Newman Quarrying Pty Ltd

SSD 6624 - Slys Quarry Expansion Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo

Modification Application

July 2017

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1. Introduction

1.1 Background

This Modification Application (MOD) is submitted to the Department of Planning and Environment (DPE) in accordance with Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Newman Quarrying Pty Ltd (NQ) is seeking approval to modify Condition 8(b), Schedule 2 of SSD6624 relating to vehicular movements at Sly's Quarry (the site) located at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo. NQ proposes an increase in heavy vehicles accessing the site from 125 to 150 per day. It is also proposed to modify the benches of the extraction pit from 10 m high by 10 m wide to 15 m high by 8 m wide.

This MOD has been prepared by GHD Pty Ltd (GHD) on behalf of NQ to support the modification application. The MOD provides a description of the modification and its need and considers the social and environmental impacts of the modification, recommending mitigation and management measures as appropriate.

1.2 The proponent

The proponent for the Section 96(2) modification application is NQ.

NQ is a family owned company located at Mororo in the Clarence Valley and has operated the quarry since the early 1990's. NQ service the Lower Clarence and surrounding areas with quarry and landscapes supplies.

1.3 Land ownership

NQ owns and operates Slys Quarry, located at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo.

1.4 Development history

The site has reportedly been used as a quarry since the 1950's. In 1995, Maclean Shire Council (now Clarence Valley Council) granted development consent (1995/128) to the operation according to *State Environmental Planning Policy* (SEPP) *No. 37 – Continued Mines and Extractive Industries*. A further consent (1997/011) was granted by Maclean Shire Council in 1997.

The expansion of Slys Quarry, which was the subject of application SSD 6624, was approved by DPE, under Section 89E of the EP&A Act, on 05 May 2016. In summary the expansion included:

- Expanding the approved sandstone quarry pit by 11.1 hectares
- Extracting a total resource of 7 million tonnes
- Increasing the maximum extraction rate of sandstone to 500,000 tonnes per year
- Importing mulch and topsoil for rehabilitation
- Closing and rehabilitating the existing quarry pits Site B and Site C

1.5 Purpose of this report

This MOD has been prepared to support a Section 96(2) modification application to modify Condition 8(b), Schedule 2 and the Development Layout in Appendix 2 of SSD 6624.

This MOD only considers the components of the modified proposal from the approved development, the potential environmental impacts of the modification and the environmental management and mitigation measures proposed to manage these potential environmental impacts.

Where components of the modified proposal do not differ from the approved development, they are not detailed within this document as they are considered to have been addressed as part of the original assessment.

1.6 Limitations

This report has been prepared by GHD for NQ and may only be used and relied on by NQ for the purpose agreed between GHD and NQ as set out in section 1.5 of this report.

GHD otherwise disclaims responsibility to any person other than NQ arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by NQ and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Existing development

2.1 Overview of the approved development

The approved expansion of Sly's Quarry included the following:

- Expanding the approved sandstone quarry pit by 11.1 hectares to 18 hectares
- Extracting a total resource of 7 million tonnes
- Increasing the maximum extraction rate of sandstone to 500,000 tonnes per year
- Importing mulch and topsoil for rehabilitation
- Closing and rehabilitating the existing quarry pits Site B and Site C

2.2 Extraction plan and operational life

The quarry operation will be carried out in stages and in response to demand. It is therefore difficult to predict exactly how the extraction would progress. In general, the extraction will move north and east initially, to the extent of the previously approved quarry. The eastern extent of the excavation will remain 10 m from the road reserve located along the eastern boundary and a safety fence would be installed. A 5 m wide buffer will be established around the remaining perimeter of the quarry to cater for access and stormwater controls. The excavation will be to the current floor level of 44 m AHD. Stage 1 will cover an area of 6.9 hectares and extract approximately 2.3 million tonnes. Stage 1 encompasses the area previously approved for a quarry.

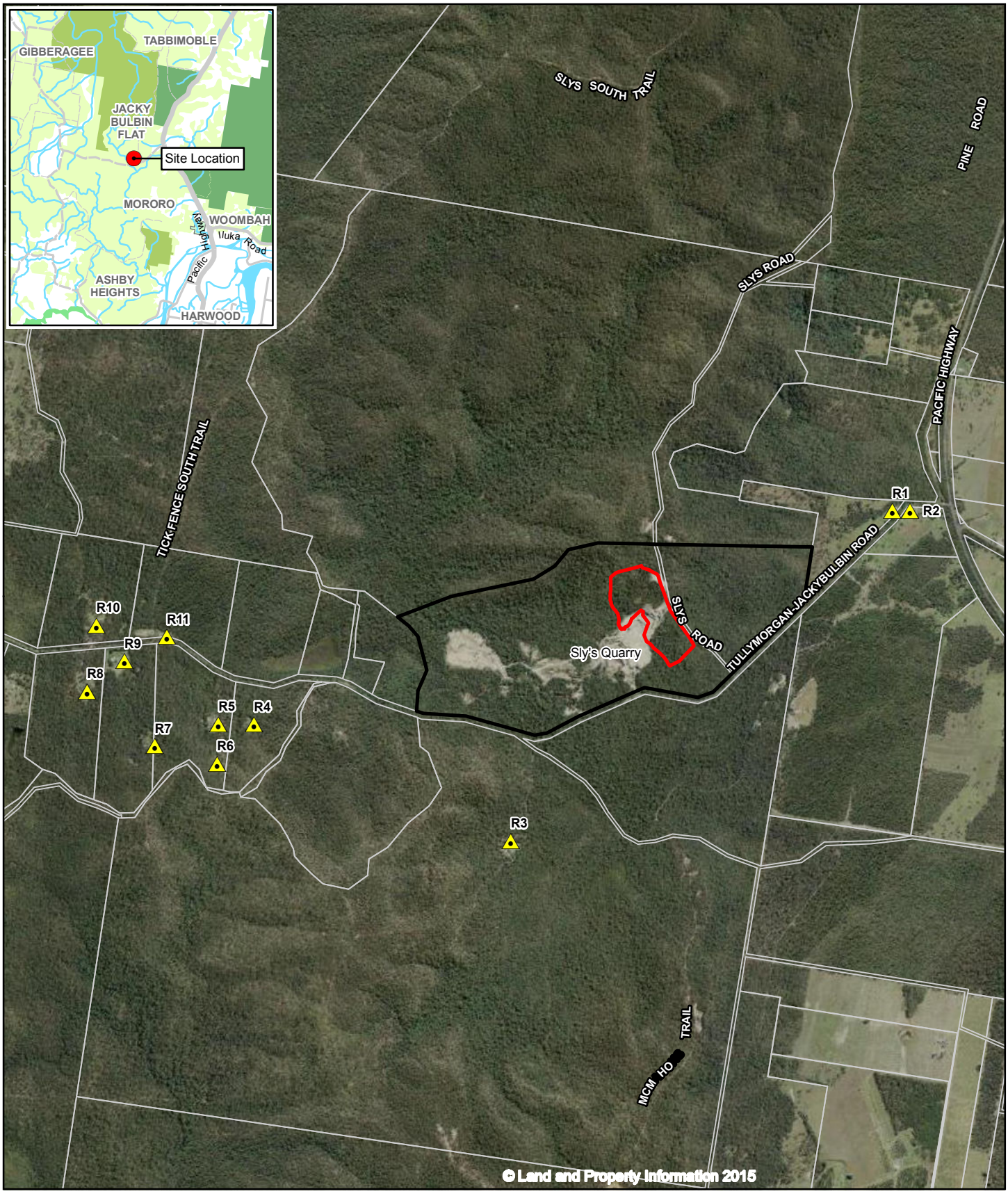
Stage 2 will involve expanding the quarry to the north and south and to a depth of 44 m AHD. This will expand the quarry by 5.7 hectares and involve the extraction of approximately 2.8 million tonnes of material. Stage 2 (south) will be exhausted prior to Stage 2 (north) being developed.

Stage 3 will be the final stage and will expand the quarry further north and south. Stage 3 will involve an expansion of 5.4 hectares to a depth of 44 m AHD. This will extract approximately 1.8 million tonnes of material. Stage 3 (south) will be exhausted prior to Stage 3 (north) being developed.

2.3 Traffic management

The majority of traffic to and from the quarry will access the site from the Pacific Highway and Tullymorgan-Jackybulbin Road via an existing, formed gravel access road that runs to the quarry pit. The layout of the quarry provides a loop that allows, trucks and machinery to enter the quarry, load and exit, all while travelling in a forward direction.

Less than 10 deliveries per year will be to the west of the quarry along Tullymorgan-Jackybulbin Road.



LEGEND

- Sensitive receiver
- Development footprint
- Development site
- Cadastre

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

Site location and sensitive receivers

Figure 2-1

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G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA001_SiteLocation_A.mxd

Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006; LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay

Figure 2-2 Existing Quarry

2.4 Operating hours and project life

The hours of operation will depend on demand with some periods of high activity and other times when activity is limited to the occasional loading of haulage trucks. The approved hours of operation are outlined in Table 2-1.

Condition 5, Schedule 2 of SSD 6624 limits the life of the quarry to 31 May 2041.

Table 2-1 Hours of operation

Activity	Permissible Hours
Employee arrival	• From 6:30 am Monday to Saturday inclusive • From 7:30 am Sundays or public holidays if engaged in maintenance, site security or other similar activities
Quarrying operations including loading and dispatch of laden trucks	• 7 am to 6 pm Monday to Friday • 7 am to 1 pm Saturday • 7 am to 4 pm if fulfilling a contract for the supply of quarry products to the Pacific Highway upgrade project • At no time on Sundays or Public holidays
Blasting	• 9 am to 3 pm Monday to Friday (except public holidays)
Maintenance	• May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2.5 Employment

Currently there are three full time employees working at the existing quarry but it is anticipated a further five full time employees would be required during periods of maximum extraction. Haulage of the material will also provide employment for truck drivers. Haulage trucks will be engaged and operated by contractors external to the quarry operations.

Additional off site employment will also be generated, in the maintenance and support services for equipment and machinery.

2.6 Site facilities

The site currently consists of a small site office, machinery shed, bunded oil shed, weighbridge, 12,000 L TransTank fuel bowser and pump-out toilet. Water for the site office and amenities is supplied via water tanks and electricity via a generator. No alterations to the existing facilities are proposed as part of this application.

The existing sediment basins will continue to treat stormwater runoff and provide water for dust control, crusher sprinklers and screen. Any excess water will be treated, as required by the site's Environmental Protection Licence, prior to discharge to the wetland. No water will be extracted from the ephemeral waterways traversing the site for any reason in respect of the operation of the quarry.

The site layout is shown in Appendix A.

2.7 Environmental management

NQ has prepared an environmental management strategy (EMS) in accordance with Condition 1, Schedule 5 of the Project Approval. The EMS details the ongoing compliance with environmental commitments made by NQ and required by the Project Approval and any associated licences. The EMS requirements include:

- In accordance with Condition 10, Schedule 5 of the Project Approval, an annual review is prepared and submitted to DPE and relevant agencies annually.
- Regular surface water, groundwater, blasting, biodiversity, air and noise monitoring to enable staff on-site to respond in a reasonable timeframe to any environmental impacts.
- Regular internal and external environmental audits to ensure the quarry is operating in accordance with the Project Approval and EMS.
- The EMS also outlines how NQ are to receive, handle, respond to and record any complaints.

2.8 Current zoning

The proposed site is predominantly zoned RU2 Rural Landscape under Clarence Valley Local Environmental Plan 2011 (CVLEP 2011), where 'extensive agriculture' is permissible without consent.

All of the existing sandstone quarry operation and the area of its proposed expansion are located in the RU2 zone.

Extractive industries, as defined in the dictionary of the CVLEP 2011, are not listed in the Land Use Table for the RU2 zone. However, the permissibility of the proposed development is determined by the *Mining Petroleum and Extractive Industries SEPP 2007* which prevails over the LEP.

2.9 Description of the surrounding area

The area immediately surrounding the quarry is heavily vegetated, with rural-residential properties to the north, south, east and west. The surrounding land is all zoned RU2 with some patches of E3 Environmental Management.

The nearest sensitive receptors are to the west, with the nearest being about 1.5 km away from the quarry. To the east two dwellings are located about 1.6 km away which are next to the Pacific Highway. To the north and south the nearest receptors are several kilometres away.

LEGEND

- Subject site
- Study area
- cadastre
- roads
- Waterways
- Waterbody

Land use zone

- E3, Environmental Management
- RU2, Rural Landscape
- RU3, Forestry

Paper Size A3

0 50 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Newman Quarrying
Sly's Quarry Environmental Impact Statement
Biodiversity Assessment

Job Number	22-17528
Revision	A
Date	18 Feb 2015

Land Use Zoning

Figure 2-3

N:\AU\Coffs Harbour\Projects\22\17528\GIS\Maps\Deliverables\22_17528_Z010_Zoning.mxd

Data Source: NSW Department of Lands: Cadastre - Jan 2014; Geoscience Australia: 250k Data - Jan 2014; NSW Department od Primary Industry - Jan 2014; ESRI image Jan 2014. Created by: qjchung

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3. Proposed modification

Condition 8(b), Schedule 2 states:

> *The Applicant must not:*
>
> *(b) receive or dispatch more than 125 laden trucks from the site on any day*

Due to the demand from the current Pacific Highway upgrade works, it is proposed to modify the approved operations by increasing the number of trucks per day to 150 (or 300 movements).

The proposed modification is due to access constraints within the construction area of the highway upgrade mean many of the trucks suppling the works are body trucks rather than truck and dog as assumed in the Environmental Impact Statement (EIS). Body trucks have the capacity to transport 12 tonnes of material compared to truck and dog which have the capacity to transport 32 tonnes of material. The limit on truck numbers imposed by Condition 8(b), Schedule 2 therefore means the volume of material Slys Quarry can supply is restricted, as illustrated by Table 3-1. The proposed increase in truck numbers would not result in an increase in extraction per annum.

Table 3-1 Volume of material by truck type

Truck type	125 trucks	150 trucks
Body truck	1,500 tonnes	1,800 tonnes
Truck and dog	4,000 tonnes	4,800 tonnes

To make blasting at the quarry more efficient while maintaining safety, the blasting contractor has suggested modifying the proposed benches of the quarry by using 15 m by 8 m benches rather than 10 m by 10 m benches. A copy of the modified quarry plans are provided in Appendix A. This would also result in additional material being extracted from each stage of the quarry, as shown in Table 3-2.

No other modifications to the approved quarry are proposed.

Table 3-2 Extraction volumes

Stage	Original volume (tonnes)	Modified volume (tonnes)
1	2,300,000	2,480,000
2 (North)	1,600,000	1,888,000
2 (South)	1,200,000	1,296,000
3 (North)	720,000	1,200,000
3 (south)	1,040,000	1,120,000
Total	**6,880,000**	**7,984,000**

4. Statutory and planning context

This section describes the regulatory framework and the application relevant to the proposed modification only.

4.1 Environmental Planning and Assessment Act 1979

The EP&A Act provides the statutory basis for planning and environmental assessment in NSW. All development is assessed in accordance with the provisions of the EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The EP&A Act institutes a system for environmental planning and assessment, including approvals and environmental impact assessment for proposed developments. The EP&A Act contains several relevant parts that impose requirements for planning approval. Part 4 provides for the control of development that requires development consent.

Section 96 of the EP&A Act allows for modifications to be made to a development consent issued by a consent authority, subject to and in accordance with the regulations. In particular Section 96(2) states:

(2) A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and

(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and

(c) it has notified the application in accordance with:

(i) the regulations, if the regulations so require, or

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Subsections (1) and (1A) do not apply to such a modification.

(3) In determining an application for modification of a consent under this section, the consent authority must take into consideration such of the matters referred to in section 79C (1) as are of relevance to the development the subject of the application.

(4) The modification of a development consent in accordance with this section is taken not to be the granting of development consent under this Part, but a reference in this or any other Act to a development consent includes a reference to a development consent as so modified.

The proposed modification is considered to be substantially the same development as that approved under SSD 6624 because:

- As discussed in Section 3 it will not alter the approved use or intensify activities beyond the current approved development. The modifications will allow for flexibility to service the Pacific Highway upgrade works.
- The proposed modification would not exceed the annual extraction limit for the quarry.
- The overall footprint of the site would not change.
- As discussed in Section 6, the modification would not result in any additional impacts.

In determining an application for modification, Section 96(3) of the EP&A Act provides that a consent authority is to take into consideration matters of relevance in Section 79C of the EP&A Act namely:

(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979), that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

(d) any submissions made in accordance with this Act or the regulations,

(e) the public interest.

The above matters are addressed in the following sections of the MOD, where relevant.

4.2 Environmental Planning and Assessment Regulation 2000

Pursuant to Clause 115 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), the following information is required to be supplied as part of the proposed modification:

(1) An application for modification of a development consent under section 96 (1), (1A) or (2) or 96AA (1) of the Act must contain the following information:

(a) the name and address of the applicant,

(b) a description of the development to be carried out under the consent (as previously modified),

(c) the address, and formal particulars of title, of the land on which the development is to be carried out,

(d) a description of the proposed modification to the development consent,

(e) a statement that indicates either:

(i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or

(ii) that the modification is intended to have some other effect, as specified in the statement,

(f) a description of the expected impacts of the modification,

(g) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved,

(h) if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner),

(i) a statement as to whether the application is being made to the Court (under section 96) or to the consent authority (under section 96AA),

and, if the consent authority so requires, must be in the form approved by that authority.

(2) The notification requirements of clause 49 apply in respect of an application if the consent of the owner of the land would not be required were the application an application for development consent rather than an application for the modification of such consent.

(3) In addition, if an application for the modification of a development consent under section 96 (2) or section 96AA (1) of the Act relates to residential apartment development and the development application was required to be accompanied by a design verification from a qualified designer under clause 50 (1A), the application must be accompanied by a statement by a qualified designer.

The above information has been presented in this MOD to satisfy Clause 115 of the EP&A Regulation.

5. Consultation

Roads and Maritime Services (RMS) and Clarence Valley Council (CVC) have been contacted to determine if they have any concerns regarding the proposed modification.

RMS indicated the Traffic Impact Assessment (TIA) would need to demonstrate how the warrants were determined and how many trucks would access the site in the peak periods. This has been addressed in Section 6.2 and Appendix B.

CVC did not raise any concerns when contacted but would require a copy of the MOD before they could make a formal response. CVC indicated they would be particularly interested in the TIA. CVC would get a copy of the MOD and an opportunity to provide a response during the DPE assessment process.

The site is relatively isolated and there was limited interest by the community in the original expansion application. Three of the neighbours were contacted by phone on 26 May 2017, which are identified as R1, R2 and Hill. None of the residents raised a concern about the proposed modification, although one did comment on the sand accumulated at the quarry access on to Tullymorgan-Jackybulbin Road and a truck driver who cut the corner to access the quarry. It was explained the access would be improved in the near future, once the BAL/BAR intersection works are complete. The community would have further opportunity to comment on the MOD during the DPE assessment process.

6. Environmental assessment

6.1 Issue identification

The majority of the potential environmental impacts identified and assessed in the original approved development are considered unchanged by the modified proposal.

Table 6-1 provides a summary of the differences in impact between the approved development and the proposed modification. Where additional potential impacts or differences in impacts as a result of the proposed modification are identified, further assessment is provided in sections 6.2 and 6.3.

Table 6-1 Identification of environmental issues

Environmental aspect	Further assessment required due to the proposed modification	Reasoning and scope of works
Land resources	No	The proposed modification will result in the extraction of additional material but the impact on land resources will be consistent with the approved development.
Surface water and groundwater	No	The proposed modification will not involve any additional construction or demolition works, therefore there will be no additional soil or water quality impacts as a result of the proposed modification. Existing soil and water quality measures will continue to be employed to mitigate any potential impacts.
Noise	Yes	The increase in truck numbers has the potential for noise impacts and requires further assessment. Refer to Section 6.2. The modification to the benching is not expected to create any additional noise impact.
Air quality	No	Due to the isolation of the site from sensitive receptors, all the air quality parameters, in the original assessment, were well within the relevant criteria. The only change to the quarry likely to change the air quality impact would be the additional truck movements within the quarry. As there would only be a 20% increase in truck numbers, the proposed modification is not expected to significantly increase the level of impact and would still be well within the adopted criteria.
Flora and fauna	No	The proposed modification will not involve any additional clearing, therefore there will be no impacts to flora and fauna as a result of the proposed modification. Existing flora and fauna measures will continue to be employed to mitigate any potential impacts.
Traffic and access	Yes	The proposed modification will result in changes to the existing heavy vehicle movements associated with the quarry operations. Up to 25 additional heavy vehicles per day are proposed. Therefore, the potential for traffic impacts due to the increase in heavy vehicle movements require assessment. Refer to Section 6.2.
Heritage	No	The proposed modification will not involve any construction or demolition works or changes to built form, therefore there will be no impacts to heritage as a result of the proposed modification. Existing heritage measures will continue to be employed to mitigate any potential impacts.
Visual amenity	No	The proposed modification to the quarry benches will not involve any works that are visible from outside the quarry, therefore there will be no visual impacts as a result of the proposed modification.

Environmental aspect	Further assessment required due to the proposed modification	Reasoning and scope of works
		Existing measures will continue to be employed to mitigate any potential impacts.
Waste management	No	The proposed modification to truck numbers and benching dimensions will not result in any additional waste being created, therefore there will be no additional waste management impacts as a result of the proposed modification. Existing waste management measures will continue to be employed to mitigate any potential impacts.
Risk and hazards	No	The proposed modification will not result in any additional risk or hazards.
Socio-economic	No	Other than the indirect social impacts caused by the increase in truck numbers and noise, there are no other socio-economic related impacts expected from the proposed modification.

6.2 Traffic impact assessment

A Traffic Impact Assessment (TIA) was prepared with the following scope:

- To assess the impact of an increase in truck numbers at Sly's Quarry from 125 to 150 per day

A copy of the TIA is provided in Appendix B and a summary is provided below.

6.2.1 Existing conditions

Key roads in the surrounding area include Tullymorgan-Jackybulbin Road and the Pacific Highway.

Tullymorgan-Jackybulbin Road

Tullymorgan-Jackybulbin Road is a two-way single carriageway road and provides access from the Pacific Highway to Sly's Quarry and other rural/residential properties. There is no sign posted speed-limit, and as such the default speed limit for non-built up areas of 100 km/h applies. It is however not expected that vehicles would travel at this speed in the vicinity of the quarry access point, with lower operating speeds likely due to the nearby corner to the east, and the beginning of an unsealed section immediately to the west. The road is sealed from the highway to the existing quarry access road and is unsealed further west of this point. The roadway is approximately 6.5-7.5 m wide, generally with grassed verges and no road shoulders.

Pacific Highway

The Pacific Highway in the vicinity of Tullymorgan – Jackybulbin Road is a two-way single carriageway road. The sign posted speed limit is 100 km/h. The Pacific Highway is a major transport corridor between Sydney and Brisbane. This section of the highway is currently being upgraded to be dual-carriageway with two lanes in each lane as part of the Pacific Highway upgrade program. Previously, Tullymorgan-Jackybulbin Road met the Pacific Highway in a T intersection for a single carriageway. The new intersection will be a Seagull T intersection meeting the new dual carriageway.

Sly's Quarry access

The access to the existing Sly's Quarry is located on Tullymorgan-Jackybulbin Road, approximately 2.6 kilometres west of the Pacific Highway. The access road is approximately

four metres wide and 400 m long from the intersection to the site office. There is an onsite speed limit of 20 km/h. The site access is gated. Figure 6-1 below shows the site access point.

The access is to be upgraded to a BAL/BAR, as per 24(d), Schedule 3, in the near future.

Figure 6-1 Site Access Road and Gate

Daily traffic volumes

The existing traffic generated by Sly's quarry is known to fluctuate substantially depending on demand for the quarry products. During busy periods, where the extraction rate is 100,000 tonnes/annum, there are approximately 80 truck movements per day. The existing workforce at the quarry consists of a maximum of seven employees, generating 14 light vehicle movements per day.

Due to a lack of traffic data for Tullymorgan-Jackybulbin Road, traffic numbers were calculated and added to the traffic known to be generated by Sly's Quarry as summarised in Table 6-2 below.

Table 6-2 Tullymorgan-Jackybulbin Road Daily Traffic Volume estimation

Traffic Generation source	Light Vehicles (v/d)	Heavy Vehicles(v/d)	Total
Residential dwellings	97	11	108
Sly's Quarry	14	80	94
Total	111	91	202

Roads and Maritime has provided traffic data for the Pacific Highway in two locations on the Pacific Highway. These are:

- Station HWDSTC, 200 m south of Yamba Road. This site is approximately 20 km south of Tullymorgan-Jackybulbin Road.
- Station 04233 at New Italy. This site is approximately 18 km north of Tullymorgan-Jackybulbin Road.

The average daily traffic for each of these sites is shown in Table 6-3.

Additional information provided by RMS showed that at the Yamba Road counting station, heavy vehicles represented 18% of all traffic.

Table 6-3 Pacific Highway traffic volume data

Year	Location	ADT
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road - Northbound	7,192
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road - Southbound	7,235
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road – Total	14,427
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Northbound	3,918
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Southbound	3,739
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Total	7,567

Source: RMS Traffic Volume Viewer

It is assumed that the volume at Tullymorgan-Jackybulbin Road is similar to the volume at Woombah. The historic data at the nearest permanent count site (130 m south of Yamba Road) indicates that since 2011 traffic has grown at 4.8% per annum (linear). Using these assumptions the estimated traffic volumes at Tullymorgan-Jackybulbin Road are shown in Table 6-4.

Table 6-4 Pacific Highway estimated traffic volumes 2017

Direction	Light Vehicles (v/d)	Heavy Vehicles(v/d)	Total
Northbound	3,870	1,170	5,040
Southbound	3,610	1,090	4,700
Total	7,480	2,260	9,740

Crash history

Crash history has been provided by Roads and Maritime Services for Tullymorgan-Jackybulbin Road from the Pacific Highway to the west of the quarry access and for the Pacific Highway itself, 1 km either side of the Tullymorgan-Jackybulbin Road intersection.

In the data period, there were a total of 6 crashes with three resulting in injury and none resulting in fatalities. None of the crashes occurred at the intersection of the Pacific Highway and Tullymorgan-Jackybulbin Road, with the closest being approximately 300 m to the south. There were no crashes in the vicinity of the quarry access or on Tullymorgan-Jackybulbin Road.

This crash history does not indicate any existing road safety issues that would be exacerbated by the proposal.

Other transport modes

Northern Rivers Bus Lines operates a public bus service (route 695) between Grafton and Lismore which runs on the Pacific Highway past the Tullymorgan-Jackybulbin Road intersection. Each weekday there is one service to Lismore in the morning and one service to Grafton in the afternoon. The closest stop to the proposed development is approximately 7 km south of Tullymorgan-Jackybulbin Road in Woombah Woods.

School bus services currently use Tullymorgan-Jackybulbin Road as a u-turn facility after picking up / dropping off school children. This occurs during the morning and afternoon.

There is no provision for pedestrians or cyclists on Tullymorgan-Jackybulbin Road.

6.2.2 Potential impacts

Cumulative traffic impacts

The quarry is expected to generate up to 300 truck movements per day, and 24 staff movements. Current levels of activity are around 80 truck movements per day.

As a result of the proposal, daily traffic volumes on Tullymorgan-Jackybulbin Road would be expected to increase from the existing average of 202 vehicles per day to 432 vehicles per day. This level of activity would represent an increase of some 89% on the current traffic volumes on Tullymorgan-Jackybulbin Road. The proportion of heavy vehicles would increase from 45% currently to approximately 72%, as shown in Table 6-5.

Table 6-5 Impacts on traffic volumes on Tullymorgan-Jackybulbin Road

Scenario	Total Vehicles	Light Vehicles	Heavy Vehicles	% HV
Existing	202	111	91	45%
Less current quarry activities	94	14	80	
Plus Proposal	324	24	300	
Future	432	121	311	72%

The increase in traffic volume on Tullymorgan-Jackybulbin Road will also result in an increase in traffic on the Pacific Highway. Table 6-6 outlines the expected increase in traffic volumes due to the proposed development.

Table 6-6 Impacts on traffic volumes on the Pacific Highway

Scenario	Total Vehicles	Light Vehicles	Heavy Vehicles	% HV
Existing	9,740	7,480	2,260	23%
Less current quarry activities	94	14	80	
Plus Proposal	324	24	300	
Future	10,064	7,504	2,560	25%

The daily traffic volumes on the Pacific Highway are expected to increase by 3.3% as a result of the proposal. This small increase in traffic (which is less than the assumed annual growth rate) is not expected to have any significant impact on the Pacific Highway in the vicinity of the proposed development, and will occur generally for only a limited period of time until the Pacific Highway upgrade program is complete.

Access Road

The existing access road is relatively narrow, however it does allow for inbound and outbound vehicles to pass each other without leaving the formed roadway in certain places. Due to the potential increase in heavy vehicles and the unsealed road surface, the road condition may deteriorate at a faster rate than it does currently. Maintenance of the existing road should be reviewed and potentially a more frequent maintenance regime be put in place.

Site Access intersection

Haulage trucks would enter and exit the site using the existing access onto Tullymorgan-Jackybulbin Road. It is expected that almost all truck movements will be to and from the east (Pacific Highway), with right turns into the site and left turns out onto Tullymorgan-Jackybulbin Road.

The likely traffic volumes at this intersection can be compared with design warrants in the Austroads Guide to Road Design Part 4A.

It is expected that the peak design hour would contain approximately 10% of truck movements into and out of the quarry (15 trucks turning in, 15 trucks turning out). It can also be estimated that the design peak hour would contain 10% of the total average daily traffic which would indicate a peak hourly volume of 43 vehicles on Tullymorgan-Jackybulbin Road.

The right turn into the quarry access, with approximately 15 trucks per hour turning in, and an affected volume of 43 vehicles per hour on Tullymorgan-Jackybulbin Road requires a basic right turn (BAR) treatment. The left turn into the quarry access would have only a rare occurrence of turning trucks, and would also require only a basic right turn (BAL) treatment. BAL and BAR treatments are to be constructed at the quarry access, as part of the SSD 6624 approval.

Even with background growth in traffic volumes on the Tullymorgan-Jackybulbin Road, or with an increase in the volume of truck activity at the quarry, this type of intersection is likely to be suitable for many years to come.

The requirements for sight distance are specified in the Austroads Guide to Road Design Part 4A. For a 100 km/hr speed environment, the sight distance requirement is 248 m. The sight distance in both directions is less than the required 248 m with 220 m to the east and 200 m to the west. However, existing speeds on Tullymorgan-Jackybulbin Road in the vicinity of this intersection are generally lower than 100 km/h and this would lower the requirement for sight distance. The available sight distance is adequate in both directions for an 80 km/h speed environment, which is commensurate with the expected speed of traffic past the site access.

As there are already warning signs in place along the roadway advising motorists of the potential for truck movements from the site access point and as the quarry has already been operating without incident for some time, the sight distance at this intersection is considered adequate.

This sight distance in both directions is illustrated in Figure 6-2 and Figure 6-3.

Figure 6-2 Looking east from site access

Figure 6-3 Looking west from site access

Pacific Highway / Tullymorgan-Jackybulbin Road intersection

Haulage trucks would enter and exit Tullymorgan-Jackybulbin Road from both directions on the Pacific Highway.

The expected traffic volumes at this intersection have been tested for the new intersection configuration currently under construction.

It is expected that the peak design hour would contain approximately 10% of truck movements into and out of the quarry (15 trucks turning in, 15 trucks turning out). Traffic count data provided by Roads and Maritime shows that the peak hour volume on the Pacific Highway in the vicinity of Tullymorgan-Jackybulbin Road is approximately 4% of the ADT in each direction. Therefore peak hour volumes on the Pacific Highway are approximately 405 vehicles.

A SIDRA Intersection analysis was undertaken for the new seagull intersection, using these volumes. The analysis indicates that the intersection will operate at Level of Service B, with delays for the right turn out of Tullymorgan-Jackybulbin Road an average of 25 seconds per vehicle. With growth in traffic on the Pacific Highway continuing at the current rate of almost 5%, the intersection is predicted to operate at Level of Service D in the peak hour in 2027, with delays for the right turn out of Tullymorgan-Jackybulbin Road at 53 seconds. This is approaching the threshold for what would be considered acceptable for this movement. However, in this situation, the volume of quarry activity is expected to be declining by this time, as the major works for the Pacific Highway upgrade program reduce.

In all scenarios, Pacific Highway traffic will not be obstructed by turning traffic, with dedicated turning and auxiliary lanes provided for turning traffic.

The requirements for sight distance are specified in the Austroads Guide to Road Design Part 4A. For a 100 km/hr speed environment, the sight distance requirement is 248 m. The site distance at this intersection under its previous configuration exceeded the required 248 m in both directions with 370 m to the north and 500 m to the south. Given the upgrades works that are currently underway, adequate sight distance at this intersection is expected to be maintained.

6.2.3 Mitigation measures

Based on the proposed modification to increase the maximum truck numbers per day from 125 to 150, there are no additional recommendations from the original assessment, associated with SSD 6624 required to mitigate against the identified traffic impacts.

6.3 Noise impact assessment

A Noise Impact Assessment (NIA) was prepared with the following scope:

- Review the previous noise studies and noise impact assessment for the quarry.
- Undertake two operational noise modelling scenarios using Computer Aided Noise Abatement (CadnaA) software to predict sound pressure levels emanating from the site based on current quarry configuration and future quarry configuration. For each scenario, off-site noise levels resulting from peak extraction rate were investigated including the increase in daily truck movements.
- Provide a summary of the predicted results and outlining recommendations for in-principle noise mitigation measures, where exceedances are predicted.

A copy of the NIA is provided in Appendix C and a summary is provided below.

6.3.1 Existing environment

Eleven potential sensitive receivers in the vicinity of the quarry were identified from aerial imagery. The nearest identified sensitive receiver is located approximately 1.5 km from the quarry boundary.

Sensitive receivers identified in the vicinity of the site are detailed in Table 6-7. Figure 2-1 shows a site aerial image and the location of identified noise sensitive receivers. These receivers were identified to represent those with the greatest potential for adverse noise impact.

Table 6-7 Identified noise sensitive receivers

Receiver	Receiver type	Approximate distance to nearest boundary[1](m)
R1	Residential	1600
R2	Residential	1700
R3	Residential	1500
R4	Residential	2600
R5	Residential	2700
R6	Residential	2800
R7	Residential	3200
R8	Residential	3600
R9	Residential	3300
R10	Residential	3500
R11	Residential	3000

1. Distance measured to the nearest boundary of operations for stage 1 configuration

Background noise monitoring was previously undertaken by GHD at two locations in order to determine the ambient background noise levels and subsequently the project specific noise levels (PSNL) for the Sly's Quarry expansion project. Table 6-8 summarises the rating background levels (RBL) and resultant PSNLs determined from the background noise logging.

Table 6-8 Project specific operational noise criteria – daytime dB(A)

Criterion	Logger 1 (Lot 100 Tullymorgan-Jackybulbin Rd)	Logger 2 (Funnels Rd)
Rating background level, $L_{A90(Period)}$	40	29[1]
Intrusiveness criteria, $L_{Aeq(15min)}$	45	35
Amenity criteria (rural), $L_{Aeq(period)}$	50	50
Project specific criterion, $L_{Aeq\ (15min)}$	45	35

Note 1: The NSW INP notes that "where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A).

6.3.2 Impact assessment

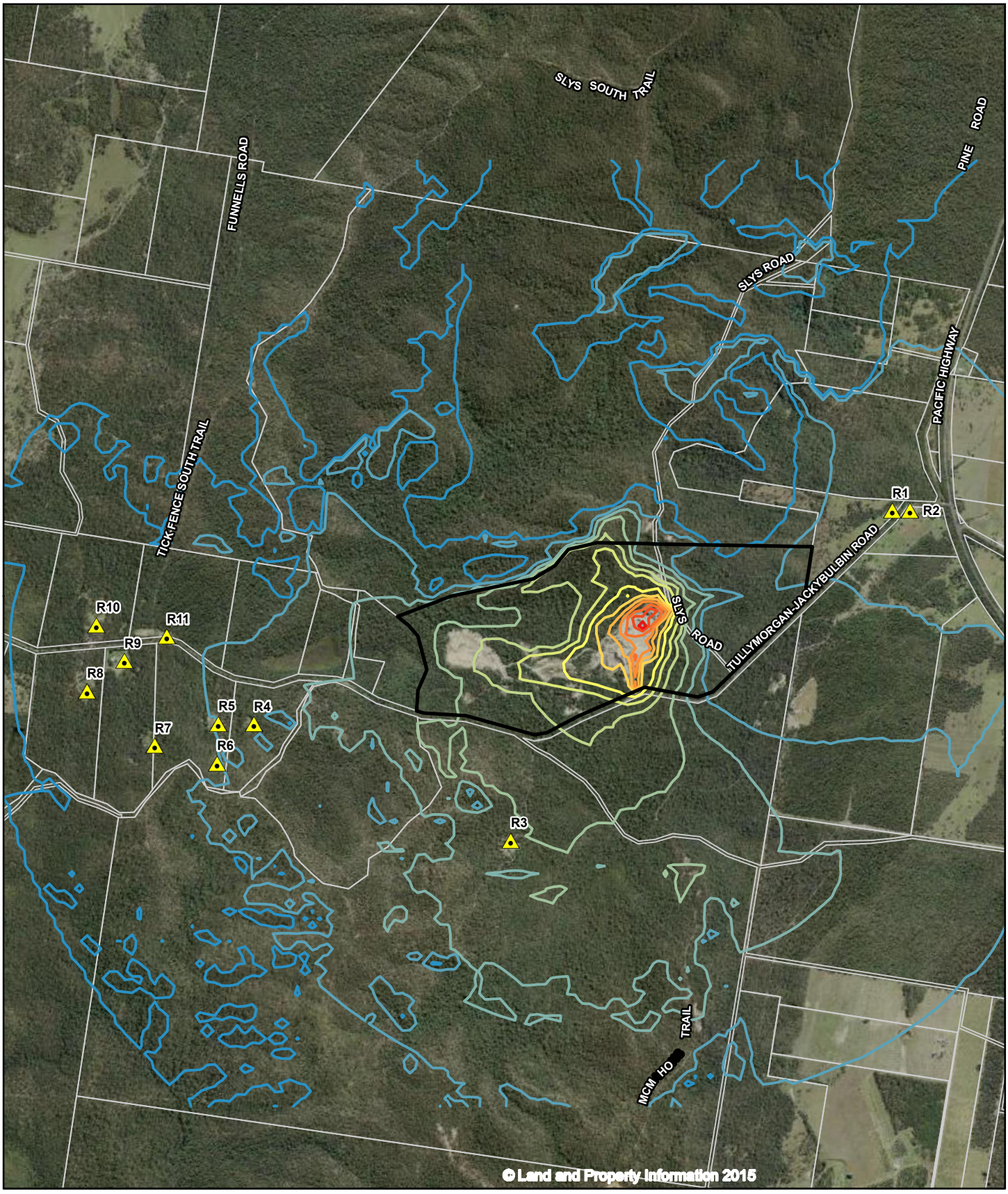
The predicted noise levels for daytime site operations with increased truck numbers are shown in Table 6-9.

Model results indicate that noise levels generated from quarry operations with increased truck numbers are predicted to comply with the INP daytime noise criteria at all sensitive receivers.

Figure 6-4 and Figure 6-5 show the worst case (i.e., with rock hammering) predicted operational noise contour plots for Scenario 1 and Scenario 2.

Table 6-9 Predicted operational noise levels

Sensitive Receiver	Noise criterion L_{Aeq} dB(A)	Predicted noise level L_{Aeq} dB(A)							
		Scenario 1 – Existing quarry configuration				Scenario 2 – Final quarry configuration			
		Average daily production without rock breaking	Average daily production with rock breaking	Peak daily production without rock breaking	Peak daily production with rock breaking	Average daily production without rock breaking	Average daily production with rock breaking	Peak daily production without rock breaking	Peak daily production with rock breaking
R1	45	26	26	28	28	26	26	28	29
R2	45	25	26	27	28	26	26	28	28
R3	35	32	33	34	35	30	31	32	33
R4	35	23	25	25	26	21	22	23	24
R5	35	23	24	25	25	20	21	22	23
R6	35	22	23	24	25	20	21	22	23
R7	35	21	22	22	23	18	19	21	21
R8	35	19	20	21	22	17	18	19	20
R9	35	20	21	22	23	18	18	20	21
R10	35	20	21	21	22	17	18	19	20
R11	35	21	22	23	24	19	20	21	22



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

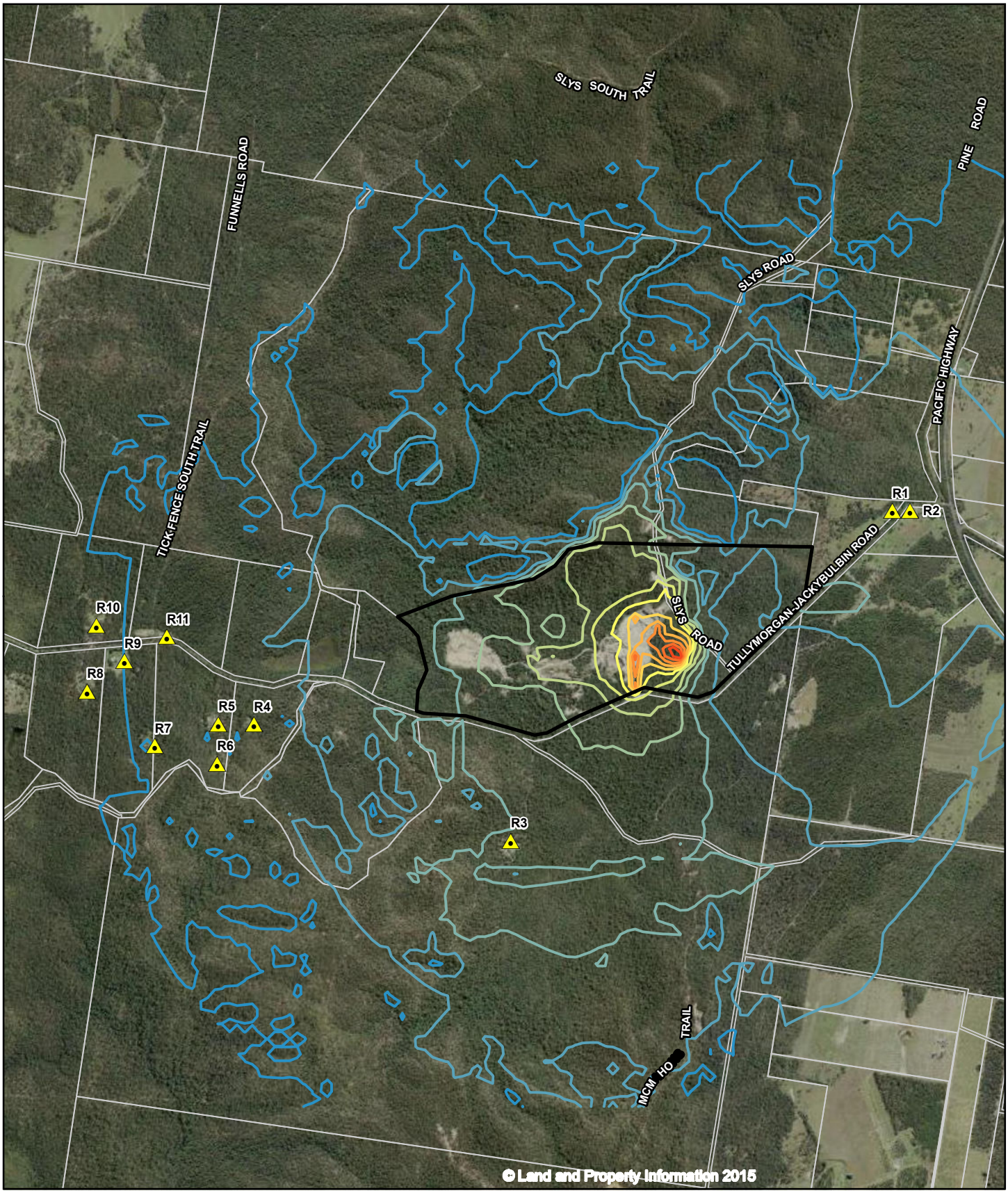
Predicted operational noise levels
Scenario 1 – Peak daily production with rock hammer

Figure 6-4

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA005_NoiseLevels_ExistPeak_RockHammer_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

Predicted operational noise levels
Scenario 2 – Peak daily production with rock hammer

Figure 6-5

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA008_NoiseLevels_FinalPeak_RockHammer_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay

Road traffic noise

Table 6-10 summarises the predicted road traffic noise level for when the quarry is operating at peak daily production with increased truck numbers, and compares this against the RNP criteria.

Table 6-10 Predicted road traffic noise level during peak daily production

Roadway	Generated heavy vehicle movements per day (average daily production)	Generated heavy vehicle movements per day (peak daily production)	RNP criteria Day (7 am – 10 pm)	Predicted road noise level	
				Average daily production $L_{Aeq(1\ hour)}$ dB(A)	Peak daily production $L_{Aeq(1\ hour)}$ dB(A)
Tullymorgan-Jackybulbin Rd	100 (50 loads)	300 (150 loads)	$L_{Aeq(1\ hour)}$ 55 (external)	49	52

1. Predicted results have received a 2.5 dB(A) façade correction

Table 6-10 shows road traffic noise along Tullymorgan-Jackybulbin Road due to a proposed increase in heavy vehicles (to 300 daily movements) during peak daily production is expected to comply with the RNP criteria. Results also indicate that the increase in truck numbers will not result in any increase in resultant road noise levels for the peak production scenario when compared to approved peak daily production truck numbers.

6.3.3 Noise mitigation measures

Notwithstanding the results of the proposed increase in truck movement numbers, it is still recommended to continue implementing appropriate noise mitigation measures to limit adverse impacts on local residents, as outlined in the approved Noise Management Plan for Slys Quarry.

7. Conclusion

This MOD has been prepared to assess the modification of Condition 8(b), Schedule 2 and the Development Layout in Appendix 2 of SSD 6624, to increase daily heavy vehicle movements in and out of the site and alter the benching dimensions. Currently, the site is restricted to 125 laden trucks per day. This proposal supports the increase of laden trucks to 150 per day.

Due to the type of truck used on the Pacific Highway upgrade, Condition 8(b), Schedule 2 is restricting the volume of material that can be supplied by the quarry. The modification will allow more flexibility in daily quarry heavy vehicle movements to supply the market.

The proposed modification is considered to be substantially the same development as that approved under SSD 6624 as it would not substantially alter the operation or result in any additional impacts.

Issues identified as having the largest potential for environmental impact as a result of the modified proposal includes traffic and noise due to increased daily heavy vehicle traffic accessing the site.

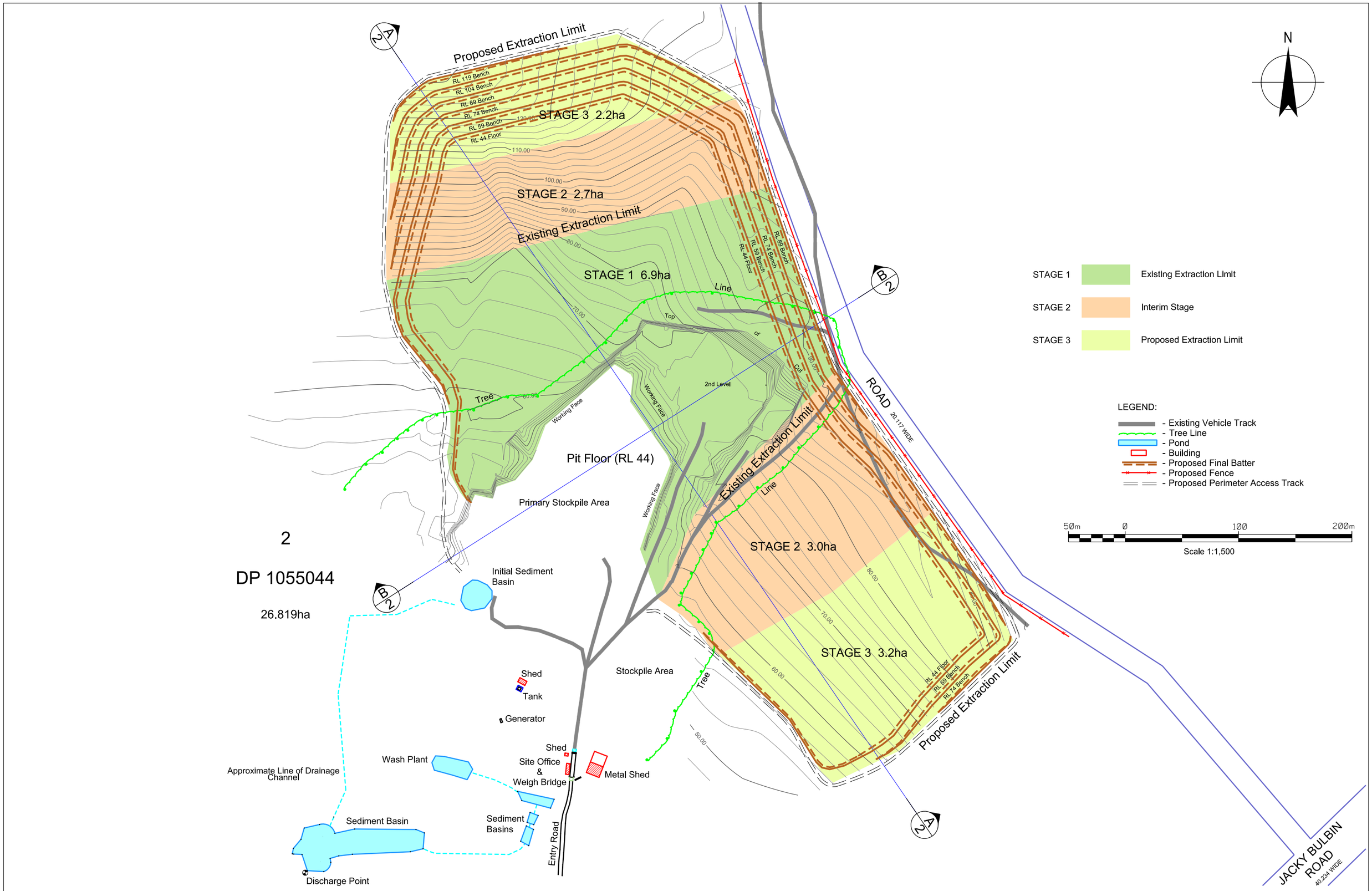
The impact assessment has determined that:

- The current road access arrangement is considered appropriate to accommodate the additional heavy vehicle activity.
- The results from noise modelling demonstrate that the modified proposal is expected to comply with both the PSNL and RNP criteria at all nearby sensitive receivers.

It is therefore requested that DPE support the proposed modification as documented.

Appendices

Appendix A – Revised Quarry Plans



No	Revision	Note: * Indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date

GHD
Level 8, 180 Lonsdale Street, Melbourne VIC 3000 Australia
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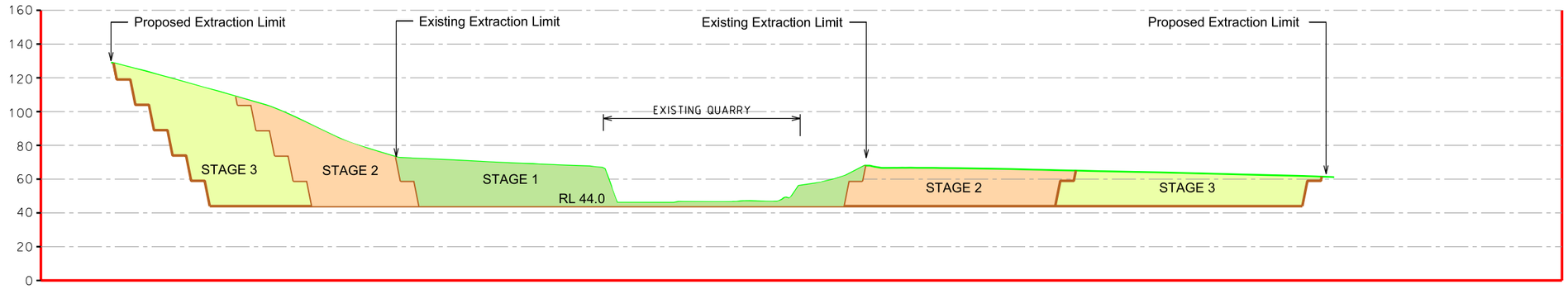
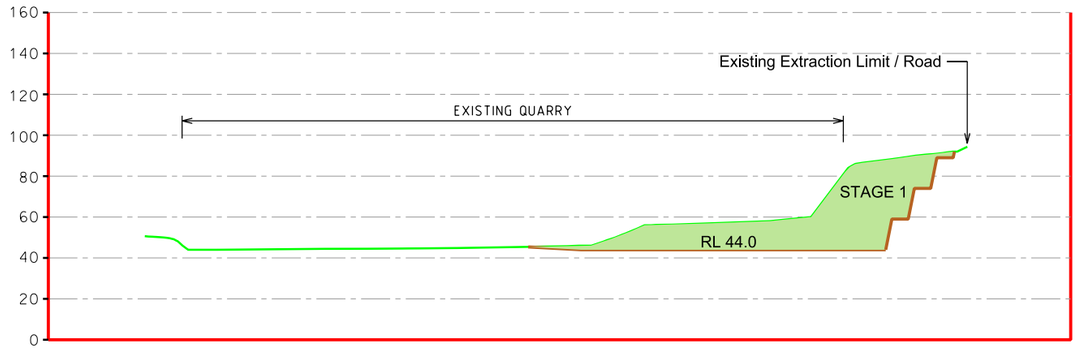
Drawn	S. Verhellen	Designer	
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client	Newman Quarrying
Project	Slys Quarry
Title	Proposed Quarry Expansion
Original Size	A1
Drawing No:	22-17528-001
Rev:	



SECTION A - A



SECTION B - B

Horizontal & Vertical Scale 1:1,500

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Level 8, 180 Lonsdale Street, Melbourne VIC 3000 Australia
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DO NOT SCALE

Drawn	S. Verhellen	Designer
Drafting Check		Design Check
Approved (Project Director)		
Date		
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved

Client	Newman Quarrying
Project	Slys Quarry
Title	Proposed Quarry Expansion
Original Size	A1
Drawing No:	22-17528-002
Rev:	

Appendix B – Traffic Impact Assessment

Newman Quarrying Pty Ltd

Sly's Quarry Expansion

Traffic Impact Assessment

June 2017

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Figure index

Appendices

1. Introduction

1.1 Project overview

GHD Pty Ltd (GHD) was engaged by Newman Quarrying Pty Ltd (Newman Quarrying) to prepare a Traffic Impact Assessment (TIA) report to address the potential traffic impacts from the proposed modification of SSD 6624, which relates to the expansion of a sandstone quarry at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo, known as Sly's Quarry.

The proposed modification relates to increasing the heavy vehicle movements in and out of the site from 125 to 150 per day.

1.2 Purpose of this report

This TIA has been prepared by GHD Pty Ltd (GHD) on behalf of Newman Quarrying Pty Ltd to assess the impact of an increase in truck numbers at Sly's Quarry from 125 to 150 per day (referred to in this report as 'the proposal'). This assessment has been prepared to form a part of an Modification Application (MOD) for the proposal.

1.3 Scope

The study area for this TIA encompasses the local road network around Sly's Quarry, Mororo NSW.

This assessment has been prepared to address specific requirements from the Department of Planning and Environment (DPE), and key issues raised by statutory agencies.

2. Existing conditions

A plan of the study area is shown in Figure 2. Key roads in the surrounding area include Tullymorgan-Jackybulbin Road and the Pacific Highway.

2.1 Tullymorgan-Jackybulbin Road

Tullymorgan-Jackybulbin Road is a two-way single carriageway road and provides access from the Pacific Highway to Sly's Quarry and other rural/residential properties. There is currently no sign posted speed-limit, and as such the default speed limit for non-built up areas of 100km/h applies. It is however not expected that vehicles would travel at this speed in the vicinity of the quarry access point, with lower operating speeds likely due to the alignment of the road to the east, and the beginning of an unsealed section immediately to the west. The road is sealed from the highway to the existing quarry access road and is unsealed further west of this point. The roadway is between 6.5-7.5m wide, with grassed verges and no road shoulders.

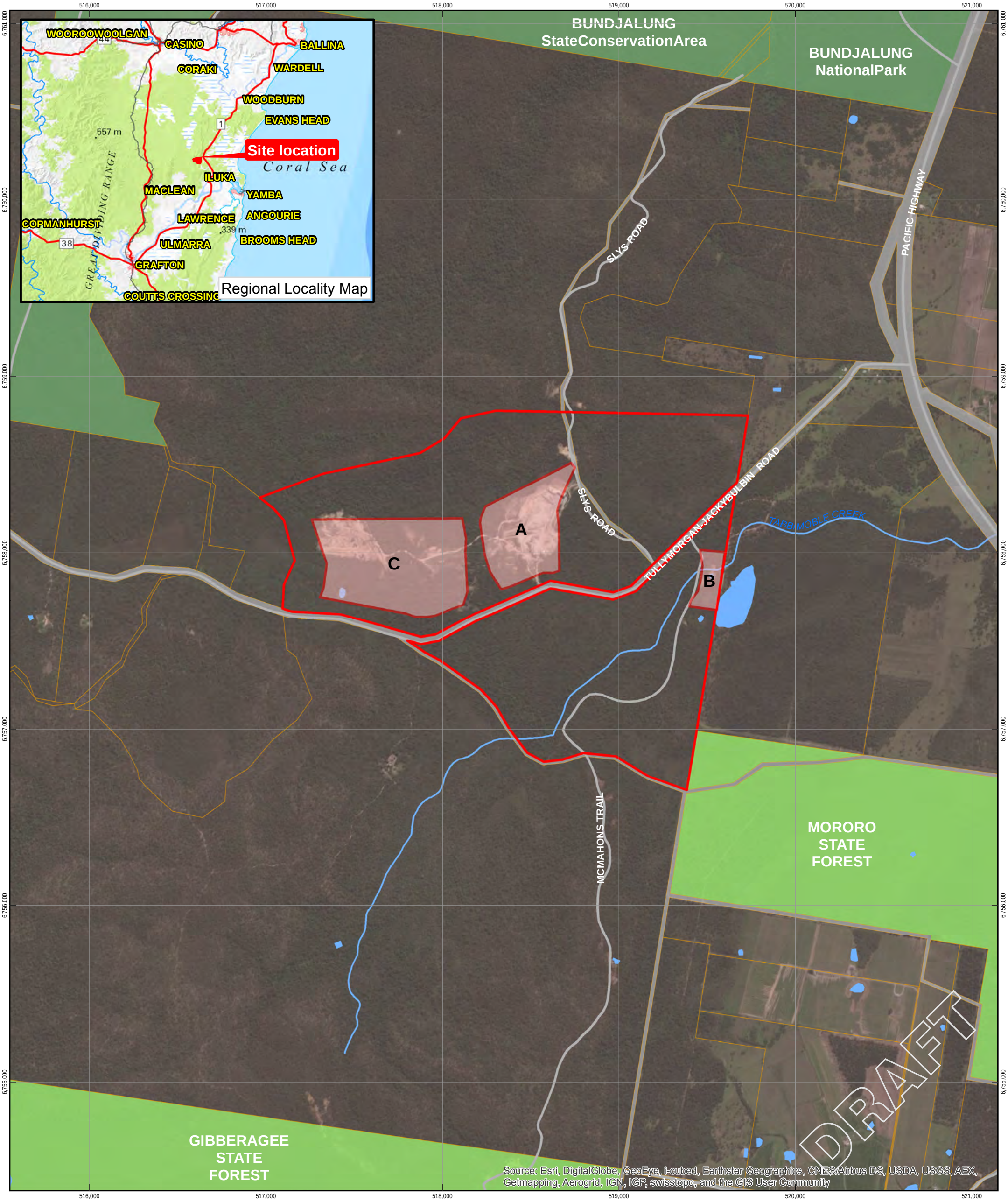
2.2 Pacific Highway

The Pacific Highway in the vicinity of Tullymorgan – Jackybulbin Road is a two-way single carriageway road. The sign posted speed limit is 100 km/h. The Pacific Highway is a major transport corridor between Sydney and Brisbane. This section of the highway is currently being upgraded to be dual-carriageway with two lanes in each lane as part of the Pacific Highway upgrade program. Previously, Tullymorgan-Jackybulbin Road met the Pacific Highway in a T intersection for a single carriageway. The new intersection will be a Seagull T intersection with associated acceleration and deceleration lanes in both directions meeting the new dual carriageway.

2.3 Sly's Quarry access

The access to the existing Sly's Quarry is located on Tullymorgran-Jackybulbin Road, approximately 2.6 kilometres west of the Pacific Highway. The access road is approximately four metres wide and 400 m long from the intersection to the site office. There is an onsite speed limit of 20 km/h. The site access is gated. Figure 1 below shows the site access point.

Figure 1 Site Access Road and Gate



LEGEND

Current Quarry Areas	Road	Waterbody
Lot 2 DP 1055044	Lot	Natural Parks
	Waterways	State Forest

Paper Size A3

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying
Sly's Quarry Environmental Impact Statement

Job Number 22-17528
Revision A
Date 11 Dec 2014

Site location

Figure 2

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Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2014; Geoscience Australia: 250k Data - Jan 2014; NSW Department od Primary Industry - Jan 2014; ESRI imagery Jan 2014. Created by: qjchung

2.4 Daily traffic volumes

2.4.1 Tullymorgan-Jackybulbin Road

There are no traffic counts that exist for Tullymorgan-Jackybulbin Road. For this reason, the existing traffic flow (not including existing quarry traffic) was calculated based on the RTA (Roads and Maritime Services) Guide to Traffic Generating Developments (2002) using the following assumptions:

- Tullymorgan-Jackybulbin Road continues west, and then south towards the town of Ashby. It was assumed that the residents of dwellings more than 10km along the road away from the quarry would continue via Ashby to access the Pacific Highway. Dwellings within this 10 km zone would access the highway by passing the quarry.
- There are 12 lots with residential dwellings with this 10km zone of Tullymorgan-Jackybulbin Road.
- The RTA Guide to Traffic Generating Developments (2002) recommends that there are 9.0 daily vehicle trips per dwelling.
- It was assumed that 10% of traffic on this section are heavy vehicles.

The existing traffic generated by Sly's quarry is known to fluctuate substantially depending on demand for the quarry products. During busy periods where the extraction rate is 100,000 tonnes/annum, there are approximately 80 truck movements per day. The existing workforce at the quarry consists of seven employees, generating 14 light vehicle movements per day.

This calculated traffic was added to the traffic known to be generated by Sly's Quarry and is summarised in Table 2-1 below.

Table 2-1 Tullymorgan-Jackybulbin Road Daily Traffic Volume estimation

Traffic Generation source	Light Vehicles (v/d)	Heavy Vehicles(v/d)	Total
Residential dwellings	97	11	108
Sly's Quarry	14	80	94
Total	111	91	202

2.4.2 Pacific Highway

Roads and Maritime has provided traffic data for the Pacific Highway in two locations on the Pacific Highway. These are:

- Station HWDSTC, 200 m south of Yamba Road. This site is approximately 20 km south of Tullymorgan-Jackybulbin Road.
- Station 04233 at New Italy. This site is approximately 18 km north of Tullymorgan-Jackybulbin Road.

The average daily traffic for each of these sites is shown in Table 2-2.

Additional information provided by RMS showed that at the Yamba Road counting station, heavy vehicles represented 18% of all traffic.

Table 2-2 Pacific Highway traffic volume data

Year	Location	ADT
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road - Northbound	7,192
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road - Southbound	7,235
2017	130 m south of Yamba Road, 20 km south of Tullymorgan-Jackybulbin Road – Total	14,427
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Northbound	3,918
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Southbound	3,739
2011	270 m north of Banana Road, Woombah, 6 km south of Tullymorgan-Jackybulbin Road – Total	7,567

Source: RMS Traffic Volume Viewer

It is assumed that the volume at Tullymorgan-Jackybulbin Road is similar to the volume at Woombah. The historic data at the nearest permanent count site (130 m south of Yamba Road) indicates that since 2011 traffic has grown at 4.8% per annum (linear). Using these assumptions the estimated traffic volumes at Tullymorgan-Jackybulbin Road are shown in Table 2-3.

Table 2-3 Pacific Highway estimated traffic volumes 2017

Direction	Light Vehicles (v/d)	Heavy Vehicles(v/d)	Total
Northbound	3,870	1,170	5,040
Southbound	3,610	1,090	4,700
Total	7,480	2,260	9,740

2.5 Crash history

Crash history has been provided by Roads and Maritime Services for Tullymorgan-Jackybulbin Road from the Pacific Highway to the west of the quarry access and for the Pacific Highway itself, 1 km either side of the Tullymorgan-Jackybulbin Road intersection. This data is inclusive of January 2009 to December 2014 and is included in Appendix A.

In the data period, there were a total of 6 crashes with three resulting in injury and none resulting in fatalities. None of the crashed occurred at the intersection of the Pacific Highway and Tullymorgan-Jackybulbin Road, with the closest being approximately 300 m to the south. There were no crashes in the vicinity of the quarry access or on Tullymorgan-Jackybulbin Road.

This crash history does not indicate any existing road safety issues that would be exacerbated by the proposal.

2.6 Other transport modes

2.6.1 Buses

Northern Rivers Bus Lines operates a public bus service (route 695) between Grafton and Lismore which runs on the Pacific Highway past the Tullymorgan-Jackbulbin Road intersection. Each weekday there is one weekday service to Lismore in the morning and one weekday service to Grafton in the afternoon. The closest stop to the proposed development is approximately 7 km south of Tullymorgan-Jackybulbin Road in Woombah Woods.

School bus services currently use Tullymorgan-Jackybulbin road as a u-turn facility after picking up / dropping off school children. This occurs during the morning and afternoon. Figure 3 below shows the signage for the area where the buses complete this manoeuvre.

Figure 3 School bus u-turn facility signage

2.6.2 Cyclists

There is no provision for cyclists on Tullymorgan-Jackybulbin Road.

2.6.3 Pedestrians

There is no provision for pedestrians on Tullymorgan-Jackybulbin Road.

3. Proposal

Due to the demand from the current Pacific Highway upgrade works, it is proposed to modify the approved operations by increasing the number of trucks per day from 125 to 150 (or 300 movements).

4. Impact assessment

4.1 Cumulative traffic impacts

The quarry is expected to generate up to 300 truck movements per day, and 24 staff movements. Current levels of activity are around 80 truck movements per day.

As a result of the proposal, daily traffic volumes on Tullymorgan-Jackybulbin Road would be expected to increase from the existing average of 202 vehicles per day to 432 vehicles per day. This level of activity would represent an increase of some 89% on the current traffic volumes on Tullymorgan-Jackybulbin Road. The proportion of heavy vehicles would increase from 45% currently to approximately 72%, as shown in Table 4-1.

Table 4-1 Impacts on traffic volumes on Tullymorgan-Jackybulbin Road

Scenario	Total Vehicles	Light Vehicles	Heavy Vehicles	% HV
Existing	202	111	91	45%
Less current quarry activities	94	14	80	
Plus Proposal	324	24	300	
Future	432	121	311	72%

The increase in traffic volume on Tullymorgan-Jackybulbin Road will also result in an increase in traffic on the Pacific Highway. Table 4-2 outlines the expected increase in traffic volumes due to the proposed development.

Table 4-2 Impacts on traffic volumes on the Pacific Highway

Scenario	Total Vehicles	Light Vehicles	Heavy Vehicles	% HV
Existing	9,740	7,480	2,260	23%
Less current quarry activities	94	14	80	
Plus Proposal	324	24	300	
Future	10,064	7,504	2,560	25%

The daily traffic volumes on the Pacific Highway are expected to increase by 3.3% as a result of the proposal. This small increase in traffic (which is less than the assumed annual growth rate) is not expected to have any significant impact on the Pacific Highway in the vicinity of the proposed development, and will occur generally for only a limited period of time until the Pacific Highway upgrade program is complete.

4.2 Access Road

The existing access road is relatively narrow, however it does allow for inbound and outbound vehicles to pass each other without leaving the formed roadway in certain places. Due to the potential increase in heavy vehicles and the unsealed road surface, the road condition may deteriorate at a faster rate than it does currently. Maintenance of the existing road should be reviewed and potentially a more frequent maintenance regime be put in place.

4.3 Site access intersection

4.3.1 Intersection configuration

Haulage trucks would enter and exit the site using the existing access onto Tullymorgan-Jackybulbin Road. It is expected that almost all truck movements will be to and from the east (Pacific Highway), with right turns into the site and left turns out onto Tullymorgan-Jackybulbin Road.

The likely traffic volumes at this intersection can be compared with design warrants in the Austroads Guide to Road Design Part 4A.

It is expected that the peak design hour would contain approximately 10% of truck movements into and out of the quarry (15 trucks turning in, 15 trucks turning out). It can also be estimated that the design peak hour would contain 10% of the total average daily traffic which would indicate a peak hourly volume of 43 vehicles on Tullymorgan-Jackybulbin Road. Figure 4 shows the warrants for turn treatments based on traffic volumes.

The right turn into the quarry access, with approximately 15 trucks per hour turning in, and an affected volume of 43 vehicles per hour on Tullymorgan-Jackybulbin Road requires a basic right turn (BAR) treatment. The left turn into the quarry access would have only a rare occurrence of turning trucks, and would also require only a basic right turn (BAL) treatment. These treatments are illustrated in Figure 5. BAL and BAR treatments are to be constructed at the quarry access, as part of the SSD 6624 approval.

Even with background growth in traffic volumes on the Tullymorgan-Jackybulbin Road, or with an increase in the volume of truck activity at the quarry, this type of intersection is likely to be suitable for many years to come.

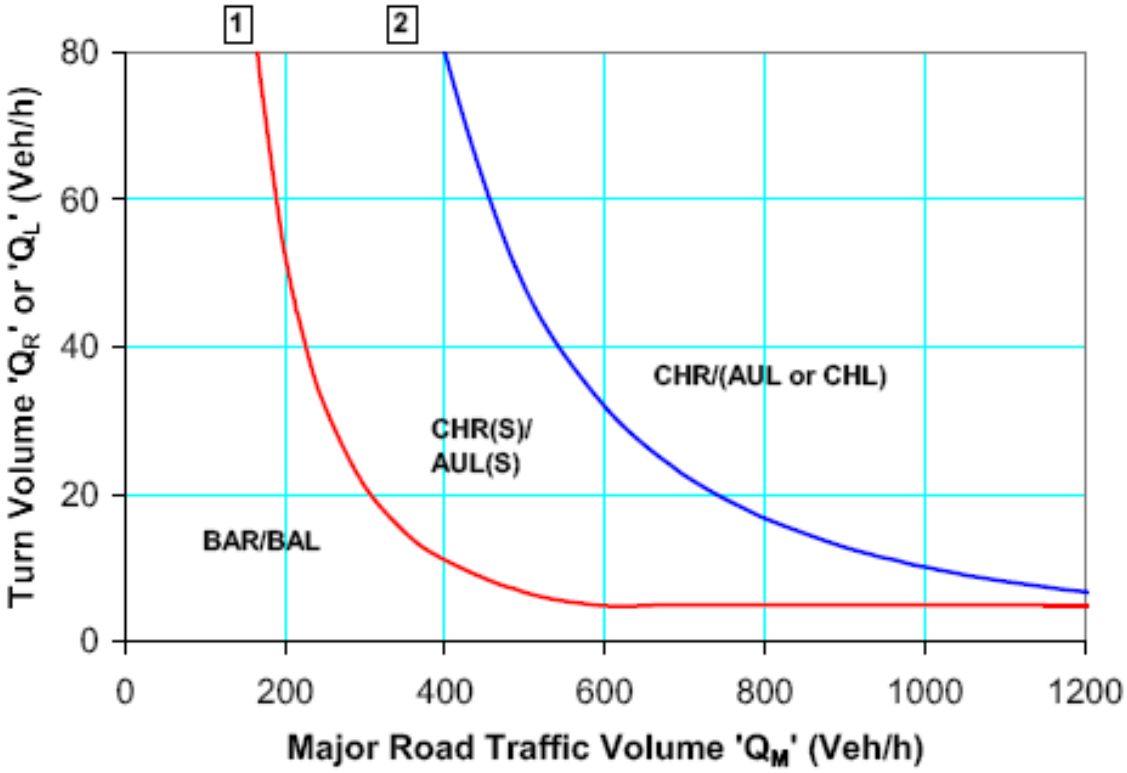


Figure 4 Austroads warrants for turn treatments on the major road at unsignalised intersections – operating speeds less than 100 km/h

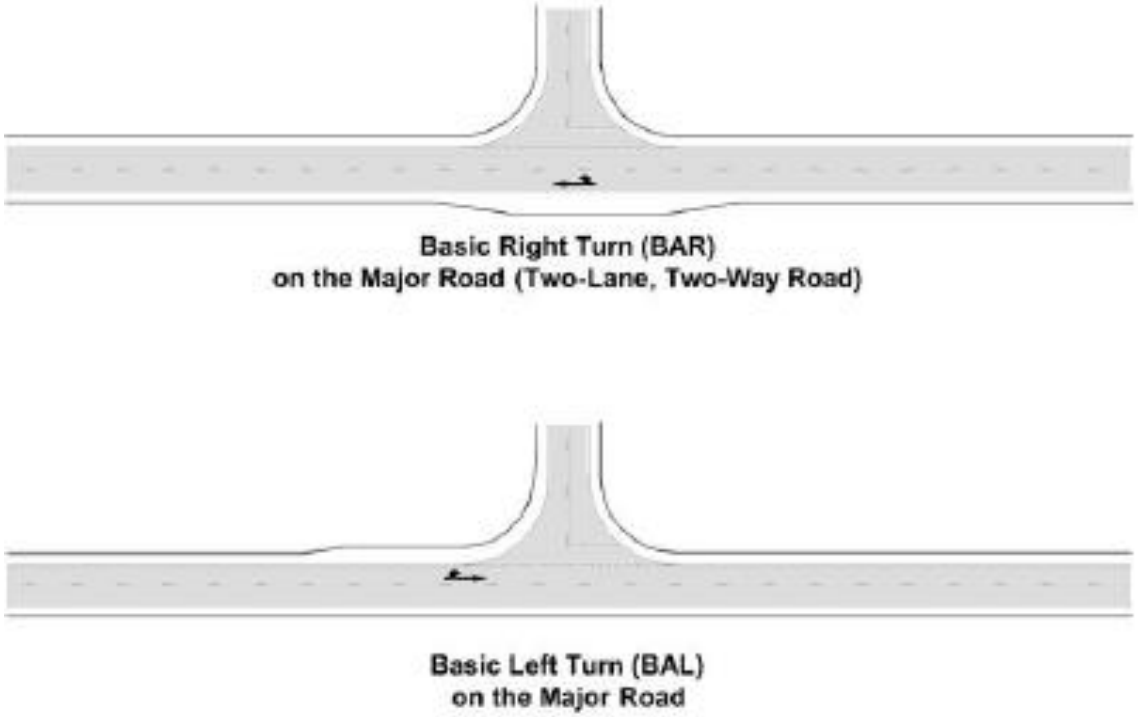


Figure 5 Austroads Rural Basic BA turn treatments

4.3.2 Sight distance assessment

The requirements for sight distance are specified in the Austroads Guide to Road Design Part 4A. For a 100 km/hr speed environment, the sight distance requirement is 248 m. The sight distance in both directions is less than the required 248 m with 220 m to the east and 200 m to the west. However as noted in Section 2.1, existing speeds on Tullymorgran-Jackybulbin Road in the vicinity of this intersection are generally lower than 100 km/h and this would lower the requirement for sight distance. The available sight distance is adequate in both directions for an 80 km/h speed environment, which is commensurate with the expected speed of traffic past the site access.

As there are already warning signs in place along the roadway advising motorists of the potential for truck movements from the site access point and as the quarry has already been operating without incident for some time, the sight distance at this intersection is considered adequate.

This sight distance in both directions is illustrated in Figure 6 and Figure 7.

Figure 6 Looking east from site access

Figure 7 Looking west from site access

4.4 Pacific Highway / Tullymorgan-Jackybulbin Road intersection

4.4.1 Intersection configuration

Haulage trucks would enter and exit Tullymorgan-Jackybulbin Road from both directions on the Pacific Highway.

The expected traffic volumes at this intersection have been tested for the new intersection configuration currently under construction.

It is expected that the peak design hour would contain approximately 10% of truck movements into and out of the quarry (15 trucks turning in, 15 trucks turning out). Traffic count data provided by Roads and Maritime shows that the peak hour volume on the Pacific Highway in the vicinity of Tullymorgan-Jackybulbin Road is approximately 4% of the ADT in each direction. Therefore peak hour volumes on the Pacific Highway are approximately 405 vehicles (refer Section 2.4.2).

A SIDRA Intersection analysis was undertaken for the new seagull intersection, using these volumes. The analysis indicates that the intersection will operate at Level of Service B, with delays for the right turn out of Tullymorgan-Jackybulbin Road an average of 25 seconds per vehicle. With growth in traffic on the Pacific Highway continuing at the current rate of almost 5%, the intersection is predicted to operate at Level of Service D in the peak hour in 2027, with delays for the right turn out of Tullymorgan-Jackybulbin Road at 53 seconds. This is approaching the threshold for what would be considered acceptable for this movement. However in this situation the volume of quarry activity is expected to be declining by this time, as the major works for the Pacific Highway upgrade program reduce.

In all scenarios, Pacific Highway traffic will not be obstructed by turning traffic, with dedicated turning and auxiliary lanes provided for turning traffic.

4.4.2 Sight distance assessment

The requirements for sight distance are specified in the Austroads Guide to Road Design Part 4A. For a 100 km/hr speed environment, the sight distance requirement is 248 m. The site distance at this intersection under its previous configuration exceeded the required 248 m in both directions with 370 m to the north and 500 m to the south. Given the upgrades works that are currently underway, adequate sight distance at this intersection is expected to be maintained.

4.5 Haulage route

Haulage of quarry materials would primarily be between the site and the Pacific Highway via Tullymorgan-Jackybulbin Road, for distribution onto the wider network. Precise routes will depend on the location of works utilising quarry outputs. For the purpose of this assessment, the following comments can be made about the safety performance of the Tullymorgan-Jackybulbin Road route:

- In general, Tullymorgan-Jackybulbin Road is considered to provide a safe road environment for the haulage activities.
- The alignment of Tullymorgan-Jackybulbin Road, being predominantly straight between the quarry and the Pacific Highway, provides drivers with good forward sight distance to be aware of any potential obstructions or other issues.
- The low volume of traffic estimated on Tullymorgan-Jackybulbin Road, with a 2-way peak volume of 432 vehicles per day, also results in a reduced risk level associated with 2-vehicle collisions.
- The crash history is not indicative of any particular safety deficiencies at specific locations and the nature and frequency of crashes is likely to be typical of similar road types elsewhere.

On this basis, it is unlikely that a formal road safety audit process will identify any major issues with this section of road. However, if required, a Road Safety Audit of the proposed haulage route should be completed prior to commencement of haulage activities.

4.6 Impact on vulnerable road users

The quarry site is remote from any source of vulnerable road user (pedestrians and cyclists) activity. As noted in Section 2.6, there are no specific facilities for pedestrians or cyclists on Tullymorgan-Jackybulbin Road. However given the relatively low traffic volumes on the road, the scale of traffic increase expected, and the physical characteristics of the road that provide for good forward sight distance, there is not expected to be any deterioration in safety for pedestrians or cyclists. Similarly, it is not expected that there will be any direct impact on existing bus stops or bus services, including school bus services as a result of the proposed development.

4.7 On-site traffic management

The quarry area will be accessed via the access road. A site office and amenities block is located approximately 400 m north of Tullymorgan-Jackybulbin Road. At this location, there is expected to be sufficient space for the manoeuvring and parking of staff vehicles, and other site vehicles as required.

Traffic movement within the quarry will depend on the area being excavated at the time. Vehicle access paths will be established to suit the specific activities being undertaken.

4.8 State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Clause 16 (1) of the SEPP for Mining, Petroleum Production and Extractive Industries requires that, amongst other things, before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following:

(a) require that some or all of the transport of materials in connection with the development is not to be by public road,

- The haulage route for this development is completely on public roads. The use of non-public roads is not practical or feasible for this proposed development.

(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,

- There are no schools in the nearby vicinity of the quarry or on Tullymorgan-Jackbulbin Road. Most residential properties exist to the west of the quarry; however there are two residential properties to the east near the Pacific Highway. Nearly all vehicle movements associated with the development will be to the east of the quarry.

(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.

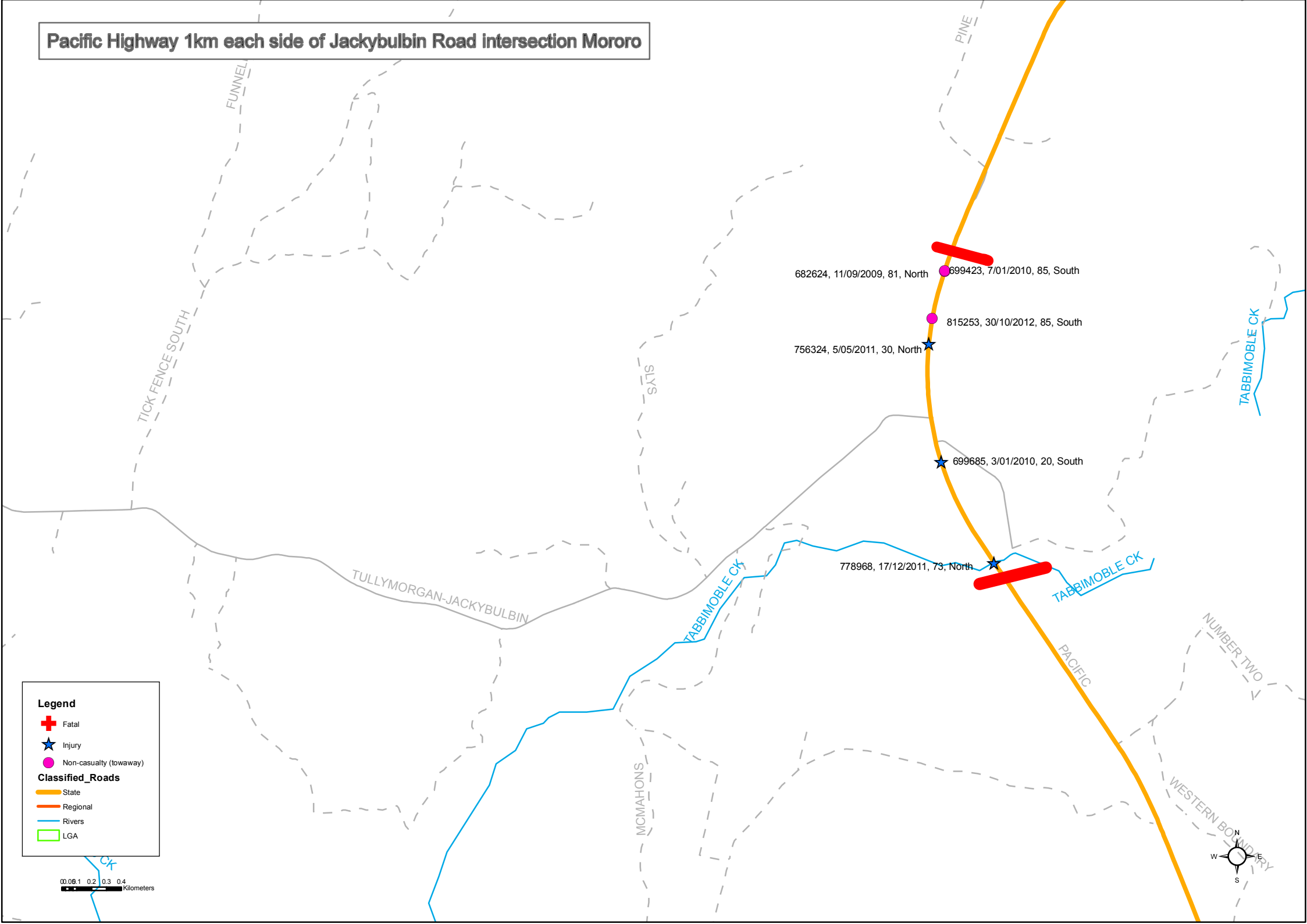
- Newman Quarrying currently has a code of conduct relating to the transport of materials on public roads. This takes the form of a Truck Safety System and a Heavy vehicle Drivers Manual. Both documents outline the drivers' responsibilities in ensuring the safe operation of their vehicles at all times and also ensures they conform to environmental standards such as the covering of loads.

5. Recommendations

Based on the proposed modification to increase the maximum truck numbers per day from 125 to 150, there are no additional recommendations from the original assessment, associated with SSD 6624. The proposed modification is therefore supported on traffic grounds.

Appendices

Appendix A – Crash Data


Pacific Highway 1km each side of Jackybulbin Road intersection Mororo
682624, 11/09/2009, 81, North
699423, 7/01/2010, 85, South
815253, 30/10/2012, 85, South
756324, 5/05/2011, 30, North
699685, 3/01/2010, 20, South
778968, 17/12/2011, 73, North
TABBIMOBLE CK
TABBIMOBLE CK
TABBIMOBLE CK
TULLYMORGAN-JACKYBULBIN
TICK FENCE SOUTH
FUNNEL
PINE
SLYS
MCMAHONS
PACIFIC
NUMBER TWO
WESTERN BOUNDARY
Legend
Fatal
Injury
Non-casualty (towaway)
Classified_Roads
State
Regional
Rivers
LGA
0 0.05 0.1 0.2 0.3 0.4
Kilometers
N
W
E
S

Summary Crash Report

# Crash Type		
Car Crash	5	83.3%
Light Truck Crash	1	16.7%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	2	33.3%
'Heavy Truck Crash	(2)	(33.3%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(2)	(33.3%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	0	0.0%
Non intersection	6	100.0%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	4	66.7%
Multi Vehicle	2	33.3%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	6	100.0%
Other Classified Road	0	0.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	2	33.3%
Fatigue	3	50.0%

Weather		
Fine	4	66.7%
Rain	0	0.0%
Overcast	1	16.7%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	0	0.0%
Dry	5	100.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	33.3%
Daylight	3	50.0%
Dusk	0	0.0%
Darkness	1	16.7%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	1	16.7%
Opposing vehicles; turning	0	0.0%
U-turn	0	0.0%
Rear-end	1	16.7%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	1	16.7%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	3	50.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit				
			~ 40km/h or less	0 0.0%
40 km/h or less	0	0.0%	80 km/h zone	0 0.0%
50 km/h zone	0	0.0%	90 km/h zone	0 0.0%
60 km/h zone	0	0.0%	100 km/h zone	6 100.0%
70 km/h zone	0	0.0%	110 km/h zone	0 0.0%

CRASHES	6	
Fatal crash	0	0.0%
Injury crash	3	50.0%
Non-casualty crash	3	50.0%

Time Group		% of Day	
00:01 - 02:59	1	16.7%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	1	16.7%	4.2%
06:00 - 06:59	1	16.7%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	1	16.7%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	1	16.7%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	1	16.7%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
0	of 1 in Dark	0.0%

CASUALTIES	3	
Killed	0	0.0%
Injured	3	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Crashes		Casualties
1	2012	0
2	2011	2
2	2010	1
1	2009	0

~ School Travel Time		
Involvement	0	0.0%

McLean Periods			% Week
A	1	16.7%	17.9%
B	1	16.7%	7.1%
C	2	33.3%	17.9%
D	0	0.0%	3.5%
E	0	0.0%	3.6%
F	0	0.0%	10.7%
G	0	0.0%	7.1%
H	1	16.7%	7.1%
I	1	16.7%	12.5%
J	0	0.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	0	0.0%	Thursday	2	33.3%	Sunday	1	16.7%
Tuesday	1	16.7%	Friday	1	16.7%	WEEKDAY	4	66.7%
Wednesday	0	0.0%	Saturday	1	16.7%	WEEKEND	2	33.3%

New Year	1	16.7%	Queen's BD	0	0.0%	Easter SH	0	0.0%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	0	0.0%
Anzac Day	0	0.0%	January SH	2	33.3%	December SH	0	0.0%

Crashid dataset Pacific Highway 1km either side of Jackybulbin Road Intersection

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Detailed Crash Report

Transport for NSW
Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
Northern Region																					
Clarence Valley LGA																					
Mororo																					
Pacific Hwy																					
699423	07/01/2010	Thu	02:20	1 km	N	JACKYBULBIN RD	2WY	CRV	Unk	Unk	100	1	CAR	M55	S in PACIFIC HWY	100	Proceeding in lane	N	0	0	F
E76582901							RUM:	85	Off rt/lft bnd=>obj				Fence (prior to 2014)								
699685	03/01/2010	Sun	16:00	300 m	S	JACKYBULBIN RD	2WY	CRV	Overcast	Dry	100	2	CAR	F18	S in PACIFIC HWY	100	Incorrect side	I	0	1	F
E41517289							RUM:	20	Head on				SEM	M23	N in PACIFIC HWY	100	Proceeding in lane				
815253	30/10/2012	Tue	05:45	5 km	N	MORORO RD	2WY	CRV	Fine	Dry	100	1	TRK	M44	S in PACIFIC HWY	100	Proceeding in lane	N	0	0	S
E49903228							RUM:	85	Off rt/lft bnd=>obj				Tree/bush								
778968	17/12/2011	Sat	06:35		at	TABBIMOBLE CRE BDGE	2WY	STR	Fine	Dry	100	1	CAR	M25	N in PACIFIC HWY	100	Proceeding in lane	I	0	1	F
E46535704							RUM:	73	Off rd rght => obj				Bridge								
Tabbimoble																					
Pacific Hwy																					
682624	11/09/2009	Fri	10:30	1 km	N	JACKBULBIN RD	2WY	CRV	Fine	Dry	100	1	UTE	M56	N in PACIFIC HWY	90	Proceeding in lane	N	0	0	S
E39300865							RUM:	81	Off left/rt bnd=>obj				Tree/bush								
756324	05/05/2011	Thu	12:10	500 m	N	JACKYBULBUIN RD	2WY	CRV	Fine	Dry	100	2	SEM	M53	N in PACIFIC HWY	100	Proceeding in lane	I	0	1	
E44199336							RUM:	30	Rear end				CAR	M80	N in PACIFIC HWY	5	Proceeding in lane				

Report Totals: Total Crashes: 6 Fatal Crashes: 0 Injury Crashes: 3 Killed: 0 Injured: 3

Crashid dataset Pacific Highway 1km either side of Jackybulbin Road Intersection

GHD

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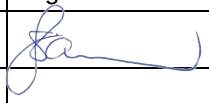
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	N. Hincks	T Bickerstaff		S Lawer		06/06/2017

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Appendix C – Noise Impact Assessment

Newman Quarrying Pty Ltd

Noise Impact Assessment

Proposed Quarry Expansion at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo

June 2017

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Figure index

Glossary

Term	Description
dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
INP	*NSW Industrial Noise Policy*
$L_{Aeq\ (period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. This is the level used for assessment purposes. The NSW INP states that where the measured RBL is less than 30 dB(A), the RBL is considered to be 30 dB(A).
$L_{A1\ (period)}$	The sound pressure level that is exceeded for 1% of the measurement period.
$L_{A10\ (period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90\ (period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.
L_{Amin}	The minimum sound level recorded during the measurement period.
Mitigation	Reduction in severity.
Peak Particle Velocity	Current practice for assessments of the risk of structural damage to buildings use measurements of Peak Particle Velocity (PPV) ground vibration (v_p), which is the maximum vector sum of three orthogonal time-synchronized velocity components. When not directly measured by an instrument, PPV may be determined by: $v_p = \sqrt{(v_x^2 + v_y^2 + v_z^2)}$ Where v_x, v_y, v_z are the instantaneous components of particle velocity of the x, y, z primary axes, respectively.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. This is the level used for assessment purposes.
Receiver	A noise modelling term used to describe a map reference point where noise is predicted. A sensitive receiver would be a home, work place, church, school or other place where people spend time.
RNP	Road Noise Policy
Sound Pressure Level (SPL)	Sound pressure level 20 times the logarithm to the base 10 of the ratio of the root mean square (RMS) sound pressure level to the reference sound pressure level of 20 micropascals.
Vibration	The variation of the magnitude of a quantity which is descriptive of the motion or position of a mechanical system, when the magnitude is alternately greater and smaller than some average value or reference. Vibration can be measured in terms of its displacement, velocity or acceleration. The common units for velocity are millimetres per second (mm/s).

1. Introduction

1.1 Purpose of this report

GHD Pty Ltd (GHD) was engaged by Newman Quarrying Pty Ltd (Newman Quarrying) to prepare a Noise Impact Assessment (NIA) report to address the potential noise impacts from a modification of operations of a sandstone quarry at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo, known as Sly's Quarry.

The expansion of Slys Quarry was approved (State Significant Development SSD 6624) by Department of Planning and Environment, under Section 89E of the *Environmental Planning and Assessment Act 1979*, on 5 May 2016. The approval involved expanding the existing sandstone quarry by 11.1 hectares, increasing the extraction rate up to 500,000 tonnes per annum and having a maximum of 125 trucks operate per day.

Due to the demand from the current Pacific Highway upgrade works, it is proposed to modify the approval by increasing the number of trucks per day to 150 (or 300 movements). Due to access constraints within the construction area of the highway upgrade, many of the trucks supplying the works are body trucks rather than truck and dog combinations, as assumed in the Environmental Impact Statement (EIS). Body trucks have the capacity to transport 12 tonnes of material compared to truck and dog, which have the capacity to transport 32 tonnes of material. The limit on truck numbers imposed by Condition 8(b), Schedule 2 therefore means the volume of material Sly's Quarry can supply is restricted. The proposed increase in truck numbers would not result in an increase in extraction per annum.

No other modifications to the approved quarry affecting noise impact are proposed.

1.2 Scope

The scope of work to conduct the modification to the Noise Impact Assessment involved:

- A review of the previous noise studies and noise impact assessment for the quarry.
- Undertake two operational noise modelling scenarios using Computer Aided Noise Abatement (CadnaA) software to predict sound pressure levels emanating from the site based on current quarry configuration and future quarry configuration. For each scenario, off-site noise levels resulting from peak extraction rate were investigated including the increase in daily truck movements.
- Providing a summary of the predicted results and outlining recommendations for in-principle noise mitigation measures, where exceedances are predicted.

1.3 Limitations

This report has been prepared by GHD for Newman Quarrying Pty Ltd and may only be used and relied on by Newman Quarrying Pty Ltd for the purpose agreed between GHD and Newman Quarrying Pty Ltd as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Newman Quarrying Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.4 of this report). GHD disclaims liability arising from any of *the assumptions* being incorrect.

GHD has prepared this report on the basis of information provided by Newman Quarrying Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions

The following assumptions were made in this assessment:

- Quarry operating hours :
  - Weekdays - 6:30 am to 6.00 pm
  - Saturdays - 6:30 am - 4.00 pm
  - Sundays or public holidays - No work
- Excavation, crushing or loading do not commence until after 7:00 am. Blasting, on an ad-hoc basis, only occurs on weekdays between the hours of 10:00 am and 4:00 pm.
- The operational equipment used on site is limited to those assessed in this report.
- Peak truck movements were assessed at 300 per day (150 trucks).

2. Existing environment

2.1 Site location

The existing quarry is located off Tullymorgan-Jackybulbin Road, Mororo, approximately 17 km north of Maclean. The quarry is located 1.5 km west of the Pacific Highway. The site is surrounded by bushland.

2.2 Existing noise sensitive receivers

Eleven potential sensitive receivers in the vicinity of the quarry were identified from aerial imagery. The nearest identified sensitive receiver is located approximately 1.5 km from the quarry boundary.

Sensitive receivers identified in the vicinity of the site are detailed in Table 2-1. Figure 2-1 shows a site aerial image and the location of identified noise sensitive receivers. These receivers were identified to represent those with the greatest potential for adverse noise impact.

Table 2-1 Identified noise sensitive receivers

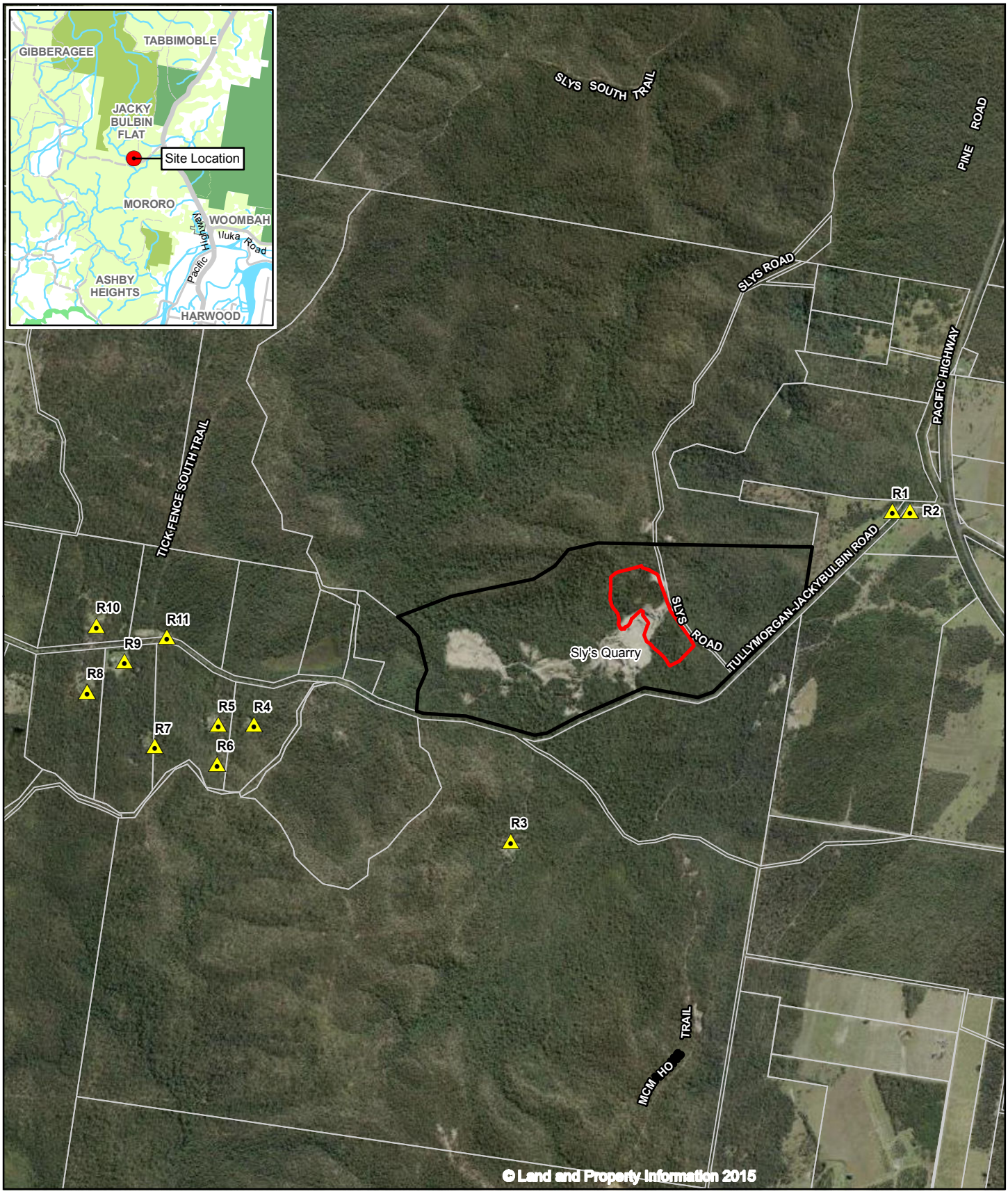
Receiver	Receiver type	Approximate distance to nearest boundary[1](m)
R1	Residential	1600
R2	Residential	1700
R3	Residential	1500
R4	Residential	2600
R5	Residential	2700
R6	Residential	2800
R7	Residential	3200
R8	Residential	3600
R9	Residential	3300
R10	Residential	3500
R11	Residential	3000

1. Distance measured to the nearest boundary of operations for stage 1 configuration

2.2.1 Potential future sensitive receivers

This assessment has considered existing sensitive receivers only. GHD is not aware of plans for future development in the area, however, acknowledges that future development may occur. The potential for noise and vibration impacts on future development in the area would need to be assessed on a case-by-case basis.

Section 5 provides further discussion around potential impacts on future sensitive receivers.



LEGEND

- Sensitive receiver
- Development footprint
- Development site
- Cadastre

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

Site location and sensitive receivers

Figure 2-1

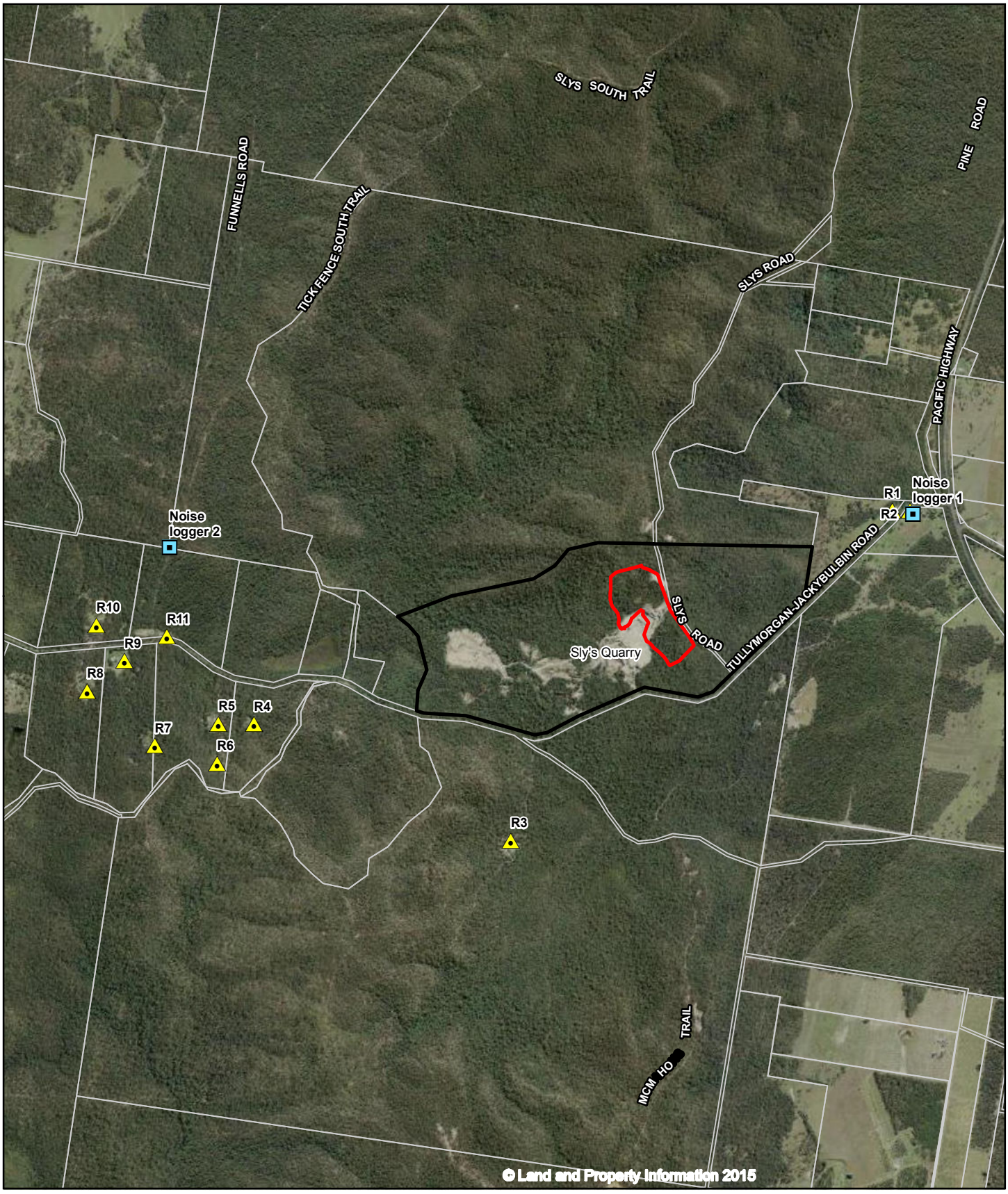
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA001_SiteLocation_A.mxd

Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006; LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay

2.3 Noise environment

Background noise monitoring was previously undertaken by GHD at two locations in order to determine the ambient background noise levels and subsequently the project specific noise levels (PSNL) for the Sly's Quarry expansion project. Complete details of the background noise logging procedure, results, and noise logging charts are found in the Sly's Quarry *Proposed Quarry Expansion at Lot 2 DP 1055044 Noise Impact Assessment* (April 2015). Table 4-1 summarises the rating background levels (RBL) and resultant PSNLs determined from the background noise logging. Logger locations are shown in Figure 2-2.



LEGEND

- Unattended logger location
- Sensitive receiver
- Development footprint
- Development site
- Cadastre

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

Unattended logger locations

Figure 2-2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA002_NoiseLoggers_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay

3. Project description

3.1 Proposed site operations

The proposal is for the modification to the approved expansion by increasing the number of trucks per day to 150 (or 300 movements).

Due to the demand from the current Pacific Highway upgrade works, it is proposed to modify the approved expansion by increasing the number of trucks per day to 150 (or 300 movements). Due to access constraints within the construction area of the highway upgrade, many of the trucks suppling the works are body trucks rather than truck and dog as assumed in the Environmental Impact Statement (EIS). Body trucks have the capacity to transport 12 tonnes of material compared to truck and dog which have the capacity to transport 32 tonnes of material. The limit on truck numbers imposed by Condition 8(b), Schedule 2 therefore means the volume of material Sly's Quarry can supply is restricted. The proposed increase in truck numbers would not result in an increase in extraction per annum.

Figure 3-1 shows typical quarry crushing operations and the existing pit area.

Figure 3-1 Typical quarry crushing operations and existing pit area

3.2 Hours of operation

The hours of operation depend on demand with some periods of high activity and other times when activity is limited to the occasional loading of haulage trucks. The approved hours of operation are:

- Quarry operating hours would be:
  - Weekdays - 6:30 am to 6.00 pm
  - Saturdays - 6:30 am - 4.00 pm
  - Sundays or public holidays - No work
- Excavation, crushing or loading don't commence until after 7:00 am. Blasting, on an ad-hoc basis, only occur on weekdays between the hours of 10:00 am and 4:00 pm.

3.3 Quarry equipment

Table 3-1 lists the plant and equipment that operate on site.

Table 3-1 Quarry equipment

Type	Typical make/model	Approximate number	Typical frequency of use	Description
Excavators	Komatsu PC350 – 8	2	12- 40 hrs/ week	Excavating material and stockpiling. Clearing and grubbing of vegetation and stripping of topsoil.
	Komatsu PC710-5	1		
Front-end Loader	Komatsu WA400-3	1	10 hrs/week	Loading material onto the haul trucks and stockpiling material within the pit floor.
	Komatsu WA470-3	1	30 hrs/week	
	Kawazaki 90ZV	1	45 hrs/week	
Crusher	McCloskey J50	1	20 – 40 hrs/ week	Crushing rock main jaw crusher.
	Komatsu BR380JG-1	1		Crushing rock spare jaw crusher.
Screen	Sandvik GE440	1	20 – 40 hrs/ week	Only for aggregate/gravel production and overburden screening.
	Sandvik GA340	1		
Haul Trucks	Truck and dog Contractors	Up to 125/day	Up to 125/day	Delivery of materials to customers and stockpiling in pit if needed and carting unsuitable material to rehabilitation areas.
Water Cart	Isuzu	1	10 hrs/week	To water haul roads and stockpiles.
Water Pump	Honda	3	10 hrs/week	To dewater excavation/basin and to fill water cart from standpipe. To water stockpiles and put moisture in products.
Generator	Cummins	1	5 hrs/week	Provide electricity to wash plant and dam pump.
	Able	1	9 hrs/day	Provide power to weighbridge and fuel pump.
Hand tools	Various	5	2 hrs/week	General activities maintaining plant.

4. Noise criteria

4.1 Operational noise

Operational industrial noise criteria are derived from the NSW INP.

The INP provides non mandatory industrial noise criteria to aid in the assessment of industrial noise sources scheduled under the *Protection of the Environment Operations Act 1997*. The policy sets two separate noise criteria to meet environmental noise objectives, one to account for intrusiveness and the other to protect the amenity of particular land uses.

Intrusiveness is assessed by determining the background noise level, where the equivalent continuous noise level from quarry operations should not be more than 5 dB above the measured background level. The amenity criterion is based on noise criteria specific to the land use and associated activities. The project specific level is the more stringent of the intrusive and amenity criteria.

The intrusive, amenity and project specific levels are shown Table 4-1. The sensitive receivers in the vicinity of the quarry have been identified from aerial imagery. Aerial imagery available does not clearly identify whether R3 and R6 are in fact residential receivers, but have been included in this assessment as a conservative measure.

The nearest identified receiver is located approximately 1.5 km from the quarry boundary. Sensitive receivers identified in the vicinity of the site are detailed in Table 2-1. Figure 2-1 shows a site aerial image and the location of identified noise sensitive receivers. These receivers have been identified to represent those with the greatest potential for adverse noise impact.

The INP rural residential category has been adopted for all identified receivers to determine the applicable amenity criteria.

Table 4-1 Project specific operational noise criteria – daytime dB(A)

Criterion	Logger 1 (Lot 100 Tullymorgan-Jackybulbin Rd)	Logger 2 (Funnels Rd)
Rating background level, $L_{A90(Period)}$	40	29[1]
Intrusiveness criteria, $L_{Aeq(15min)}$	45	35
Amenity criteria (rural), $L_{Aeq(period)}$	50	50
Project specific criterion, $L_{Aeq\ (15min)}$	45	35

Note 1: The NSW INP notes that "where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A).

The NSW INP requires that the noise level at residences be assessed at the most affected point on or within the residential boundary or, if this is more than 30 m from the residence, at the most-affected point within 30 m of the residence.

In selecting the appropriate noise criteria for each receiver, the following methodology was used:

- The noise criterion of 45 dB(A) $L_{eq(15\ min)}$ derived from Logger 1 was adopted at receivers located close to the Pacific Highway.
- The noise criterion of 35 dB(A) $L_{eq(15\ min)}$ derived from Logger 2 was adopted at all other receivers.

The adopted criterion for individual receivers is shown in Table 5-2.

4.2 Traffic on public roads

GHD understand that rock material is hauled from the site along Tullymorgan-Jackybulbin Road. Therefore, the increase in truck movements has the potential to create additional traffic noise on Tullymorgan-Jackybulbin Road.

Given the quarry access road is located on the site and is not a public road, noise from the access road is assessed under the INP.

The NSW *Road Noise Policy* (OEH, 2011) (RNP) provides non-mandatory road traffic noise target levels for land use developments with potential to create additional traffic on public roads.

Tullymorgan-Jackybulbin Road is considered a local road. The road traffic noise target levels are presented in Table 4-2.

Table 4-2 RNP traffic noise target levels at residential receivers – dB(A)

Type of development	Day (7 am – 10 pm)	Night (10 pm – 7 am)
Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq(1\,hour)}$ 55 (external)	$L_{Aeq(1\,hour)}$ 50 (external)

5. Noise impact assessment

5.1 Noise modelling methodology

The noise emissions from the proposed increase in truck numbers have been assessed through noise modelling using Computer Aided Noise Abatement (CadnaA v4.6) to predict sound pressure levels at the nearest identified noise sensitive receivers.

CadnaA is a computer program for the calculation, assessment and prognosis of noise propagation. CadnaA calculates environmental noise propagation according to ISO 9613-2, *Acoustics – Attenuation of sound during propagation outdoors*. Propagation calculations take into account sound intensity losses due to hemispherical spreading, atmospheric absorption and ground absorption.

The ISO 9613-2 algorithm also takes into account the presence of a well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or downwind conditions which are favourable to sound propagation. As a result, predicted received noise levels are expected to represent a worst case scenario.

5.2 Noise generating equipment

Table 5-1 displays a list of identified noise generating equipment used during site operations and their corresponding sound power levels.

Table 5-1 Noise sources and sound power levels

Noise source	Octave centre frequency (Hz) dB(lin)								Lw dB(A)	Source of data
	63	125	250	500	1k	2k	4k	8k		
Excavator Komatsu pc350-8	79	86	90	95	96	95	89	81	101	A
Excavator Komatsu pc350-8 with rock hammer attachment	89	99	106	106	110	112	110	104	117	A
Excavator Komatsu pc710-5	92	96	99	100	105	101	94	86	108	A
Front End Loader Kawasaki 90ZV	73	93	96	101	100	100	95	87	106	A
Front End Loader Komatsu WA400-3	73	93	96	101	100	100	95	87	106	D
Front End Loader Komatsu WA470-3	73	93	96	101	100	100	95	87	106	D
Crusher McCloskey J50	90	103	106	103	109	107	103	93	114	A
Crusher Komatsu BR380JG-1	90	103	106	103	109	107	103	93	114	D
Screen Sandvik GE440	91	97	103	110	112	110	105	95	116	A
Screen Sandvik GA340	84	90	96	100	103	100	96	89	107	A
Haul trucks	85	95	96	98	100	97	91	83	105	D
Water cart Isuzu	85	85	87	85	87	84	81	74	94	A
Generator Cummins	70	79	88	89	85	75	73	66	93	A
Generator Able	68	77	79	80	79	80	74	69	86	A

1. Excavator pc350-8 with rock hammer attachment was measured while breaking rocks. This sample was considered representative of typical operations, and thus the LAeq was used to calculate the sound power of the operation. A 3 dB(A) penalty has been applied due to the impulsive nature of the noise, as recommended by the NSW INP.

A. On site noise measurement.

B. BS 5228.1 – 2009.

C. Engineering Noise Control, Third Edition, A. Bies and H. Hanson, 1998.

D. Previous noise measurement data undertaken by GHD of similar plant.

E. UK Department for Environment, Food and Rural Affairs.

F. Australian Standard AS 2436-2010.

G. Adopted from Sandvik QJ 341 crusher.

5.3 Modifying factor corrections

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, it can cause greater levels of annoyance than other noise sources at the same noise level. The INP provides correction factors which are to be applied to the predicted noise levels for when such sources exist.

A review of site noise sources has been undertaken, based on the observations made on site as well as noise data taken on site. No on-site noise sources were found to contain low frequency or tonal characteristics. Intermittency characteristics need only be assessed where the noise source occurs during the night period. Since Sly's Quarry does not operate during the night time period, intermittency was not assessed.

On-site measurement of an excavator breaking rocks with a rock hammer attachment was found to be impulsive in nature. This noise source received a 3 dB(A) adjustment as recommended by the NSW INP.

5.4 Model configuration

As the quarry progresses throughout its lifetime, the shape of the working area would change. For example, the pit walls would become larger and the location of the working area would move throughout various stages. It would be impracticable to attempt to model all stages of the quarry life. The increase in truck numbers has only been assessed for peak daily production. Therefore, the following two operational scenarios have been modelled and assessed.

- **Scenario 1**: Future operations with current quarry configuration (considered to represent a worst-case scenario as equipment would be most exposed to sensitive receivers).
- **Scenario 2**: Future operations with final quarry configuration.

For both scenarios, the noise impact of the quarry on surrounding receivers has been assessed at:

- Average daily production, generates about 50 truck loads (100 movements) per day.
- Peak daily production, which would require about 150 truck loads (300 truck movements) per day.

The following assumptions were made with regard to the model configuration:

- A general ground absorption coefficient of 1.0 was used throughout the model, representing the surrounding vegetation and land uses.
- Sound propagation is calculated according to the ISO 9613-2 algorithm, with noise enhancing meteorological conditions such as a moderate temperature inversion or light breeze in the direction of the receiver.
- Modelling is based on atmospheric conditions of 10˚C and 70% humidity.

The noise modelling assumptions are as follows:

- All modelled equipment was assumed to be operating simultaneously at full sound power.
- There were assumed to be 24 light vehicle movements per day for staff (12 in / 12 out).
- Noise source heights above ground level were modelled as follows:
  - Excavator: 2.5 m
  - Screening plant: 3 m
  - Front End Loader: 2 m
  - Crusher: 3 m
  - Haul truck: 3 m
  - Light vehicles: 0.5 m
  - Generator and pump: 1 m
- Blast hole drilling was not assessed in this noise model.
- Single storey receivers were modelled at a height of 1.5 m above ground.

5.5 Operational noise model results

Noise levels were predicted for the scenarios listed in Section 5.4. The predicted noise levels for daytime site operations with increased truck numbers are shown in Table 5-2.

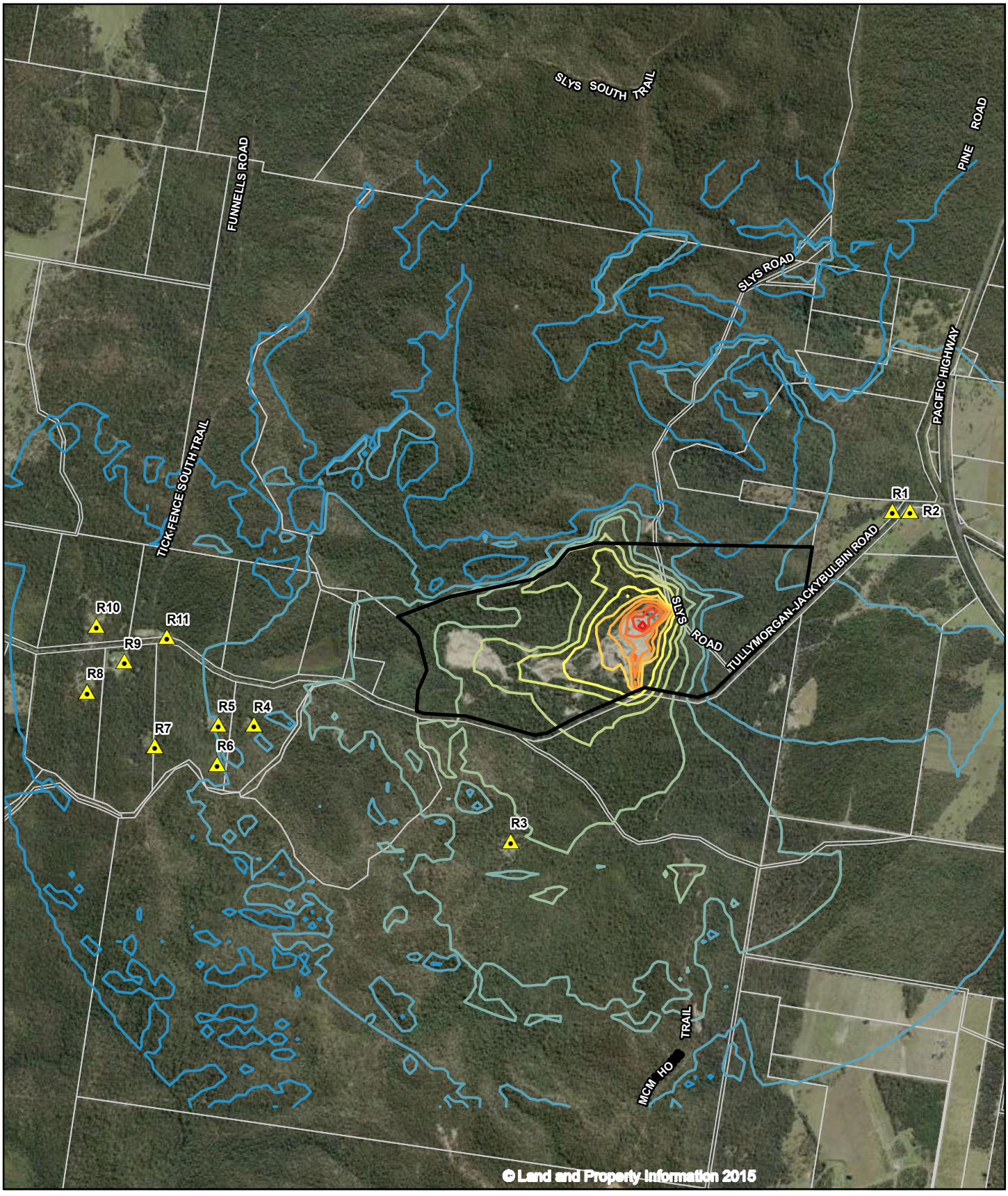
Model results indicate that noise levels generated from quarry operations with increased truck numbers are predicted to comply with the INP daytime noise criteria at all sensitive receivers.

Figure 5-1 to Figure 5-6 shows the predicted operational noise contour plots for Scenario 1 and Scenario 2.

Predicted operational noise levelsResults indicate that the increase in truck numbers will not result in any exceedance of noise criteria. The results remain the same as noise levels previously predicted under the proposed quarry expansion NIA.

Table 5-2 Predicted operational noise levels

Sensitive Receiver	Noise criterion L_{Aeq} dB(A)	Predicted noise level L_{Aeq} dB(A)							
		Scenario 1 – Existing quarry configuration				Scenario 2 – Final quarry configuration			
		Average daily production without rock breaking	Average daily production with rock breaking	Peak daily production without rock breaking	Peak daily production with rock breaking	Average daily production without rock breaking	Average daily production with rock breaking	Peak daily production without rock breaking	Peak daily production with rock breaking
R1	45	26	26	28	28	26	26	28	29
R2	45	25	26	27	28	26	26	28	28
R3	35	32	33	34	35	30	31	32	33
R4	35	23	25	25	26	21	22	23	24
R5	35	23	24	25	25	20	21	22	23
R6	35	22	23	24	25	20	21	22	23
R7	35	21	22	22	23	18	19	21	21
R8	35	19	20	21	22	17	18	19	20
R9	35	20	21	22	23	18	18	20	21
R10	35	20	21	21	22	17	18	19	20
R11	35	21	22	23	24	19	20	21	22



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Predicted operational noise levels
Scenario 1 – Average daily production

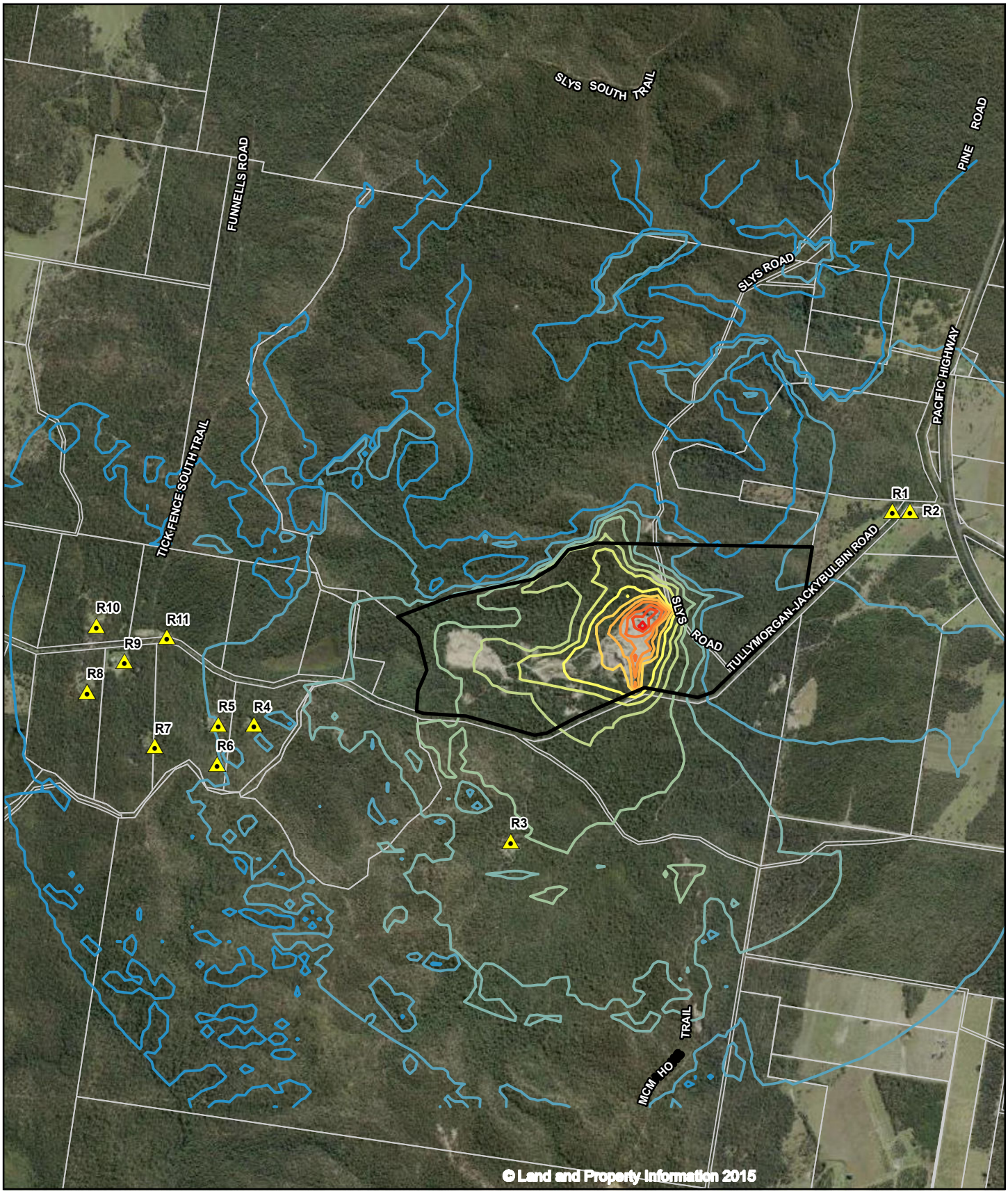
Job Number 22-17528
Revision A
Date 24 May 2017

Figure 5-1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA003_NoiseLevels_ExistAvg_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Predicted operational noise levels
Scenario 1 – Peak daily production

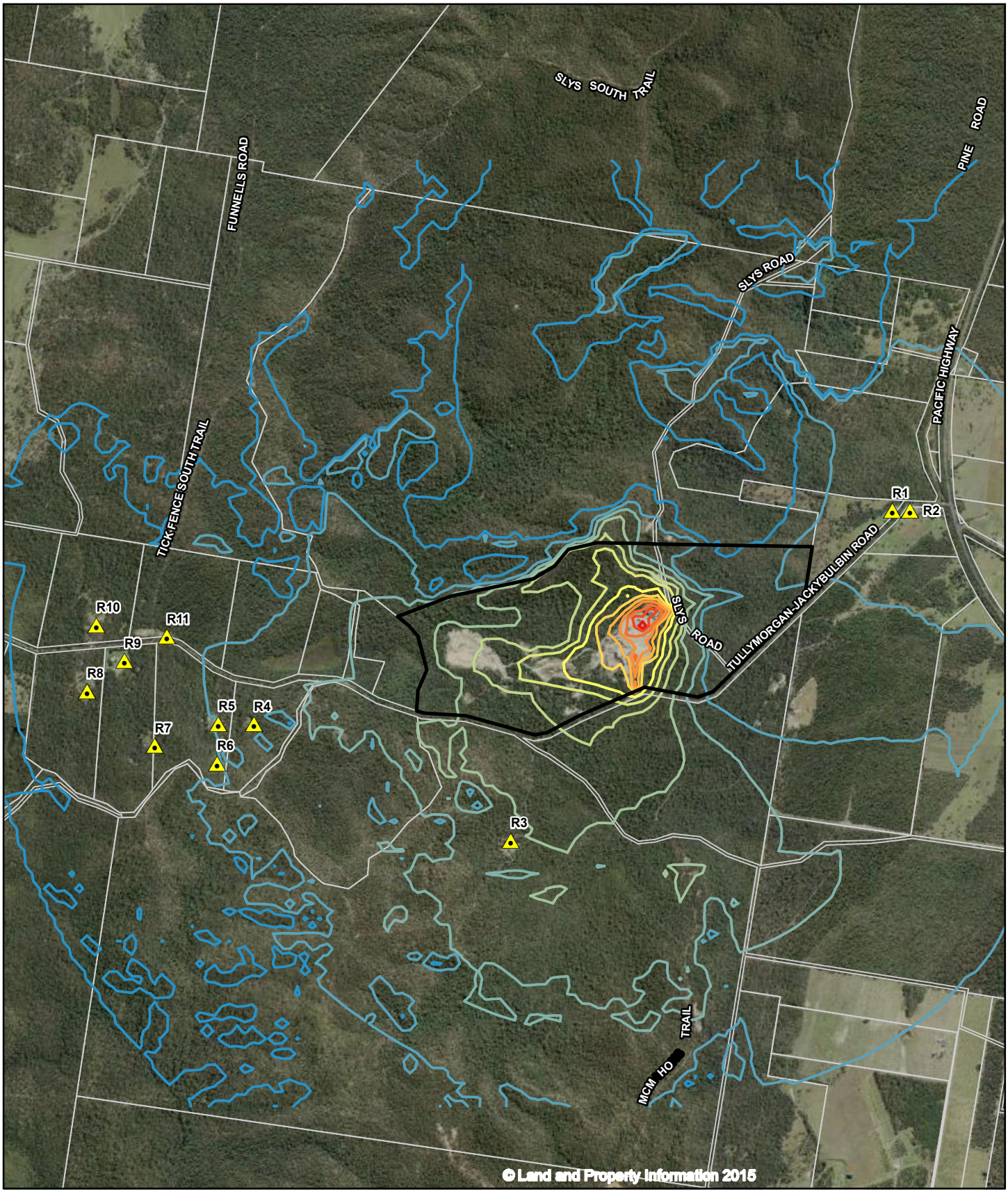
Job Number 22-17528
Revision A
Date 24 May 2017

Figure 5-2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA004_NoiseLevels_ExistPeak_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Predicted operational noise levels
Scenario 1 – Peak daily production with rock hammer

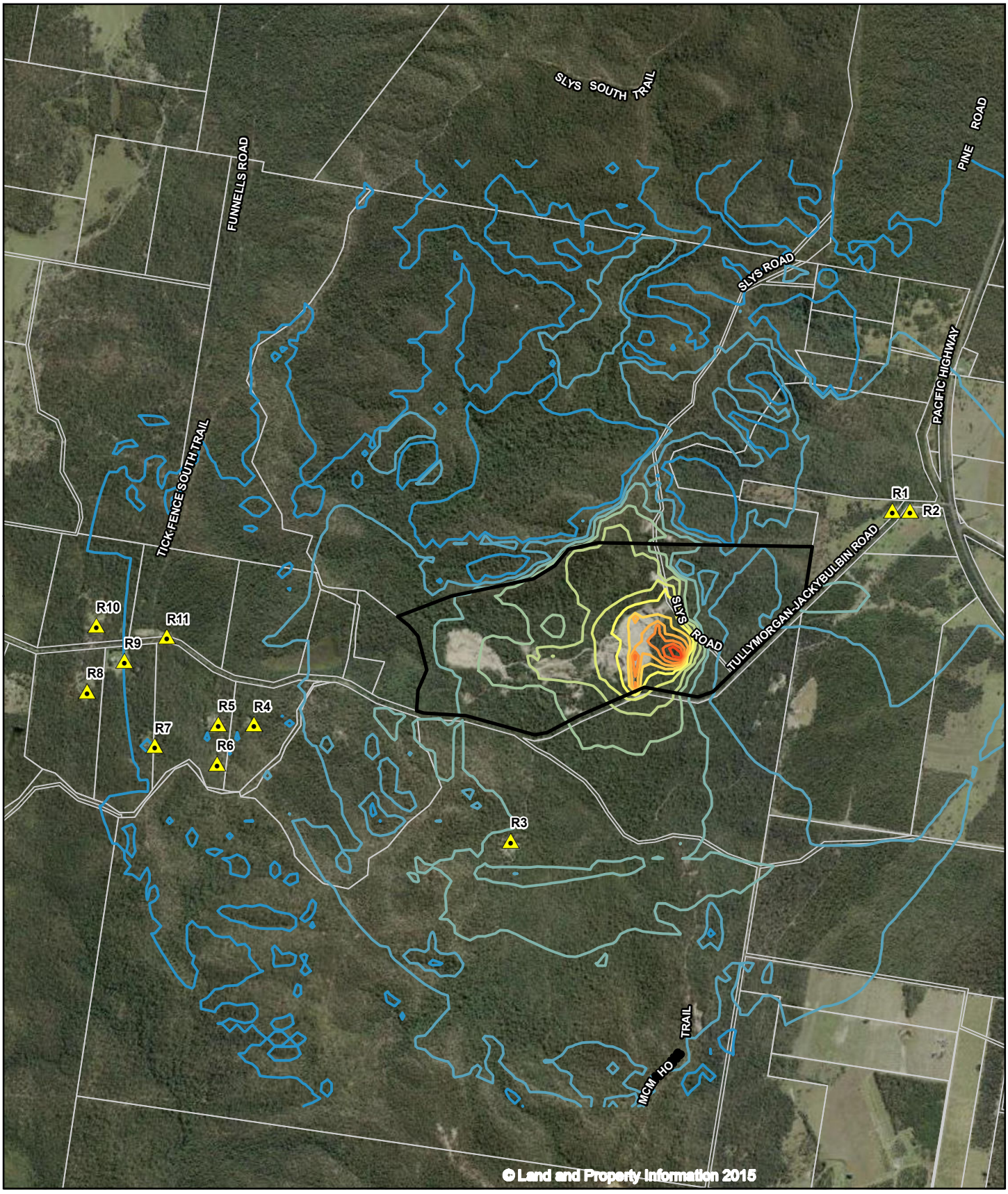
Job Number 22-17528
Revision A
Date 24 May 2017

Figure 5-3

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA005_NoiseLevels_ExistPeak_RockHammer_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay



LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Predicted operational noise levels
Scenario 2 – Average daily production

Job Number 22-17528
Revision A
Date 24 May 2017

Figure 5-4

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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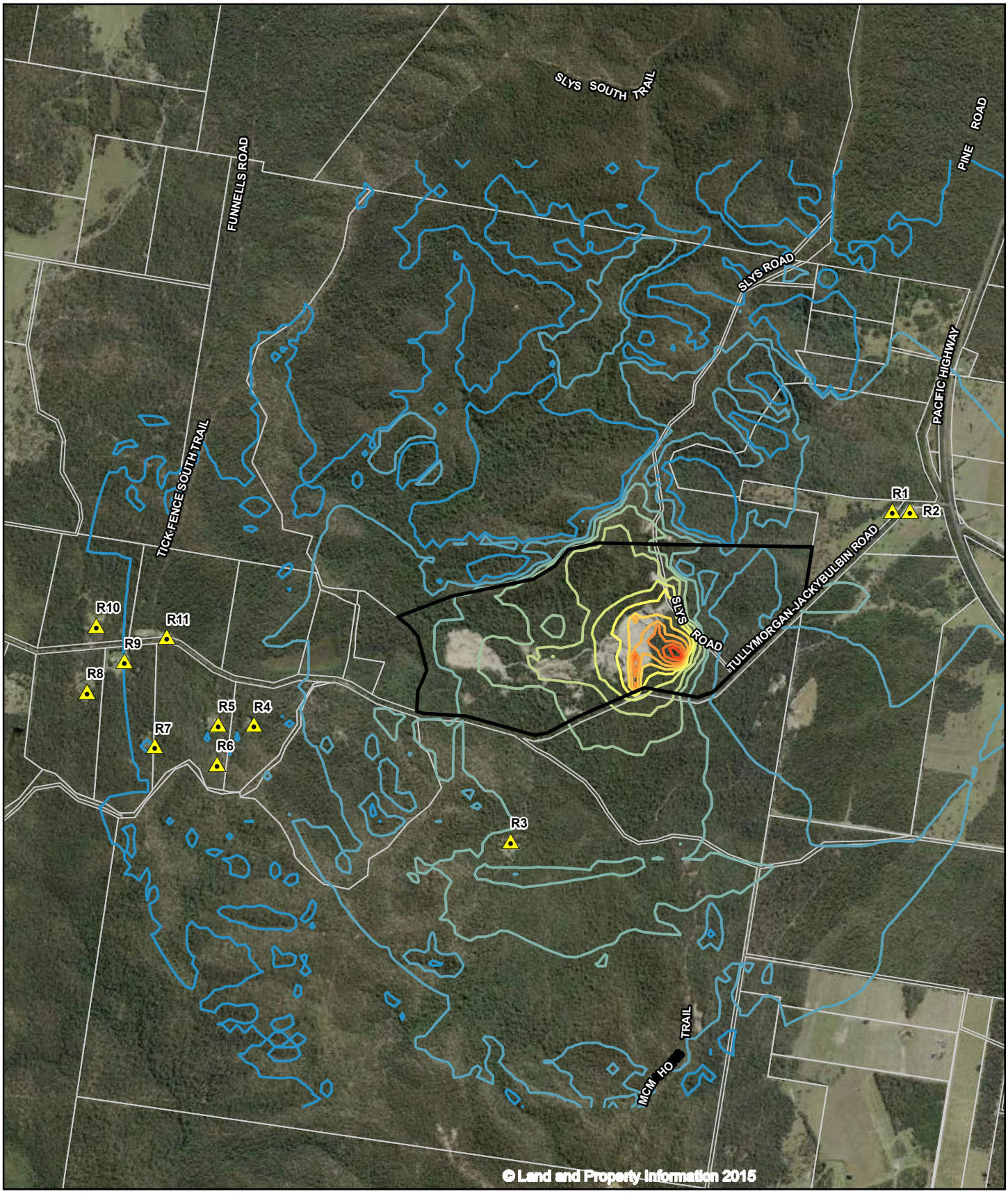

LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Predicted operational noise levels
Scenario 2 – Peak daily production

Job Number 22-17528
Revision A
Date 24 May 2017

Figure 5-5

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA007_NoiseLevels_FinalPeak_A.mxd

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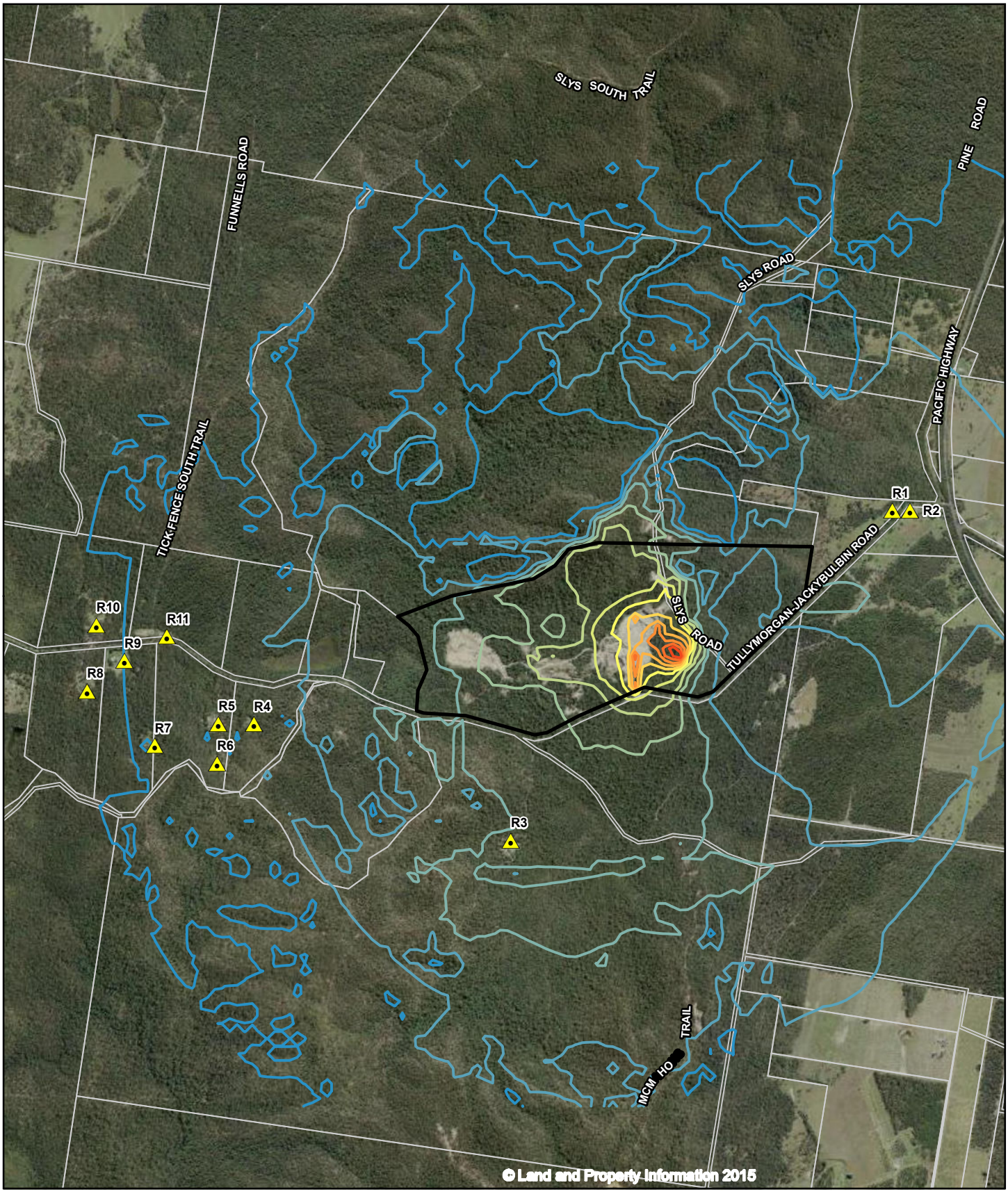

LEGEND

- Sensitive receiver
- Development site
- Cadastre

Noise level

- 20 dBA
- 25 dBA
- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

Paper Size A4

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Newman Quarrying Pty Ltd
Sly's Quarry Noise Assessment

Job Number 22-17528
Revision A
Date 24 May 2017

Predicted operational noise levels
Scenario 2 – Peak daily production with rock hammer

Figure 5-6

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

G:\22\17528\GIS\Maps\Deliverables\NoiseAssessment\2217528_NA008_NoiseLevels_FinalPeak_RockHammer_A.mxd

Data source: LPI: DTDB / DCDB, 2012, Aerial Imagery, 2015. Created by: fmackay

5.6 Road traffic noise

Continuous traffic flow related noise is typically calculated using the United Kingdom Calculation of Road Traffic Noise (CoRTN) algorithm, however due to the non-continuous nature of the heavy vehicle movements to and from the site, the United States EPA's Intermittent Traffic Noise guidelines has been utilised to determine potential impacts. The following equation outlines the mathematical formula used in calculating the $L_{eq,T}$ noise level for intermittent traffic noise.

$$L_{eq},T = L_b + 10\log\left[1+\frac{ND}{T}\left(\frac{10^{(L_{max}-L_b)/10}-1}{2.3}-\frac{(L_{max}-L_b)}{10}\right)\right]$$

Where:

L_b is background noise level, dB(A)

L_{max} is vehicle maximum noise level, dB(A)

T is the time for each group of vehicles (min)

N is number of vehicle trips

D is duration of noise of each vehicle (min)

The parameters above were determined as follows:

- Background noise levels are based on the unattended noise monitoring conducted at Location 1.
- The heavy vehicle maximum noise level was measured at Logger 1.
- The duration of each vehicle passby was 10.8 seconds.
- The time for each group of vehicles was 60 minutes.

Table 5-3 summarises the predicted road traffic noise level for when the quarry is operating at peak daily production with increased truck numbers, and compares this against the RNP criteria.

Table 5-3 Predicted road traffic noise level during peak daily production

Roadway	Generated heavy vehicle movements per day (average daily production)	Generated heavy vehicle movements per day (peak daily production)	RNP criteria Day (7 am – 10 pm)	Predicted road noise level	
				Average daily production $L_{Aeq(1\,hour)}$ dB(A)	Peak daily production $L_{Aeq(1\,hour)}$ dB(A)
Tullymorgan -Jackybulbin Rd	100 (50 loads)	300 (150 loads)	$L_{Aeq(1\,hour)}$ 55 (external)	49	52
1. Predicted results have received a 2.5 dB(A) façade correction					

Table 5-3 shows that using this algorithm, road traffic noise along Tullymorgan-Jackybulbin Road due to a proposed increase in heavy vehicles (to 300 daily movements) during peak daily production is expected to comply with the RNP criteria. Results also indicate that the increase in truck numbers will not result in any increase in resultant road noise levels for the peak production scenario when compared to approved peak daily production truck numbers.

6. Noise mitigation measures

Notwithstanding the results of the proposed increase in truck movement numbers, it is still recommended to continue implementing appropriate noise mitigation measures to limit adverse impacts on local residents, as outlined in the approved *Quarry Expansion at Lot 2 DP 1055044, Tullymorgan-Jackybulbin Road, Mororo Noise Management Plan* (GHD 2017)

7. Conclusion

An assessment of the potential noise impacts from an increase in peak truck movement numbers at Sly's Quarry has been undertaken. This assessment has led to the following conclusions, which are subject to the limitations outlined in Section 1.3:

- The noise assessment has been undertaken based on a worst-case operating scenario, with all equipment operating at maximum sound power levels.
- The noise assessment indicates that the noise levels due to operation of the quarry with a proposed increase in truck numbers to 300 daily movements is expected to meet the adopted noise criteria at all identified sensitive receivers.
- The predicted growth in quarry traffic along Tullymorgan-Jackybulbin Road to 300 daily movements was investigated using the United States EPA's Intermittent Traffic Noise guidelines. This model indicated road noise along Tullymorgan-Jackybulbin Road would comply with the RNP criteria at all assessed sensitive receivers
- Recommendations referenced in Section 6 to assist in minimising potential noise impacts.

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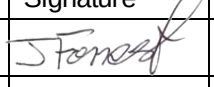
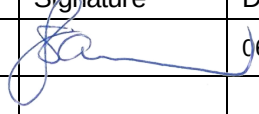
0	E Potoczny	J Forrest		S Lawer		06.06.2017

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