RE: OBJECTION to Proposed Karuah East Hard Rock Quarry - MP 09_0175

I hereby OBJECT to the proposed above Hard Rock Quarry and request the NSW Planning & Infrastructure Department and Minister Tony Bourke reject the entire proposal for the following reasons:

1.Karuah East Hard Rock Quarry P/L is already operating (under the name of Hunter Quarries) an existing Quarry on Lot 21 and 11 with a license to extract 500 000 tons of rock per annum.
2.There is no need for a new quarry while the land where the existing quarry is presently operated by Hunter Quarries still has a proven resource of at least 26 million tonnes of rock in stage 2 and while Stage 1 has never been exploited which is also in direct breach of the Development Consent dated 3.6.2005.
3.No mining of Lot 12 should occur unless Karuah East Quarry (KEQ) demonstrates that they have exhausted resources on their existing Quarry including the leasehold.
4.If that occurs sometime in the future, new mining into lot 12 should only be done from lot 11 where the existing Quarry is located minimising the destruction of environmentally valuable land including the destruction of plant species listed as threatened as well as numerous other wildlife.
5.Currently, the Lot 11 is leased by KEQ with royalties for extraction paid to the owner. The current proposal is to duplicate the existing infrastructure at the expense of the environment.
6.The owner of lot 11 gave assurance that he is willing to let KEQ extract extra rock beyond the present yearly quota of 500 000 tonnes at the going commercial rate of royalty and that he also will consider any reasonable approach from KEQ to mine for access into lot 12 via his Lot 11.
7.We feel very strongly that it is the Department of Planning's duty to minimise the impact on the environment, to keep Big Business under control not to maximise their profits on the expense of the Environment and in general the people of NSW.
8.The people living in the neighbourhood of the new proposed development would be impacted to great degree by visual, noise dust pollution and devalued properties, should a DA be approved.
9.The existing Quarry is a testimony of what should not happen, what was once a unique natural environment is now a Moonscape, an eyesore travelling from Sydney to the North, we do not need more of this.

Sophie Butcher - Proposed Karuah East Hard Rock Quarry MP 09_0175

From: "Suzanne Collins" <suecoll4@dodo.com.au>
To: <information@planning.nsw.gov.au>
Date: 4/19/2013 11:10 AM
Subject: Proposed Karuah East Hard Rock Quarry MP 09_0175
Attachments: Attachment 8 - topographical map of subject area.pdf; Attachment 7 - Redacted email from Michael Kiely, owner of Lot 11.pdf; Attachment 6 - email from Shane Emanuel resident close to existing quarr....pdf; Attachment 5 - 3M Company Material Data Sheet.pdf; Attachment 4 - email from Keystone Lawyers re prosecution of Hunter Quar....pdf; Attachment 3 - Potential Resource Estimate, Lot 11.pdf; Attachment 2 - Distribution of Threatened flora within subject area.pdf; Attachment 1 - Dept Environment data on T. juncea.pdf

Date: 18.4.20013

NSW Department of Planning and Infrastructure

Email: Sophie.butcher@planning.nsw.gov.au

Email: information@planning.nsw.gov.au

Dear Sir/Madam

Proposed Karuah East Hard Rock Quarry MP 09_0175

We are writing to object to the quarry development proposed at Karuah East by Hunter Quarries Pty Ltd. We believe that the project analyses submitted by Hunter Quarries in support of this development have not adequately addressed the social, economic and particularly, environmental factors. Please find attached a List of Issues and Considerations dealing with the details of our concerns. The key points are:

- The proposed quarry is to be located in a pristine and unique environmental area which, according to expert reports, would severely impact threatened flora. This impact is unacceptable given the fragility of the area into which the proposed quarry will intrude. The area will be further fragmented, devaluing it as fauna and flora habitat.

- The loss of Mt Karuah to quarrying would represent a change in the nature of the area, greatly increasing the visual impact of the existing quarry.

- The quarry operations would generate serious levels of noise and dust which would have a significant and unacceptable impact on plants and animals including endangered species.

- The sense of place and community of the neighbouring residents of Hunterview and Halloran roads has already been compromised by the existing quarry operation and this would be exacerbated by the adverse impact of the proposed mining operation in respect of noise, dust and visual pollution.

- Residents who chose the area for its peaceful and pristine rural environment will see a significant and unacceptable devaluation of their properties if the proposed project proceeds. It is unlikely that these residents would have purchased in the area had they been aware of the Hunter Quarries' plan and its modus operandi.

- Since it would appear that the existing quarry has ample reserves to meet future output requirements the logic to develop Karuah East is questionable.

- Hunter Quarries has failed to meet a number of environmental approval conditions relating to the existing quarry. As such, Hunter Quarries cannot be relied upon as a good corporate citizen. From our investigations it would appear that their motive in proposing the new quarry has much to do with their inability to effectively communicate with the owner of the mined property and far less so with their approach to sensible business development.

We trust that the information in our detailed submission (attached) will enable you to fully consider our concerns about the proposed development. We wish to claim submitter's rights to supply further information. Also, should you require any further information we would be happy to oblige or meet with you if you so wish.

Yours sincerely,

Suzanne Collins, 309 Halloran Road, North Arm Cove 2324

For the Hunterview and Halloran Road Neighbourhood Community against the Karuah East Quarry Expansion

PLEASE NOTE I CLAIM SUBMITTERS RIGHT FOR OBJECTION UNTIL FINAL DECISION IS MADE IN REGARD TO MP 09_0175

Damage to the local environment

1. A total of Four Threatened fauna species and three Threatened flora species were recorded within the study area according to the report by RPS produced for the proponent (Appendix I, page 36). There were 52 fauna species recorded at the site by RPS – 34 birds, nine mammals, three reptiles and 5 frogs and toads. Of these there were two vulnerable bird species – the Powerful Own and the Varied Sittella; Two vulnerable bat species – The Eastern Freetail-bat and the Eastern Falsistrella; One vulnerable snake species- Stephens' Banded Snake. There were three vulnerable flora species recorded – Tetratheca juncea; Grevillea parviflora (subs parviflora) and Asperula asthenes.
2. The development will significantly impact the Threatened floral species Tetratheca juncea (Black-eyed Susan) and Grevillea parviflora subs. parviflora (the northern-most recorded instance of this species) and Asperula asthenes (Trailing Woodruff). The report by RPS produced for the proponent (Appendix I, page 1) states:

> A total of three (3) Threatened flora species listed under the NSW *Threatened*
>
> *Species Conservation Act* 1995 (TSC Act) and Commonwealth *Environmental Protection and Biodiversity Assessment Act 1999* (EPBC Act) were recorded within the study area during the flora surveys, these being:

i. *Tetratheca juncea* (Black-eyed Susan) – 6567 plant clumps were recorded in the study area (of which 2742 clumps occur within the proposed quarry development footprint);
ii. *Grevillea parviflora* subsp. *parviflora* (Small-flower Grevillea) – 100 suckering stems were recorded from 9 patches (32 stems were recorded in the proposed quarry development footprint); and
iii. *Asperula asthenes (*Trailing Woodruff*)* – 2 patches recorded along Yalimbah Creek outside the proposed quarry development footprint within the existing conservation offset lands on Lot 12.

> An assessment of impacts using the framework prescribed under Section 5A of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) (commonly referred to as '7 Part Test of Significance') was carried out for these 3 Threatened flora species and concluded that the Proposal had the potential to have a significant impact on two of these

species, these being *Tetratheca juncea* and *Grevillea parviflora* subsp.*parviflora*.

1. Tetratheca juncea is listed as a vulnerable species under both the TSC Act and EPBC Act. At 4.6 of the RPS report, the ecologists state that "the proposal will result in the direct removal of 2742 clumps of the Threatened sub-shrub Tetratheca juncea" and that a further 839 clumps close to the site would be adversely impacted (see also Figure 6 of the RPS report).

   Information at this link indicates that the concentration of this species at the development site is of major significance:

2.

   (part of this report is at Attachment 1 to this submission)

   The section 5A assessments at Appendix 6 of the RPS report states that the proposal will result in the loss of 41% of the total population identified at the study area and a further 13% that will be vulnerable to edge effects, i.e., "54% of the total site population will be impacted". The author goes on to say "DSEWPAC (2011) states that the species will likely have a very high risk of significant impact if a proposed action will directly or indirectly affect an ‘important population’ of Black-eyed Susan resulting in a loss of greater than 25% or 1000 clumps (whichever is the lesser)". The affected population meets this definition. The Section 5A report also states that "habitat fragmentation has potentially adverse consequences for pollen and seed distribution of *T. juncea*", will likely lead to the loss of genetic variation, increased divergence and reduced abundance and effectiveness of pollinators. The author points to such fragmentation arising from the proposed development affecting other populations of the species. The author concluded that "the proposed activity on the subject site has the potential to have a significant effect on *T. juncea*.
3. The RPS report identified 100 suckering stems of the species grevillea parviflora subs parviflora at the study site (see Attachment 2 to this submission from the RPS report). The report states that the species on the subject site represents an "important population" under the SEWPAC Significant Impact Guidelines as it would represent the northern limit of the species range. Of the 100 plants, 32 would be directly destroyed by the proposal and the remainder will be impacted by edge effects from related quarry activity and the reduction of known habitat. The Section 5A assessment (Appendix 6) that the proposal "may have a significant impact on the life cycle" of the species such that "a viable local population of the species is likely to be placed at risk of extinction". See information on the current population of this species at:

4.

   and at:

5.
6. In addition to this, four threatened fauna species listed under the TSC Act were recorded within the study area during the project field surveys, namely the Powerful Owl, Varied Sittella, the Eastern Freetail Bat and the Eastern False Pipistrelle. The ecologists added "potential habitat exists on the subject site for a further 14 Threatened fauna species previously recorded in the locality" (RPS Assessment Report, page 1). The RPS report also states (page 39 – 3.3.6.3) that "the subject site provides extensive foraging and roosting habitat for a suite of threatened microchiropteran bat species" and "abundant blossom resources" for Grey-headed Flying-foxes as well as "extensive breeding, sheltering and foraging opportunities for a diversity of reptile species" (3.3.6.5). The site also provides potential habitat for

Stephen's Banded Snake which has been previously recorded on adjacent Lot 12 offset lands (which will be devalued by being cut off by the development proposal).

7. The presence of these species indicates the high conservation values of the area designated by the proponent for the quarry and crusher site. Supporting this view is the finding by RPS that a total of 52 fauna species were recorded within the subject site (RPS report, page 36). The ecologists also note at 3.3.6.6 that:

> The subject site is represented by an undulating topography, encompassing ridges, which are colonised by dry forest communities, with intervening gullies that provide moist and sheltered conditions for wet sclerophyll plant communities. This diversity of forest habitat provides an extensive mosaic of habitat for a wide range of common forest avifauna. The subject site has an abundance of *Allocasuarina* tree species,which are the favoured food source of *Calyptorhynchus lathami* (Glossy Black-Cockatoo).

8. The subject site is part of a bushland remnant comprising almost 300 hectares, the connectivity of which has already been affected by the intrusion of the existing quarry but which will be much more seriously fragmented by extension of the quarry into the centre of this fragment under the proposed plan. The RPS report points to the adverse effects of further fragmentation (RPS 3.3.6.7 and 4.3 and Figure 9) and that "the removal of 30.68 hectares of forested habitat on the subject site as part of the proposal will further fragment the 300 hectare remnant and may isolate the south-west portion of it (bushland on Lot 11, existing offset areas of Lot 12) for less mobile arboreal, terrestrial mammals, Koala, reptiles and amphibians" and that "the size of this isolated fragment may be too small to support resident fauna species, particularly territorial mammals". The author adds that "this potentially isolated remnant and proximate remnants will be tenuous at best given the absence of connective forest cover" with a consequent affect on the glider population. To that we would add that the narrowing of the corridor to the east of the proposal on the remainder of Lot 13 and Lot 14 would significantly reduce that area's value as part of the larger remainder of the remnant bushland and the ability of gliders to traverse the nearby Pacific Highway. We note that the most suitable glide path for such animals from the south of the Highway is directly opposite the proposed site and the remnant that would become isolated (see topological diagram Appendix K, sub-appendix A to the proponent's EIS, reproduced at Attachment 8 to our submission).
9. The proposal will generate effects that "will increase the edge/area ratio within the retained bushland habitats on Lots 12 and 13 and will render these areas more vulnerable to weed invasion including *Lantana camara*, rubbish dumping, predation from exotic fauna (dogs) and changes in light/wind regimes" which may ultimately adversely affect native species including the Threatened species identified. (See RPS report 4.5 and Figure 9). The entry of quarry machinery into the site is likely to result in the infection of native plants introduction of the water mould, *Phytopthora cinnamomi*, which attacks the roots of plants and can reach epidemic proportions "causing death of large numbers of plants". *P. cinnamomi* can also be transmitted via water courses and stormwater runoff to other adjacent areas. (See RPS report 4.10.3).
10. The consultant concluded that because of the adverse effects on the State and Federally listed Threatened flora species *T. juncea* and *G. parviflora subs. parviflora*, the proposal should be referred to the Commonwealth department of Sustainability, Environment, water, Population and Communities (SEWPAC).

A. Proposed Offset

1. The proponent's submission claims that the offset proposed achieves a ratio of 3.7:1 (see Eco Logical Australia report in Appendix I). While this may be true of the total area of land offset it has not been established that the Threatened species *Tetratheca*

juncea and *Grevillea parviflora* exist in one of the offset areas (Tahlee).

2. It has also not been established that the habitat for these species (Smooth barked Apple-Red Bloodwood-Stringybark Dry Sclerophyll Forest) exist in a sufficient area of the offset sites to compensate even in a 1:1 ratio. The area of this type of forest to be lost from the development is 9.74 ha (Eco Logical report, Table 1). The area containing this type of forest at Tahlee is "about" 5.6 ha (Eco Logical, Table 2). It should be noted that the 9.7 ha lost figure does not include losses due to edge effects in the proposed offset at Lots 13 and 14. The distribution of *T. juncea* in figure 9 of the RPS report indicates a small area of this habitat (possibly no greater than one half of the area to be lost) in Lots 13 and 14, i.e., about 5 ha. With edge effects accounting for about another 30% of the area directly affected (based on 800 clumps lost out of nearly 2700), the total area lost to T. juncea would be approximately 13 ha. The offset at lots 13 and 14 (as calculated above, roughly 5 ha based on the estimated distribution of T. juncea in non-edge affected areas – RPS, Figure 6) and at Tahlee (5.7 ha upon which the existence of *T. juncea* is yet to be established) gives a total of no more than 12 ha. It appears that the offset of this type of habitat is no more than 1:1 without the establishment of the existence of either *T. juncea* or *G. parviflora* at half of the offset.
3. The proponent investigated the purchase of Biobank credits for T. juncea but the Biobank Credit register did not contain any such credits for sale (Eco Logical report 3.1), an indication of the low occurrence of this species.
4. There appears to be no investigation of the management of the existing offset on land owned by the proponent (the southern portion of Lot 12). The competence of the existing operator, Hunter Quarries Pty Ltd and the related entity Karuah East Quarry Pty Ltd has not been established and may be questionable (See evidence of breaches to current consent at Attachment 4 to this submission). This is particularly important given the proximity of the offset to the existing quarry and the likelihood of edge effects including quarry related activity. They should present baseline data on the state of the offset at the time of the consent for the existing quarry on Lot 11 and this should be compared with the current state of this offset. It is noted that this offset is likely to be severely affected by becoming isolated as part of the new development.
5. The offset proposal does not investigate or take into account the high probability that the isolated fragment of land (including the Lot 12 offset) referred to in the RPS report, (RPS 3.3.6.7 and 4.3 and Figure 9) will lose biodiversity and its value as habitat for affected fauna and flora. Any offset should also account for the likely adverse effects of this isolation.

A. Health and Wellbeing

1. Residents and landowners are also concerned at the health implications of a processing plant so close to homes as well as the volume of dust that arises directly from the mining activity at the quarry. Andesite is classified as a human carcinogen because of its quartz content (see attachment, 3M Materials Safety Data Sheet, Page 2 at Attachment 5 to this submission). Observers of the existing quarry report seeing clouds of dust rising from the quarry, particularly when blasting occurs. Nearby residents report nose bleeds they believe are related to excessive dust from the quarry (see email from the Emanuel Family, at Attachment 6 to this submission). Residents also report concerns about dust in their tank water. Despite this, the proponent's report from SLR states that they "are not aware of any air quality complaints". It appears that the consultant's did not talk to the Emanuel family who are only one kilometre from the existing quarry. The issue also raises questions for the safety of workers at the proposed and the existing site.
2. The proponent's Noise and Blasting Impact Statement (page 29) concludes that

"No increase in road traffic noise levels due to quarry contributed traffic would be discernible at any residential location adjacent to the Highway". We note that this is a very vague statement. What constitutes "adjacent"? It seems that the careful wording implies that residents not adjacent will hear quarry related traffic. The further implication given the proposed location of the crusher and other plant and related truck movements is that noise, including very high levels of low frequency noise identified by the SLR report, will indeed be heard by nearby residents. Low frequency noise has the capacity to produce documented ill effects over a much greater distances than the monitoring units set up for the proponent's noise study as detailed from the following abstract:

Low-frequency noise is common as background noise in urban environments, and as an emission from many artificial sources: road vehicles, aircraft, industrial machinery, artillery and mining explosions, and air movement machinery including wind turbines, compressors, and ventilation or air-conditioning units. The effects of low-frequency noise are of particular concern because of its pervasiveness due to numerous sources, efficient propagation, and reduced efficacy of many structures (dwellings, walls, and hearing protection) in attenuating low-frequency noise compared with other noise. Intense low-frequency noise appears to produce clear symptoms including respiratory impairment and aural pain. Although the effects of lower intensities of low-frequency noise are difficult to establish for methodological reasons, evidence suggests that a number of adverse effects of noise in general arise from exposure to low-frequency noise: Loudness judgments and annoyance reactions are sometimes reported to be greater for low-frequency noise than other noises for equal sound-pressure level; annoyance is exacerbated by rattle or vibration induced by low-frequency noise; speech intelligibility may be reduced more by low-frequency noise than other noises except those in the frequency range of speech itself, because of the upward spread of masking.

1Institute of Environmental Medicine, Karolinska; Institute and Department of Psychology, Stockholm University, Stockholm, Sweden; 2Department of Psychology, University of Sydney, Sydney, Australia

We have reports from residents almost four kilometres east of the existing quarry hearing noise from the crusher plant despite the intervening cliff face of the present quarry. How much worse will this noise be for residents if the plant moves to the proposed site?

3. It must also be noted that the noise levels calculated by SLR are average levels of noise over 15 minute intervals and do not account for the impact on residents of very loud noise at shorter intervals.
4. From the watershed of the area that drains into Bulga Creek, Mt Karuah is the most significant feature and shields this valley which includes properties in Hunterview and Halloran Roads, from strong westerly winds. The removal of the top of Mt Karuah will severely detract from the appearance of that feature both from the valley and surrounding hilltops and from the Pacific Highway to the south-west. It will also open the valley to the strong westerly winds with consequential environmental and aesthetic effects.
5. The community that bought into this area after the division of the land by the AMP Society around 2002 and 2003 did so in the expectation of being able to quietly enjoy their surroundings. The area now includes people running small-scale cattle and horse grazing and breeding businesses as well as those in the middle of their working life who work locally as well as retirees. Most of these people have the majority of their wealth tied up in these properties which will be severely affected by the proposed development.

A. The Development in its current form is entirely unnecessary

1. The preference of our group is that there should be no expansion of the existing quarry. We have information from Michael Kiely, the landowner of Lot 11, which is the site of the current quarry operations by Hunter Quarries, a company associated with the proponent, that there are ample resources that remain available to Hunter Quarries on Lot 11. An estimate by consultant geologist, Larry Cook & Associates estimated in March 2010, that there remained 16.7 million tonnes of minable hardrock resources available on Lot 11 directly adjacent to the southern side of the existing quarry. (See Attachment 3 to this submission). That would be sufficient for another 30

years of quarrying. There are further large unknown reserves in the existing stage 1 and 2 of the existing Quarry. We are in possession of an email from the landowner of Lot 11 that states that he is willing to let the proponent quarry this resource additional resource "at a going commercial rate of royalty per ton (sic)". Paragraph 2.13.1 of the environmental Assessment report reads as follows:

> The proponent has been investigating ways to extract the available resource on Lots 12 and 13 for a number of years. As part of these investigations the key available alternate option was to extend the existing Karuah Quarry currently operating on adjoining land to the west (on Lot 11) into Lots 12 and 13. It is noted however that Karuah East Quarry Pty Ltd are not the owner of Lot 11 and only has rights conferred under existing lease terms. These terms do no confer rights to require the owner of Lot 11 to provide a legal right of way over Lot 11.
>
> Significant effort has been undertaken by Karuah East Quarry Pty Ltd to secure access over Lot 11 however this has not been able to be achieved. As a consequence, Karuah East Quarry Pty Ltd has no other option than to pursue a new stand alone quarry operation on Lots 12 and 13.
>
> It should be noted however, that the final design of the proposed Karuah East Quarry does not prevent extending the existing Karuah quarry into Lot 12 in the future should an agreement be reached with the owner of Lot 11.

2. This paragraph 2.13.1 and also correspondence we have indicates that the proponent would prefer to access the proposed site through Lot 11. That would obviate the need for placing the plant at the site of the endangered species of flora and the destruction of a large swathe of habitat for other flora and fauna. As stated, our preference is that there be no expansion and we question the need for any expansion given available resources.
3. While not resiling from our objections to the proposal, it would be a tragedy for this fragile and environmentally important site if this development goes ahead in its current form with the consequent destruction of vulnerable species and their habitat on Lots 12 and 13, as well as severe loss of amenity to nearby residents simply because a mutually satisfactory agreement cannot be reached between two landowners – those associated with the quarry who own Lots 12 and 13 and the owner of Lot 11, Mr Michael Kiely.
4. We understand that an offer of sale was made to Mr Kiely but he refused, which is his right. However, his statement that he is willing to allow access at a commercially reasonable rate should be taken up if the decision maker does not agree with our proposition that no expansion should occur. (See attached email from Mr Kiely).

Biodiversity

Species Profile and Threats Database

Glossary

Tetratheca juncea — Black-eyed Susan

SPRAT Profile

For information to assist proponents in referral, environmental assessments and compliance issues, refer to the Policy Statements and Guidelines (where available), the Conservation Advice (where available) or the Listing Advice (where available).

In addition, proponents and land managers should refer to the Recovery Plan (where available) or the Conservation Advice (where available) for recovery, mitigation and conservation information.

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Legal Status and Documents

EPBC Act Listing Status	**Listed as Vulnerable**
Listing and Conservation Advices	*Commonwealth Listing Advice on* Tetratheca juncea (Threatened Species Scientific Committee (TSSC), 2005be) [Listing Advice]. *Commonwealth Conservation Advice on* Tetratheca juncea (Threatened Species Scientific Committee (TSSC), 2008yk) [Conservation Advice].
Recovery Plan and other EPBC Act Plans	*Threat abatement plan for disease in natural ecosystems caused by* Phytophthora cinnamomi (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009w) [Threat Abatement Plan].
Policy Statements and Guidelines	*Referral guidelines for the black-eyed susan,* Tetratheca juncea (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011h) [Admin Guideline].
Federal Register of Legislative Instruments	*Declaration under s178, s181, and s183 of the Environment Protection and Biodiversity Conservation Act 1999 - List of threatened species, List of threatened ecological communities and List of threatening processes* (Commonwealth of Australia, 2000) [Legislative Instrument].
State Government Documents and Websites	NSW: *Black-eyed Susan Profile* (NSW Department of Environment and Climate Change (NSW DECC), 2005s) [Internet]. NSW: *Threatened Species Information-Tetratheca juncea* (NSW National Parks and Wildlife Service (NSW NPWS), 2000d) [Information Sheet]. NSW: *Environmental Impact Assessment Guidelines Tetratheca juncea* (NSW National Parks and Wildlife Service (NSW NPWS), 2000e) [Internet].

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Naming

Scientific name	*Tetratheca juncea* [21407]
Family	Tremandraceae:Polygalales:Magnoliopsida:Magnoliophyta:Plantae
Species author	Smith
Infraspecies author	
Reference	A Specimen of the Botany of New Holland (1 Oct. 1793) 5, t. 2.

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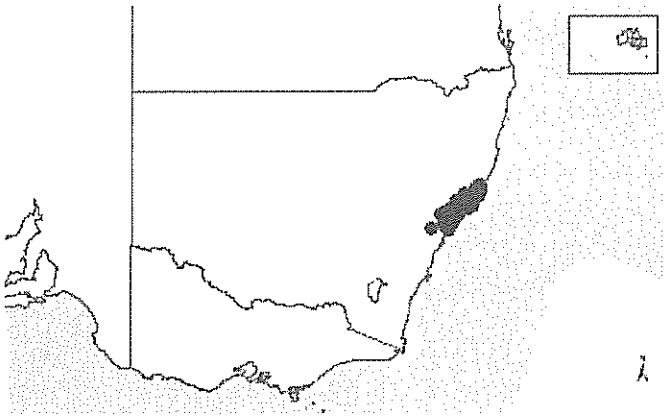
Distribution Map

Distribution map



This is an indicative distribution map of the present distribution of the species based on best available knowledge. See map caveat for more information.

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Illustrations

Illustrations Google Images

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Australian and State/Territory Government Legal Status

The current conservation status of Black-eyed Susan (*Tetratheca juncea*), under Australian and State Government legislation, is as follows:

National: Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act (1999).*

New South Wales: Listed as Vulnerable under the *Threatened Species Conservation Act 1995.*

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Taxonomy

Scientific name: *Tetratheca juncea*

Common Name: Black-eyed Susan

The taxonomy of this species is currently under review with a strong argument for considering *Tetratheca* as a member of the family Elaeocarpaceae (Crayn et al. 2006).

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Description

Black-eyed Susan is a low shrub that grows in clumps of single or multiple stems arising from a single rootstock. Stems are up to 1 m long, hairless with minute tubercles, and with two or three narrow wings that give them an angular appearance (Benson & McDougall 2001; NSW DECC 2005s; Harden 1992). The distinctly angular, winged structure distinguishes Black-eyed Susan from other members of the *Tetratheca* genus (Thompson 1976). Juvenile plants have alternate narrow lanceolate (lance-shaped) leaves (Norton 1994). Mature plants are usually leafless but if leaves are present they are alternate, hairless, usually reduced to narrow triangular scales up to 3 mm long, or otherwise narrow-elliptic to 20 mm long and approximately 5 mm wide with flat or recurved margins (Harden 1992).

Plants of Black-eyed Susan are usually sprawling and can be difficult to detect amongst other vegetation when not flowering (NSW DECC 2005s; Payne 2001). An individual plant can grow into a clump of as many as 200–500 individual stems of genets (plants growing from seed) and ramets (plants growing from asexual rhizomal spread) (Bartier et al. 2001) which can bear several hundred flowers (Payne 2001). Gross and colleagues (2003) report that clumps appear to be long-lived, with the inside of the clump becoming senescent while the outside of the clump remains vigorous. Plant clumps tend to be low growing and straggly amongst low dense vegetation but in taller heath the plants can reach 1.5 m in height and there is a tendency for them to scramble (climb) (Payne 2001).

Black-eyed Susan has hanging pink flowers with the dark centre giving rise to the common name (Gross et al. 2003). Flowering occurs between July and December (Benson & McDougall 2001; Harden 1992) with the peak flowering period occurring between the start of September to the end of October (Driscoll 2009). The flowers face downwards and usually have four petals which range from white to pink to dark purple in colour (NSW DECC 2005s; Payne 2001; Thompson 1976) and have pink sepals ranging from 1–1.5 mm long (Harden 1992). However Driscoll (2003) also recorded flowers having five, six and seven petals proportionately arranged. The flowers occur singly or in pairs along the stem suspended on a peduncle approximately 5–10 mm in length (Harden 1992). Flowers are bisexual, odourless and nectarless (Gross et al. 2003).

Floral morphology

Gross and colleagues (2003) described the floral morphology in detail and noted that flowers have eight anthers recurved around the pistil (carpel). Anthers are poricidal and contain a deep-red tapetal fluid at the base that is slightly oily. Pollen is contained within the tapetal fluid (Driscoll 2003). The style projects from the corona of anthers and elongates with age. The stigma is minute (less than 0.2 mm wide). Pollen is 80% viable at first but by 14 days is inviable. Only a few pollen grains are passively shed from the anthers (sometimes landing on the stigma), otherwise pollen has to be actively removed from the anthers (Gross et al. 2003).

Fruit and seed morphology

The *Tetratheca* fruit is a non fleshy capsule which opens spontaneously at maturity to release brown, shiny seeds that have a large chalazal appendage on the outside of the seed (Belairs et al. 2006). The fruit capsule is obovate and 6–8 mm in length, with seeds approximately 4 mm long (Benson & McDougall 2001; Harden 1993). Seeds are produced in late spring and mature from November to February. However, seeds have very low viability (Bellairs et al. 2006) and the longevity of the soil seed bank is short (Bartier et al. 2001; Bellairs et al. 2006) indicating that Black-eyed Susan is dependant on annual seed set for seedling recruitment.

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Australian Distribution

Historic distribution

Black-eyed Susan is endemic to NSW and was historically distributed from Port Jackson and Botany Bay in Sydney, north to Bulahdelah and Lake Macquarie on the central coast of NSW (Harden 1992; Benson & McDougall 2001; Driscoll 2003). Payne (2001) suggests that there was a localised disjunct in populations of the Sydney area with those found between Wyong, Lake Macquarie and Bulahdelah. Payne (2001) also believes the Bulahdelah population to be disjunct.

Current distribution

Black-eyed Susan is now regarded as extinct in the Sydney area (Harden 1992; Payne 2001; Driscoll 2003; Gross et al. 2003). The last recorded collection in the Sydney area occurred in 1913 at Bexley (Payne 2001). The species has now contracted to 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 (NSW NPWS 2000e; Payne 2001; Driscoll 2003; Gross et al. 2003).

It is currently found in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock (NSW DECC 2005s; Payne 2001), with North Wyong and Lake Macquarie appearing to be the strongholds of the species (Payne 2001). The distribution of Black-eyed Susan is not known to overlap with any threatened ecological communities listed under either the EPBC Act or the TSC Act.

The current extent of occurrence is estimated to be between 1594 and 1861 km² (TSSC 2005be). These estimates appear to cover all subpopulations located during detailed surveys by Payne (2001). No specific information is available on past changes in the extent of occurrence. No information is available to estimate or indicate future changes in the extent of occurrence.

The current area of occupancy is estimated at 46 km². These figures are based on the number of 1 km² grid squares in which the species is thought to occur. The estimate is considered to be of low reliability, as recent ground-truthing at all populations has not occurred. No specific information is available on past changes in the area of occupancy. No information is available to estimate or indicate future changes in the area of occupancy.

Black-eyed Susan is grown in the Australian National Botanic Gardens, Canberra; the Botanic Gardens of Adelaide; Mt Annan Botanic Gardens near Sydney (CHABG 1992), the Royal Botanic Gardens, Sydney (Meredith & Richardson 1986) and Newcastle Botanic Gardens (Bellairs et al. 2006). Green Point Nature Reserve is a site where plants of the species have been translocated, but with little success (NSW NPWS 2000d).

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Surveys Conducted

Detailed surveys conducted prior to 2005 revealed approximately 239–250 locations of Black-eyed Susan, with distribution considered to be severely fragmented (TSSC 2005be). As of early 2010, the Atlas of NSW Wildlife has over 2000 records for Black-eyed Susan with a much less fragmented distribution.

Between June 1991 and November 2007, approximately 30 surveys were conducted in the area between Wyong and Bulahdelah. Most surveys have been undertaken because of proposed development projects.

In June 1991, Payne (1993) conducted field investigations of populations of Black-eyed Susan in the Munmorah area. A corridor about 5 km long between Munmorah and the Wallarah Colliery was examined as well as 12 km^2 surrounding this area, including Munmorah State Recreation Area and sites at Point Wolstoncroft. Both populations and isolated plants were recorded. A population was designated if there was more than 20 plant clumps along a ridge with a length of 100 m (Payne 1993). Fourteen populations were identified.

In September 1992, 323 plant clumps were recorded at seven sites in Munmorah State Recreation Area (Payne 1993).

A survey was undertaken between August 1997 and 30 December 1999 (during the flowering seaon) for Lake Macquarie Council (Payne 2001b). In 1998 another search was made to the north and east of Lake Macquarie, and within NSW NPWS managed lands. A further survey was completed between September and December 1999 in the Karuah to Bulahdelah area and west of the lakes. The surveys located 162 subpopulations in the Lake Macquarie Local Government Area (Payne 2001b).

Between 2001 and 2005 vegetation mapping and surveys were undertaken for the Branxton Freeway Link. Vegetation clearing figures that were presented in the EIS (Connell Wagner 1995 in Acacia EP 2007) and the Representations Report (RTA 2001 in Acacia EP 2007) were based on vegetation polygons delineated from aerial photography and limited ground-truthing.

In 2005 Biosis Research updated the Lower Hunter and Central Coast Regional Environmental Management Strategy (LHCCREMS) mapping to incorporate the results of targeted flora surveys and selected ground-truthing, as well as threatened species that have been gazetted since approval in 2001. Three subpopulations of Black-eyed Susan were found, of 2, 33 and 123 clumps on the site, although development would only affect the two subpopulations of 2 and 33 clumps (Acacia EP 2007).

A survey on the Moonee Colliery Site, in the Wyong Local Government Area, was undertaken in March 2003 by Wildthing. Black-eyed Susan was found on the perimeter of the site (Ecobiological 2007).

Wildthing undertook a flora survey in the Gwandalan site from March 2003 until August 2003. Black-eyed Susan was found in forested areas of the site (Ecobiological 2007).

A survey in the Crangan Bay Site was carried out by Wildthing in November 2003. Over 30 ha of heavily populated Black-eyed Susan was present at the site (Ecobiological 2007).

In July 2005, and on 26 July 2005, HLA undertook a survey on 56 ha of land located north of the existing Eraring Power Station ash dam. The study area included land owned by Eraring Energy and land to be purchased. There were 684 clumps of Black-eyed Susan observed within the study area (HLA 2006).

A survey of the proposed gas turbine facility, gas connection pipeline and inlet facility at Munmorah in the Wyong Local Government Area was undertaken in 2005. A targeted survey was undertaken on 30 and 31 August 2005 to coincide with the flowering period of Black-eyed Susan. A second targeted survey was undertaken on 12 and 13 December to coincide with a later flowering time of Black-eyed Susan. No Black-eyed Susan plants were found on either occasion (Parsons Brinkerhoff 2005).

Between October 2002 and February 2006, the Wyong Employment Zone was surveyed by Forest Fauna Surveys. Black-eyed Susan plants were located in each planning precinct: three populations in Precinct 14 in areas not zoned for development; five populations in the central part; and ten populations near the F3 Freeway. There were a further five populations in Precincts 11 and 13, and eight populations, each supporting single plants, or a few plant clumps, in Warnervale Business Park (Forest Fauna Surveys 2007).

Between July 2005 and February 2006 Ecobiological Pty Ltd undertook a targeted search in the Proposed Moonee Colliery Site development area. Black-eyed Susan was found on the site mostly to the west in undisturbed bushland outside the development area (Ecobiological 2007).

Additional Black-eyed Susan was identified in the Moonee Colliery Site north of Montefiore Street (Ecobiological 2007) in a

survey in 2006.

Between 2001 and 2006 Conacher Travers undertook surveys within the Wallarah Peninsula. Approximately 7022 indivdual Black-eyed Susan plants were identified in development precincts within the peninsula and Wallarah National Park areas. A further 1939 occur in "potential" habitat in the Wallarah Peninsula area (Conacher Travers 2006).

In 2006, 28 Black-eyed Susan plants were recorded by Ecovision Consulting (2006) in the Cessnock LGA between Cessnock and Kurri Kurri, on land rezoned for development.

A survey by HSO in 2007 confirmed the extent of the main population of Black-eyed Susan, within the Narrabeen Snappy Gum Forest in the north-west of the site, to be 178 plants (HSO 2007e).

In September 2007 flora surveys were carried out across the Catherine Hill Bay site (HSO 2007a). A total of 8042 Black-eyed Susan plants were located during the targeted surveys within the site. Of these over 7057 (88%) will be retained within the conservation lands to the south and west of the development. Another large population of 985 Black-eyed Susan individuals was located within the site of the future development estate (HSO 2007a).

Targeted Black-eyed Susan surveys within Catherine Hill Bay land owned by Coal and Allied Operations were undertaken from 12–16 November 2007 by HSO. The majority of land was located between the coast at Catherine Hill Bay and the shores of Lake Macquarie at Crangan Bay, with a smaller portion of land located at Kanangara Drive, Gwandalan. While subpopulations of Black-eyed Susan were identified during previous investigations (EcoBiological 2007) the population size was not assessed. The subpopulations identified in 2006 were targeted for detailed survey. Around 583 Black-eyed Susan plants were located during the targeted surveys within the site. Approximately 369 clumps were to be removed as part of the development proposal. Suitable habitat within the remainder of the development lands was searched. The identification of the extent of the species occurrence within the offset lands was performed by random meander techniques and no parallel transects or individual counts were undertaken, but the numbers were expected to be large (HSO 2007d).

Targeted and significant flora surveys were carried out in 2007 by HSO in the proposed Gwandalan site situated within land owned by Coal and Allied Operations, on the Gwandalan peninsula. A total of 10 095 Black-eyed Susan plants were located. Of these, 3498 plants were located within the development site while 6591 plants were planned to be retained within the conservation lands to the south and west of the development estate (HSO 2007b).

In November 2007 a survey was conducted by HSO within the Nords Wharf site. Some 6798 Black-eyed Susan plants were located during the targeted surveys. Of these, 5933 (88%) were to be retained within the conservation lands to the south and north of the development estate. The remaining 865 (12%) individuals were to be removed as part of the proposal (HSO 2007f).

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Population Information

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 surrogate for individual plants. The total population size of Black-eyed Susan has previously been estimated to be between 9881 and 11 893 plant clumps (approximately 10 000 individuals) (Hogbin 2002b, cited in TSSC 2005be).

In recent years, however, there have been a significant number of targeted surveys for Black-eyed Susan, primarily associated with environmental assessments for land development. Unfortunately, much of this work is unpublished company confidential data and not readily available. However, a review of available data and estimates made by Driscoll (2009) reveals that the population estimate made by Hogbin (2002b, cited in TSSC 2005be) may grossly underestimate the total population of Black-eyed Susan.

Driscoll (2009) divides the entire geographic distribution of Black-eyed Susan into three metapopulations:

- southern, and presumed extinct, in the Sydney area
- central coast, from Wyong to Beresfield
- northern, from Karuah to Bulahdelah.

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 (Payne 2001b; TSSC 2005be). The major area in the Lake Macquarie region is on the coastal ridges between Munmorah and Swansea, Belmont and Charlestown (Payne 2001b).

Known populations of Black-eyed Susan:

Locality	Land tenure	No. of Plant Clumps
Awakabal	Nature Reserve	87
Glenrock	Nature Reserve	1194–1434
Karuah	Nature Reserve	Approx 100
Lake Macquarie Foreshore Reserve	State Recreation Area	29
Lake Macquarie	Lake Macquarie LGA	123
Munmorah (Birdie Creek South)	State Recreation Area	296–323
Wallaroo	Nature Reserve/State Forest	Approx 1000
Green Point	Recreation Reserve	>1000
Wallarah	National Park	9900 (4 subpopulations)
Jilliby	State Recreation Area	
Wallarah Peninsula	Lake Macquarie LGA	Approx 15 000
Wyong	Wyong LGA	162 subpopulations
Newcastle	Newcastle LGA	
Port Stephens	Port Stephens LGA	
Cessnock-Heaton	State Forest	
Cessnock	Cessnock LGA	28
Great Lakes	Great Lakes LGA	
Awaba	State Forest	>1000
Red Head	Lake Macquarie LGA	>1000
Maitland	Maitland LGA	
Kurri Kurri Interchange	Cessnock LGA	158
Bulahdelah	State Forest	
Swansea	Wyong LGA	
Gwandalan Site	Wyong LGA	10 095
Kanangra Drive, Gwandalan	Wyong LGA	178
Nords Wharf	Private land	6605
Jewells Swamp	Lake Macquarie LGA	Extinct?
Pindimar	Port Stephens LGA	
Belmont	Lake Macquarie LGA	
Charlestown	Lake Macquarie LGA	
Catherine Hill Bay	Wyong LGA	8013
Charmhaven	Wyong LGA	90
Summerland Point	Wyong LGA	Significant
Hillsborough	Lake Macquarie LGA	
Cardiff South	Lake Macquarie LGA	
Mount Hutton	Lake Macquarie LGA	
Whitebridge	Lake Macquarie LGA	
Morisset	Lake Macquarie LGA	
Cooranbong	Lake Macquarie LGA	Large
Plattsburg	Newcastle LGA	
Wakefield		250

West Wallsend	Lake Macquarie LGA	
Killingworth	Lake Macquarie LGA	Large
Rankin Park	Cessnock LGA	
Highfields	Lake Macquarie LGA	
Barnsley	Lake Macquarie LGA	
Cardiff Heights	Lake Macquarie LGA	
Nelson Bay	Port Stephens LGA	
Wyee	Wyong LGA	
Doyalson	Wyong LGA	
Lake Haven	Wyong LGA	
Tuggerah	Wyong LGA	
Vales Point	Wyong LGA	Extinct
Newstan Colliery	Wyong LGA	Extinct
Five Dock (1884)	Concord LGA	Extinct
Cooks River (1892, 1905)	Marrickville LGA	Extinct
Carlton (1893)	Kogarah LGA	Extinct
Tempe (1891, 1893)	Marrickville LGA	Extinct
Kogarah (1893)	Kogarah LGA	Extinct
Bexley (1913)	Rockdale LGA	Extinct
Undercliff (1889)	Marrickville LGA	Extinct
Port Jackson (1802-5)	LGA (Sydney)	Extinct
Hurstville (1885)	Hurstville LGA	Extinct
Helensburgh (1893)	Wollongong LGA	Extinct
Canterbury (1892)	Canterbury LGA	Extinct
Tempe-Arncliffe (1886)	Marrickville LGA	Extinct

(After Benson & McDougall 2001; Conacher Travers 2007 in HSO 2007f; Driscoll 2003; Ecovision Consulting 2006; Forest Fauna Surveys 2007; HSO 2007a, 2007b, 2007d, 2007e; Murray & Bell 2001; NSW NPWS 2000d; Payne 1993, 2001b; TSSC 2005be; Wyong Shire Council n.d.).

The age of Black-eyed Susan is difficult to determine (NSW NPWS 2000d). An individual plant is clonal and can grow into a clump of many stems of genets and ramets (Bartier et al. 2001). Clumps seem to be long lived with the inside of the clumps dying while the outside of the clumps remain alive and healthy (Gross et al. 2003).

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Land Tenure of Populations

In 2000, 45 populations of Black-eyed Susan were located in state conservation areas comprising 1600 plant clumps (TSSC 2005be). These are Awabakal Nature Reserve, Glenrock State Recreation Area, Lake Macquarie Recreation Area, Jilliby State Recreation Area and Munmorah State Recreation Area. Others are reserved in Wallarah National Park, Wallaroo Nature Reserve, Karuah Nature Reserve and Green Point Recreation Reserve (TSSC 2005be).

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Habitat

Black-eyed Susan is found in sandy, occasionally moist heath and in dry sclerophyll vegetation communities endemic to coastal NSW (Harden 1992). Benson and McDougall (2001) further detail Black-eyed Susan to prefer ridges in areas from 0 -200 m in altitude with an annual rainfall of 1000–1200 mm and restricted to open forest of *Angophora costata, Eucalyptus haemastoma, E. globoidea, Corymbia gummifera*, and *E. capitellata*. The preferred substrates are: sandy skeletal soil on

sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral.
Payne (2001) reported Black-eyed Susan preferred ridge and upper crest sites with a moist aspect in open forest with a dense understorey. More specifically a preference for: south-western and south-eastern aspects; shallow slopes of less than 5°; woodland forest with a canopy cover ranging between 11–50%; heathland and closed heathland of between 51–100% cover; and occurring in low nutrient forest of *Angophora costata, E. capitellata* and *E. gummifera* (MU 30) (vegetation community classification follows NSW NPWS 2000) or *E. haemastoma, E. capitellata* and *E. gummifera* (MU 31).

Habitat suitability modelling conducted by Driscoll (2009), however, showed aspect, slope and elevation had little influence on preferred habitat. The predominant factors were rainfall and soil; the species occurs predominantly in erosional soil landscapes in areas where annual rainfall exceeds 1000 mm. Driscoll (2009) further showed that the greatest overlap between modelled suitable habitat for Black-eyed Susan and various canopy species occurred with species associated with Coastal Plains Smoothbarked Apple Woodland and Coastal Plains Scribbly Gum Woodland.

Driscoll (2003) summarised the vegetation communities in which over 400 records of Black-eyed Susan occurred within the Lower Hunter and Central Coast region. Black-eyed Susan showed a distinct preference for the Coastal plains smoothbarked apple woodland (MU 30) vegetation community. The species also appeared to favour several underlying geologies including Quaternary sands, Triassic sandstones, Triassic shales, Permian coal measures and Carboniferous volcanics (Driscoll 2003).

Distribution of reports of Black-eyed Susan across vegetation map units in the Lower Hunter and Central Coast regions (Driscoll 2003).

Vegetation Community Description	Vegetation Community Map Unit (classification follows NPWS (2000))	Percentage
Coastal Plains Smoothbarked Apple Woodland	MU 30	62
Coastal Plains Scribbly Gum Woodland	MU 31	14
Coastal Foothills Spotted Gum-Ironbark Forest	MU 15	10
Alluvial Tall Moist Forest	MU 5	2
Heath	MU 55	2
Lower Hunter Spotted Gum-Ironbark Forest	MU 17	1
Wyong Paperbark Swamp Forest	MU 43	1
Coastal Sheltered Apple-Peppermint Forest	MU 11	1
Coastal Sand Wallum Woodland-Heath	MU 34	1
Swamp Mahogany-Paperbark Forest	MU 37	1
Riparian Melaleuca Swamp Woodland	MU 42	1
Coastal Clay Heath	MU 48	1
Coastal Wet Sand Cyperoid Heath	MU 44	<1
Coastal Wet Gully Forest	MU 1	0.5
Coastal Sand Apple-Blackbutt Forest	MU 33	0.5
Hunter Valley Moist Forest	MU 12	< 0.5

Research conducted by Bartier and colleagues (2001) found that Black-eyed Susan forms arbuscular mycorrhizal associations (fungi/root association) and typically grows in low nutrient soils of moderate to strong acidity. Therefore, the appropriate mycorrhizal fungi may be needed in the soil for long term survival. Bellairs and colleagues (2006) further note that the poor growth and survival of seedlings grown in glasshouses, suggests mychorriza may be needed for their survival.

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Life Cycle

There is a lack of ecological knowledge of Black-eyed Susan (Bellairs et al. 2006). As a consequence of clonality, at any location a group of plants will be comprised of genets (plants originating from seed germination) and ramets (plants arising vegetatively from a particular genet) (Driscoll 2009). No genetic studies have been conducted on Black-eyed Susan to determine the proportion of genets and ramets in a local group of plants.

Individual plants are difficult to identify given the plant is clonal and will resprout from rootstock (NSW NPWS 2000d). The plant usually spreads by underground stems which can be up to 50 cm long with plant clumps covering around 0.5 m^2 (NSW NPWS 2000d). Mature plants can have as many as 200–500 stems (Bartier et al. 2001 in Gross et al. 2003).

Individual clumps (>100) have now been monitored for over 10 years and it is apparent that the plant is very slow growing. The oldest reliable record of a location where a Black-eyed Susan population is still present in 2009 is from 1940, 69 years ago (NSW Wildlife Atlas 2009 in Driscoll 2009). Local populations/patches of the plant could be a hundred or more years old (Driscoll 2009). Evidence from historical urban development and rural land clearing indicates that the species continues to exist despite large losses from a local population (Driscoll 2009).

Driscoll (2009) concludes that a generation could be in the order of 20–50 years and that in any local population the establishment of a new plant from seed which was the product of fertilisation by pollen from a different local population need only occur every 100 years or so to maintain healthy genetic variability, thus avoiding the onset of inbreeding depression.

Reproduction

Reproduction in Black-eyed Susan is through asexual rhizomal spread and sexual pollination, seed development and germination (Driscoll 2003; Payne 2001). Black-eyed Susan is rhizomatous and propagates asexually from rootstock to form plant clumps of up to 0.5 m^2. Regeneration and spread is aided by hot, fast and medium intensity fires which result in seed germination. Slow cool fires completely burn out the rootstock and kill the plant (Norton 1994).

Bartier and colleagues (2001) and Gross and colleagues (2003) found the preferred breeding system of Black-eyed Susan to be outcross pollination requiring a pollinator for high seed yield. They determined that the floral structure of Black-eyed Susan (poricidal anthers with pollen located within tapetal fluid) requires special class of native bees capable of buzz pollination. The gradual dehydration of tapetal fluid assists with a timed release of pollen to buzz pollinating bees.

The flowers of Black-eyed Susan produce no nectar that could attract pollinators, and it appears pollen is the sole reward available (Driscoll 2003), and so bees pollinating Black-eyed Susan collect nectar and pollen from a number of other plant species. Driscoll (2009) confirmed six species of native bees, *Exoneura* sp., *Lasioglossum convexum, L. erythrurum, L. gilesi, L. hemichalceum* and *L. carbonarium* collected pollen from the flowers and noted five potential pollinator species. Driscoll (2003) found that the strong flowering period from September to January coincided with the presence of pollinators and fruiting only occurred in coincidence with flower pollination by the bees. He further notes that flowering, seed set and seed release was a concurrent process while ever the bees were active. The sexual reproductive process in Black-eyed Susan appears to be pollinator limited, and this was considered as possibly explaining what was believed to be very low seed set within populations (Driscoll 2003). However Driscoll (2009) has since demonstrated that seed set levels in Black-eyed Susan fall within the normal range for a plant with bisexual flowers.

The short-lived seed bank and very low seed viability after soil storage indicates that Black-eyed Susan is dependant on annual seed set for seedling recruitment (Bellairs et al. 2006). Studies by Bartier and colleagues (2001) and Bellairs and colleagues (2006) found that seeds germinated after exposure to smoke or scarification of the seed coat (such as from heat acting on the seed coat during fire), suggesting that fire will increase the likelihood of germination. Furthermore, Bellairs and colleagues (2006) notes fire may stimulate seed germination in the months following dispersal but limited germination is likely unless a fire occurs soon after seed release.

Bartier and colleagues (2001) also found Black-eyed Susan able to self-pollinate, although the automatic self-production of seed was uncommon. The potential for self pollination and subsequent seed set was considered to be low because of the minute stigma surface and downward presentation of the flowers limiting the opportunities for air-borne pollen to land on the stigma surface (Driscoll 2003).

Dispersal

The chalazal appendage of Black-eyed Susan seeds have a high lipid content attracting ants, which disperse and bury the seeds (Bellairs et al. 2006; Boesewinkel 1999). The combination of the seed chalazal appendage, ant dispersion, and smoke stimulated germination is an indication of a fire adapted species (Bellairs et al. 2006).

Macropods may also act as dispersal agents. There is evidence of Black-eyed Susan clumps being heavily grazed by macropods and seeds could pass through the gut and be dispersed over large distances (Driscoll 2009).

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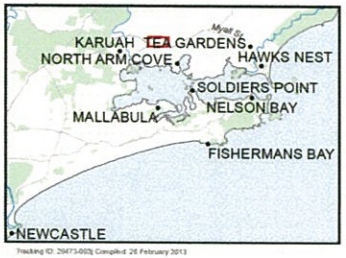
Survey Guidelines

Black-eyed Susan is readily distinguished from other *Tetratheca* species by its distinct, angular winged stem (Thompson 1976) and reduced leaves. Only *T. thymifolia* is known to grow in association with this species (NSW NPWS 2000d). It is an erect straggling shrub, with leaves that are usually in whorls of 3–5, and the flowers are rarely paired (Harden 1992).

Plants of Black-eyed Susan are usually sprawling and can be difficult to detect amongst other vegetation when not flowering (Murray & Bell 2001).

Survey recommendations

The following recommendations to conducting surveys for Black-eyed Susan were developed in consultation with species experts during the Black-eyed Susan significant impact guidelines policy statement expert workshop held in November 2009.



Tracking ID: 29473-002| Compiled: 26 February 2013

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100 0 100 200

Metres

APPROX SCALE 7,500 @ A4

GDA 1994 MGA Zone 55

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

DATA SOURCES

RPS 2012.

LEGEND

- Subject Site
- Study Area
- *Asperula asthenes* (2 patches totalling 8m²)
- *Grevillea parviflora subsp. parviflora* (9 patches totalling 100 suckering stems)
- *Tetratheca juncea* (6567 clumps)

RPS

FIGURE 6

Threatened Flora Survey Records

Larry Cook & Associates Pty Ltd
(ABN 81 070 341 749)

PO Box 8146 Tumbi Umbi NSW 2261
Office 02 4385 6084 Mobile 0428 884645 Fax 43856087 Email lcook@ccl.net.au

23rd March 2010

Principal
Michael J Dick & Associates
PO Box 6163
GOSFORD WEST NSW 2250

Attention: Michael Dick

Dear Michael,

Re: **Potential Resource Estimate - Lot 11 DP1024564 61 Blue Rock Close Karuah**

Introduction

A best estimate of potential mineable hardrock resource quantities has been prepared for the lease area on Lot 11 in DP1024564, 61 Blue Rock Close Karuah.

Methodology

The estimates of hardrock quantities were based on the following data and information:

- Photogrammetry based on the aerial photographic surveys carried out by Geo-Spectrum between the late 1990s and September 2009
- Volume calculations carried out by Geo-Spectrum using 3D modelling
- Hardrock already extracted from the lease area
- The volumes were calculated down to 42 m Australian Height Datum (AHD) which is understood to be the consent level.
- Laboratory rock density calculations conducted on local andesite samples by Coffey Partners. A density of 2.6 t/m^3 was applied in the estimates
- The results of manual volume (and tonnage) calculations carried out by Bert Brink between 2007 and 2009
- The monthly tonnage returns supplied to Wedgerock Pty Limited by Hunter Quarries for the purpose of royalty payment calculations. These data were also used to extrapolate the total production between September 2009 (last aerial survey) and March 2010.

Limitations

The following limitations affecting the accuracy of the resource estimate are noted:

- Broad estimates of the hardrock resource within the lease area preserved as quarry batters and haul roads/access ramps. These parts of the resource are effectively

sterilised and not readily available for extraction. A conservative batter angle of 70° was adopted and a gradient of 1 in 10 used for the haul roads. This estimate is conservative and also includes a component of waste that includes any reject material, for example weathered or altered andesite that may be encountered in the expanding quarry

- The most recent data and information on the hardrock extracted to date was obtained from volume calculations carried out by Geo-Spectrum based on the aerial photographic survey carried out by them in September 2009. For the purposes of estimating the resource remaining within the lease area, an extraction volume was calculated for the September 2009 through March 2010 period using extrapolation from previous months.
- The estimates were developed in lieu of a quarry plan. The implication is that the position of quarry panels, benches and haul roads is not known at this stage
- We are not privy to any results of relatively deep resource drilling within the lease area, if indeed there has been any, and cannot therefore predict the position and scale of any structural discontinuities (or weak zones) that may potentially dissect the resource. These zones, if they occur, may have altered and/or weathered envelopes associated with them.

Estimate of Potential Resource

An estimate of the potential mineable resource remaining within the lease area down to 42 m AHD is provided in **Table 1**. The calculations and estimates are summarised in a spreadsheet attached as **Table 2**.

Table 1
Estimate of Potential
Mineable Hardrock Resources
within Lease Area on Lot 11

Volume	Tonnage
6,421,321	16,695,434

If you have any questions or require further information please do not hesitate to contact Larry Cook on 0428 884645.

For and on Behalf of
Larry Cook & Associates

Larry Cook
Geoscientist

Attachments: Table 2

cc: Wedgerock Pty Limited

Table 2

Wedgerock Pty Limited
Estimates of Volumes and Tonnages of Andesite within Lease Area in Lot 11

Estimates of Batters (including a component for haul roads and waste

Part of Quarry	Volume (m^3)			Tonnage (t)		
	Total	Category 'A' (90%)	Category 'B' (10%)	Total	Category 'A' (90%)	Category 'B' (10%)
Southern End	273,700	246,330	27,370	711,620	640,458	71,162
Eastern Side	293,250	263,925	29,325	762,450	686,205	76,245
Western Side	293,250	263,925	29,325	762,450	686,205	76,245
Totals	**860,200**	**774,180**	**86,020**	**2,236,520**	**2,012,868**	**223,652**

Calculation of Volumes and Tonnages

Layer	Volume (m^3)			Tonnage (t)		
	Total	Category 'A' (90%)	Category 'B' (10%)	Total	Category 'A' (90%)	Category 'B' (10%)
Difference between pre-quarrying surface (1998) and September 2009 surface	917,046	825,341	91,705	2,384,320	2,145,888	238,432
Difference between September 2009 surface and 65m AHD Level	3,716,088	3,344,479	371,609	9,661,829	8,695,646	966,183
Difference between 65m AHD Level and Consent Level of 42m AHD	3,723,125	3,350,813	372,313	9,680,125	8,712,113	968,013
Totals	**8,356,259**	**7,520,633**	**835,626**	**21,726,273**	**19,553,646**	**2,172,627**
Less Extractions to September 2009 (based on last aerial survey)	917,046	825,341	91,705	2,384,320	2,145,888	238,432
Sub Totals	**7,439,213**	**6,695,292**	**743,921**	**19,341,954**	**17,407,758**	**1,934,195**
Less estimated extractions between September 2009 and March 2010 (6 mths)	157,692	141,923	15,769	410,000	369,000	41,000
Sub Totals	**7,281,521**	**6,553,369**	**728,152**	**18,931,954**	**17,038,758**	**1,893,195**
Less Quantites contained within Batters, Haul Roads and Waste	860,200	774,180	86,020	2,236,520	2,012,868	223,652
Total Potential Mineable Resource	**6,421,321**	**5,779,189**	**642,132**	**16,695,434**	**15,025,890**	**1,669,543**

Notes: **Rock Density:** 2.6 tonnes/m^3 (SG 2.65 measured in laboratory ex Coffey)
Batter Angle: 70° adopted (60° - 80° acceptable in this rocktype)
Gradient of Haul Roads: 1 in 10 acceptable
Category 'A' product: approx. 90% of extracted product
Category 'B' product: approx. 10% of extracted product
Production from Sep 09 to Mar 10: Based on 68,000 t/mth (average over 12 months)

ABN: 66086 340392

BERTANN Pty Ltd

Bert Brink B.Sc. FAusIMM, MGSA, MAIG, RPGeo.

12 Beckford Road
OURIMBAH NSW 2258

Ph: (02) 4362 2280
bertann@exemail.com.au

Wedgerock Pty Ltd
Pacific Highway
Karuah NSW

Attention: Michael Kiely

Dear Michael,

As requested, I have considered a potential rock quarry on the northern section of your land (Lot 11) and have calculated a yield if the quarry floor were to be excavated to RL = 31 (the level of the NW corner). Additionally, the quarry floor level was calculated if the area were to yield 5 million tonnes.

For the various calculations I have adopted the following parameters:

(a) Buffer zones along the eastern, northern and western boundaries -- 10 metres wide (20 m wide buffer zones would reduce the yield by some 350,000 tonnes)
(b) Average face slope of 20 degrees (ignoring benches, as in reality faces would probably stand steeper in hard, fresh rock)
(c) Conversion factor of 2.5 tonnes/cu.m
(d) Scale of 1:2000 on the attached plan
(e) No waste factor

The following values are the result of the various measurements and calculations:

Yield to floor level (RL = 31)---- 530,000 cu.m. =1,320,000 tonnes

Yield for each metre depth below floor level ---- 23,000 cu.m. = 72,000 tonnes

Hence to produce 5 million tonnes, a quantity of 5,000,000 – 1,320,000 = 3,680,000 tonnes needs to be extracted from below the quarry floor level of RL = 31. At 72,000 tonnes per vertical metre the final excavation depth would be 3,680,000 : 72,000 = 51 metres. This does not allow for face slopes, benches, haul roads, etc. and therefore the final depth would probably be some 60 metres below the level of the NW corner of the area under consideration This appears excessively deep and logically as well as economically you could extract perhaps up to 2 million tonnes from this northern area.

I trust that this of assistance to you.

Regards, Bert

ABN: 66086 340392

BERTANN Pty Ltd

Bert Brink B.Sc. FAusIMM, MGSA, MAIG, RPGeo.

12 Beckford Road
OURIMBAH NSW
2258

Ph: (02) 4362 2280
bertann@exemail.com.au

Base area at 42 m AHD 103,280 ,, 85,600 sq.m 95,760 ,, 284,640sq.m

Lot 21 – Volume Calculations

To calculate volumes of potential reserves, the base areas were multiplied by half the difference between base level and crest height, ie: Volume=Area x Height/2 cu.m.

	Above 62 m	Above 42 m
Area A:	40,800 x 38/2 = 775,200 cu.m	103,280 x 58/2 = 2,995,120 cu.m
Area B:	Nil	85,600 x 18/2 = 770,400 cu.m
Area C:	31,040 x 11/2 = 170,720 cu.m	95,760 x 31/2 = 1,484,280 cu.m
Totals :	**945,920 cu.m**	**5,249,800 cu.m**

Lot 11 – Area Measurements (within lease area)

At 62 m AHD : 161,000 sq.m
At 42 m AHD : 196,000 sq.m

Lot 11 – Volume Calculations

Above 62 m 161,000 x 73/2 = **5,876,500 cu.m**

Above 42 m 196,000 x 93/2 = **9,114,000 cu.m**

In summary, potential reserves of andesitic rock materials are :

Lot 21
Above 62 m AHD - 945,920 cu.m = 2,459,392 tonnes
Above 42 m AHD - 5,249,800 cu.m = 13,649,480 tonnes

Lot 11
Above 62 m AHD - 5,876,500 cu.m = 15,276,900 tonnes
Above 42 m AHD - 9,114,000 cu.m = 23,696,400 tonnes

Quarry weighbridge records and subsequent volume calculations indicate that since 1998 a total of 528,787 cu.m of rock materials have been removed from the site (Lot 11 + Lot 21). It is clear that this volume was present on Lot 21 above 62 m AHD (current floor level) and close to ten times this volume above 42 m AHD(consent level). Hence, there

Patrick Kaluski

From: Patrick Kaluski
Sent: Friday, 30 November 2012 3:23 PM
To: 'lecourt@agd.nsw.gov.au'
Subject: Query

Dear Sir/Madam,

I act for Michael John Kiely.

My client is the owner of the property at 221 Pacific Highway Karuah, on which Hunter Quarries Pty Ltd operates a hard rock quarry pursuant to a licence agreement with my client.

Hunter Quarries was prosecuted in the LEC and sentenced by Biscoe J for breaches of conditions of its development consent number 265-10-2004. The matter was reported as *Minister for Planning v Hunter Quarries Pty Ltd* [2010] NSWLEC 246.

My client has sought information from Hunter Quarries in relation to the evidence relied on in those proceedings. Hunter Quarries has to date not provided the information requested.

Is there a procedure available for my client to uplift the file from the Court? If so, can you please advise what form(s) / application would be required. The information may be relevant to breaches of the Licence Agreement

Your advice in relation to this matter is appreciated.

I look forward to hearing from you.

Kind regards

Patrick Kaluski Executive Counsel

T +61 2 4915 9950 **F** +61 2 4915 9951 **M** +61 (0) 408 173 061
E patrick@keystonelawyers.com.au **W** www.keystonelawyers.com.au

Newcastle Office 8, Level 2 Harbour Pier, 335 Wharf Road, Newcastle NSW 2300
Postal PO Box 264, Newcastle NSW 2300

Material Safety Data Sheet

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: 3M Brand Roofing Granules - ZT9300 (Pittsboro, NC)
MANUFACTURER: 3M
DIVISION: Industrial Mineral Division

ADDRESS: 3M Center, St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 01/11/13
Supercedes Date: 03/28/12

Document Group: 20-2357-0

Product Use:
Intended Use: Granules for coating roofing shingles.

SECTION 2: INGREDIENTS

Ingredient	C.A.S. No.	% by Wt
Andesite (composition varies naturally, typically contains feldspars, amphibole, pyroxene, chlorite and epidote)	Mixture	85 - 95
Quartz (a component of Andesite)	14808-60-7	5 - 15
Ceramic	66402-68-4	1.5 - 5.5
Titanium Dioxide	13463-67-7	0.05 - 1.25
Inorganic Pigments	Mixture	0.1 - 1
Oil	64741-96-4	< 0.5

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Granules
Odor, Color, Grade: White color, slightly oily odor, typical particle size 0.84-2.0 mm
General Physical Form: Solid
Immediate health, physical, and environmental hazards: Granules are not respirable. Dust generated during handling may contain respirable material. Contains a chemical or chemicals which can cause cancer.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:
Mechanical eye irritation: Signs/symptoms may include pain, redness, tearing and corneal abrasion.

Skin Contact:
Mechanical Skin irritation: Signs/symptoms may include abrasion, redness, pain, and itching.

Inhalation:
Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Prolonged or repeated exposure may cause:
Silicosis: Signs/symptoms may include breathlessness, weakness, chest pain, persistent cough, increased amounts of sputum, and heart disease.

Ingestion:
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

Carcinogenicity:
Contains a chemical or chemicals which can cause cancer.

Ingredient	C.A.S. No.	Class Description	Regulation
Quartz (a component of Andesite)	14808-60-7	Grp. 1: Carcinogenic to humans	International Agency for Research on Cancer
SILICA, CRYSTALLINE (AIRBORNE PARTICLES OF RESPIRABLE SIZE)	SEQ677	Grp. 1: Carcinogenic to humans	International Agency for Research on Cancer
SILICA, CRYSTALLINE (AIRBORNE PARTICLES OF RESPIRABLE SIZE)	SEQ677	Known human carcinogen	National Toxicology Program Carcinogens
Titanium Dioxide	13463-67-7	Grp. 2B: Possible human carc.	International Agency for Research on Cancer

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.

Skin Contact: Wash affected area with soap and water. If signs/symptoms develop, get medical attention.

Inhalation: Remove person to fresh air. If signs/symptoms develop, get medical attention.

If Swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature	*Not Applicable*
Flash Point	*Not Applicable*
Flammable Limits(LEL)	*Not Applicable*
Flammable Limits(UEL)	*Not Applicable*

5.2 EXTINGUISHING MEDIA
Non-combustible. Choose material suitable for surrounding fire. Material will not burn.

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Not applicable.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate unprotected and untrained personnel from hazard area. The spill should be cleaned up by qualified personnel. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Warning! A motor could be an ignition source and could cause flammable gases or vapors in the spill area to burn or explode.

6.2. Environmental precautions
Reclaim undamaged product. Place in a closed container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

Clean-up methods
Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Contain spill. Collect as much of the spilled material as possible. Use wet sweeping compound or water to avoid dusting. Sweep up. Clean up residue with detergent and water.

In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. For industrial or professional use only. Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below Occupational Exposure Limits. If ventilation is not adequate, use respiratory protection equipment. 3M does not recommend material handling methods that could damage the coating or base mineral. In particular, roofing granules should not be conveyed pneumatically, via screw conveyors, or used as a sand blasting media. These uses can cause coating and base mineral attrition which may lead to increased levels of dust generation.

7.2 STORAGE
Not applicable.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS
Use with appropriate local exhaust ventilation. Provide local exhaust ventilation at transfer points. Use in an enclosed process area is recommended.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection
Avoid eye contact. The following eye protection(s) are recommended: Safety Glasses with side shields.

8.2.2 Skin Protection
Avoid prolonged or repeated skin contact. Gloves not normally required.

8.2.3 Respiratory Protection
An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure: Half mask R95 particulate respirator. Half mask or full facepiece air-purifying respirator with N100 particulate filters. Half facepiece or full facepiece air-purifying respirator suitable for particulates. For questions about suitability for a specific application, consult with your respirator manufacturer.

8.2.4 Prevention of Swallowing
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Wash hands after handling and before eating.

8.3 EXPOSURE GUIDELINES

Ingredient	Authority	Type	Limit	Additional Information
Quartz (a component of Andesite)	ACGIH	TWA, respirable fraction	0.025 mg/m3	
Quartz (a component of Andesite)	OSHA	TWA concentration, respirable	0.1 mg/m3	
Quartz (a component of Andesite)	OSHA	TWA concentration, as total dust	0.3 mg/m3	
Titanium Dioxide	ACGIH	TWA	10 mg/m3	
Titanium Dioxide	CMRG	TWA, as respirable dust	5 mg/m3	
Titanium Dioxide	OSHA	TWA, as total dust	15 mg/m3	

SOURCE OF EXPOSURE LIMIT DATA:
ACGIH: American Conference of Governmental Industrial Hygienists
CMRG: Chemical Manufacturer Recommended Guideline
OSHA: Occupational Safety and Health Administration
AIHA: American Industrial Hygiene Association Workplace Environmental Exposure Level (WEEL)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Granules
Odor, Color, Grade:	White color, slightly oily odor, typical particle size 0.84-2.0 mm
General Physical Form:	Solid
Autoignition temperature	*Not Applicable*
Flash Point	*Not Applicable*
Flammable Limits(LEL)	*Not Applicable*
Flammable Limits(UEL)	*Not Applicable*
Boiling Point	*Not Applicable*
Specific Gravity	2.75 - 2.90 [*Ref Std:* WATER=1]
Melting point	*Not Applicable*
Solubility In Water	*Not Applicable*
Percent volatile	Nil

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.

Materials and Conditions to Avoid:

10.1 Conditions to avoid
None known

10.2 Materials to avoid
None known

Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition: NONE

SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Not determined.

CHEMICAL FATE INFORMATION

Not determined.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: For quantities <100 lbs. (50kg): dispose of waste product in a sanitary landfill. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste.

EPA Hazardous Waste Number (RCRA): Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14:TRANSPORT INFORMATION

ID Number(s):
98-0213-4016-5

For Transport Information, please visit http://3M.com/Transportinfo or call 1-800-364-3577 or 651-737-6501.

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS
Contact 3M for more information.

311/312 Hazard Categories:
Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - Yes

STATE REGULATIONS

Contact 3M for more information.

CALIFORNIA PROPOSITION 65

Ingredient	C.A.S. No.	Classification
SILICA, CRYSTALLINE (AIRBORNE PARTICLES OF RESPIRABLE SIZE)	None	**Carcinogen
Titanium Dioxide	13463-67-7	**Carcinogen

** WARNING: contains a chemical which can cause cancer.

CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

Contact 3M for more information.

INTERNATIONAL REGULATIONS

Contact 3M for more information.

ADDITIONAL INFORMATION

Not California Code of Regulations (CCR) Title 22 hazardous waste.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification

Health: 1 **Flammability:** 0 **Reactivity:** 0 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Revision Changes:
Section 13: Waste disposal method information was modified.
Section 8: Respiratory protection - recommended respirators information was modified.
Section 8: Respiratory protection - recommended respirators was modified.
Section 8: Respiratory protection - recommended respirators guide was modified.
Section 15: California proposition 65 ingredient information was modified.
Section 6: Personal precautions information was modified.
Section 6: Environmental procedures information was modified.
Section 6: Methods for cleaning up information was modified.
Copyright was modified.
Section 8: Respiratory protection - recommended respirators punctuation was deleted.

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3M USA MSDSs are available at www.3M.com

Peter Wright

From: Goetz Schraer [goetz@3slighting.com]
Sent: 10 April 2013 15:52
To: Shane Emanuel (spewin@msn.com)
Cc: wedgerock@aapt.net.au; pwrighter@bigpond.com; D&D Conveyor Services Pty Ltd (ddconveyor@harboursat.com.au)
Subject: FW: Proposed East Karuah Quarry (MP 09_0175)

Hi Shane,

Further to my e-mail and call. I think it would be good to send this e-mail as a proper objection against Karuh East Quarry's DA to the department of planning Mr. Paul Freeman (paul.freeman@planning.nsw.gov.au

Cc to OHS

From: Shane Emanuel [mailto:spewin@msn.com]
Sent: Tuesday, 9 April 2013 5:50 PM
To: Goetz Schraer
Subject: Proposed East Karuah Quarry (MP 09_0175)

To whom it may concern

My name is Shane Emanuel of 740 Tarean Rd Karuah. I am writing to express my concern about the Proposed Extension of Karuah East Hard Rock Quarry (MP 09_0175). My house is just 1 kilometre away from the existing Quarry and approximately the same distance from the Proposed New Quarry. My biggest concern is the health of my family. My children and my wife often have bleeding noses and we believe this is caused by the dust coming from the Quarry. The last time that I was on my annual leave from work, I also experienced a bleeding nose on three occasions. I have read reports and news letters issued by the Karuah Quarry telling us the dust is at an acceptable level. I find this very hard to believe as many times I have looked up at the Quarry and seen the dust rising into the air like smoke coming from the bush fire. I have come home from work and I can taste the dust in my mouth. I have three (3) young children and I am concerned about the health and long term effect the dust may have on them. My mother-in-law from the Philippines spent holidays here with us and had bleeding nose in some occasions. Great Lakes Council building inspector, Nick Green, was inspecting new extensions to our house and stated to me " do you have a dust problem here?" I replied " yes, the Quarry " he just turned and walked away. Another concern is all this dust lending on our roof and being washed in to our water tanks which our drinking water. I feel that if the new quarry is going to be three times bigger than the existing one, that will mean three times more dust . The Proposed New Quarry is moving a bit farther to the North East , the wind regularly blows from the North East which will cause more dust on our roof and in the air. The health of my family and other residents is of major concern. The existing quarry has done nothing about the dust issue.
There are many times, the blasting from the existing quarry has made the whole house vibrated. On one occasion, I ran outside to take a look on what happened and I have seen a mushroom cloud of dust rising in the air.

Emanuel family

From: Doreen Ingram <wedgerock@aapt.net.au>
Date: 12 April 2013 12:50:23 PM AEST
To: Paul Freeman <Paul.Freeman@planning.nsw.gov.au>, Michael Howat <Michael.Howat@epa.nsw.gov.au>, howard.reed@planning.nsw.gov.au
Subject: Fwd: submission to department of planning Mr. Paul Freeman in regard to MP 09-0175

Dear Paul,michael,howard

it was brought to my attention that the Karuh East Quarry's (KEQ) Environmental Assessment Report page 41 paragraph 2.13 claims that a "significant effort was made to secure access over lot 11 to quarry Lots 12 and 13." Please note that this is news to me and absolutely not true, [redacted]

However, I agree with KEQ' that it makes commercial sense to quarry lots 12 and 13 through my property Lot 11 (should they run out of resources on lot 11), instead of duplicating the existing infrastructure at a very high cost and at the expense of the destruction of larger than necessary parts of the unique environment of lot 12 and 13.including threaten ed species ,of plants ,flora and fauna,birds ,snakes ,migratory species,their is enough minable quality andersite resources within existing stages of [1] and [2] for the next 20 years at one and a half million tons per annum

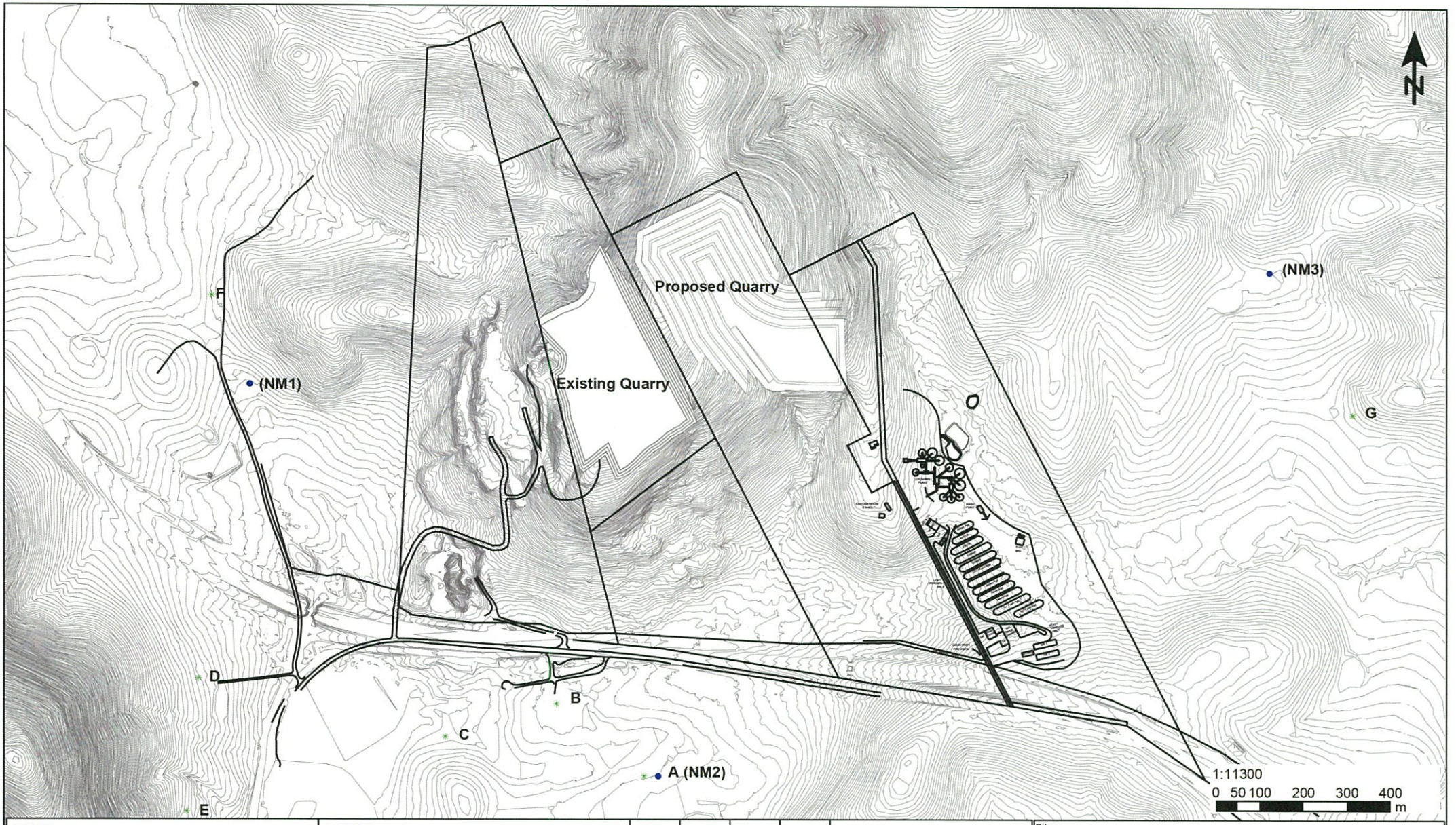
The existing stage 2 of the present operating quarry on its current development still has an estimated resource of 10 Mill tons. i have a geological report from Larry Cook and Associates PL, dated the 23.3.2010. This report estimates that another 16.7 Mill tons resources are available directly adjacent to the South face of present Quarry stage 2.there is also millions of tons available on stage [1] materiel in pit stage

Please note that I'm prepared and willing to let KEQ quarry this resource at a going commercial rate of royalty per ton.rather than destroy more land and the animal habitat,loss of trees for koalas ,i note current development koala

--- The rest of this email has been redacted –

Thanks and best regards

Michael Kiely



NOTES	LEGEND
	• Noise Monitoring Location * Assessment Location

Revision	Drawn By	Chkd By	Date	Comments
1	DW	JC	1/11/2011	

SLR
2 LINCOLN STREET
LANE COVE
NEW SOUTH WALES 2066
AUSTRALIA
T: 61 2 9427 8100
F: 61 2 9427 8200
www.slrconsulting.com

Site: Proposed Karuah East Hard Rock Quarry

Project: Noise & Blasting Impact Assessment

Drawing: **Appendix A**
Site Location Map

Date	Drawing Number	Revision
9/11/2012	630.02482.SP00A	3

Scale: 1:11289