora epomophora</i>	Southern Royal Albatross	V	No
<i>Diomedea epomophora sanfordi</i>	Northern Royal Albatross	E	No
<i>Diomedea exulans antipodensis</i>	Antipodean Albatross	V	No
<i>Diomedea exulans exulans</i>	Tristan Albatross	E	No
<i>Diomedea exulans gibsoni</i>	Gibson's Albatross	V	No
<i>Diomedea exulans (sensu lato)</i>	Wandering Albatross	V	No
<i>Fregetta grallaria grallaria</i>	White-bellied Storm Petrel	V	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	C	Unlikely
<i>Hirundapus caudacutus</i>	White-throated Needletail	C,J,K	Unlikely
<i>Hydroprogne caspia</i>	Caspian Tern	C,J	No
<i>Limosa lapponica</i>	Bar-tailed Godwit	C,J,K	No
<i>Macronectes giganteus</i>	Southern Giant-Petrel	E	No
<i>Macronectes halli</i>	Northern Giant-Petrel	V	No
<i>Merops ornatus</i>	Rainbow Bee-eater	J	Unlikely
<i>Numenius madagascariensis</i>	Eastern Curlew	C,J,K	No
<i>Numenius phaeopus</i>	Whimbrel	C,J,K	No
<i>Pluvialis fulva</i>	Pacific Golden Plover	C,J,K	No
<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	E	No
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel	V	No

<i>Rostratula australia</i>	Australian Painted Snipe	E	Unlikely
<i>Thalassarche bulleri</i>	Buller's Albatross	V	No
<i>Thalassarche cauta cauta</i>	Shy Albatross	V	No
<i>Thalassarche cauta salvini</i>	Salvin's Albatross	V	No
<i>Thalassarche cauta steadi</i>	White-capped Albatross	V	No
<i>Thalassarche eremita</i>	Chatham Albatross	E	No
<i>Thalassarche melanophris</i>	Black-browed Albatross	V	No
<i>Thalassarche melanophris impavida</i>	Campbell Albatross	V	No
<i>Tringa brevipes</i>	Grey-tailed Tattler	C,J,K	No
<i>Tringa nebularia</i>	Common Greenshank	C,J,K	No

Regent Honeyeater

The Regent Honeyeater is found only in Victoria and NSW within patchy communities (the Department 2014b). The species is highly mobile and occur mainly in dry box ironbark open-forest and woodland areas inland of the Great Dividing Range, particularly favouring those on the wettest, most fertile soils, such as along creek flats and broad river valleys. The species is recorded from coastal areas, particularly in the Hunter region, although less frequently. They spend much of their time in eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak). They are generally recorded feeding on the nectar from eucalypts such as the Mugga Ironbark, White Box and Yellow Box, and Blakeley's Red Gum on which they are reliant.

The species is listed as nationally endangered, the total known population of Regent Honeyeaters is most recently estimated at between 350 and 400 mature age birds.

The main threat to the Regent Honeyeater is the loss of their woodland habitat due to primarily to expanding agriculture and additionally to other human induced activities such as dieback and increased grazing. The clearance of the most fertile stands, the poor health of many remnants and very slow growth rate of replacement trees as well as the lack of regeneration due to stock grazing are also contributing to the decline in numbers.

While the Regent Honeyeater was not recorded during field surveys, there are historical and more recent records within the lower Hunter valley (~15 – 20 km away). Surveys by RPS (2011 and 2013) and ELA (2013) did not detect Regent Honeyeater, despite surveys conducted during winter months. The subject site was found to contain suitable wintering habitat for Regent Honeyeater in a low abundance. Whilst there is woodland in the site suitable for winter foraging habitat, it would provide limited foraging habitat and accordingly has potential to attract this species on an irregular basis only.

The proposed action will remove 28.1 ha of remnant native vegetation within the site, with all adjacent native vegetated areas to be retained (129 ha as part of a formal conservation area). This impacted vegetation contains a small proportion of potential wintering habitat for Regent Honeyeater. If the species did occur within the site, the proposal would not have a significant impact on Regent Honeyeater as they are a highly mobile species and have the ability to access a wide range of habitat within the region. The proposed development will not contribute to fragmentation or reduce interconnectivity from other patches of potential habitat for the species within the region. Therefore, it is considered the proposed development will not have a significant impact on Regent Honeyeater.

Swift Parrot

The Swift Parrot breeds in Tasmania and over-winters on mainland Australia (the Department 2014a). The principal over wintering habitat on the mainland is the box-ironbark forests and woodlands inland of the Great Dividing Range in Victoria and NSW. They occur in areas where eucalypts are flowering profusely and favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *Corymbia gummifera*, Mugga Ironbark *Eucalyptus sideroxylon* and White Box *Eucalyptus albens*. Key habitat for Swift Parrots on the coast and coastal plains of NSW include Spotted Gum *Corymbia maculata*, Swamp Mahogany *Eucalyptus robusta* and Forest Red Gum *Eucalyptus tereticornis* Forests. It is a highly mobile species able to utilise a variety of nectar sources over large areas.

On the mainland the main threat to Swift Parrots is loss of habitat through clearing for agriculture, and urban and industrial development. Collisions with wire netting fences, windows and cars during the breeding season and winter migration (especially where such obstacles are in close proximity to suitable habitat) are also a threat to this species.

While the Swift Parrot was not noted during recent field surveys (RPS 2011 and 2013; ELA 2013), the species has been recorded more than 50 times within the locality. The closest records (~5 km) are from the nearby areas of North Arm Cove, Bundabah and Carrington.

The subject site was found to contain suitable wintering habitat for Swift Parrot. *Corymbia gummifera* and *Corymbia maculata* are present in moderate abundance. Whilst there is woodland in the site area suitable for winter foraging habitat, it would provide limited foraging habitat and has potential to attract this species on an irregular basis only.

The proposed development will result in the removal of approximately 28.1 ha of remnant native vegetation within the site. This vegetation contains a small proportion of potential wintering habitat for Swift Parrot. If the species did occur within the site, the proposal would not have a significant impact on Swift Parrot as they are a highly mobile species and have the ability to access a wide range of habitat within the region. The proposed development will not contribute to fragmentation or reduce interconnectivity from other patches of potential habitat for the species within the region. Therefore, it is considered the proposed development will not have a significant impact on Swift Parrot.

Frogs

Scientific name	Common name	EPBC status	listing	Likelihood of Occurrence
<i>Litoria aurea</i>	Green and Golden Bell Frog	V		Unlikely
<i>Mixophyes iteratus</i>	Giant Barred Frog	E		Unlikely

No federally listed threatened frog species were recorded or expected to occur on site.

Mammals

Scientific name	Common name	EPBC status	listing	Likelihood of Occurrence
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V		Unlikely

<i>Dasyurus maculatus</i>	Spotted-tailed Quoll (SE Mainland Population)	E	Unlikely
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	V	Unlikely
<i>Phascolarctos cinereus</i>	Koala	V	Unlikely
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	Unlikely
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	V	Unlikely
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Potential

Grey-headed Flying fox

The Grey-headed Flying Fox is known to occur along the eastern coast of Australia from Bundaberg in Queensland to Melbourne in Victoria (the Department 2014c). Due to the high mobility of the species, there are no separate or distinct populations as individuals move between camps and throughout its geographic distribution. This species may occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps and feeds on the nectar and pollen of native trees, in particular Eucalyptus, Corymbia, Angophora, Melaleuca and Banksia. Additionally, they also eat both native rainforest fruits and often utilise cultivated fruit crops (e.g. orchards). Roosting camps are generally located within 20 km of a regular food source although the species can travel up to 50 km to forage. Camps are commonly found in gullies, close to water, or in vegetation with a dense canopy.

The main threat to the survival of the species is habitat loss and disturbance through the clearing of foraging habitat and roosting locations for development and farming. Loss of important areas of habitat has also caused increased fragmentation of suitable habitat, resulting in the species having to travel greater distances for food or resorting to alternative sources such as food crops. Other threats to the species include unregulated shooting and electrocution on power lines.

The site contains areas of suitable habitat, particularly nectar and blossom trees, which are widely disbursed across the site as canopy species. Grey-headed Flying-fox were not observed during the site surveys by RPS (2011 and 2013) although the species was observed flying over the adjacent property to the north (ELA 2013). It is highly likely that the species would utilise the site on occasion due to the presence of suitable feeding resources.

The Grey-headed Flying-fox is known to use vegetation within the locality for foraging and roosting, with known roosting sites in the locality. There are several NSW Wildlife Atlas records of the Grey-headed Flying-fox in the locality, with the majority of the records within foraging habitat, often near residential / urbanised areas. The species is known from four camps within 20 km, namely Wallaroo National Park, Glen William, Schnapper Island and The Branch (the Department 2014d). Records of the species do not indicate a local abundance of Grey-headed Flying-fox. Rather the records indicate a relative measure of abundance and the distribution of the species and habitat in the local area.

The individuals previously recorded within the locality and study region are likely to be part of a large regional population of Flying-fox which move between roosting populations within the Lower Hunter and Mid-north Coast areas along the NSW coast.

The proposal would remove approximately 28.1 ha of remnant native vegetation from the site. This vegetation is potential foraging habitat for the Grey-headed Flying-fox. Therefore, the proposal may directly impact on foraging habitat for this species. In particular, twelve important blossom diet species and three important fruit diet species were recorded in the site area. Two important winter flowering species are also present in moderate numbers in the site area (*Corymbia maculata* and *Corymbia gummifera*). No known roosting camps would be impacted by the proposal.

Despite the proposal's potential impact to known foraging habitat for Grey-headed Flying-fox, it is unlikely that the proposal will have significant impacts on the species which would place a local population of the species at risk of extinction. Foraging habitat is extensive across the locality to the north, south, west and east of the site area, which will provide ongoing foraging resources for the species. Individuals from roosting camps in the wider area are likely to find abundant foraging resources due to their adaptability to modified environments. They require foraging resources within 40 - 50 km of camps (the Department 2014c) and this requirement is satisfied in the locality, including reserved areas. Within the locality, foraging habitat is protected within Karuah Nature Reserve, Wallaroo Nature Reserve and Myall Lakes National Park.

Despite the proposal's potential impact on foraging habitat for the Grey-headed Flying Fox, it is unlikely that the proposal will have a significant impact on the species which would place a local population of the species at risk of extinction, as the area of habitat which would be impacted by the proposal is relatively small in the context of available habitat within the locality and does not represent key foraging or roosting habitat.

Reptiles

Scientific name	Common name	EPBC status	listing	Likelihood of Occurrence
<i>Caretta caretta</i>	Loggerhead Turtle	E		No
<i>Natator depressus</i>	Flatback Turtle	V		No
<i>Chelonia mydas</i>	Green Turtle	V		No
<i>Dermochelys coriacea</i>	Leatherback Turtle	E		No
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	V		No
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	V		No

No federally listed threatened reptile species were recorded or expected to occur on site.

Plants

Scientific name	Common name	EPBC listing status	Likelihood of Occurrence
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	E	No
<i>Angophora inopina</i>	Charmhaven Apple	V	Unlikely
<i>Asperula asthenes</i>	Trailing Woodruff	V	Known
<i>Asterolasia elegans</i>	-	V	Unlikely
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	Unlikely
<i>Diuris praecox</i>	Rough Double Tail/Newcastle Doubletail	V	Unlikely
<i>Eucalyptus parramattensis</i> subsp. <i>decadens</i>	Earp's Gum	V	No
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	Known

<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	Unlikely
<i>Phaius australis</i>	Lesser Swamp-orchid	E	Unlikely
<i>Streblus pendulinus</i>	Siah's Backbone	E	Unlikely
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	Unlikely
<i>Tetratheca juncea</i>	Black-eyed Susan	V	Known

***Grevillea parviflora* subsp. *parviflora* (Small-flower Grevillea)**

Grevillea parviflora subsp. *parviflora* distribution is from as far south as the Camden and Appin areas south of Sydney, to the Kurri Kurri / Cessnock district in the west and Karuah in the north, a north south range of approximately 225 km and 40 km east-west (DoE 2014d). The population located at the subject site is near or at the species northern limit of distribution. *Grevillea parviflora* subsp. *parviflora* is found on crests, upper slopes or flat plains in low-lying areas of the Lake Macquarie LGA and Lower Hunter Region. The species grows in sandy or light clay soils over thin shales, often with lateritic ironstone gravels. *Grevillea parviflora* subsp. *parviflora* often occurs in open, slightly disturbed sites, including tracks and easements (the Department 2014d). Therefore, the subject site area supports suitable habitat for *Grevillea parviflora* subsp. *parviflora*.

The species is known to have substantial populations conserved in Werakata National Park, near Kurri Kurri 60 km east in the lower Hunter Valley (NPWS 2002) and some smaller populations in the Sugarloaf State Conservation Area in the Awaba - Ryhope area of western Lake Macquarie. Locally, the species has been observed in Karuah Nature Reserve (RPS 2013).

The primary key threatening process to *Grevillea parviflora* subsp. *parviflora* is clearing of native vegetation, and additionally other factors including: competition from feral honey bees (*Apis mellifera*), high frequency fire resulting in the disruption of life cycle processes in plants and loss of vegetation structure and composition, infection of native plants by *Phytophthora cinnamomi*, and Bitou Bush invasion (SEWPaC 2013).

At least eight populations of *Grevillea parviflora* subsp. *parviflora* have been recorded in 10 km of the site with approximately 500 populations identified across the species distribution in NSW. The preferred habitat in the Hunter region appears to be '*Coastal Plains Smooth-barked Apple woodland*' which is a relatively common vegetation community within the region and locality; although within the conservation area the species occurs in the *Angophora costata* – *Corymbia gummifera* - *Eucalyptus capitellata* *Dry Sclerophyll Open Forest* (RPS 2013). Overall the species has an estimated extent of occurrence of around 6,500 km² (GHD 2010), although the actual estimated *area* of occupancy is in the vicinity of ~55 km² (the Department 2014d). The species is not previously known from the study site.

The habitat for the species within the site primarily comprises the *Angophora costata* – *Corymbia gummifera* - *Eucalyptus capitellata* *Dry Sclerophyll Open Forest* community, which covers an area of 7.31 ha in the subject site. Generally beyond this vegetation community the species is absent within the conservation area, although within the adjacent properties (including the proposed conservation areas) the species occurs in the widely distributed Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin.

No individuals of *Grevillea parviflora* subsp. *parviflora* are located within the proposed construction area. The location of recordings and populations of *Grevillea parviflora* subsp. *parviflora* in adjacent areas are depicted in **Figure 4**.

Prior to the revision of the site footprint and proposed layout of facilities and infrastructure, 32 stems of the species from a total of ~100 were to be directly impacted as part of the construction works. Consideration of the location of *Grevillea parviflora* subs. *parviflora* was key to the final construction layout, particularly as the species at this location is at its northern most distribution. Due to the modifications to the design no individuals of *Grevillea parviflora* subsp. *parviflora* will be directly impacted as a result of the construction and operation of the quarry. Additionally, over 30 ha of known and suitable habitat for the species will be retained as part of the 129 ha dedicated conservation reserve which will be managed in perpetuity as part of this project.

A Dust Management Plan – will be implemented to assist in minimising the potential for stigma clogging of all plant populations in retained bushland habitats with particular emphasis in regard to threatened flora. All haul roads are proposed to be sealed between the quarry site to the Pacific Highway – this will reduce potential dust emissions by up to 100% compared to unsealed roads (DSWEPAC 2012). Other dust control measures include:

- vehicle speed restrictions
- watering dust prone surfaces
- use of hygroscopic salts
- use of larger vehicles rather than smaller vehicles to minimise the number of vehicle movements
- incorporation of wind breaks
- Stockpiles will be subject to water spraying and protected by the installation of wind breaks of 4 m in height
- the crushing plant will be enclosed

Prior to construction all areas regarded as “no-go areas” will be fenced and have signage erected to reduce the potential for any adverse impact to *Grevillea parviflora* subsp. *parviflora* and its habitat, beyond the project disturbance footprint.

A Conservation Management Plan will be prepared for the conservation areas, including those that contain *Grevillea parviflora* subsp. *parviflora*, to guide the implementation of the management actions within the conservation area.

The proposed development will not fragment any existing populations of *Grevillea parviflora* subsp. *parviflora* as the area to be cleared is adjacent to other naturally vegetated areas containing the appropriate vegetation types.

In summary the approximately 7.31 ha of vegetation which will be impacted upon as a result of the works will not directly impact any individuals of *Grevillea parviflora* subsp. *parviflora*. There is however regard for some indirect impacts to the species through issues such as dust, accidental disturbance, and weed invasion. But with the incorporation of the avoidance and mitigation measures indicated in Section 4 there is not considered to be a significant adverse impact on this species as a result of the project.

***Tetradlea juncea* (Black-eyed Susan)**

Tetradlea juncea has a range of approximately 110–125 km north-south from Wyong north to Bulahdelah, and inland 50 km east-west to the edge of the Sugarloaf Range (the Department 2014e). It is currently found in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock, with North Wyong and Lake Macquarie appearing to be the strongholds of the species. The current extent of occurrence is estimated to be between 1594 and 1861 km² (TSSC 2005be). The sub-populations in the north (Karuah to Bulahdelah) are considered disjunct to the core population in the Lake Macquarie area.

The total population size of Black-eyed Susan is difficult to estimate accurately due to the species' habit of clumping. Plant clumps are commonly counted during survey work and used as a substitute for individual plants. The total population size of Black-eyed Susan has previously been estimated to be between 9881 and 11 893 plant clumps (the Department 2014e).

Most populations occur in the Wyong and Lake Macquarie Local Government Areas with isolated but widespread populations at Cessnock, Maitland, Newcastle, Port Stephens and the Great Lakes Local Government Areas (the Department 2014e). The major area in the Lake Macquarie region is on the coastal ridges between Munmorah and Swansea, Belmont and Charlestown.

Tetratheca juncea habitat typically occurs in open woodland, although occasionally in heathland; common associated canopy species include *Angophora costata*, *Corymbia gummifera* and *Eucalyptus haemastoma*. The species prefers sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil typically from conglomerates. The preferred habitat in the Hunter region appears to be 'Coastal Plains Smooth-barked Apple woodland' which is a relatively common vegetation community within the region and locality; although within the site the species occurs in the *Angophora costata* – *Corymbia gummifera* - *Eucalyptus capitellata* Dry Sclerophyll Open Forest (RPS 2013).

Tetratheca juncea is well known within the study locality with numerous records present, including populations in the vicinity of Swan Bay, Wallaroo Nature Reserve, Karuah Nature Reserve, Tahlee and Girvan. A total of 243 clumps of *Tetratheca juncea* are located within the proposed construction area and as such will be removed for the quarry construction. The location of recordings and populations of *Tetratheca juncea* on site and in adjacent areas are depicted in **Figures 3 and 4**. An important population of the species is located in the proposed conservation area adjacent to the proposed quarry footprint as the population has greater than 1,000 plant clumps (DSEWPC 2011). A total of 6,324 clumps of *Tetratheca juncea* are present as part of the population within the dedicated conservation area.

In response to comments from the NSW OEH made during the Part 3A Assessment process, the quarry footprint has been changed to a design which avoids more threatened flora species. Significantly, the amended design reduced the direct impact on *Tetratheca juncea* from 2,742 clumps (42% of the study area sub-population) to 243 clumps (3.7% of the study area sub-population). This is a reduction in direct impact on *Tetratheca juncea* of almost 90% relative to the earlier (January 2013) design. Additionally, over 30 ha of known and suitable habitat for the species will be retained as part of the 129 ha dedicated conservation reserve which will be managed in perpetuity as part of this project.

Issues to reduce the impact on *Tetratheca juncea* as a result of the quarry establishment include not only the avoidance measures indicated above, but also several other measures including:

Production of a Dust Management Plan - implemented to assist in minimising the potential for stigma clogging of all plant populations in retained bushland habitats with particular emphasis in regard to threatened flora. All haul roads are proposed to be sealed between the quarry site to the Pacific Highway – this will reduce potential dust emissions by up to 100% compared to unsealed roads (DSWEPAC 2012). Other dust control measures include:

- vehicle speed restrictions
- watering dust prone surfaces
- use of hygroscopic salts
- use of larger vehicles rather than smaller vehicles to minimise the number of vehicle movements
- incorporation of wind breaks
- Stockpiles will be subject to water spraying and protected by the installation of wind breaks of 4 m in height.
- the crushing plant will be enclosed

Issues arising as a result of the dust impacts, as per RPS 2013, where potential adverse impacts were indicated for all *Tetratheca juncea* clumps within 50 m of the construction zone will be significantly reduced due to the implementation of the various components of the Dust Management Plan – specifically the sealing of all roads and the construction of a fully enclosed crushing facility, in association with other proposed measures (see Section 4). With the implementation of these measures impacts to *Tetratheca juncea* reproduction via dust clogging of the stigma are expected to be reduced to minimal levels. Accordingly the likely scenario is considered to involve no additional impact on the conserved *Tetratheca juncea*. Should managed areas become susceptible to edge affected impacts during construction, a considered scenario of 5 m (edge effects) could result in minor impacts to an additional 41 clumps.

Section 4 further outlines mitigation measure to ensure minimisation of impacts stemming from the site area. In relation to *Tetratheca juncea* these include:

- Installation of pre-construction “no-go areas” with fencing and signage
- a Water Management Plan to ensure no changes to the surrounding hydrology
- a Conservation Management Plan for the conservation area
- translocation measures

The proposed development will not significantly fragment any existing populations of *Tetratheca juncea* as the area to be cleared is adjacent to other naturally vegetated areas containing appropriate vegetation types. Additionally the distances between sub-populations will be well below the 500 m distance considered as an upper limit for pollinator movement / dispersal.

In summary the approximately 7.31 ha of suitable vegetation for *Tetratheca juncea* which will be impacted upon as a result of the works will directly impact 243 clumps of *Tetratheca juncea*. Due to the relatively small number of clumps impacted (3.7% of the total local population), the 243 clumps to be cleared (and potentially translocated) for development does not result in a significant impact on an important population. There is regard for some short lived indirect impacts to the species through issues such as dust prior to establishment of the sealed road. However, there is not considered to be a significant adverse impact, both direct or indirect, on this species as a result of the project, particularly with the incorporation of the following avoidance and mitigation measures (detailed in Section 4):

- construction layout redesigns focussed on avoidance of the species
- avoidance of fragmentation
- translocation
- a Dust Management Plan
- enclosed crushing plant
- weed management
- establishment of a monitored, managed, and maintained conservation area

***Asperula asthenes* (Trailing Woodruff)**

A small trailing perennial herb restricted in distribution to the lower north coast of NSW, primarily between the Karuah / Bulahdelah area in the south and north to Kempsey, with an outlier to the north near Coffs Harbour. The species has a range of approximately 100 - 150 km north to south, but is generally restricted to the near coastal fringe. *Asperula asthenes* is found in habitats that are generally in association with alluvial riparian habitats along small creeks and watercourses, often in vegetation having rainforest and paperbark forest elements. The species can also be found in and adjacent to stands of swamp forest which are periodically inundated.

Asperula asthenes occurs sporadically within areas of potential habitat within its known range. The species is known from a few locations in the surrounding area (15 – 20 km), namely Girvan, The

Branch and Bulahdelah. The species was recorded within the adjacent conservation areas on two occasions along Yalimbah Creek Lot 12 (RPS 2013) and another small watercourse also in conservation lands on Lot 5 (ELA 2013). The location of recordings and populations of *Asperula asthenes* in the site area and adjacent conservation areas are depicted in **Figure 4**.

Threats to the species include habitat loss due to development, grazing and weed invasion.

Due to the initial avoidance of all records of *Asperula asthenes* by the construction layout there will be no individuals directly impacted as a result of the construction and operation of the proposed quarry.

Potential dust impacts, within the vicinity of the construction zone will be significantly reduced due to the implementation of the various components of the Dust Management Plan – specifically the sealing of all roads and the construction of a fully enclosed crushing facility, in association with other proposed measures.

Section 4 further outlines mitigation measure to ensure minimisation of impacts stemming from the site area. In relation to *Asperula asthenes* these include:

- a Dust Management Plan
- an Erosion and Sediment Control Plan to minimise potential impacts to proximate gullies which support two patches of the species
- Installation of pre-construction “no-go areas” with fencing and signage
- a Water Management Plan to ensure no changes to the surrounding hydrology
- a Conservation Management Plan for the conservation area
- translocation measures

In summary, no areas of suitable habitat for *Asperula asthenes* will be impacted upon as a result of the works and as such no significant direct adverse impacts will be presented as part of this project. However, regard for some indirect impacts to the species through issues such as dust, accidental disturbance, and weed invasion will be monitored and managed. With the incorporation of the avoidance and mitigation measures indicated in this document (detailed in Section 4), there is not considered to be a significant adverse impact on this species as a result of the project.

3.1 (e) Listed migratory species

A total of 26 different migratory species were identified from the search undertaken using the SEWPaC Protected Matters Search Tool. A full listing of these species is provided below.

Nature and extent of likely impact

The likelihood of occurrence was determined and expressed using the five terms as defined in section 3.1(d). While it was found to be unlikely that many of the listed migratory species identified in the Protected Matters search report would occur on site, four of these species were identified to have the potential to occur.

However, each of the species considered have large natural distributions and are found in a wide variety of areas throughout Australia. Any impacts on these species as a result of the development

of the quarry are therefore expected to be minor to nil. In addition, the site does not represent important habitat or support an ecologically significant proportion of any of the species listed below, accordingly a significant impact to any species will not result from the development.

Migratory Birds

Scientific Name	Common Name	EPBC Listing Status	Likelihood of Occurrence
<i>Apus pacificus</i>	Fork-tailed Swift	M	Potential
<i>Calonectris leucomelas</i>	Streaked Shearwater	M	No
<i>Diomedea antipodensis</i>	Antipodean Albatross	M	No
<i>Diomedea dabbenena</i>	Tristan Albatross	M	No
<i>Diomedea epomophora</i>	Southern Royal Albatross	M	No
<i>Diomedea exulans</i>	Wandering Albatross	M	No
<i>Diomedea gibsoni</i>	Gibson's Albatross	M	No
<i>Diomedea sanfordi</i>	Northern Royal Albatross	M	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	M	Unlikely
<i>Hirundapus caudacutus</i>	White-throated Needletail	M	Potential
<i>Macronectes giganteus</i>	Southern Giant-Petrel	M	No
<i>Macronectes halli</i>	Northern Giant-Petrel	M	No
<i>Merops ornatus</i>	Rainbow Bee-eater	M	Potential
<i>Monarcha melanopsis</i>	Black-faced Monarch	M	Unlikely
<i>Monarcha trivirgatus</i>	Spectacled Monarch	M	Unlikely
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M	Unlikely
<i>Puffinus carneipes</i>	Flesh-footed Shearwater	M	No
<i>Rhipidura rufifrons</i>	Rufous Fantail	M	Potential
<i>Sterna albifrons</i>	Little Tern	M	No
<i>Thalassarche bulleri</i>	Buller's Albatross	M	No
<i>Thalassarche cauta</i>	Shy Albatross	M	No
<i>Thalassarche eremita</i>	Chatham Albatross	M	No

<i>Thalassarche impavida</i>	Campbell Albatross	M	No
<i>Thalassarche melanophris</i>	Black-browed Albatross	M	No
<i>Thalassarche salvini</i>	Salvin's Albatross	M	No
<i>Thalassarche steadi</i>	White-capped Albatross	M	No

Fork –tailed Swift

The Fork-tailed Swift (*Apus pacificus*) is a medium to large member of the Apodidae family. The species breeds in Siberia and the Himalayas east to Japan and southeast Asia (Pizzey and Knight 2007) and is a regular non-breeding summer (September – April) migrant to Australia. It is found in a variety of habitats including arid, coastal and urban areas (Simpson and Day 2004).

The species is known to be insectivorous and birds are often recorded hawking for insects in proximity to cyclonic weather conditions. The Fork-tailed Swift predominantly forages on the wing, up to 300m above mainly open habitats such as water, woodlands and grasslands. The preferred nesting habitat of this species is cliffs and escarpments, with hollow bearing trees representing a secondary nesting habitat.

This species has been recorded within 10 km of the site, and given the broad habitat preferences of this species, there is potential for the species to utilise the site area on occasion, for foraging purposes, although very limited secondary nesting habitat, in the form of hollow-bearing trees, are present within on site.

The proposal will remove approximately 28.09 ha of native vegetation for the quarry and associated infrastructure, with all adjacent native vegetated areas to be retained (129 ha as part of a formal conservation area). As discussed above, the vegetation within the study area which will be impacted represents potential foraging habitat and to a lesser extent potential nesting habitat.

The proposed development will contribute to threatening processes relevant to the species, including habitat removal through the clearing of native vegetation. However the scale of these impacts is considered negligible in the context of the wide range of the species and broad habitat preferences. The impacts of the proposed actions, including direct loss of potential habitat for this species, are considered unlikely to represent a significant impact to the species.

White-throated Needletail

The White-throated Needletail (*Hirundapus caudacutus*) is a large, long-winged swift and one of the world fastest birds (Pizzey and Knight 2007). The species breeds in western Siberia and the Himalayas east to Japan and is a regular non-breeding summer (October – April) migrant to eastern Australia (Pizzey and Knight 2007). The species is almost exclusively aerial and is found above a variety of habitats including wooded areas, forests, woodlands, heathlands, cleared areas and mudflats (Pizzey and Knight 2007).

The species is known to forage aerially on a range of insects, often in areas of updraughts such as cliff lines, and up to great heights. The species roosts in trees in forests and woodlands utilising dense foliage in the canopy and hollows.

This species has been recorded within 10 km of the study area. Given the broad habitat preferences of White-throated Needletail, there is potential for the species to utilise the site, on occasion, for both foraging and roosting, although there is limited potential for hollow bearing trees in the quarry footprint.

The proposal will remove approximately 28.09 ha of native vegetation for the quarry and associated infrastructure, with all adjacent native vegetated areas to be retained (129 ha as part of a formal conservation area). As discussed above, the vegetation within the study area which will be impacted represents potential foraging habitat and to a lesser extent potential nesting habitat.

The proposed development will contribute to threatening processes relevant to the species habitat removal through the clearing of native vegetation. However the scale of the impacts is considered negligible in the context of the wide range of the species and broad habitat preferences. The impacts of the proposed actions, including direct loss of potential habitat for this species, are considered unlikely to represent a significant impact to the species.

Rainbow Bee-eater

The Rainbow Bee-eater (*Merops ornatus*) is a medium sized bird and the only species of Bee-eater in Australia. The species is distributed across the majority of mainland Australia, with the exception of the most arid zones of the central and western deserts. It can be found on several near-shore islands, but is not found in Tasmania.

Southern populations of Rainbow Bee-eater are known to migrate following breeding to spend winter in northern Australia, while in northern localities the species is present year-round. The species is found mainly in open forests, woodlands and shrublands, and can tolerate some level of human disturbance or habitation, but has been found in a wide range of habitat types from vine thickets to sedgeland to dune systems. The Rainbow Bee-eater generally forages from open perches, from which it may scan for prey. Prey usually consists of flying insects; however they have been known to occasionally eat earthworms, spiders and tadpoles.

This species has not been recorded within 10 km of the site however, given the large distances travelled by this species and its broad habitat preferences, there is potential for the species to utilise the site, on occasion, for foraging. There is limited nesting habitat for this species within the site area.

The proposal will remove approximately 28.09 ha of native vegetation for the quarry and associated infrastructure, with all adjacent native vegetated areas to be retained (129 ha as part of a formal conservation area). As discussed above, the vegetation within the study area which will be impacted represents potential foraging habitat and to a lesser extent potential nesting habitat.

The proposed development will contribute to threatening processes relevant to the species, including habitat removal through the clearing of native vegetation. However the scale of this impact is considered negligible in the context of the wide range of the species and considering that no nesting habitat will be impacted. The impacts of the proposed actions, including direct loss of potential habitat for this species, are considered unlikely to represent a significant impact to the species.

Rufous Fantail

The Rufous Fantail (*Rhipidura rufifrons*) is a small active bird, similar in habitat to the Grey Fantail. The species is distributed across the east coast fringe of mainland Australia, from south western Victoria through to northern Queensland (Pizzey and Knight 2007). It can be found on several near-shore islands, and is also in several Pacific Islands including New Guinea and the Solomon Islands.

Southern populations of Rufous Fantail are known to migrate following breeding to spend winter in northern Australia, while in northern localities the species is present year-round. The species is found mainly in wet sclerophyll forests, rainforests, swamp forest and occasionally mangroves, and can tolerate some level of human disturbance in urban areas. The Rufous Fantail generally forages in the upper and mid canopy of forested areas for prey. Prey usually consists of flying insects.

This species has been recorded within 10 km of the site however, given the large distances travelled by this species and its broad habitat preferences, there is potential for the species to utilise the site, on occasion, for foraging and nesting purposes.

The proposal will remove approximately 28.09 ha of native vegetation for the quarry and associated infrastructure, with all adjacent native vegetated areas to be retained (129 ha as part of a formal conservation area). As discussed above, the vegetation within the study area which will be impacted represents potential foraging habitat and also potential nesting habitat.

The proposed development will contribute to threatening processes relevant to the species, including habitat removal through the clearing of native vegetation. However the scale of this impact is considered negligible in the context of the wide range of the species and considering that no nesting habitat will be impacted. The impacts of the proposed actions, including direct loss of potential habitat for Rufous Fantail, are considered unlikely to represent a significant impact to the species.

3.1 (f) Commonwealth marine area

Description

NA

Nature and extent of likely impact

NA

3.1 (g) Commonwealth land

Description

NA

Nature and extent of likely impact

NA

3.1 (h) The Great Barrier Reef Marine Park

Description

NA

Nature and extent of likely impact

NA

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

NA

Nature and extent of likely impact

NA

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

NA

3.2 (a)	Is the proposed action a nuclear action?	X	No

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?	X	No

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	X	No

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))

3.2 (d)	Is the proposed action to be taken on Commonwealth land?	X	No

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

3.2 (e)	Is the proposed action to be taken in the Great Barrier Reef Marine Park?	X	No

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

3.3 Other important features of the environment

3.3 (a) Flora and fauna

A total of 149 flora species have been recorded at the site during previous ecological surveys, including three threatened flora species, these being *Tetradlea juncea*, *Grevillea parviflora* subsp. *parviflora* and *Asperula asthenes*.

A total of 57 vertebrate fauna species were recorded within the study area, comprising five frogs, two reptiles, 35 birds and 15 mammals. Four threatened fauna species listed under the TSC Act were recorded in the study area during the March 2010 RPS field surveys, these being Powerful Owl (*Ninox strenua*), Vaired Sittella (*Daphoenositta chrysoptera*), Eastern Freetail-bat (*Mormopterus norfolkensis*) and Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

Fauna habitat recorded within the study area varies with respect to vegetation quality, density and community form. The study area encompasses vegetation communities ranging from dry, moist and wet sclerophyll vegetation associations with dams and ephemeral creek lines attracting streamside vegetation and denser understorey habitats.

3.3 (b) Hydrology, including water flows

The study area is situated along a ridge top in the upper catchments of both Yalimbah and Bulga Creeks. The catchment-divide lies along the ridge top running north-south through the study area. Yalimbah Creek lies to the south west, and flows into Port Stephens wetlands, which are located approximately 1 km downstream of the Study Area. Bulga Creek flows to the east of the Study Area through agricultural land before also flowing into Port Stephens wetlands, approximately 3.5 km downstream of the Study Area.

The study area is characterised by a mostly steep, heavily forested landscape. The majority of this area lies within the Yalimbah Creek catchment draining to the south west, with only a small portion of the area draining to the east and into the Bulga Creek catchment. The land where the office facilities, processing area and stockpiles are proposed for construction comprises mostly open pasture with scattered stands of eucalyptus, and lies within the Bulga Creek catchment.

Three ephemeral first order watercourses (according to the Strahler numbering system) lie within the western half of the Study Area (Lot 12). These drainage lines meander through the predominantly forested catchment of the area. These drainage lines have an intermittent low flow channel with poorly defined bed and banks, two flowing in a westerly direction, and one to the south west, ultimately joining Yalimbah Creek.

3.3 (c) Soil and Vegetation characteristics

A soil assessment of the site was conducted by GSSE 2013. The assessment identified three soil types within the Study Area; Brown Chromosols, Red Dermosols and Leptic Tenesols. In regional geology terms, the rock being quarried belongs to the Myall Block in the Tamworth Belt of the New England Orogen. The site forms part of what is known as the Nerong Volcanics, which are carboniferous siliceous volcanic flows of the rhyolitic and dacitic ignimbrites with occasional flows of tuffaceous sandstone and conglomerate.

Field surveys conducted as part of the RPS 2013 assessment recorded the following vegetation:

- three native vegetation communities, none of which are listed as endangered under the TSC Act of EPBC Act. Communities recorded:
 - *Spotted Gum-Grey Ironbark-Grey Gum-White Mahogany Moist Sclerophyll Forest*
 - *Smooth barked Apple-Red Bloodwood-Brown Stringybark Dry Sclerophyll Forest*
 - *Grey myrtle dry rainforest.*
- three threatened flora species listed under the TSC Act and EPBC Act were recorded on the site including:
 - *Tetratheca juncea*
 - *Grevillea parviflora* subsp. *parviflora*
 - *Asperula asthenes*

3.3 (d) Outstanding natural features

The site does not possess any outstanding natural features.

3.3 (e) Remnant native vegetation

Three vegetation communities occur within the site area. All three vegetation communities are well represented across the region and are not listed under the TSC Act. The vegetation communities present in the development area and their equivalent biometric communities are represented below and are based on RPS (2013).

Vegetation Community (RPS)	Equivalent Biometric Vegetation Type
<i>Eucalyptus propinqua</i> – <i>Eucalyptus acmenoides</i> – <i>Corymbia maculata</i> – <i>Eucalyptus paniculata</i> subsp. <i>paniculata</i> Moist Sclerophyll Open Forest	Spotted Gum – Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin
<i>Angophora costata</i> – <i>Corymbia gummifera</i> - <i>Eucalyptus capitellata</i> Dry Sclerophyll Open Forest	Sydney Peppermint – Smooth barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin
<i>Backhousia myrtifolia</i> Rainforest	Shatterwood-Giant Stinging Tree – Yellow Tulipwood dry rainforest of the North Coast and northern Sydney Basin

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The highest point on the site is approximately 150 m AHD associated with a ridgeline falling to the south of the study area. Elevations range from 40 to 150 m AHD, with slopes ranging from approximately 4% in the lower areas up to 40% in the upper slopes of the study area.

3.3 (g) Current state of the environment

The site is primarily naturally vegetated, containing three native vegetation communities of generally good quality with expected representative species and diversity. Vegetation community structure is limited due to the often even age of the stands present, and as very few old growth habitat attributes are represented. This is likely due to past timber-getting and grazing activities. Few areas of weeds are current, but where present they are generally restricted to the edges of modified vegetation (e.g. existing residence) and tracks, with more common species including aggregations of *Lantana camara* (Lantana), *Rubus ulmifolius* (Blackberry) and *Setaria sphacelata* (South African Pigeon Grass). Feral animals were not observed, although it is likely that species such as Feral cats, wild dogs or Foxes may occasionally use the site.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no Commonwealth Heritage Places within the site.

3.3 (i) Indigenous heritage values

Cultural Heritage Assessment has been prepared by RPS (2013). The initial consultation and survey was conducted in January 2010 and March 2010 in accordance with the guidelines of the then Department of Conservation and Climate Change and Water (DECCW) Interim Community Consultation Requirements (2005) with the Karuah Local Aboriginal Land Council. An updated search of the AHIMS database was undertaken on the 21st May 2012—the search revealed no listed sites inside the immediate study area and the pedestrian survey revealed no Aboriginal cultural heritage items. No evidence of Aboriginal cultural heritage was found during the survey. The lack of mature trees and the presence of introduced weeds such as lantana would indicate that sometime previously the area has been cleared or logged. Consequently, the potential for undisturbed and *in situ* Aboriginal cultural material is considered unlikely. The report concludes that no Aboriginal cultural heritage sites were identified during the study area survey.

If Aboriginal site/s are identified in the study area during works, then all activity in the area will cease, the area cordoned off and contact made with the Department Enviroline 131 555, a suitably qualified archaeologist and the relevant Aboriginal stakeholders, so that it can be adequately assessed and managed.

3.3 (j) Other important or unique values of the environment

The majority of the site is considered unremarkable.

3.3 (k) Tenure of the action area (e.g. freehold, leasehold)

The study area is currently owned and managed by Karuah East Quarry Pty Ltd.

3.3 (l) Existing land/marine uses of area

The majority of the subject site is comprised of bushland. An electricity easement bisects the northern portion of Lot 13 and the southern portion of the Lot 12/13 boundary. A dwelling and surrounding cleared area is also present in the central portion of Lot 13. A series of generally unformed 4WD access tracks occur in the southern portion of Lot 13. The site was previously subject to logging / timber getting and cattle grazing regimes, although both practices have ceased on all lots.

3.3 (m) Any proposed land/marine uses of area

The site contains a valuable state resource and the proposed Karuah East Quarry development will involve the extraction of this resource prior to returning the disturbed area to native vegetation. The proposed use of the land is the establishment and operation of a new hard rock quarry. The Karuah East Quarry will involve the extraction of up to 1.5 million tonnes of andesite per annum (excluding overburden material) from a total resource of approximately 29 million tonnes over a 20 year extraction period. The proposal involves clearing of part of the site and construction of a new staged quarry, establishment of plant facilities including weighbridge, site office, amenities, stock piles and new constructed access via an upgrade and extension of Blue Rock Lane.

4 Measures to avoid or reduce impacts

A suite of key measures have been committed to be implemented by Karuah East Quarry Pty Ltd that will be executed to avoid/minimise impacts on and protect *Tetratheca juncea* and *Grevillea parviflora* subsp. *parviflora* within the conservation area:

Avoidance Measures

In response to commentary from the NSW OEH during the Part 3A Assessment process the quarry footprint has been changed to a design which largely avoids threatened flora species. Significantly, the amended design (which was approved by the Part 3A determination in June 2014) reduced the direct impact on *Tetratheca juncea* from 2,742 clumps (42% of the study area sub-population) to 243 clumps (3.7% of the study area sub-population). This is a reduction in direct impact on *Tetratheca juncea* of almost 90% relative to the earlier (January 2013) design. The design also results in the reduction of the direct impact on *Grevillea parviflora* subsp. *parviflora* from three patches (comprised of 32 suckering stems) to nil. The amended design satisfied the concerns raised by OEH.

Dust Management

A Dust Management Plan will be implemented to assist in minimising the potential for stigma clogging of all plant populations in retained bushland habitats with particular emphasis in regard to threatened flora. All haul roads are proposed to be sealed between the quarry site to the Pacific Highway including the internal haul road from entry point to the crushing plant. Sealing the haul roads reduces potential dust emissions by up to 100% compared to unsealed roads (DSWEPAC 2012). Additional best practice control measures include:

- vehicle speed restrictions
- watering dust prone surfaces
- use of hygroscopic salts
- dust barrier - geotextile covering of cyclone fences (during construction) to restrict airborne dust to conservation area populations
- use of larger vehicles rather than smaller vehicles to minimise the number of vehicle movements
- incorporation of wind breaks
- enclosure of the crushing plant

Watering of any unsealed roads and surfaces will occur at a prescribed volume of 2L/m²/hour. Air quality monitoring will be undertaken in by a suitably qualified acoustic expert. Additionally, the crusher will be entirely enclosed to ensure the capture of all dust. Stockpiles will be subject to water spraying and protected by the installation of wind breaks of 4 m in height.

An Erosion and Sediment Control Plan will be implemented to minimise potential impacts to proximate gullies which support the Threatened *Asperula asthenes* population and associated habitat. All erosion and sediment control measures will be maintained in a functioning condition until individual areas have been deemed to be "successfully" rehabilitated. Structural soil conservation works will be inspected after high intensity rainfall so that de-silting and prompt repairs and/or replacement of damaged works can be initiated as required.

Translocation Measures

Tetratheca juncea is known to have been translocated with some success at other locations and thus a salvage program has been committed to by the proponent to help minimise the loss of these plants earmarked for disturbance or encountered during construction. The salvage program would broadly comprise the excavation of clumps (along with rhizomes and surrounding root balls) proposed for removal and their reintroduction into prepared 'beds' within suitable habitats nearby. Translocation

is regarded as an additional measure to help enable further biodiversity outcomes, but it is noted that translocation is often a difficult and time consuming process.

The salvage program will require a Section 91 license from OEH and will be subject to a detailed Salvage Plan to be prepared by the proponent (and endorsed by OEH and DoPI) prior to commencement of the works.

Conservation area

As part of the proposal the proponent has committed to improve the condition of and protect in perpetuity an area of 129 hectares of vegetation and habitat for threatened species on adjacent, adjoining land to the quarry site. The conservation area consists of three land parcels: Part of Lot 13 DP 1024564, part of Lot 14 DP 1024564, and Lot 5 DP 838128. The conservation area provides part of a contiguous patch of vegetation that affords an important habitat corridor and habitat area to the north of and adjacent to Karuah Nature Reserve. The conservation area contains a minimum of 6,324 clumps of *Tetratheca juncea*, over 100 stems of *Grevillea parviflora* subsp. *parviflora* (ELA 2013) and populations of the *Asperula asthenes* (2 patches totalling ~8m²). In addition to the threatened species to be conserved there is a significantly large area of intact good quality native vegetation to be retained.

The conservation area will be subject to ongoing monitoring and will be managed using standard management actions required to initially bring the conservation area to a maintenance level. These actions include weed management / control, cat and/or fox control, exclusion of miscellaneous species, feral and/or native herbivore control, and maintenance of flow regimes. The site will be fenced to exclude inappropriate activities such as rubbish dumping, grazing and vehicle access. Information signs at all entry points to the site will provide information on the use of the site as conservation area. Other initial management tasks may include minor drainage line restoration, native vegetation planting, fire trail upgrades and Asset Protection Zone slashing near existing residences. A Conservation Management Plan will be prepared for the conservation area to guide the implementation of the management actions.

Monitoring

Threatened plant sub-populations of *Tetratheca juncea*, *Grevillea parviflora* subsp. *parviflora* and *Asperula asthenes* situated within retained bushland habitats on Lots 13-14 will be monitored quarterly for the first year (to increase success of adaptive management techniques) and annually from the second onwards by a suitably qualified and experienced botanist for the life of the quarry operation. A Monitoring Plan will be prepared prior to the commencement of clearing activity to detail survey design, data collection and reporting. Adaptive management will be employed for the life of the quarry and monitoring to respond to population issues that are identified, including weed control. All reporting will be submitted to relevant agencies for review.

Regular monitoring of the revegetated areas will be required during the initial vegetation establishment period and beyond to demonstrate that the objectives of the rehabilitation strategy area being achieved and that a sustainable, stable landform has been provided.

Environmental Management Strategy

An Environmental Management Strategy (EMS) has been prepared for the quarry site. It includes an overview of the environmental management and monitoring strategies proposed for the Quarry. The EMS will provide guidance and direction to the quarry operator and incorporate the Karuah East environmental policies, procedures and management plans, as well as relevant legislation, guidelines, standards and policies to ensure best practice environmental management on the site.

The EMS will be applicable to all persons working at the quarry, including contractors and visitors to the site. Where contractors may be responsible for the management and/or maintenance of a

specific site operation, they may be required to prepare and implement their own EMS in addition to complying with the requirements of this EMS. Where this is required, Karuah East will provide the contractor with details of the required content and format.

The EMS will be continually updated; responding to changes in the operation, changes in legislation, results of any independent environmental audits, and to reflect changes as part of the management review and continuous improvement process.

Environmental procedures proposed within the EMS include:

- water monitoring and management
- biodiversity management
- noise and vibration (blasting) management
- transport management
- air quality and greenhouse gas management
- heritage management
- visual management
- clearing and topsoil management
- quarry closer and rehabilitation
- waste monitoring and management

Environmental Management Plans

Environmental Management Plans (EMPs) will be developed to assist in the management of any potential environmental issues associated with the quarry's operational activities. The following EMPs will be prepared for the Karuah East quarry, which will be designed to comply with relevant statutory requirements.

- air quality management plan
- surface water management plan (including erosion and sediment control and monitoring)
- groundwater monitoring plan
- soil management plan
- biodiversity conservation management plan
- noise and blasting management plan
- quarry closure and rehabilitation management plan
- waste management plan
- construction environmental management plan
- pre clearing survey
- vegetation management/monitoring plan
- construction traffic management plan

EMPs will be reviewed at regular intervals to ensure that environmental management details remain relevant to the quarry operations.

Water Management Plan

The proponent will prepare a Water Management Plan (WMP) in consultation with the Environment Protection Authority (EPA) and NSW Office of Water (NOW). The WMP will include:

- a site water balance that includes details;
 - sources and security of water supply, including contingency planning
 - water use on site
 - measures that would be implemented to minimise use of clean water and maximise recycling of dirty water on the site
- a surface water management plan, that includes;

- baseline data on surface water flows and quality in the watercourses that could be affected by the project
- a detailed description of the surface water management system on the site, including the design objectives and performance criteria for;
 - clean water diversions
 - erosion and sediment controls
 - water storages
 - control of water pollution from areas of the site that have been rehabilitated
- surface water impact assessment criteria, to be developed following analysis of baseline data, including trigger levels for investigating any potentially adverse surface water quality impacts
- a program to monitor;
 - any surface water discharges
 - the effectiveness of the water management system
 - surface water flows and quality in local watercourse
 - ecosystem health of local watercourse
- an assessment of appropriate options to improve storage and retention times in accordance with Managing Urban Stormwater: Soils and Construction (Landcom)
- a groundwater monitoring program that includes
 - baseline data of groundwater levels surrounding the site
 - groundwater impact assessment criteria
 - a program to monitor and/or validate the impacts of the project on groundwater resources
- a surface and groundwater response plan that describes the measures and/or procedures that would be implemented to:
 - respond to any exceedance of the surface water impact assessment criteria and groundwater impact assessment criteria
 - mitigate and/or offset any adverse impacts on surface water and groundwater resources located within and adjacent to the site.

A key objective of the WMP is to ensure that there will be no unsuitable runoff entering the conservation area and impacting on Threatened plant species or their habitats. Specifically, the following surface water management measures will be implemented to ensure this objective:

- Quarry Extraction Area:
 - Runoff generated within the active quarry extraction area will be directed into an in-pit sump where it will be contained and pumped out as required so as not to impede quarrying activity
 - A bund and sediment fence will be maintained along the southern boundary of the quarry, to minimise the risk of sediment being washed downstream of the quarry
 - Construction of the quarry floor will be managed in such a way so as to direct all runoff to the in-pit sump. The location of this sump will change as quarrying progresses, however it will generally be located in the south east corner of the quarry
 - Water collected in the in-pit sump will be pumped out as required into a rock lined table drain adjacent to the main haul road. The water will flow down this drain to the main dirty water dam, Dam 1, via a rock lined drop structure
 - Progressive rehabilitation of all formed surfaces, such as quarry benches and long term soil stockpiles, will occur wherever possible to reduce the amount of total suspended solids (TSS) in runoff from disturbed areas

- Dam 1 Catchment (crushing plant and product stockpiles):
 - An existing farm dam will be upgraded and used as a sediment dam (Dam 1)
 - The crushing plant area will be graded such that runoff from this area will flow into Dam 1
 - Water for haul road and some stockpile dust suppression, as well as for the crushing plant will be sourced from Dam 1
 - A diversion bund will be constructed along the eastern boundary of this catchment area, to direct runoff from the area into Dam 1
- Dam 2 Catchment (product stockpiles and office infrastructure area):
 - A second sediment dam, Dam 2, will be constructed adjacent to the main haul road to capture runoff from this area. Water collected in Dam 2 will be re-used for dust suppression on the product stockpiles.
- Dam 3 Catchment (product stockpiles)
 - A third sediment dam, Dam 3, will be constructed in the north east corner of the southern stockpile area. Water collected in dam 3 will be re-used for dust suppression on the adjacent product stockpiles.

The internal haulage road between the Dam 1 and Dam 2 catchment areas (which is located to the west of the vegetation to be conserved in Lot 13) will be sealed and maintained as effective 'clean' catchments. The entrance road to the site will also be sealed. As such, runoff from these areas will not need to report to one of the sediment dams to discharge from the site.

All dams will be constructed in accordance with the 'Blue Book' requirements. Inspections of the dams will be undertaken as part of routine site environmental inspections or following significant rainfall. Various information such as the general condition of the dam, evidence of overflow, condition of downstream catchments, water, colour, evidence of eroding surfaces and approximate retained capacity, will be recorded.

Surface Water Management

A Surface Water Management Program (SWMP) will be implemented to monitor both the surface water quality upstream and downstream of the site, and the effectiveness of the sites Water Management Plan. It will therefore also gauge whether any impacts are occurring on the surrounding surface water environment. The results of the surface water monitoring undertaken during quarrying operations at the site will be compared against the baseline data collected as part of the Surface Water Assessment. A baseline ecological health condition assessment of Yalimbah Creek will be undertaken prior to commencement of operations, and monitoring of the creek will continue as part of the annual ecological monitoring of offset areas.

Rehabilitation and Closure

A Rehabilitation and Closure plan will be implemented on site. Until such time that extraction has ceased rehabilitation will occur around the perimeter of the pit only along the benches and will not involve the pit floor. As the extraction progresses through the resource, 15 m wide benches will be left every 15 m of a depth to provide a horizontal platform on which native flora will be established.

The revegetation program will re-establish native tree/shrub/ground cover and will stabilise reshaped and benched areas. Benches will be deep ripped to actively promote infiltration of water which will enhance soil moisture requirements for direct tree seeding and minimise surface runoff to underlying benches and the pit floor dirty water control system. On completion of quarry operations, the pit floor will be re-shaped and revegetated with wetland plant species to form a free draining wetland environment. A mixture of native trees and shrubs locally indigenous to the area will be sown onto the majority of the reshaped and benched pit areas following topdressing and site preparation.

The seed will be sourced from reputable seed supply agents and ideally collected from the local area (~10 km radius). Native seed for revegetation of the quarry will be appropriately pre-treated in

order to break dormancy restrictions. The native tree and shrub seed mix will be sown at a total combined rate of approximately 6.3kg/ha. Seeding will be conducted in late spring, summer and early autumn.

Fencing (or a similar barrier) will be erected and maintained to exclude and prohibit the movement of persons and vehicles into areas that have been rehabilitated. The fencing will be routinely checked and repaired where necessary with signs placed in prominent locations to indicate areas that are undergoing rehabilitation. Weed control will be undertaken on an "as required" basis should cyclical weed invasion events occur.

Mitigation Summary

It is considered unlikely that the proposed development and clearance of 243 *Tetratheca juncea* clumps will lead to a significant impact when considering the following:

- avoidance of 96.3% of the total study area population of *Tetratheca juncea*
- avoidance of all total study area *Grevillea parviflora* subsp. *parviflora*
- dust management including sealed roads, water spraying, and enclosure of high dust generation areas
- monitoring regime for retained threatened plants and associated habitat
- the commitment by the proponent to improve the condition of and protect in perpetuity the Conservation area of 129 ha including 6,324 clumps of *Tetratheca juncea*, 100 stems of *Grevillea parviflora* subsp. *Parviflora* and populations of *Asperula asthenes*
- preparation of a EMS to guide environmental management and monitoring strategies
- preparation of various EMPs to assist in the management of any potential environmental issues associated with the quarry' operational activities
- preparation of a WMP and SWMP to ensure to no dirty water runoff into areas of protected threatened plants
- comprehensive rehabilitation, both progressive and at completion of quarry operation
- potential for incorporation of translocation measures for impacted threatened plants in association with OEH

The proposed development will lead to a minimal additional impact with regard to habitat loss or disturbance at the local area level. However, the nature of the impact from the current proposal is not considered significant with regard to the viability of the local population adjacent to the proposed quarry.

Given the protection afforded by the managed Conservation Area, the minor impacts proposed by the development are not considered to be significantly influencing *critical habitat* or an *important population* of the listed threatened flora species.

5 Conclusion on the likelihood of significant impacts

5.1 Do you THINK your proposed action is a controlled action?

- | | |
|-------------------------------------|---------------------------|
| <input checked="" type="checkbox"/> | No, complete section 5.2 |
| <input type="checkbox"/> | Yes, complete section 5.3 |

5.2 Proposed action IS NOT a controlled action.

For the reasons set out in sections (3) and (4) above in relation to avoidance, mitigation and ongoing conservation of key MNES.

5.3 Proposed action IS a controlled action

Matters likely to be impacted

- | | |
|--------------------------|---|
| <input type="checkbox"/> | World Heritage values (sections 12 and 15A) |
| <input type="checkbox"/> | National Heritage places (sections 15B and 15C) |
| <input type="checkbox"/> | Wetlands of international importance (sections 16 and 17B) |
| <input type="checkbox"/> | Listed threatened species and communities (sections 18 and 18A) |
| <input type="checkbox"/> | Listed migratory species (sections 20 and 20A) |
| <input type="checkbox"/> | Protection of the environment from nuclear actions (sections 21 and 22A) |
| <input type="checkbox"/> | Commonwealth marine environment (sections 23 and 24A) |
| <input type="checkbox"/> | Great Barrier Reef Marine Park (sections 24B and 24C) |
| <input type="checkbox"/> | A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E) |
| <input type="checkbox"/> | Protection of the environment from actions involving Commonwealth land (sections 26 and 27A) |
| <input type="checkbox"/> | Protection of the environment from Commonwealth actions (section 28) |
| <input type="checkbox"/> | Commonwealth Heritage places overseas (sections 27B and 27C) |

6 Environmental record of the responsible party

	Yes	No
<p>6.1 Does the party taking the action have a satisfactory record of responsible environmental management?</p> <p>Provide details The proponent is committed to maintaining a continuous environmental rehabilitation program. Hunter Quarries Pty Ltd (which owns Karuah East Quarry Pty Ltd in full) currently publicise monthly environmental reports on their website.</p>	Yes	
<p>6.2 Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?</p> <p>If yes, provide details</p> <p>Hunter Quarries Pty Ltd (owner of Karuah East Quarry Pty Ltd) was subject to proceedings under the Environmental Planning & Assessment Act 1979 for a breach of condition 6 in approval number 265-10-2004. The breach related to the tonnage of rock permitted to be hauled from the site in any 12 month period. The condition of consent was breached in the year between 1 August 2008 to 31 July 2009 by 554,437 tonnes. Hunter Quarries Pty Ltd paid a breach notice and introduced improved measures for monitoring the export of material from site. The breach of Condition 6 did not have any impact on any Matters of National Environmental Significance or State/Local Environmental Significance and the judgement stated that "no environmental harm resulted from the offence" (paragraphs [18] and [27]).</p>		No
<p>6.3 If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?</p> <p>If yes, provide details of environmental policy and planning framework The action will be undertaken in accordance with the conditions of Major Project Approval 09_0175 issued by the Minister for Planning and Environment on 17 June 2014. The Major Project Approval requires all mitigation measures as outlined within Section 4 of this Referral to be undertaken. The Major Project Approval (09_0175) is provided in Attachment 4 of this Referral.</p>	NA	
<p>6.4 Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?</p>		

Provide name of proposal and EPBC reference number (if known)

Yes

The existing Karuah Quarry on adjacent land to the west which is operated by Hunter Quarries Pty Ltd (which owns Karuah East Quarry Pty Ltd in full) was previously referred as an action under the EPBC Act (reference EPBC 2004/1358). On 19 March 2004 it was determined by The Department of the Environment and Heritage that the action was not a Controlled Action.

7 Information sources and attachments

(For the information provided above)

7.1 References

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Simpson and Day (2004) *Field Guide to the Birds of Australia*, Lloyd O'Neil, Melbourne Australia.

Threatened Species Scientific Committee (TSSC) (2005be). Commonwealth Listing Advice on *Tetratheca juncea*. [Online]. Available from:
<http://www.environment.gov.au/biodiversity/threatened/species/tetratheca-juncea.html>

7.2 Reliability and date of information

7.3 Attachments

Attachment 1 – Figures

Attachment 2 – Database search of the EPBC PMST for matters of NES

Attachment 3 – Terrestrial Ecology Survey and Assessment Report – RPS 2013

Attachment 4 – Part 3A Major Project conditions of approval

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)		
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)		
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)		
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

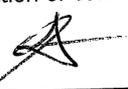
8 Contacts, signatures and declarations

Project title: Karuah East Quarry

8.1 Person proposing to take action

Name Grahame Chevalley
Title Director/Owner
Organisation Karuah East Quarry Pty Ltd
ACN / ABN (if applicable) ACN – 141 505 035
Postal address PO Box 3284, Thornton, NSW 2322
Telephone (02) 4966 3766
Email gc@gwhbuild.com.au

Declaration I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I acknowledge that I may be liable for fees related to my proposed action following the introduction of cost recovery under the EPBC Act.

Signature 

Date 28/7/14

8.2 Person preparing the referral information (if different from 8.1)

Name Brendan Dowd
Title Senior Approvals Consultant,
Organisation Eco Logical Australia Pty Ltd
ACN / ABN (if applicable) 87 096 512 088
Postal address Suite 204, Level 2, 62 Moore Street Austimner NSW 2515
Telephone 02 4201 2202 or 0404 214 940
Email brendand@ecoaus.com.au

Declaration I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.

Signature 

Date