



Planning & Environment

STATE SIGNIFICANT DEVELOPMENT ASSESSMENT

GUNLAKE QUARRY EXTENSION PROJECT (SSD 7090)



Assessment Report
Section 89E of the *Environmental Planning and
Assessment Act 1979*

December 2016

Cover Photograph: Remnant Box Gum Woodland on the Gunlake Quarry site (Sept 2016)

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EXECUTIVE SUMMARY

Gunlake Quarries Pty Ltd (Gunlake) owns and operates Gunlake Quarry, an existing hard rock quarry located to the north west of the Hume Highway near Marulan. Gunlake currently has approval to extract, process and transport 750,000 tonnes of aggregate per year until 2038. The majority of the aggregate from the quarry is transported by trucks along the Hume Highway to Gunlake's concrete batching plants in Sydney.

Gunlake is seeking approval to increase its production rate to 2 million tonnes per year and correspondingly increase the number of truck movements on its transport routes. The project would increase the disturbance footprint of the quarry from 45 to 99 hectares (ha) on the 230 ha site and would include the construction of a second overburden emplacement area. The number of on-site employees would increase from 25 to 32.

The most significant change proposed is the increase in truck movements from an average of 164 to 440 per day and from a maximum of 320 to 590 per day.

The proposed development is State significant development under section 89C of the *Environmental Planning & Assessment Act 1979* (EP&A Act), as it is development that extracts more than 500,000 tonnes per annum of extractive materials and also is development that extracts from a resource of more than 5 million tonnes, as identified in Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011*.

As more than 25 public submissions in objection were received, the Planning Assessment Commission must determine the application in accordance with the Minister's delegation dated 14 September 2011.

On 15 October 2015, the proposed development was declared to be a 'controlled action' under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* as it was likely to have a significant impact on listed threatened species and communities. Under the current Bilateral Agreement between the Commonwealth and NSW Governments, the Department must undertake an assessment of these potential impacts under Part 4 of the EP&A Act and make a recommendation to the Commonwealth Minister on whether the controlled action should be approved under the EPBC Act.

The Department made Gunlake's development application and accompanying Environmental Impact Statement publicly available from 4 April until 20 May 2016. The Department received 57 submissions on the project, including 8 from public agencies, 1 from the Towrang Community Progress Group, 1 from Holcim (the owner of two nearby quarries) and 47 from members of the public. The submission from the Towrang Community Progress Group and the 47 public submissions objected to the project.

The Department held a community meeting at Marulan on 30 June 2016 to inform the local community about the planning process for the application and to listen to the community's views about the project. More than 50 members of the local community attended the meeting.

Gunlake submitted its Response to Submissions (RTS) on 23 September 2016. The RTS provided a detailed response to submissions from the community and agencies and also responded to matters raised during the subsequent consultation, including at the community meeting.

The Department considers that the key issues associated with the assessment of the project relate to:

- significant increase in truck movements and the impacts of this increase on the amenity of residents who live along the transport route between the quarry and the Hume Highway;
- operational noise and traffic noise;
- air quality;
- biodiversity; and
- water management.

Due to the proposed significant increase in the number of trucks, the Department required Gunlake to consider in detail whether there was any alternative option for transporting its products, particularly any option for Gunlake to use rail to transport its quarry products to Sydney. Following careful consideration of additional information provided by Gunlake in its RTS, particularly a cost benefit analysis of alternative rail and road options, the Department is satisfied that these options are not economically viable.

The Department has carefully considered the operational and traffic noise associated with the project. The Department notes that operational noise levels for the day, evening and night periods are predicted to remain below the relevant criteria at all but three privately-owned residences. It is recommended that one of these residences be given acquisition rights and another noise 'mitigation on request'.

A number of people living near Towrang and along Towrang Road (about 6 – 9 kilometres (km) from Gunlake Quarry) object to the project on the grounds that there are times when they can hear the crusher and other noise from the existing quarry operations. Although no exceedances of the relevant noise criteria are predicted at this location, Gunlake committed in its RTS to enclosing its primary crusher in response to community concern. The Department has recommended conditions requiring that Gunlake enclose the primary crusher within four months of commencing development and also demonstrate that the enclosure results in a 5 dB(A) reduction in its measured sound power level.

The project is predicted to result in an increase in road traffic noise levels; however these increases are predicted to comply with relevant criteria during both day and night periods. Nonetheless, the Department has recommended a number of conditions relating to the upgrade of Gunlake's primary transport route with the intention of reducing traffic noise along the route.

The project is predicted to result in only minimal changes to air quality; there being no predicted exceedances (either incrementally or cumulatively) at any privately-owned residence near the quarry.

The assessment of the impacts of the project on biodiversity has been carried out in accordance with the *NSW Offset Policy* and the *Framework for Biodiversity Assessment*. The principal biodiversity impact of the project is the removal of 15.8 ha of Box Gum Woodland that is protected under both State and Commonwealth biodiversity legislation. Following its assessment, the Department is satisfied that this impact and other impacts on biodiversity can be adequately managed, mitigated and/or offset and that the project would be able to be undertaken in a way that would result in the maintenance or improvement of the biodiversity values of the locality. The Department therefore considers the project's impacts on biodiversity, including on Matters of National Environmental Significance, is acceptable and recommends the Commonwealth Minister for the Environment approve the action, subject to the recommended conditions.

The Department is satisfied that the project's groundwater impacts would be minor, with the 2 metre groundwater drawdown contour being predicted to be confined to within 1.5 km of the edge of the quarry pit. The Department is also satisfied there are sufficient water allocations available within the market for Gunlake to purchase licences for the predicted groundwater inflows to the pit (up to 37 megalitres/year). With regard to surface water, the Department is satisfied that the project's impacts would be able to be managed to ensure a neutral or beneficial effect on receiving waters.

The cost benefit analysis of the project indicated that it would have a net benefit to NSW of between \$16 and \$27 million, and is justified from an economic efficiency perspective. The project would provide on-going socio-economic benefits to the local community, including additional employment opportunities and would contribute to providing aggregate to meet the on-going demands for construction materials in Sydney.

Having had regard to all impacts of the project and having considered the submissions from the community, the Department is satisfied that the project would deliver economic benefits to the local region and NSW. The project's environmental impacts have been substantially reduced, primarily by Gunlake's proposal to enclose its primary crusher, upgrade its primary transport route and increase its proposed biodiversity offset package. Consequently, the Department considers that the project is in the public interest and is approvable, subject to strict conditions.

1. INTRODUCTION

Gunlake Quarries Pty Ltd (Gunlake) owns and operates Gunlake Quarry, an existing hard rock quarry located on Brayton Road, approximately 7 kilometres (km) northwest of Marulan (Figure 1).

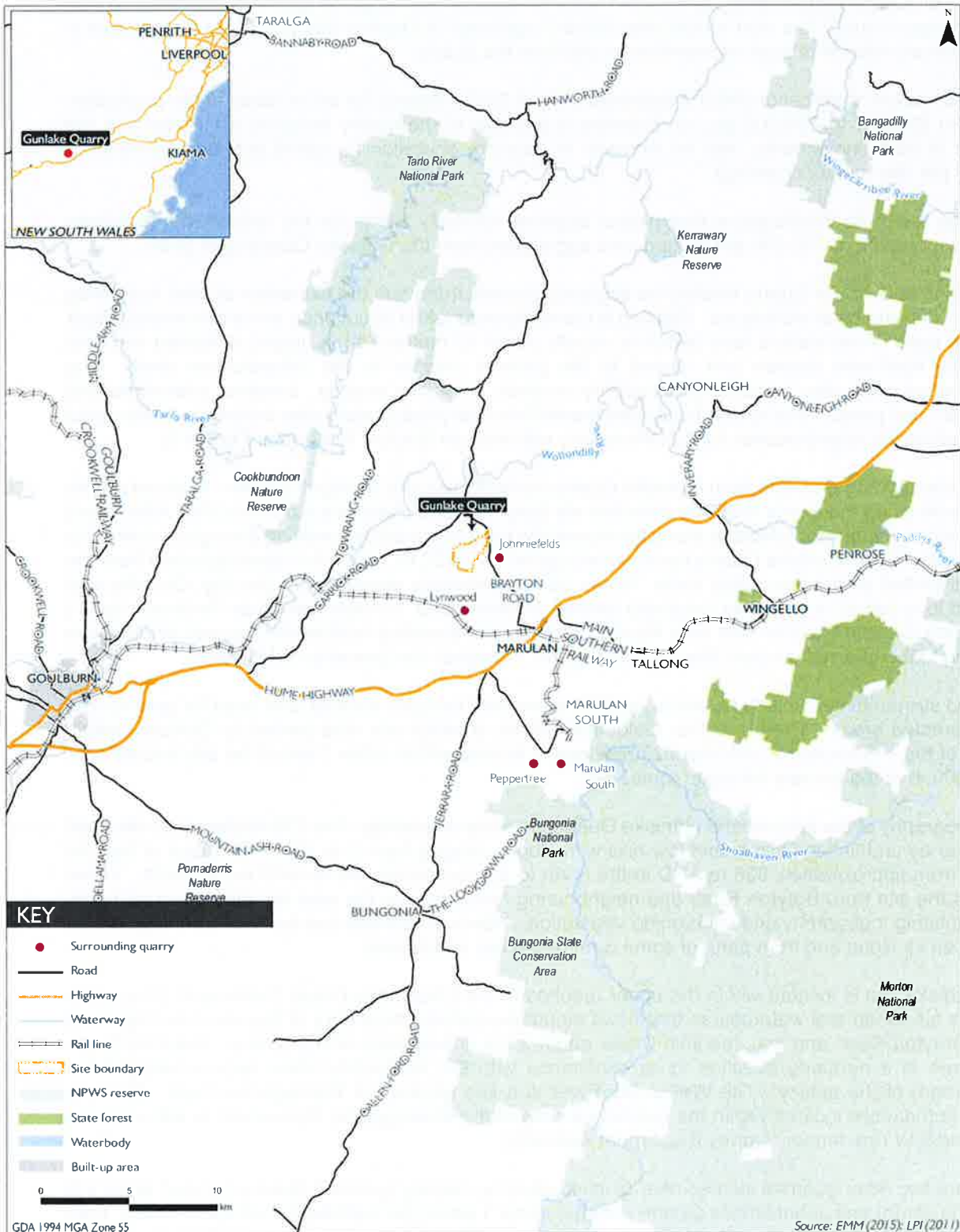


Figure 1: Location of Gunlake Quarry and other nearby quarries

Gunlake Quarry operates under a project approval granted by the then Minister for Planning in September 2008 under the former Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The original project approval allowed for the extraction and processing of up to

500,000 tonnes per annum (tpa) of hard rock aggregates and manufactured sand for 30 years, and the transportation of the extracted material to market.

Operations at Gunlake Quarry commenced in 2010. Since then, the project approval has been modified three times. The first modification (Mod 1 approved in March 2013) modified the approval to allow Gunlake to use the then recently constructed Marulan South interchange on the Hume Highway as part of its transport route. The next modification (Mod 3 approved in October 2014) allowed an increase in the maximum number of truck movements to and from the quarry.

The most recent modification (Mod 2 approved in April 2015) allowed for an increase in the production rate from 500,000 to 750,000 tpa, an increase in the size of the quarry footprint, an increase in the number of truck movements, and an increase in hours of operation for some activities (specifically 24 hour per day tertiary crushing).

Following the three modifications, the project approval currently allows for the extraction, processing and transportation of 750,000 tpa of hard rock aggregates from the Gunlake Quarry until 2038.

Operations at Gunlake Quarry involve the stripping of overburden and the extraction of hard rock using standard drill and blast techniques. Blasting is currently undertaken about once every two weeks. Rock from the base of the blasted face (which is usually about 13 metres (m) in height) is loaded into haul trucks by front end loaders and hauled to the primary crusher in the infrastructure area. The infrastructure area also contains a secondary crusher, a tertiary crusher, screens, interconnecting conveyors and product stockpiles. Trucks are loaded from the product stockpiles before travelling about 1.4 km along the quarry-access road to the quarry entrance on Brayton Road (see **Figure 2**).

Trucks transporting products from Gunlake Quarry currently use two transport routes - a primary route northwards along the Hume Highway (reached via Brayton Road, Ambrose Road and Red Hills Road) and a secondary route southwards along the Hume Highway (reached by travelling through the township of Marulan). When Gunlake Quarry commenced operations in 2010, all trucks travelling to and from the quarry travelled on the secondary route. When truck movements exceeded 25 per day, Gunlake was required to construct a new road (originally termed 'Bypass Road' but now named as 'Ambrose Road') connecting Brayton Road to Red Hills Road to allow trucks travelling northwards, as well as all trucks returning to the quarry from both the north and south, to bypass the township of Marulan.

The land surrounding Gunlake Quarry is rural in nature, and includes cleared land used for grazing and some forested areas. There are four residences (three of which are now owned by Gunlake) within 1.5 km of the site boundary and about 25 residences located within either 3 km of the site boundary or within 600 m of the primary transport route.

The topography of the land around Gunlake Quarry is gently undulating. The 230 hectare (ha) site itself is typified by undulating valleys and low hills with slopes ranging from 2 to 10%. Elevation of the site ranges from approximately 636 m AHD in the north to approximately 680 m AHD in the south. Views towards the site from Brayton Road and neighbouring residences to the east are largely screened by the undulating topography and intervening vegetation. However, the site can be seen from high points along Carrick Road and from parts of some rural properties to the west.

The Gunlake site is located within the upper reaches of the Chapmans Creek Catchment. Chapmans Creek is an ephemeral watercourse that flows along the northern boundary of the site (see **Figure 2**) under Brayton Road and into Joarimin Creek about 3 km downstream of the quarry. Joarimin Creek then flows in a northerly direction to its confluence with the Wollondilly River approximately 8 km downstream of the quarry. The Wollondilly River is a key tributary of Warragamba Dam. Gunlake Quarry is therefore located within the catchment area of the Warragamba Dam which is administered by WaterNSW (the former Sydney Catchment Authority).

There are two other quarries located near Gunlake Quarry, namely Lynwood Quarry (located about 2.5 km to the south) and Johnniefields Quarry (located about 1 km to the northeast on Brayton Road), both owned by Holcim (see **Figure 1**). Holcim has announced that Johnniefields Quarry, which is an older quarry operating under an approval granted by Goulburn Mulwaree Council, will be closed in the next few years as its new quarry, Lynwood Quarry (which commenced operations in 2015) becomes fully operational.

Other extractive industries in the vicinity of Marulan are Boral's hard rock Peppertree Quarry and Marulan South Limestone Mine which are located on the eastern side of the Hume Highway, about 15 km from Gunlake Quarry (see **Figure 1**).

The *Sydney Canberra Corridor Regional Strategy (2006-2031)* applies to the Goulburn Mulwaree local government area. This Strategy was prepared by the Department in 2008 and represents an agreed NSW Government position on the future of the Sydney-Canberra Corridor. The Strategy recognises the significance of the major deposits of sand and hard rock in the region and their potential to supply Sydney with construction material. The Strategy particularly notes the location of these resources near major rail and road infrastructure.

In August 2016, the Department exhibited a draft *Regional Plan for the South East and Tablelands Region* for community consultation. Once finalised, this plan will replace the *Sydney Canberra Corridor Regional Strategy*. The draft Plan contains goals and actions that aim to build a strong diversified economy and resilient and sustainable communities. As with the Regional Strategy, the draft Plan recognises the importance of the region's extractive resources to the state of NSW, noting their proximity to Australia's biggest construction materials market (ie Sydney) and their access to rail lines and freeways.

2. PROPOSED DEVELOPMENT

In response to increasing demand for its products, Gunlake has submitted an application seeking a new approval for the Gunlake Quarry under Part 4 of the EP&A Act. The application seeks approval for all currently approved activities at the quarry. As well, the application seeks approval to:

- increase the processing rate from 750,000 tpa to 2 million tpa;
- carry out operations for 30 years from the date of approval;
- undertake most quarrying operations 24 hours per day;
- increase the average number of daily truck movements from 164 to 440;
- increase the maximum number of daily truck movements from 320 to 590 (reduced from the 690 specified in the Environmental Impact Statement (EIS));
- increase the quarry footprint from 45 ha to 99 ha; and
- construct a new overburden emplacement area in the south-western corner of the site.

Gunlake proposes that development of the expanded pit would commence from the current quarry footprint and expand firstly to the south and south-east, then to the west (at a depth of 650 M AHD) during the first five years of development. During years 5 to 10 an additional 13 m bench would be extracted, taking the pit floor to a depth of 637 m AHD. Over years 10 to 20, a further three benches would be extracted. Over years 20 to 30, the final two benches would be extracted taking the pit floor to a final elevation of 572 m AHD, about 90 m below current ground level.

When quarrying concludes, the pit void would gradually fill with water from a combination of groundwater inflows and rainfall. The lake that would form in the void is expected to reach equilibrium after about 70 years at a level about 35 m below the spill point.

As the existing overburden emplacement area would be unable to accommodate the amount of overburden required to be removed from the expanded pit area, Gunlake proposes to construct an additional overburden emplacement area to the west of the pit, as shown on **Figure 2**. This new emplacement area would be progressively constructed and shaped to a height of between 5 to 15 m above ground level.

Products from Gunlake Quarry are used to supply Gunlake's three concrete batching plants in Sydney (located at Smeaton Grange, Glendenning and Silverwater). Gunlake has submitted an application for a fourth concrete batching plant at Banksmeadow, which is currently being assessed by Bayside Council, and is preparing an application for a fifth plant in Prestons. The project is required to supply these new plants and meet Sydney's increasing demand for construction materials and concrete.

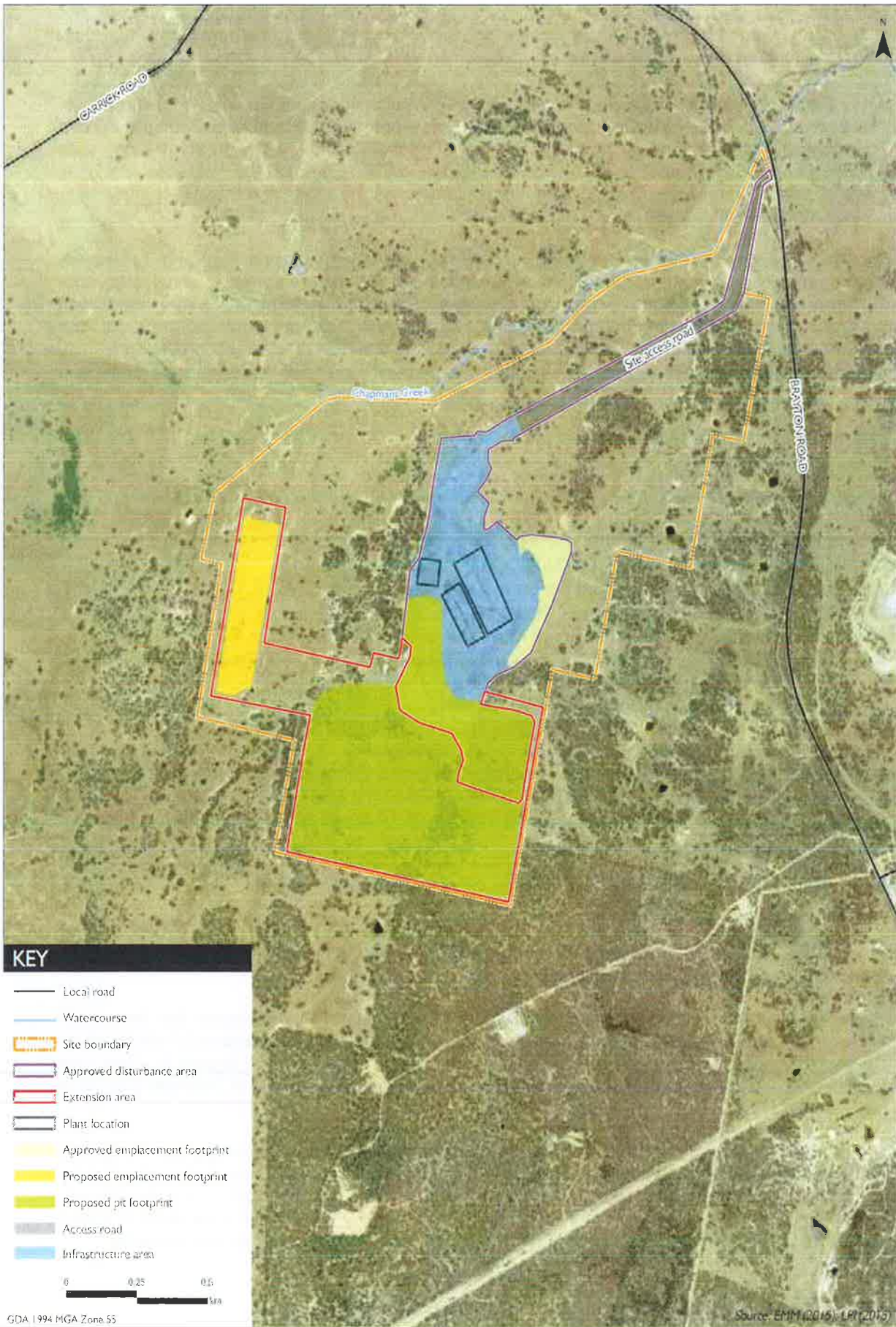


Figure 2: Existing and proposed development

The proposed development (the project) is described in full in the EIS, which is attached as **Appendix A**. The general layout of the existing and proposed development is shown on **Figure 2**. Key aspects of the existing and proposed development are compared in **Table 1**.

Table 1: Key aspects of the existing and proposed development

Aspect	Existing	Proposed
<i>Resource</i>	180 million tonnes	No change
<i>Production rate</i>	750,000 tpa	2 million tpa
<i>Quarry life</i>	2038	30 years from date of approval
<i>Quarry footprint</i>	45 ha	Extension of quarry footprint to approximately 99 ha
<i>Hours of operation</i>	Overburden removal and drilling - 7 am to 6 pm Monday to Saturday. None on Sundays and Public Holidays	No change
	Blasting – 9 am to 5 pm Monday to Friday. None on Saturdays, Sundays and Public Holidays	No change
	Quarrying and processing (excluding tertiary crushing) – 7 am to 6 pm Monday to Saturday. None on Sundays and Public Holidays	Quarrying operations (excluding overburden removal/emplacement and drilling) 24 hours a day but not between 6 pm Saturday and 2 am Monday. None on Sundays or public holidays.
		Overburden removal/emplacement and drilling – 7 am to 6 pm Monday to Saturday. None on Sundays or Public Holidays.
	Tertiary crushing – 24 hours a day, except between 6 pm Saturday to 2 am Monday	No change
	Loading and dispatch – 24 hours a day, except between 6 pm Saturday to 2 am Monday	No change
	Transportation on the primary transport route – 24 hours a day, except between 6 pm Saturday to 2 am Monday. None on Sundays or Public Holidays	No change
	Transportation on Brayton Road through Marulan – 6 am to 7 pm Monday to Saturday. None on Sundays or Public Holidays	No change
	Maintenance, 24 hours a day Monday to Saturday. None on Sundays or Public Holidays	Allow maintenance anytime (including Sundays and Public Holidays)
<i>Number of employees</i>	25 on-site employees 25 to 38 truck drivers	32 on-site employees 45 to 58 truck drivers
<i>Quarrying method</i>	Open cut methods – excavation, drill and blast, load and haul	No change
<i>Number of blasts</i>	Once a fortnight	Two per week
<i>Average truck movements</i>	164 per day (averaged over each calendar month)	440 per day (averaged over each calendar month)
<i>Maximum truck movements</i>	320 per day	590 per day

3. STATUTORY CONTEXT

3.1 State Significant Development

The project satisfies two separate criteria for State significant extractive industries in Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011*, namely it is development that extracts more than 500,000 tpa of extractive materials and also is development that extracts from a resource of more than 5 million tonnes. The project is therefore State significant development under section 89C of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Minister for Planning is the consent authority for the development application. However, as more than 25 public submissions objecting to the project have been received (see **Appendix B**), the Planning Assessment Commission (the Commission) must determine the application in accordance with the Minister's delegation of 14 September 2011.

3.2 Permissibility

The Gunlake Quarry site is zoned part RU1 Primary Production and part RU2 Rural Landscape under the *Goulburn Mulwaree Local Environmental Plan 2009*. Extractive industries are permissible with development consent in both these zones.

The proposal is also permissible with consent under clause 7(3) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP).

3.3 Requirements of the EP&A Act

3.3.1 Objects of the Act

The Minister is required to consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the Minister's decision on whether or not to approve the development are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land...*
 - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
 - (vii) *ecologically sustainable development.*

The Department is satisfied that the project encourages the proper use of resources (Object 5(a)(i)) and the promotion and co-ordination of the orderly and economic use of land (Object 5(a)(ii)). The project would provide for the continued and expanded use of an existing quarry located in relatively close proximity to a major market for its products. As well, the project is located in an area that has been identified in existing and draft strategic planning documents as important for supplying resources for the Sydney construction market.

The encouragement of the protection of the environment (Object 5(a)(vi)) is considered in **Section 5** of this report. Following this consideration, the Department is satisfied that the potential environmental impacts of the project can be suitably mitigated and managed to ensure an acceptable level of environmental performance.

The Department has carefully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) in its assessment of the development application in **Section 5** of this report. The Department has considered the precautionary principle; the principle of inter-generational equity; the conservation of biological diversity and ecological integrity; and improved valuation, pricing and incentive mechanisms.

The Department has considered the increase in greenhouse gas emissions associated with the project and is satisfied that the project's contribution to climate change would be small and acceptable in the context of the social and economic benefits of the project.

The Department has considered the impacts of the project on elements of the natural environment, including watercourses and groundwater aquifers, Aboriginal and historic cultural heritage, and threatened species, populations, ecological communities and their habitats, and is satisfied that the risks of serious or irreversible environmental damage are low.

In terms of balancing the environmental, social and economic considerations of the project, the Department has carefully considered the costs and benefits of the project, particularly with regard to

the viability of other potential transport options, including rail. The Department is satisfied that the transport option presented in the EIS is the only reasonable and feasible option currently available. This issue is addressed in detail in **Section 5.1** of this report.

3.3.2 Significant Effect on Threatened Species, Populations or Ecological Communities, or their Habitats

Sections 5A to 5D of the EP&A Act relate to threatened species assessment and management. In deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats, the consent authority is required to take into consideration:

- the factors listed in section 5A(2) of the EP&A Act (the 7 part test);
- any assessment guidelines issued and in force under the *Threatened Species Conservation Act 1995* (TSC Act) or *Fisheries Management Act 1994*; and
- the register of critical habitat identified in section 5B of the EP&A Act.

The Department has considered the 7 part tests which have been presented in the EIS in assessing whether there is likely to be a significant effect on threatened species, populations, ecological communities, or their habitats. This consideration has informed the Department's assessment of impacts to threatened species, populations or ecological communities or their habitats which is presented in **Section 5.4**.

3.3.3 Environmental Planning Instruments

Under section 79C of the EP&A Act, the consent authority is required to consider the relevant provisions of any State Environment Planning Policy (SEPP) or other environmental planning instrument (EPI). A number of EPIs are relevant to the proposed development, including:

- SEPP (*Mining, Petroleum and Extractive Industries*) 2007 (the Mining SEPP);
- SEPP (*Infrastructure*) 2007;
- SEPP (*State and Regional Development*) 2011;
- SEPP (*Sydney Drinking Water Catchment*) 2011;
- SEPP No. 33 – *Hazardous and Offensive Development*;
- SEPP No. 44 – *Koala Habitat Protection*;
- SEPP No. 55 – *Remediation of Land*;
- *Sydney Regional Environmental Plan No. 9 Extractive Industries*; and
- *Goulburn Mulwaree Local Environmental Plan 2009*.

Consideration of the relevant EPIs was provided in Chapter 4 of the EIS (see **Appendix A**). The Department is satisfied that Gunlake has adequately addressed the applicable requirements of the relevant EPIs and accepts the conclusions of this assessment.

3.4 Integrated Approvals

Under section 89J of the EP&A Act, a number of other statutory approvals have been integrated into the State significant development approval process and are not required to be separately obtained for the project. These include certain approvals and permits under the *National Parks and Wildlife Act 1974*, the *Heritage Act 1977* and the *Water Management Act 2000*.

Under section 89K of the EP&A Act, a number of further approvals are required, but these cannot be refused if they are necessary for the carrying out of an approved State significant development. These include variations to the quarry's existing environment protection licence (EPL) under the *Protection of the Environment Operations Act 1997* and a permit under section 144 of the *Fisheries Management Act 1994*.

The Department has consulted with the relevant government authorities responsible for these other approvals (see **Section 4**), and considered the relevant issues relating to these approvals in its assessment of the project (see **Section 5**). None of the relevant authorities object to the project on grounds that relate to these other approvals, subject to the imposition of suitable conditions.

3.5 Environmental Protection and Biodiversity Conservation Act 1999

On 15 October 2015, the Commonwealth Minister for the Environment declared the project to be a 'controlled action' for the purposes of the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to its potential impacts on listed Matters of National

Environmental Significance (MNES), specifically listed threatened species and communities (sections 18 & 18A of the EPBC Act).

Under the current Bilateral Agreement between the Commonwealth and NSW governments, the Commonwealth has accredited the NSW assessment process under Part 4.1 of the EP&A Act, for the purposes of the EPBC Act, enabling a single integrated assessment of the project. However, the Commonwealth decision-maker maintains a separate approval role, which will be exercised following the Commission's determination of the development application for the purposes of the State.

The Department has assessed the potential impact of the project on the relevant MNES in accordance with the requirements of the bilateral agreement. This assessment is provided in **Section 5.4** and **Appendix G** of this report and includes sufficient detail for the Commonwealth decision-maker to fully consider these impacts when determining whether to approve the project. Additionally, this report makes a recommendation and proposes conditions to the Commonwealth Minister for the Environment in relation to an approval decision.

3.6 Compliance Matters

Since the EIS was exhibited, the Department has become aware that Gunlake may not be operating in full accordance with its current project approval. The Department's Compliance team is investigating current operations at the quarry against the conditions of the current approval. This investigation is considered to be separate in nature from the assessment and determination of the current development application, from both a NSW and Commonwealth perspective.

4. CONSULTATION

The Department publicly exhibited the development application and the accompanying EIS (**Appendix A**) from 4 April to 20 May 2016:

- on the Department's website;
- at the Department's Information Centre in Sydney;
- at the offices of Goulburn Mulwaree Council; and
- at the offices of the Nature Conservation Council.

The details of the exhibition were advertised in in the Goulburn Post, the Goulburn Weekly, the Sydney Morning Herald and the Daily Telegraph. The Department notified relevant State Government authorities and Goulburn Mulwaree Council of the exhibition and wrote to adjoining landowners.

Goulburn Mulwaree Council and seven government agencies made submissions on the proposed development. As well, 49 submissions were received from members of the community and non-government organisations. All submissions are included in **Appendix B**.

4.1 Community Submissions

The community submissions included a submission from Holcim (the owner of the two nearby quarries, Lynwood and Johnniefields), a submission from Swaab Attorneys (made on behalf of a community member) and a submission from the **Towrang Community Progress Group (TCPG)**.

All 49 submissions (with the exception of the submission from Holcim) raised the impacts of the increased numbers of trucks as a reason for objecting to the project. Local residents and landowners were particularly concerned about the increased traffic noise (particularly with regard to the proposed significant increase in truck movements). The impacts of trucks on the safety of other road users (particularly as Brayton Road is part of a school bus route), increased road kill of native fauna, increased damage to roads, increased damage to vehicles as a result of stones thrown from trucks and increased greenhouse gas emissions from this form of transport were also significant concerns. A substantial number of people questioned why Gunlake could not use rail to transport its products to Sydney.

The impact of noise from operational activities at Gunlake Quarry was also a major concern for the local community. Other issues of concern to the local community are shown in the **Figure 3** below. It can be seen that, after traffic impacts and noise impacts, the issues of most common concern were Gunlake's limited consultation with the local community, air quality, and impacts on the rural nature of the area and local property values.

The TCPG's submission objected to the project principally on the grounds of noise and traffic. With regard to noise, the TCPG raised concerns that the increase in crushing hours to 24 hours a day would have a significant impact on the amenity of residents and that Gunlake should undertake to enclose all crushing and processing activities in a sound-proof shed, similar to the one constructed at the Lynwood Quarry.

The Holcim submission considered that Gunlake should be required to contribute to the cost of the South Marulan interchange which Holcim had previously constructed as a condition of its consent in 2014 at a cost of \$20.6 million. This request is discussed in **Section 5.1.6**.

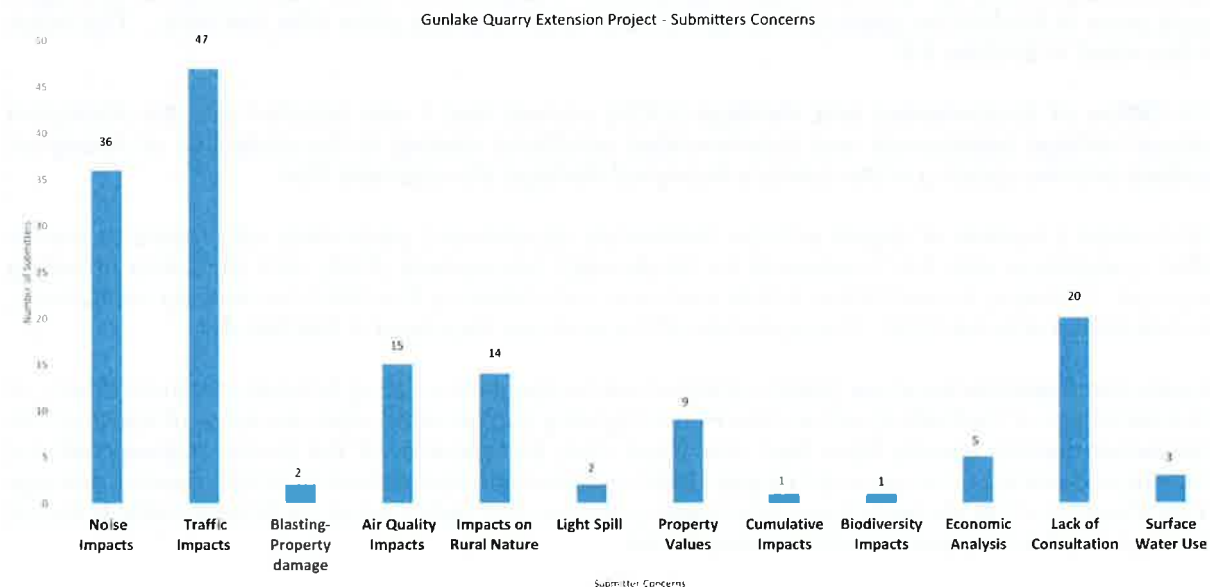


Figure 3: Issues identified in community submissions

4.2 Agency Submissions

Goulburn Mulwaree Council (Council) advised that it did not object to the project. However, Council noted the high level of public interest in the project and that the main issues of concern to the community were traffic generation, haulage routes, noise and dust. Council requested that further public consultation be undertaken and that further justification for the transport arrangements be provided.

The **Division of Resources and Energy** (DRE) within the Department of Industry advised that it was satisfied with the level of geological and resource assessment undertaken by Gunlake. DRE also advised that the project would allow Gunlake to make a significant long-term contribution towards the demand for hard rock construction aggregates in the Sydney and local markets. DRE requested that a condition be imposed on any development consent to require the provision of annual production data to DRE.

The **Environment Protection Authority** (EPA) identified a number of issues relating to operational noise and blasting, road traffic noise and air quality.

With regard to operational noise, the EPA made a number of recommendations regarding monitoring and compliance over the life of the project, and the application of mitigation and/or acquisition rights should any future compliance assessment demonstrate that its project specific noise levels (PSNLs) had been exceeded. The EPA noted that blasting is proposed to increase from once a fortnight to up to twice a week and recommended that the existing Noise and Blasting Management Plan be updated to include management and monitoring measures that respond to the proposed four-fold increase. The EPA recommended that the EIS's commitment to reduce the mobile fleet during evening and night periods should be formalised in either Gunlake's Statement of Commitments or conditions.

The EPA noted that the project would lead to a significant increase in traffic levels along the primary transport route and that the impacts of this increase would be most keenly felt by the people living along that route. However, the EPA also notes that the project is predicted to be compliant with the *NSW Road Noise Policy*, with both the daytime and night-time noise levels being compliant with this policy's

criterion for these periods and the relative increase criterion (up to 12 decibels) being predicted to be met at all residences.

With regard to air quality, the EPA noted that the project's dust impacts are predicted to be below applicable limits, but made recommendations for additional air quality monitoring, in particular the placement of additional High Volume Air Samplers (HVASs). The issue of additional air quality monitoring is discussed in **Section 5.3**.

With regard to water management, the EPA noted that up to 110 megalitres/year (ML/year) of water would be required by the quarry for dust suppression. The EPA also noted that while water shortages could occur in the first ten years of the project, water surpluses may occur after that time. This issue is discussed in **Section 5.6**.

The **Office of Environment and Heritage (OEH)** advised that it was satisfied with the Aboriginal cultural heritage assessment and recommended conditions relating to the protection of Aboriginal heritage and the updating of the quarry's Aboriginal Heritage Management Plan.

OEH raised a number of issues with the biodiversity assessment, particularly with regard to survey effort, compliance with the *Framework for Biodiversity Assessment (FBA)* and Gunlake's offsetting proposal. Following the exhibition, further work was undertaken by Gunlake's biodiversity consultants, in consultation with the OEH. The outcomes of this work are discussed in **Section 5.4**.

Roads and Maritime Services (RMS) raised concerns about the existing behaviour of truck drivers at the intersection of Red Hills Road and the Hume Highway and provided video evidence of trucks at this intersection turning directly from Red Hills Road onto the shoulder of the Hume Highway without stopping and waiting for an appropriate gap. RMS considers that this behaviour is both causing damage to the shoulder of the Hume Highway and is also a serious road safety issue, as through traffic is forced to merge into the fast lane to avoid entering trucks.

RMS therefore did not support Gunlake's proposal to provide an acceleration lane before 2025, but considered that a left turn north-bound acceleration lane on the Hume Highway at Red Hills Road should be constructed before *any* increase in truck movements is permitted under any new consent.

The **Heritage Council of NSW** advised that Gunlake Quarry is not located near the former alignment of the Hume Highway or known listed historic heritage items. The Heritage Council noted that there appears to be no heritage values present on the quarry site and subsequently did not recommend any conditions.

The **Department of Primary Industries (DPI)** reviewed the EIS and recommended several conditions relating to the preparation of water-related management plans and licensing. DPI recommended that management plans and monitoring systems be designed to ensure no net impact on receiving waters and to include sampling of water during discharge events.

WaterNSW advised that the project is located in the Warragamba Dam catchment and expressed concern at the proximity of the proposed development to Chapmans Creek and its tributaries. WaterNSW advised that Gunlake needs to demonstrate that its proposed management measures would have a neutral or beneficial effect on water quality leaving the site boundary.

WaterNSW also raised concerns about the lack of detailed plans showing road and creek crossings and the potential for existing soil conservation works to be impacted by expansion of the quarry footprint. WaterNSW subsequently recommended that it is consulted during preparation of the quarry's updated Water Management Plan and the Pollution Incident Response Plan for the site.

4.3 Community Meeting

The Department held a community meeting at the Marulan Community Hall on 30 June 2016 to inform the local community about the planning process for the application and to listen to the community's views about the project. Officers from the Department and Goulburn Mulwaree Council attended the meeting, as did Gunlake's Managing Director and Gunlake's consultants. More than 50 members of the local community attended the meeting.

Concerns expressed at the meeting were broad-ranging but focussed on amenity impacts resulting from the significant increase in truck movements; operational noise (particularly from the proposed 24 hour operation of the primary crusher); air quality impacts and road safety impacts. A summary of the comments made by community members during the meeting is attached as **Appendix C**.

4.4 Response to Submissions Report (RTS)

Gunlake submitted its RTS report on 23 September 2016. The RTS (see **Appendix D**) provides a detailed response to submissions from the community and agencies received during the exhibition and also responded to matters raised during subsequent consultation, including the community meeting on 30 June 2016. In preparing its RTS, Gunlake focussed on addressing and responding to the issues of most concern to the community, the Council and Government agencies.

The RTS includes a detailed consideration of the costs and benefits of transporting quarry products by a number of alternative rail and road options. It also includes the findings of a road safety audit of the primary transport route.

The RTS includes a statement of commitments from Gunlake which includes commitments to:

- enclose the primary crusher, within 4 months of receiving development consent;
- construct an additional north-bound acceleration lane at the intersection with the Hume Highway; and
- undertake a number of other improvements along the primary transport route.

4.5 Government Agency Comments on the RTS

The Department forwarded the RTS to all agencies that had previously provided submissions. The resulting agency comments are attached in **Appendix E**.

The EPA acknowledged that the RTS addressed a number of the issues it had raised with regard to the EIS. The EPA welcomed Gunlake's commitment to enclose the primary crusher and requested that conditions be imposed to validate the noise reductions achieved by this measure.

The EPA also recommended that Gunlake be required to install HVASs at two additional locations to provide an accurate assessment of the quarry's contribution to ambient dust levels. The issue of air quality monitoring is discussed in **Section 5.3** of this report.

WaterNSW advised that water impacted by the project must be captured and treated to achieve a neutral or beneficial effect on water quality leaving the site. WaterNSW recommended a number of water management conditions which have been included in the recommended conditions.

OEH advised that it was generally satisfied with how issues relating to compliance with the NSW Offsets Policy and biodiversity surveying and offsetting had been addressed. OEH made a number of recommendations regarding biodiversity and offsets which are discussed in **Section 5.4**.

RMS advised that it continues to object to any increase in truck movements until an acceleration lane has been constructed on the Hume Highway at its intersection with Red Hills Road. The issue of the timing of construction of the acceleration lane is discussed in **Section 5.1.3**.

Council, in providing comments on draft recommended conditions, requested that Gunlake be required to pay contributions to Council for the upgrade and maintenance of Council-owned roads in accordance with its current *Section 94 Development Contributions Plan 2009*, or any subsequent relevant contributions plan adopted by Council in the future. This matter is discussed in **Section 5.1.6**.

DPI, DRE and the Heritage Council provided no further comments.

5. ASSESSMENT

In assessing the merits of the project, the Department has considered:

- the EIS (see **Appendix A**);
- submissions from the community and Government agencies (see **Appendix B**);
- issues raised at the community meeting on 30 June 2016 (see **Appendix C**);

- Gunlake's RTS (see **Appendix D**) and Government agencies' comments on the RTS (see **Appendix E**);
- relevant EPIs, policies and guidelines; and
- the requirements of the EP&A Act, including the relevant objects of the Act.

The Department considers that the key assessment issues for this project are transport, noise, air quality, biodiversity and water management. Other issues, including Aboriginal cultural heritage, visual impact and socio-economic impacts, are addressed in **Table 13** in **Section 5.7**.

5.1 Transport

Gunlake is seeking approval for a significant increase in the number of truck movements required to transport its quarry products to market, specifically, an increase in average daily truck movements from 164 to 440 and an increase in maximum daily truck movements from 320 to 590. The impact of this proposed increase, particularly on residents living along the primary transport route between the quarry and the Hume Highway, has been at the forefront of the Department's consideration and assessment of this project.

5.1.1 Current Transport Arrangements

Gunlake currently transports its quarry products by road along two transport routes (see **Figure 4**), namely:

- a primary transport route for trucks heading north along the Hume Highway to Sydney (Brayton Road, Ambrose Road, Red Hills Road); and
- a secondary transport route for trucks heading south along the Hume Highway (along Brayton Road, through the northern edge of Marulan to the Marulan Interchange on the Hume Highway).

Gunlake constructed Ambrose Road (formerly referred to as Bypass Road) in 2012 to connect Brayton Road through Red Hills Road to the Hume Highway to form the primary transport route, as was required by the conditions of approval. Ambrose Road, like Brayton Road, is an approved B-double route and is generally subject to a speed limit of 100 km/hour. However, in response to community concern about road safety over the last two years, Gunlake has instructed its drivers to travel at less than 80 km/hour on this route.

At the intersection of Red Hills Road and the Hume Highway, the median has been closed to prevent right-hand turns. Although there is a lay-by and deceleration lane on the Hume Highway at this intersection for vehicles turning left into Red Hills Road, there is no acceleration lane for vehicles heading north.

Currently about 90% of Gunlake's quarry products are transported to Sydney on the primary transport route and about 10% are transported to locations to the south or within the Southern Highlands. Trucks returning to the quarry from the north drive past Marulan and proceed to the South Marulan Interchange. They then cross over the highway and enter the north-bound lanes of the Hume Highway. They proceed north past Marulan and make a left hand turn into Red Hills Road. Trucks returning on the Hume Highway from the south proceed past Marulan and make a left hand turn onto Red Hills Road.

Gunlake has approval to transport its products on the primary transport route 24 hours per day between 2 am Mondays to 6 pm on Saturdays, but with no transportation allowed on Sundays or Public Holidays. As part of the project, Gunlake is seeking approval to increase the average truck movements to 440 (220 laden trucks) each day. In its EIS, Gunlake requested that it be allowed a maximum of 690 truck movements per day. However, in its RTS, Gunlake advised that it is now seeking approval for a maximum of 590 truck movements per day.

Gunlake has approval for an average of 25 (and a maximum of 38) outbound laden truck movements on the secondary transport route per day, between the hours of 6 am to 7 pm Monday to Saturday, with no transportation allowed on Sundays or Public Holidays. No change to the number of movements on the secondary route is proposed as part of the project.

Between 45% and 71% of the existing traffic on the primary transport route (before the Hume Highway) consists of quarry trucks associated with Gunlake Quarry or Johnniefields Quarry. The remainder of the traffic is primarily local or farm traffic. School buses also travel along Brayton Road and Ambrose Road. School bus stop locations are shown on **Figure 4**.

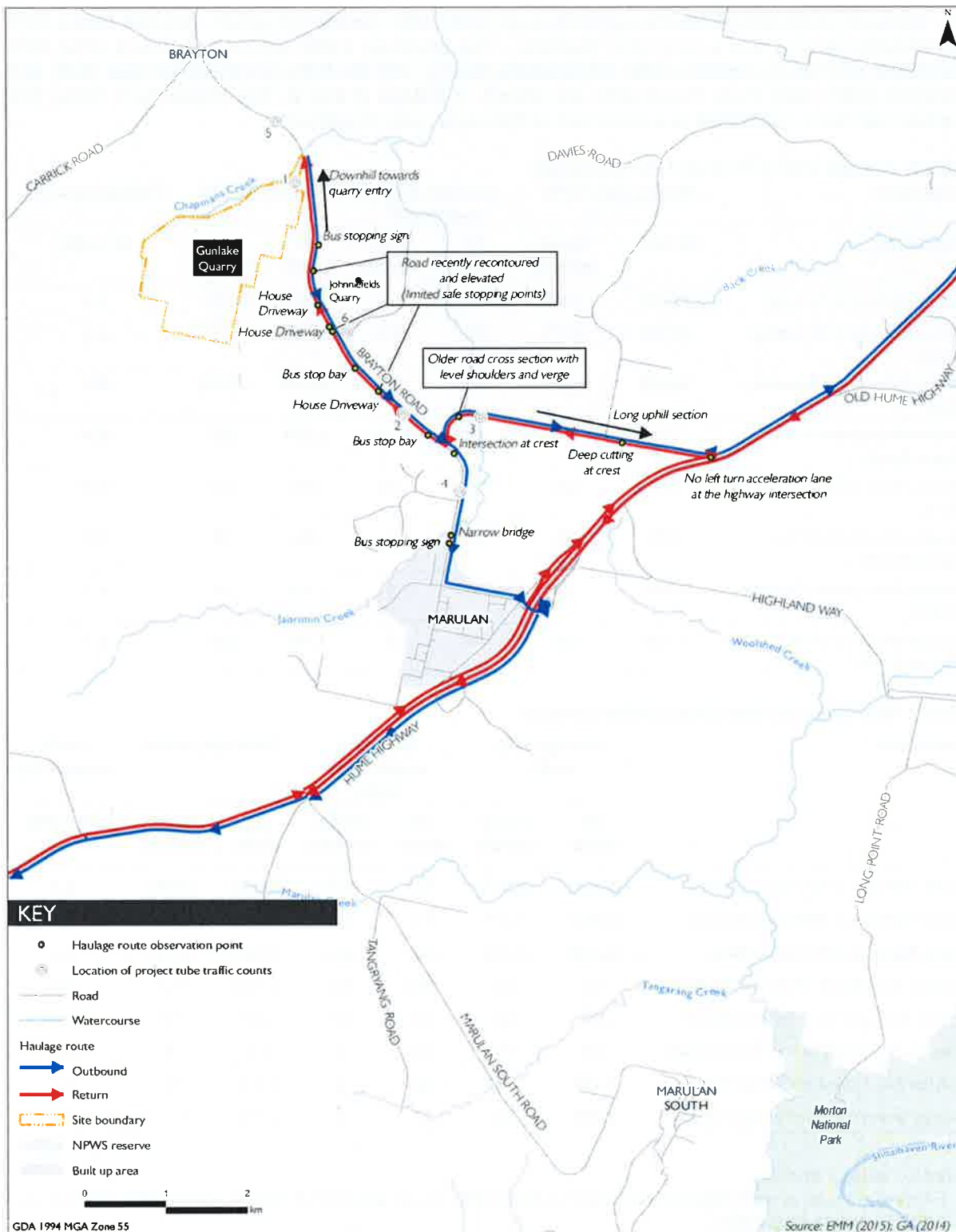


Figure 4: Gunlake Quarry's primary and secondary transport routes

Gunlake's current approval requires the company to make contributions to Council for the maintenance of local roads in accordance with Council's Contributions Plan and specifies the rate at \$0.0313 per km per tonne of product transported on Council's roads.

5.1.2 Road Network Capacity

The EIS includes a Transport Assessment prepared by EMM which assessed the potential traffic impacts of the project on the capacity, safety and efficiency of the local and State road network.

The Transport Assessment considered both short-term traffic generation (which included trucks from Johnniefields Quarry) and a long-term scenario. The predicted traffic volumes for future short-term operations, prior to any closure of the Johnniefields Quarry, with the EIS's proposed average (440) and maximum (690) daily truck movements are shown in **Tables 2** and **3**. The Department notes that Gunlake has since committed to a maximum of 590 daily truck movements.

Table 2: Average short-term project traffic increases

Road name	Average daily traffic ¹		Extension Project daily traffic ²		Total daily traffic		Traffic increase (%)
	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic
Hume Highway at Penrose	22,600	4,065	282	276	22,882	4,341	1.2
Hume Highway at Mittagong Bypass	20,900	4,175	282	276	21,182	4,451	1.3
Hume Highway at Pheasants Nest	36,000	5,400	282	276	36,282	5,676	0.8
Brayton Road (west of the Bypass Road)	720	326	330	276	1,050	602	45.8
Bypass Road (north of Brayton Road)	398	221	282	276	680	497	70.9
Brayton Road (east of the Bypass Road)	448	99	48	0	496	99	10.7
Brayton Road (west of George Street)	1,130	73	48	0	1,178	73	4.2
George Street (south of Brayton Road)	1,750	107	48	0	1,798	107	2.7

Table 3: Maximum short-term project traffic increases

Road name	Average daily traffic		Additional project daily traffic		Total daily traffic		Traffic increase (%)
	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic
Hume Highway at Penrose	22,600	4,065	532	526	23,132	4,591	2.4
Hume Highway at Mittagong Bypass	20,900	4,175	532	526	21,432	4,701	2.5
Hume Highway at Pheasants Nest	36,000	5,400	532	526	36,532	5,926	1.5
Brayton Road (west of the Bypass Road)	720	326	580	526	1,300	852	80.6
Bypass Road (north of Brayton Road)	398	221	532	526	930	747	133.7
Brayton Road (east of the Bypass Road)	448	99	48	0	496	99	10.7
Brayton Road (west of George Street)	1,130	73	48	0	1,178	73	4.2
George Street (south of Brayton Road)	1,750	107	48	0	1,798	107	2.7

Notes to Tables 2 and 3:

- Existing average project-related daily heavy vehicle traffic (ie an average of 164 movements/day) is included within "Average daily traffic".
- While approximately 10% of existing average project-related daily heavy vehicles traffic travels to the south along the secondary transport route, all additional project daily heavy-vehicle traffic has been assumed to use the primary transport route.

Tables 2 and **3** show that the project (once production has reached 2 million tpa) would result in increases in traffic on:

- Brayton Road (between the quarry and Ambrose Road) of between 46% and 81%;
- Ambrose Road and Red Hills Road of between 71% and 134%; and
- Hume Highway at Penrose of between 1.2% and 2.4%.

The Transport Assessment found that no specific improvements (eg road widening) to the local road network would be required in order to accommodate the additional traffic generated by the project. However, Gunlake included a Road Safety Audit of the primary transport route prepared by Lyle Marshall & Partners in the RTS (Appendix G of the RTS). The audit identified a number of deficiencies along the primary transport route and recommended corrective actions such as the installation of dividing barrier lines along the full length of the route and the installation of edge lines. The Road Safety audit also recommended that Gunlake work with Council to make a formal submission to RMS to lower the speed limit from 100km/hour to 80 km/hour.

In its updated Statement of Commitments, which was included in the RTS and forms part of the recommended conditions of consent, Gunlake has committed to a number of actions relating to traffic and transport, including:

- constructing a 500 m northbound acceleration lane on the Hume Highway, at its intersection with Red Hills Road, within 12 months of commencing development under the consent;
- working with Council to submit an application to RMS to reduce the speed limit on the primary transport route to 80 km/h;
- reducing the proposed maximum number of daily truck movements from 690 to 590 per day;
- implementing the corrective actions recommended in the Road Safety Audit, including the installation of centre double lines and edge lines along appropriate sections of the primary transport route;
- constructing an acceleration lane on Brayton Road south of the quarry intersection;
- widening both shoulders on Ambrose Rd for 400 m on the approach to Brayton Road; and
- improving the Red Hills Road and Hume Highway intersection.

The Department is satisfied that Gunlake has adequately considered the impact of the project on the capacity of the local and State networks and, subject to the actions identified above, considers that the impact of the additional trucks on the capacity and safety of the primary transport route would be acceptable.

5.1.3 Intersection Performance

The Transport Assessment also included an analysis of intersection performance under the scenario of the initially proposed maximum (690) truck movements per day, prior to any reduction in traffic resulting from the closure of Johnniefields Quarry.

The analysis showed that almost all intersections along the primary and secondary transport routes would continue to operate with a high level of service (Level of Service A or B). The exception is the intersection of Red Hills Road with the Hume Highway where the increased traffic would result in increased traffic delays (Level of Service C or D).

The Transport Assessment identified that the appropriate response to the predicted traffic delays expected at this intersection would be to construct a 500 m north-bound acceleration lane on the Hume Highway. However, on the basis of expected project-related heavy vehicle growth, it suggested this would not be required until approximately 2025. In its submission on the EIS, RMS strongly objected to this delay and recommended that the acceleration lane be constructed before *any* increase in truck movements. RMS reiterated its concerns about trucks transporting products from Gunlake Quarry entering the left hand lane of the Hume Highway without stopping and waiting for an appropriate gap. RMS advised it is concerned about the potential for a serious road accident to occur at this intersection at a result of such behaviour and confirmed its position that there should be no increase in truck movements from Gunlake Quarry until the acceleration lane has been constructed. In its RTS, Gunlake committed to constructing the acceleration lane as soon as RMS approval for its design and construction is received. RMS's position was most recently reiterated on 6 December, wherein it proposed construction of the acceleration lane should be completed 'prior to commencing quarrying operations under the consent', rather than prior to any increased haulage from the quarry.

The Department has carefully reviewed RMS's footage of trucks entering the Hume Highway without stopping to wait for a suitable gap in the traffic and agrees with RMS that this is a major safety issue. The RMS has been working with NSW Police regarding enforcement of appropriate driving practices at the intersection. The Department also accepts RMS's position that the existing risk of bad driving behaviour at the intersection causing a serious road accident must necessarily increase with the number

of trucks using the intersection. Nonetheless, the safety issue is not intrinsically related to the number of trucks, but in essence results from poor driving practices and inadequate oversight.

RMS's proposal to restrict haulage from the quarry to current levels until the intersection is upgraded is accepted. However, this restriction should be expressed in terms of maintaining the current maximum dispatch level (measured on a monthly basis), rather than 'prior to commencing quarrying operations under the consent'. This latter approach would have the unfortunate outcome of also restricting implementation of many other favourable elements of the new consent.

RMS also apparently considers that improving driver behaviour is solely within the control or influence of NSW Police. The Department also supports other methods to achieve this outcome. In 2015, the Department required installation of a camera to record truck driver behaviour at the intersection of a quarry access road and Nelson Bay Road, near Port Stephens. The Department's Compliance Branch considers this to have been a highly successful measure to moderate the behaviour of quarry truck drivers and has strongly encouraged the wider use of such cameras.

The Department considers that driving existing behaviour at the intersection can be controlled more directly and more completely than solely by restricting haulage to current levels until the acceleration lane is constructed. The Department has therefore recommended that Gunlake be required to operate a video camera at the intersection to record all vehicles turning left from Red Hills Road to join the Hume Highway, until the acceleration lane is constructed. The camera's recordings must be reviewed at least weekly by Gunlake to ensure safe merging practices, stored securely for at least 60 days and made available to the Department and RMS on request. The recording of driver behaviour would be supported by a requirement for the Drivers' Code of Conduct to specifically address safe merging practices at the intersection. The recommended conditions also require measures to be in place to ensure compliance with the Drivers' Code of Conduct.

In summary, the Department has considered the impacts of the proposed average and maximum truck movements on the road network, particularly at intersections, and is satisfied that the existing road network, including its intersections, generally has the capacity to accommodate the proposed additional truck movements, subject to the construction of the acceleration lane on the Hume Highway and the other upgrades and improvements identified in the Transport Assessment and Road Safety Audit.

5.1.4 Consideration of Potential Alternative Transport Options

The Secretary's Environmental Assessment Requirements for the project's EIS required Gunlake to identify and describe all reasonable options to reduce transport of quarry products on local roads, including extension of the Bypass Road or use of either existing rail infrastructure at Lynwood Quarry or new rail infrastructure, and to provide a detailed assessment of any feasible option.

Gunlake responded to this requirement by including a Transport Options Review in the EIS (Appendix D of the EIS) that analysed seven transport options, including four road-based options and three road/rail options. The Transport Options Review analysed the design and environmental constraints for each option, considering matters such as property acquisition, road safety, biodiversity and amenity impacts, and estimated the capital cost of each options.

The Transport Options Review found that continued use of the primary transport route for transporting quarry products to Sydney would have an estimated mid-range capital cost of \$4.5 million. The other three road-only options, one of which included a new southern haulage route through Lynwood Quarry, were estimated to have mid-range capital costs between \$15 million and \$45 million. Of the three road/rail options considered, the least expensive option (involving the construction of a 7 km haul road from Gunlake Quarry to the Lynwood rail siding, including a bridge over the Main Southern Railway line, and an intermodal terminal in Sydney) was estimated to have a mid-range cost of \$60 million. The two other rail options, the latter involving the construction of a rail spur to the quarry, were estimated to have mid-range capital costs of \$64 million and \$120 million.

The Transport Options Review noted that freight rail transport in NSW is currently focussed on the transport of homogenous bulk commodities, transported from a single point of origin to a single destination, typically with uniform trainloads of products despatched each day to a fixed timetable. The review identified that contrary to this model, Gunlake produces a range of aggregates with different dimensions and distributes these to Gunlake's three concrete batching plants which are dispersed

across western Sydney. The Review concluded that increasing truck numbers along the primary transport route was the project's only economically viable transport option.

Following exhibition of the EIS, Council and the local community expressed the view that Gunlake had not adequately considered alternative options for transporting Gunlake's products, either by rail or a private haul road.

Following the community meeting and consideration of community submissions, the Department required Gunlake to further address the potential feasibility of a rail option, specifically to:

- undertake further work to ensure it has identified the lowest-cost option for transporting all or some of its products by rail (following consultation with Holcim) and provide a detailed analysis of the costs and benefits associated with this option compared to the costs and benefits of transporting its products by road under the company's preferred option. The analysis should include a comparison of the costs of the two scenarios with regard to the full range of economic, social and environmental costs, including the external costs of traffic congestion, carbon emissions and road accidents.

Gunlake responded in its RTS and provided the following studies:

- *Gunlake Quarries Rail Transport Study* (Hatch) in Appendix E of the RTS;
- *Gunlake Quarry Road Options Assessment* (EMM) in Appendix F of the RTS; and
- *Review of Cost Benefit Analysis of Gunlake Quarry Rail Transport Study Prepared by Hatch* (Gillespie Economics) in Appendix H of the RTS.

The findings of these studies are summarised below.

- *Gunlake Quarries Rail Transport Study*

Hatch identified and evaluated potential rail solutions for the transportation of approximately 1.5 million tpa of quarry products to Gunlake's existing and proposed concrete plants in Sydney. This was on the basis that, although the project requests approval for a production rate of 2 million tpa, about 0.5 million tpa of this would be transported to destinations that could not be supported by rail.

Hatch considered a total of 20 transport options, including 18 rail-based options and two road-only options (Options 1 and 2), against the base case of continuing to use the primary transport route. At the quarry end, Hatch assessed three primary rail loading facility options (loading facility at the quarry, loading facility to the north of the Main Southern Railway line and shared use of Lynwood's facility). At the Sydney end, three potential unloading sites were identified at Glendenning (involving shared use/adjacent construct at Lynwood's Rooty Hill Distribution Centre), Silverwater and Smeaton Grange.

Hatch noted that the project could never support the cost of more than one rail facility and therefore trucking from each potential rail unloading facility to each of Gunlake's five existing and proposed concrete batching plants was assessed individually.

The analysis considered the capital, operating and maintenance costs for each option over a 20 year period using a discount rate of 7%, a 30 year period using a discount rate of 7%, and a 20 year period at a discount rate of 4%, in accordance with government guidelines. In addition, the costs of externalities associated with each option (primarily pollution, greenhouse gas, noise, environmental and crash costs) were assessed. Given that the project has a life of 30 years, the findings from the 30 year period at a discount rate of 7% are used in this report.

The findings of the Hatch report are summarised on **Figure 5**. In terms of capital costs (excluding land surplus and land premium costings), Hatch found that:

- continued use of the primary transport route (base case) would have a capital cost of \$1.5 million (including the cost of an acceleration lane on the Hume Highway);
- a private haul road through the Lynwood Quarry to the Marulan South Interchange (Option 2) would have a capital cost of \$35 million; and
- the lowest cost rail options (Options 11-13) which would involve construction of a private haul road to Lynwood Quarry's loading facilities, rail transport to an unloading facility at Smeaton Grange and then distribution by truck to Gunlake's concrete batching plants would have a capital cost of \$70 to \$75 million.

Gunlakes Quarries - Transport Options Capital Investment

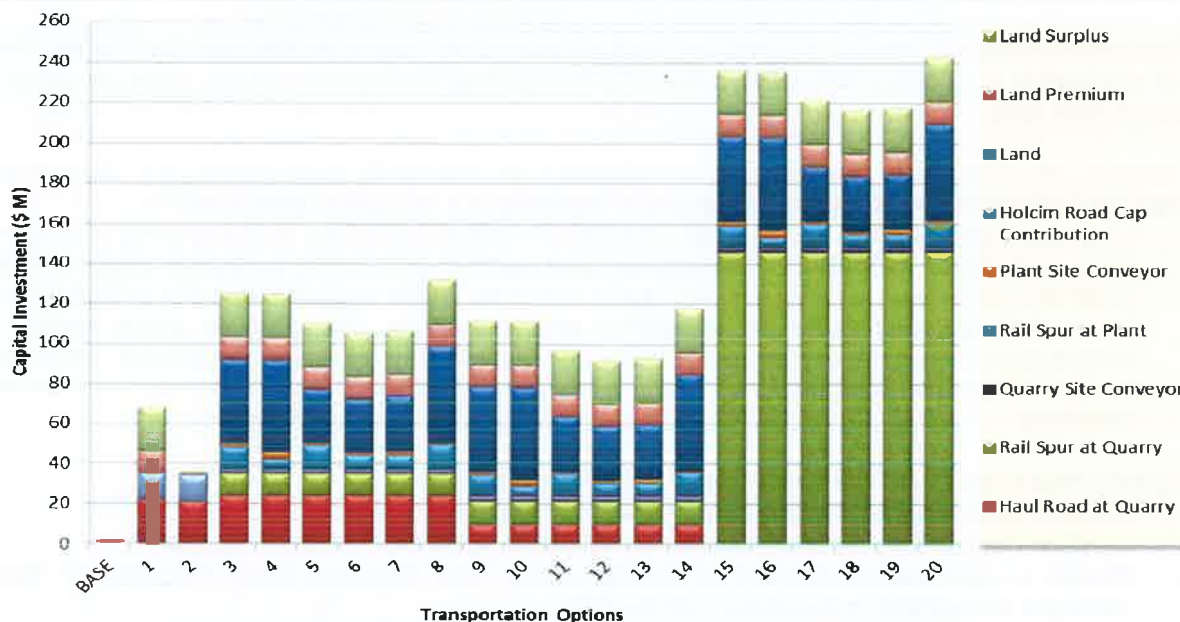


Figure 5: Estimated capital costs of the twenty assessed transport options

Hatch also compared the operational and maintenance costs for each option and found that, due to the complexity of handling quarry products, the annual operating and maintenance costs associated with transporting products by rail would be more than \$4.5 million more expensive than the annual operating and maintenance costs associated with continued use of the primary transport route. A private haul road through Lynwood Quarry to the Marulan South Interchange option (Option 2) would have annual operating and maintenance costs of \$680,000, compared to the annual operating and maintenance costs of continued use of the primary transport route of \$380,000.

To complete its analysis, Hatch combined the capital costs in **Figure 5**, the operating and maintenance costs associated with each option and the costs of externalities associated with each option. In summary, Hatch found that the net present costs of:

- continued use of the primary transport route had the lowest net present cost of \$240 million;
- Option 2 (a private haul road through Lynwood Quarry) had the next lowest net present cost of \$284 million; and
- Options 11–13 (the lowest-cost rail options) have a net present cost of between \$365 million and \$367 million.

• *Feasibility of an alternative private haul road*

The potential feasibility of an alternative primary transport route to the Hume Highway was considered in detail by EMM. In particular, this study focused on the feasibility of constructing Hatch’s Option 2 (a private 8.7 km long haul road through Lynwood Quarry to the Marulan South Interchange). The proposed road would extend from Gunlake Quarry’s processing area to the south through two privately-owned properties, then through the Lynwood Quarry site (to the east of Lynwood’s granite pit) to the Marulan South Interchange. The road would need to bridge a gas pipeline and the Main Southern Railway line, as shown on **Figure 6**.

The study estimated that a haul road with a sealed pavement width of 9 m in a corridor about 15 m wide would have a cost in the order of \$21.3 million. Contributions to Holcim, including a contribution to Holcim’s original construction cost for the Marulan South Interchange on the Hume Highway (see **Section 5.1.6**) were estimated to be in the order of \$13.1 million, bringing the total estimated cost of a private haul road to the Marulan South Interchange to \$34.4 million. Including operating costs, the total present cost of this option would be \$44 million more than continued use of the primary transport route.

The Department notes that the private haul road would also have a number of environmental and social impacts. About 7.3 ha of land would need to be cleared, including about 1 ha of Endangered Ecological Communities (EECs), 3.3 ha of potential EECs and about 3.8 ha of other native vegetation and

potentially sites of Aboriginal heritage significance. As well, part or whole of the land parcels owned by two private landholders would need to be either purchased or other commercial arrangements agreed to guarantee access for 30 years. Gunlake has consulted with the relevant land owners who have indicated their land is not for sale. In addition, agreement would need to be reached with Holcim for the use of its land.

- *Review of Cost Benefit Analysis of the Hatch Study*

In its Economic Assessment for the project as a whole (Appendix N of the EIS), Gillespie estimated that the project would have net social benefits to NSW of between \$16 and \$27 million, in addition to the benefits of the current quarry operations, and is therefore desirable and justified from an economic efficiency perspective.

Following completion of the Hatch study, Gillespie undertook an assessment of the incremental costs and benefits of the least-cost private haul road and rail options on the net social benefits of the project.

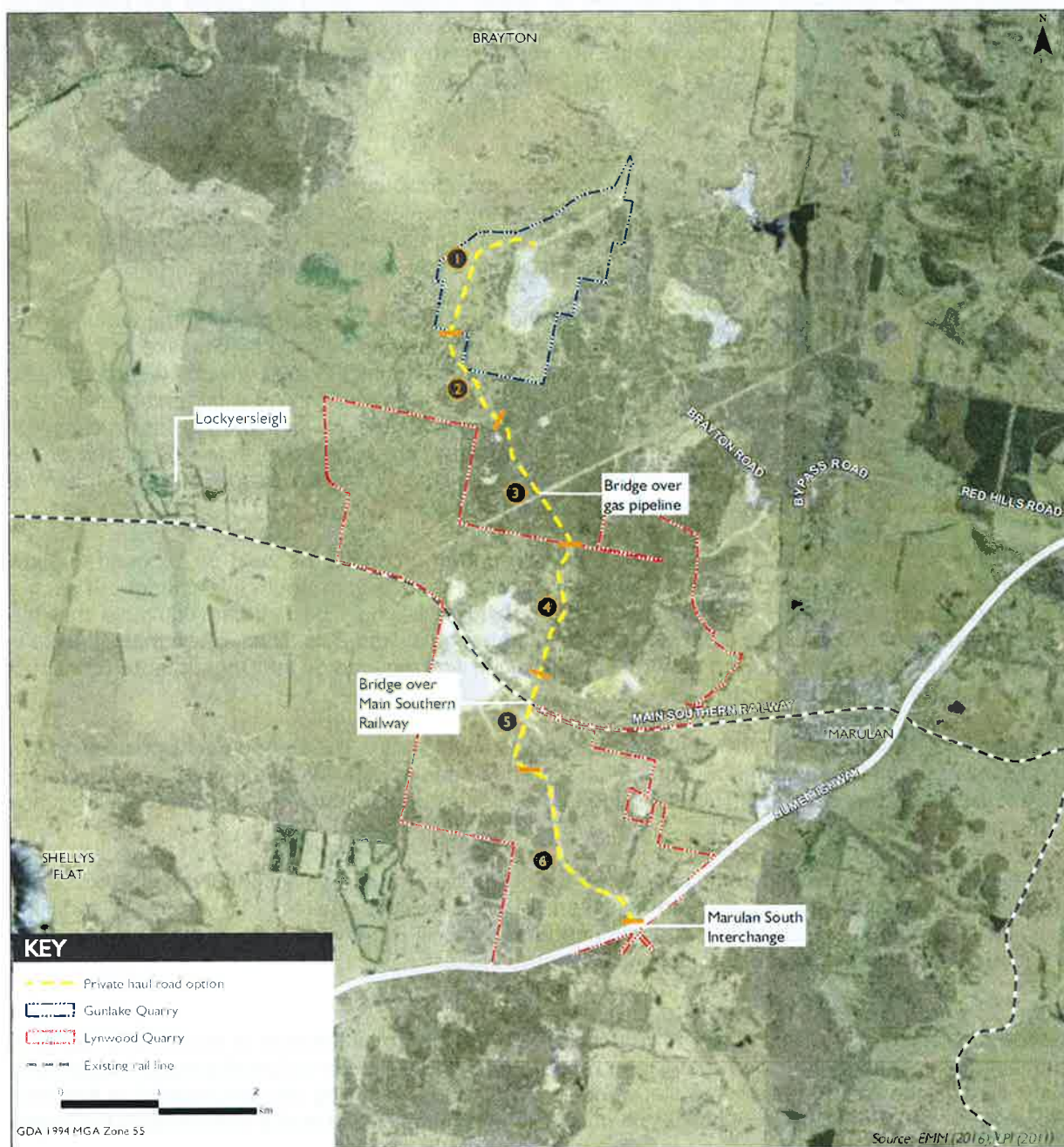


Figure 6: Potential private haul road (Option 2)

Gillespie found that shifting to the lowest-cost rail option (Option 12) would result in the project shifting from having a net benefit to NSW of \$16 - 27 million, to having a net cost to the community of \$94 - 105 million. Shifting to the lowest cost road option (Option 2) would result in the project shifting from having a net benefit to NSW of \$16 - 27 million, to having a net cost to the community of between \$17 - 28 million.

Gillespie also considered the cost of the crash-cost externalities of road versus rail, noting that the impetus for the further work was principally community concern over safety, noise and dust associated with the escalation of truck movements along the primary transport route. Gillespie estimated that these could be between \$360,000 to \$650,000 (present value, 7% discount rate, over 30 years). However, Gillespie also advised that these figures could be considered to be an over-estimation, as costs associated with road freight are internalised to some degree through mechanisms such as road safety programs, road rules enforcement and measures to influence driver behaviour.

Gillespie did not allocate a cost to noise and air quality impacts, noting that these are predicted to comply with relevant assessment criteria. Consequently, the site-specific externality impacts from road transportation on the primary transport route are very low when compared to the cost of avoiding this stretch of road which is around \$121 million (present value) using rail transport or \$44 million using a private haul road.

5.1.5 South Marulan interchange

The original development consent for the nearby Lynwood Quarry included a condition requiring construction of a major grade-separated interchange at the intersection of the Hume Highway and South Marulan Road, about 3 km to the south of the township of Marulan. Holcim constructed this interchange in April 2014, at a cost of \$20.6 million, and subsequently transferred its ownership to RMS.

In its submission on the project, Holcim asked the Secretary to recoup proportional costs of the construction of the interchange on the grounds that it is proposed to be used by Gunlake as part of its transport route. Holcim refers to a note to condition 29 of Schedule 3 in the Lynwood Quarry consent which states *"If other quarries or developments area are approved that use this intersection, the applicants for such developments may be required to contribute to the cost of constructing the intersection, pro-rata on maximum usage rates. The Applicant must keep detailed records of the intersection design and construction costs and provide this information to the Director-General if requested to assist in levying costs on any such developments."*

Holcim has requested, should the project be approved, that a condition should be imposed to allow Holcim to recover proportional costs for its construction of the Marulan South Interchange. If such a condition is not imposed, Holcim advises that it considers it would be fair and equitable that the Department require Gunlake to construct its own interchange at Red Hills Road, given that Gunlake is proposing to transport 2 million tpa of product and Holcim was required by the Department to construct an interchange for 1.5 million tpa.

The Department sought legal advice about condition 29 and its note. The Department's position on this matter must be that the South Marulan interchange has been transferred to the RMS and now forms part of the State road network. Therefore, the Department is unable to treat it any differently from any other road within the State network.

The Department has considered the capacity of the public road network to accommodate the additional traffic associated with the project and considers it has adequate capacity. To impose a condition requiring Gunlake to construct its own interchange at Red Hill Road would, when the capacity of the existing road network is adequate, not be in the public interest.

5.1.6 Contributions to Council

Gunlake currently pay contributions to Council for the ongoing maintenance of local roads along its primary and secondary transport routes at a rate of \$0.0313 per km per tonne of product transported. As well, Gunlake has undertaken capital works on local roads, including the construction of Ambrose Road which it has dedicated to Council. Gunlake's financial and capital works contributions to Council are shown below in **Table 4**.

Table 4: Gunlake contributions to Goulburn Mulwaree Council

Financial year	s94 Contribution	Capital works	Road section
2010/11	\$35,962	\$100,650	Brayton Road from Gunlake to Johnniefields Quarry
2011/12	\$47,917	-	
2012/13	\$62,937	-	
2012/13	-	\$1,695,120	Bypass Road
2013/14	\$81,418	\$338,516	Hume Highway intersection
2013/14	-	\$230,715	Red Hills Road from Bypass Road to Hume Highway
2014/15	\$87,376	\$607,200	Brayton Road from Johnniefields Quarry to McClura Drive
Sub-total	\$315,610	\$2,972,201	
Total s94 and capital costs	\$3,287,811		

Gunlake considers that the current level of contributions it pays to Council under its project approval, which reflect the ongoing benefits provided by its capital works, should continue. In its EIS, Gunlake estimates that contributions to Council under the current rate would be about \$19 million over the project's life, which Gunlake considers would more than cover the estimated \$12 million cost of repairing and maintaining the local roads that it uses.

However, Council has advised that it does not support Gunlake's position and has requested that any local contributions be paid in accordance with Council's *Section 94 Development Contributions Plan 2009* (as revised on 23 June 2016) which applies to extractive industries across the local government area. The Department has reviewed Council's contributions plan and considers it provides a sound basis for calculating contributions. The Department has therefore recommended a condition requiring Gunlake to pay contributions in accordance with the *Goulburn Mulwaree Section 94 Development Contributions Plan 2009*, or any subsequent relevant contributions plan adopted by Council.

5.1.7 Conclusion

The Department has carefully considered the submissions of local residents who raised significant concerns over the current and proposed use of the primary transport route. The Department accepts that residents who live along the route or use the route would notice the impact of the proposed significant increase in the number of trucks. However, the Department notes the relatively small number of affected residents, particularly on Ambrose Road and Red Hills Road (see **Figure 8** which shows the location of residences and their distance from the road). The Department also notes that Ambrose Road was constructed by Gunlake specifically to provide a transport route from the quarry to the Hume Highway that bypassed the township of Marulan and areas of greater residential density. In addition, the Department notes that the traffic noise levels at the residences along the route are predicted to comply with relevant criteria (see **Section 5.2.7**).

The local community has expressed a strong preference for quarries in the Marulan area to use rail to transport quarry products. In response, the Department required Gunlake to provide a detailed examination of all potential options to transport its products by rail (see **Section 5.1.4**). Following consideration of the studies in the RTS, the Department is satisfied that Gunlake has demonstrated that there is no economically viable way to transport its quarry products by rail as part of the proposed project. The Department accepts that the nature of Gunlake's business, which involves transporting its products a relatively short distance to dispersed locations mostly in the Sydney metropolitan region, means that the project would be unviable if Gunlake was required to use rail to transport its products.

The Department is also satisfied with the level of detail in Gunlake's assessment of the costs of constructing a private haul road through Lynwood Quarry to the South Marulan interchange and accepts that the project would also be unviable if construction of this road was required. The Department also notes that, apart from its significant costs, a private haul road through Lynwood Quarry would result in additional environmental impacts beyond those currently associated with the project.

The Department therefore considers that it has exhausted all options to avoid increasing the number of trucks on the primary transport route as part of the project.

The local community raised concerns over the behaviour of truck drivers on the primary transport route and the condition of the road. The Department agrees that there are a number of improvements that

should be made to the roads along the primary transport route to address safety concerns and also to minimise the impacts of increased truck numbers on the amenity of residents who live along the route.

The RTS's Road Safety Audit included a detailed assessment of the condition of the primary transport route. In its updated Statement of Commitments, which now forms part of the recommended conditions of consent, Gunlake has committed to a number of recommendations from the audit, including:

- constructing a 500 m northbound acceleration lane on the Hume Highway at its intersection with Red Hills Road;
- working with Council to submit an application to RMS to reduce the speed limit on the primary transport route to 80 km/hour;
- installation of centre double lines and edge lines along sections of the primary transport route;
- constructing an acceleration lane on Brayton Road south of the quarry intersection;
- widening both shoulders on Ambrose Rd for 400 m on the approach to Brayton Road; and
- improving the Red Hills Road and Hume Highway intersection.

The Department has also recommended a condition requiring that Gunlake prepare and implement a Traffic Management Plan that includes a Drivers' Code of Conduct and that details the measures that would be put in place to ensure compliance with the Code.

The Department is satisfied that it has identified all reasonable and feasible measures available to Gunlake to minimise the impact of the increased number of trucks on the primary transport route. The Department's recommended conditions require Gunlake to operate in accordance with its Statement of Commitments and specifically to construct the acceleration lane on the Hume Highway prior to exceeding its current maximum haulage rate, implement the corrective actions in the Road Safety Audit and undertake the proposed road upgrades along the primary transport route.

Subject to the recommended conditions, and having regard to the social and economic benefits of the project, the Department is satisfied the transport impacts of the project are acceptable.

5.2 Noise

The potential for the project to increase noise emissions is of major concern to members of the local community and is a key assessment issue for this project.

The project has the potential to increase noise through the proposed:

- increase in production rate from 750,000 tpa to 2 million tpa which would be achieved through the greater utilisation of plant and increased hours of operation;
- expansion of the quarry footprint, including an increase in the size of the quarry pit and the construction of a new emplacement area in the south-western corner of the site;
- increase in the number of truck movements and the noise associated with the loading of these additional trucks;
- increase in the hours for crushing and processing (to 24 hours a day); and
- increase in the maximum number of blasts from approximately one every two weeks to approximately two per week.

The EIS includes a Noise Assessment of the project, undertaken by EMM in accordance with the *Industrial Noise Policy* (INP) and the *Road Noise Policy* (RNP), which includes an assessment of noise impacts of the project on nearby residents and also on residents living along Gunlake's primary transport route.

As shown in **Figure 7**, there are four residences within 1.5 km of the site, three to the east of the quarry on Brayton Road (R1, R2 and R3) and one residence to the north-west of the quarry on Carrick Road (R4). Three of these properties have been acquired by Gunlake since quarrying began (with R4 being recently acquired) and only R2 is currently privately-owned. For the purposes of assessing the noise impacts of the project, EMM identified a further four residences, R5 and R6 to the north-west of the quarry on Carrick Road and R7 and R8 to the south-east of the quarry on Brayton Road.

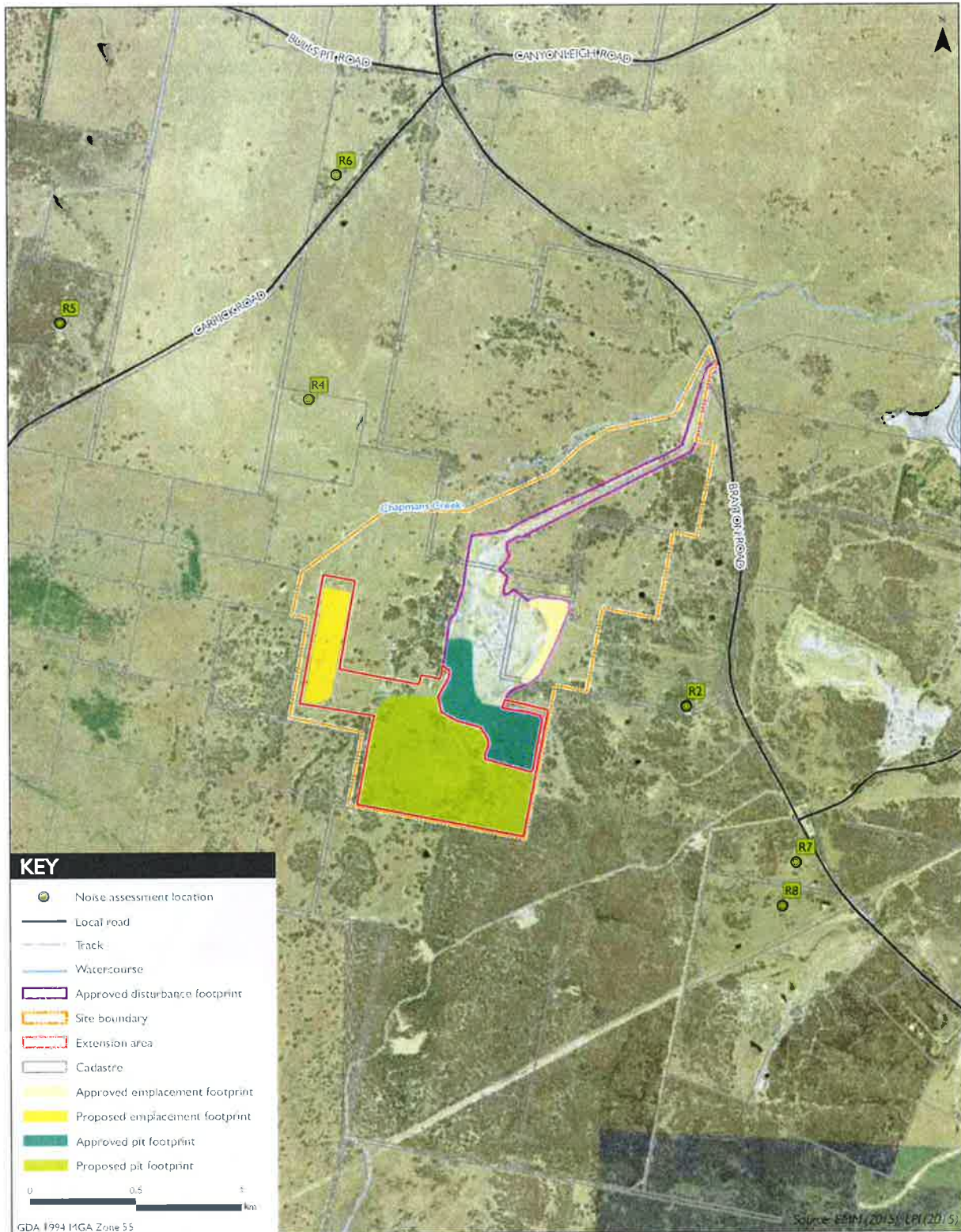


Figure 7: Location of noise sensitive receivers for project-related noise

In the RTS, EMM noted that the community had raised concern with the selection of sensitive receiver locations, and confirmed that its selection of receivers was based on their proximity to the quarry. Notwithstanding, the RTS included two additional receivers in the assessment of the worst-case year for worst-case meteorological conditions with and without enclosure of the primary crusher. The noise contours from this assessment showed there are no residences within the 35 dB $L_{Aeq}(15 \text{ min})$ contour that were not assessed in the EIS’s Noise Assessment. The Department is therefore satisfied that the receiver locations identified in the Noise Assessment are appropriate and sufficient for assessing the project’s noise impacts.

As shown on **Figure 8**, there are 13 residences within 600 m of Gunlake's primary transport route. The Noise Assessment considered the impact of noise from the increased number of trucks on these residences. As the project would not increase traffic movements on Gunlake's secondary transport route, the impact of traffic noise on residences along this route was not assessed.

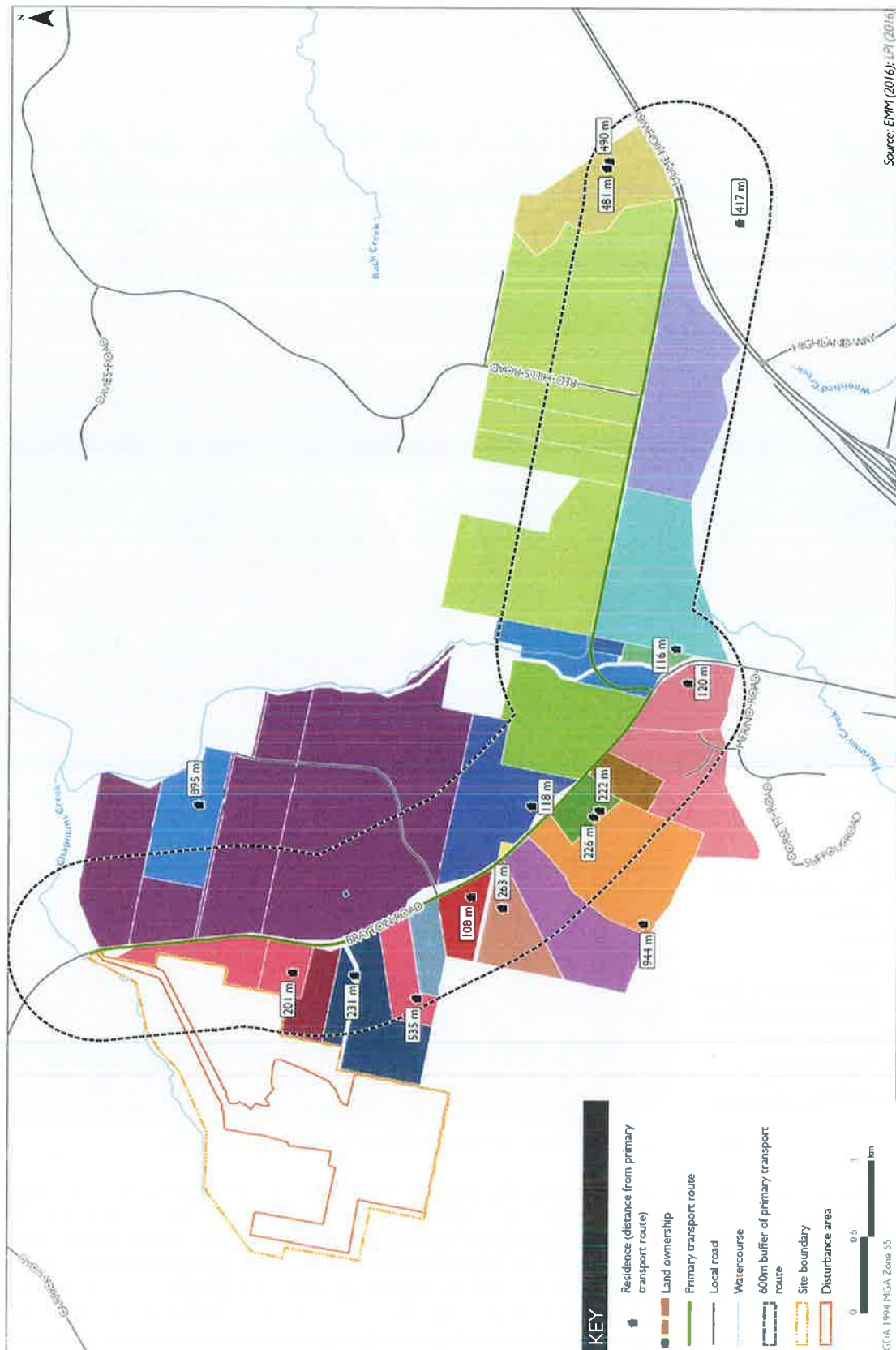


Figure 8: Landownership along the primary transport route

The issue of additional road noise as a result of increased truck numbers was identified as being of significant concern to landowners and residents along the primary transport route. These submissions considered that more than doubling average truck movements (from 164 to 440 per day) would have a very significant negative impact on their quality of life, opportunities for further developing their properties and their property values.

The Department also received a number of submissions from residents of elevated areas at Towrang and Red Hill, located between six and nine kilometres to the west of the quarry. These residents raised particular concern about noise from the primary crusher, the distinctive noise of which they advise they can hear, under certain conditions, from their residences.

5.2.1 Background Noise Levels

Under the INP, background noise levels (ie noise levels present at the time of the noise assessment and without the subject development operating) need to be established prior to carrying out a noise assessment. From the background noise levels, a Rating Background Level (RBL), a single figure representing background noise levels over all assessment periods (day/evening/night), is calculated. Should the measured background noise levels be found to be less than 30 dB(A), then under the provisions of the INP, the lowest RBL that can be set is 30 dB(A).

To assist in establishing the background noise levels, EMM reviewed the quarry's previous noise assessments. These assessments identified a RBL of less than 30 dB(A) at R3 and R4. EMM also conducted two short-term attended noise surveys in September 2015 when the quarry was not operating. These surveys found that the background noise levels on Carrick Road (near R4) were less than 30 dB(A) and on Brayton Road (near R2) were, after being filtered for extraneous high-frequency noise sources, approximately 30 dB(A).

Consequently, EMM adopted an RBL of 30 dB(A) for all residences. Noise propagation over distance is strongly influenced by prevailing weather conditions, particularly wind direction and strength, and the presence of temperature inversions. Data from the quarry's on-site weather station showed that winds with speeds up to 3 metres/second (m/s) with an occurrence greater than or equal to 30% of the time ranging from the north to east-south-east prevailed during the night period. The data also showed that temperature inversions are a significant characteristic of the area during the night in winter.

5.2.2 Project Specific Noise Levels

The INP requires that project noise impacts are measured against two criteria, namely an intrusiveness criteria (RBL plus 5 dB) and an amenity criteria (which aims to protect amenity across an area given the proposed and existing land uses). The intrusiveness criteria apply over 15 minutes in any period (day, evening or night). The amenity criteria apply to each entire assessment period (day, evening or night). The area around Gunlake Quarry is classified as 'rural' under the INP and the intrusiveness and amenity criteria for the project at nearby residences are shown in **Table 5** below. The intrusiveness criteria are significantly lower than the amenity criteria and therefore become the Project Specific Noise Levels (PSNLs) against which the Noise Assessment was undertaken. It should be noted that 35 dB(A) is the lowest intrusive criterion that can be applied anywhere in the State.

Table 5: Project-specific intrusive and amenity criteria

Assessment Location	Period ¹	Intrusive criteria, $L_{Aeq(15-min)}$ dB	Amenity criteria, $L_{Aeq(Period)}$ dB
R2, R7, R8 - Brayton Road	Day	35	50
	Evening	35	45
	Night	35	40
R4, R5, R6 - Carrick Road	Day	35	50
	Evening	35	45
	Night	35	40

Notes: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.

The current project approval for Gunlake Quarry contains noise criteria for two properties, R2 east of the quarry and R4 west of the quarry of 35 dB(A)_{L_{Aeq}(15min)} for the day, night and evening periods. As shown in **Table 6**, the Noise Assessment predicts that noise from existing operations would be exceeding the current noise criteria for R2 and R4. The Department has asked Gunlake to supply records of its noise monitoring. Having reviewed these records, the Department considers the noise monitoring undertaken over the past three years is inadequate and also notes that Gunlake has not been reporting its monitoring results in accordance with the requirements of its current project approval. This matter has been referred to the Department's Compliance Branch for further investigation.

Table 6: Predicted operational noise levels

Assessment location	Predicted operational L _{Aeq} (15-min) noise levels, dB				Noise criteria L _{Aeq} (15-min), dB
	Day	Evening/ Night	Night	Night	
	Calm	Calm	Prevailing winds ¹	Inversion ²	
Existing quarry operations					
R2	40	38	40	40	35
R4	39	37	39	39	35
R5	28	25	28	28	35
R6	29	27	29	29	35
R7	33	31	34	34	35
R8	32	30	33	33	35
Year 1 quarry operations					
R2	41	42	44	45	35
R4	41	42	45	45	35
R5	29	31	34	34	35
R6	31	32	35	35	35
R7	34	35	37	38	35
R8	33	34	37	37	35
Year 5 quarry operations					
R2	41	42	44	45	35
R4	41	42	45	45	35
R5	30	31	34	34	35
R6	31	32	35	35	35
R7	34	35	38	38	35
R8	33	34	37	37	35
Year 10 quarry operations					
R2	41	42	44	45	35
R4	41	42	45	45	35
R5	29	31	34	34	35
R6	31	32	35	35	35
R7	34	35	38	38	35
R8	33	34	37	37	35
Year 20 quarry operations					
R2	41	42	44	44	35
R4	41	42	45	45	35
R5	30	31	34	34	35
R6	31	32	35	35	35
R7	34	35	38	38	35
R8	33	34	37	37	35

5.2.3 Predicted Operational Noise Levels and Acquisition and Mitigation Rights under the VLAMP

EMM modelled the noise impacts of the project using software that is capable of calculating cumulative noise levels at receiver locations from the concurrent operation of multiple noise sources. Operational noise impacts were modelled for the existing operations and for four scenarios over the proposed life of the project, namely for Year 1, Year 5, Year 10 and Year 20. As shown in **Table 6**, noise levels would increase as result of the project. For example, at R5 on Carrick Road during calm conditions, it is predicted that evening/night-time noise levels would increase from 25 dB(A) to 31 dB(A). At R7 on Brayton Road during calm conditions, it is predicted that evening and night noise levels would increase from 31 dB(A) to 35 dB(A).

The Noise Assessment predicted that the project would result in significant noise impacts at R2, the closest residence. The modelling showed that the current operations would result in noise levels up to 5 dB(A) above the PSNL at R2. As a result of the project, the day-time noise levels at R2 would be exceeded by 6 dB(A) during the day and by up to 10 dB(A) during the night during worst-case conditions.

At R4, EMM predicted the project would result in noise levels up to 6 dB(A) above the PSNL during the day and noise levels up to 10 dB(A) above the PSNLs during the evening and night. R4 would therefore also have been entitled to voluntary acquisition on request if it were still in private ownership. However, since the EIS was submitted, R4 has been purchased by Gunlake.

At locations R5 and R6 along Carrick Road, the predicted noise levels would meet the PSNLs under all scenarios. At R8 and R7, it is predicted that the project would meet the PSNLs during day, evening and night periods in calm conditions for all stages of the project. However, the PSNLs would be exceeded by 2 dB(A) and 3 dB(A), respectively, during worst-case night-time meteorological conditions.

The predicted noise levels mean that, under the NSW Government's *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP), R2 would be entitled to voluntary acquisition on request. As well, R7 would be entitled to 'mitigation on request' rights. The predicted 2 dB(A) night-time exceedances at R8 are not considered to be significant under the INP and unlikely to be discernible from current noise levels. Under the VLAMP, no acquisition or mitigation actions are required at this residence. The Noise Assessment states that noise levels at all residential receivers further away from the quarry are predicted to satisfy PSNLs under all meteorological conditions for all stages of the project.

In terms of sleep disturbance, the highest predicted L_{Amax} noise level is 46 dB(A) at R2 during F class temperature inversions. Although this would satisfy the current project approval limit of 47 dB(A), it would slightly exceed the EPA's screening criteria for sleep disturbance of 15 dB(A) above the RBL, ie 45 dB(A). The Department notes that R2 is entitled to voluntary acquisition on request as a result of the predicted operation noise levels. At R4 to R8, the highest predicted L_{Amax} noise levels range between 36 dB(A) and 43 dB(A) during F class temperature inversions, which satisfies the EPA's screening criteria for sleep disturbance of 45 dB(A).

As Johnniefields Quarry is located about 1.5 km east of Gunlake Quarry, the residences between these two quarries (R2, R7 and R8) could potentially be impacted by cumulative noise. The Noise Assessment therefore included a qualitative review of potential cumulative noise impacts from the two quarries which found that the INP's amenity criteria of 50 dB(A), 45 dB(A) and 40 dB(A) during the day, evening and night periods respectively were likely to be satisfied. The Department accepts this assessment and also notes that Holcim has announced that Johnniefields will be closed in the near future as production increases at its new Lynwood Quarry.

Lynwood Quarry is located about 2.5 km to the south of Gunlake Quarry and potentially there could be cumulative noise impacts at R7 and R8. A recent modification application for Lynwood Quarry included a noise assessment that predicted noise levels following that modification on R7 and R8 as being less than 30(A) dB for all stages of the modification under worst-case meteorological conditions. The Department accepts that the contribution of noise from Lynwood Quarry to the predicted noise levels of the project would not increase cumulative noise levels above the INP's amenity criteria at R7 or R8.

The VLAMP requires the assessment of cumulative noise impacts on privately-owned vacant land. Acquisition rights are assigned to land owners if the total combined industrial noise levels from all projects exceeds the recommended maximum noise levels on more than 25% of a parcel of privately-owned vacant land where a dwelling could be built under existing planning controls. The Noise Assessment predicted that noise levels from the project would exceed the applicable amenity noise levels on more than 25% of two privately-owned land parcels (Lots 64 and 72 of DP 750003). However, as shown on **Figure 9**, these two land parcels are part of two larger properties. Therefore the VLAMP acquisition provisions are not triggered.

5.2.4 Assessment of Operational Noise Impacts

About two thirds of submissions received from community members raised increased operational noise levels as a reason for objecting to the project.

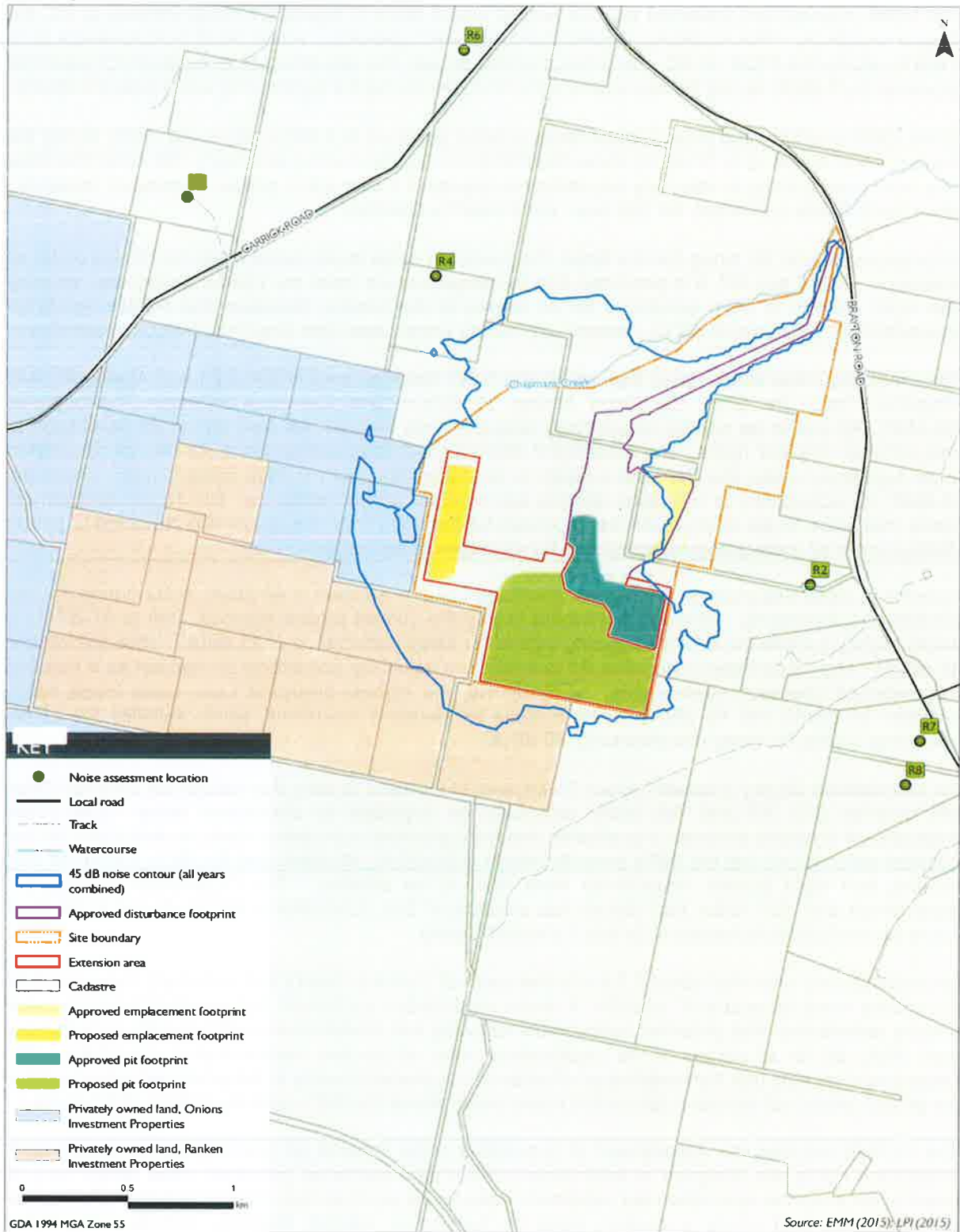


Figure 9: Predicted noise levels on privately-owned land

The Department notes that operational noise levels for the day, evening and night periods are predicted to remain below the PSNLs at all residences except R2, R7 and R8. In accordance with the provisions of the VLAMP, the recommended conditions include acquisition rights and 'mitigation on request' rights for R2 as well as 'mitigation on request' rights for R7. The exceedances at R8 are not so significant as to lead to 'mitigation on request' rights.

A number of people living near Towrang and along Towrang Road (about 6 – 9 km west of Gunlake Quarry) objected to the project on the grounds that there are times when they can hear the crusher and other noise from the existing quarry operations, particularly during the temperature inversions that can occur in the area (commonly in the early morning). Both in submissions and at the community meeting, members of the community requested that Gunlake enclose its primary crusher. People from these areas noted that Holcim has enclosed its crushers at Lynwood Quarry and consider that this enclosure has significantly reduced noise emissions from that quarry.

The Department and the EPA are satisfied that the Noise Assessment has been carried out in accordance with the INP. The Department is satisfied that, given the project meets the PSNLs at R5 during worst-case meteorological conditions at a distance of 1.7 km from the quarry site, it would meet the PSNLs at distances that are three or four times this. Notwithstanding, the Department accepts that people living some distance from the quarry near Towrang can hear the primary crusher under certain weather conditions and that this is a significant source of irritation to them.

In response to community concerns, Gunlake committed in its RTS to enclosing the primary crusher, noting that this would improve the nature of its distinctive noise emissions which can currently be heard over a wide area, particularly during temperature inversions. Gunlake also updated its noise model to predict operational noise levels after the crusher's enclosure and found that it would result in a 1 dB(A) reduction in noise levels (from the operation as a whole, rather than just from the crusher) during worst-case night-time meteorological conditions at R2, R5 and R6. Noise levels at other locations are not predicted to change.

The Department's Noise Specialist has reviewed the predicted reductions in noise levels that would result from enclosing the primary crusher and advised that a reduction in sound power level of 5 dB(A) would be sufficient to reduce the predicted noise levels at R2, R5 and R6 by 1 dB(A). This should result in a noticeable reduction in the crusher's noise emissions as perceived by both near neighbours and also residents at Towrang.

The Department notes that enclosure of the primary crusher would not change the number of properties eligible for acquisition (R2) or 'mitigation upon request' rights (R2 and R7) under the VLAMP. In addition, it would not result in changes to the noise criteria for the project as, at all privately-owned residences (with the exception of R7 and R8), the criteria are already proposed to be set at the lowest level that can be set under the INP, namely 35 dB(A) $L_{Aeq}(15\text{ min})$ during the day, evening and night. R2 would have no noise impact assessment criteria, since it instead receives acquisition rights.

The Department considers that enclosing the primary crusher would result in a significant reduction in that facility's noise emissions. However, due to the other significant noise sources involved in the quarry's operations, enclosing the crusher would only reduce the overall noise emissions from the quarry by 1 dB(A). Nonetheless, the reduction in noise emissions from the primary crusher is expected to lead to significant reductions in received noise for both near and distant neighbours, including in locations where the operational noise from the quarry is predicted to comply with the PSNLs.

The Department has therefore recommended a condition requiring that the primary crusher be enclosed within four months of commencing development and prior to operating the primary crusher at night. The Department has also recommended a condition requiring Gunlake to measure the sound power level of the primary crusher before and after its enclosure to demonstrate that its enclosure results in a 5 dB(A) reduction in its sound power level.

5.2.5 Blasting

Gunlake monitors blast emissions at the two nearest residential properties to the quarry (R1 and R3, which are both owned by the company). There were 85 blasts at the quarry between July 2011 and July 2015. During this time, the ground vibration criterion (5mm/s) was met on all occasions. The airblast overpressure criterion (115 dB Lin Peak) was marginally exceeded on two occasions (at R3 by 0.6 dB and 2.1 dB, in April 2012 and June 2013 respectively). These two exceedances are within the exceedance limit of 5% of the total number of blasts over a 12 month period and below the absolute criterion of 120 dB, Lin Peak.

Blasting is proposed to increase from once a fortnight to twice weekly under the project. EMM undertook a quantitative assessment of potential blast overpressure and ground vibration levels at several

distances from the proposed quarry pit. The results show that a large range of Maximum Instantaneous Charges can be used whilst still satisfying the blasting criteria.

The Department is satisfied that Gunlake would be able to continue to operate in accordance with standard blasting criteria and that the proposed increase in the number of blasts is acceptable. The Department has recommended conditions that include standard blasting criteria and require the preparation and implementation of a Blast Management Plan.

5.2.6 Road Traffic Noise

The project proposes to increase the number of truck movements from a daily average of 164 to a daily average of 440, and from a daily maximum of 320 to a daily maximum of 590.

Gunlake Quarry's current daily average of 164 truck movements (84 laden and 84 empty), equates to 6.8 truck movements per hour (over a 24 hour day). An increase to a daily average of 440 movements per day would equate to 18.3 truck movements per hour. A maximum of 590 truck movements per day would equate to 23.6 truck movements per hour. In objecting to the project, local residents referenced these hourly numbers, with some residents stating that the project could result in a truck passing their residence every two to three minutes.

As part of the Noise Assessment, EMM installed two noise loggers on Brayton Road to measure the noise from existing traffic. One logger was installed between Gunlake Quarry and Johnniefields Quarry and one was installed on Brayton Road just east of its intersection with Ambrose Road.

Table 7: Road traffic noise levels

Road section	Distance to nearest receiver (m)	Driving speed (km/h)	Existing total traffic noise (including Gunlake Quarry), dB(A)	Calculated extension project traffic noise, dB(A)	Future total traffic noise, dB(A)	Criteria, dB(A)	Difference between existing and future total traffic noise, dB
Day period							
Brayton Rd - west of Bypass Rd	108	100	47	45	49	60	2
Bypass/Red Hills Rd	400	100	38	38	41	60	3
Brayton Rd - east of Bypass Rd	62	100	47	43 ^{1,2}	48 ^{1,2}	60	1
Brayton Rd - east of Bypass Rd (Marulan)	16	50	50	44 ^{1,2}	51 ^{1,2}	60	1
Night period							
Brayton Rd - west of Bypass Rd	108	100	42	44	46	55	4
Bypass/Red Hills Rd	400	100	34	37	39	55	5
Brayton Rd - east of Bypass Rd	62	100	39	43 ^{1,2}	44	55	5
Brayton Rd - east of Bypass Rd (Marulan)	16	50	43	44 ^{1,2}	47	55	4

Notes: 1. Includes light vehicles only, as additional Gunlake heavy vehicles will leave and return to the quarry using the Bypass/Red Hills Road.

2. It was assumed that half of the additional Gunlake light vehicle traffic will be travelling within a single hourly period.

The results were used to predict the project's road traffic noise impacts, against the RNP's applicable daytime and night-time criteria. As all proposed additional trucks would use the primary transport route to the Hume Highway, there would be no increase in the number of trucks along Brayton Road south of Ambrose Road and the assessment did not cover this route.

As shown in **Table 7**, during the daytime, the most-affected resident is predicted to be exposed to a 3 dB(A) increase in road traffic noise. During the night-time, residents are predicted to be exposed to a 4 to 5 dB(A) increase in noise levels. However, the predicted road noise levels comply with the RNP's

criteria of 60 dB(A) during the daytime and 55 dB(A) during the night-time. The predicted increases also satisfy the RNP's relative increase criterion of 12 dB(A).

The EPA has reviewed the Noise Assessment and accepts its findings with regard to compliance with the RNP. However, the EPA noted that the impacts of increased road traffic would be felt by residents along the primary transport route and questioned whether there may be an alternative transport option available to Gunlake. As detailed in **Section 5.1**, considerable analysis on the potential to use rail or an alternative road route was submitted in Gunlake's RTS and the Department is satisfied that no other option is economically viable.

5.2.7 Conclusion

The Noise Assessment found that the worst-case project operational noise levels would be below the PSNL of 35 dB(A) at all but three private residences (R2, R7 and R8). In accordance with the VLAMP, the Department has recommended conditions that would give the owner of R2 acquisition rights and the owners of R2 and R7 'mitigation upon request' rights. Under worst case meteorological conditions, it is predicted that the PSNL of 35 dB(A) at R8 would be exceeded by 2 dB(A). Under the VLAMP, this exceedance is classified as minor and no acquisition or mitigation rights arise.

The Department has also recommended a suite of contemporary noise management and mitigation measures, requiring Gunlake to:

- implement best practice noise management and mitigation on site and along the transport routes;
- carry out quarterly monitoring to determine whether the development is complying with the noise impact assessment criteria;
- develop and implement a Noise Management Plan, a Blast Management Plan and a Traffic Management Plan, including a Drivers' Code of Conduct; and
- communicate regularly with the community, including publicly reporting monitoring results, and effectively responding to enquiries and complaints.

The Department supports Gunlake's commitment to enclose the primary crusher. Whilst noting that modelling indicates that the reduction in noise levels would be minimal, the primary crusher has a distinctive noise which may be muted as a result of enclosure. The Department has recommended a condition requiring that Gunlake to enclose the primary crusher within four months of commencing development under a new consent and prior to operating the primary crusher at night.

The Department considers that monitoring of quarry noise emissions to date has been inadequate. The Department has therefore recommended a condition requiring attended quarterly noise monitoring to be carried out by a suitably qualified and experienced acoustical practitioner. The Department has also recommended that a noise compliance assessment of the traffic noise impacts of the project is undertaken within two months of annual dispatches of quarry products exceeding 1 million, 1.5 million and 1.9 million tonnes to assess compliance of the traffic noise impacts of the development against the RNP's noise criteria.

The EPA has reviewed the recommended conditions and advised that it is generally satisfied. The Department is satisfied it has required Gunlake to implement all reasonable and feasible measures to minimise the impacts of operational and traffic noise as a result of the project.

5.3 Air Quality

The EIS includes an air quality impact assessment (AQIA) prepared by Ramboll Environ Australia Pty Ltd, which assessed the project's air quality impacts through emissions of total suspended particulates (TSP), PM₁₀, PM_{2.5}, respirable crystalline silica and deposited dust. The AQIA also assessed the greenhouse gas emissions of the project.

Sources of fugitive dust at Gunlake Quarry result from the:

- removal, hauling and emplacement of topsoil and overburden;
- drilling and blasting in the quarry pit;
- removal, handling and hauling of hard rock on site;
- processing of hard rock (crushing, screening and conveying);
- wind erosion from stockpiles and exposed surfaces; and
- transportation of hard rock aggregates along unpaved internal roads and paved public roads.

The quarry's emissions may increase as a result of the project due to the proposed increased production rate, increased disturbance footprint, increased truck movements and increased operating hours. The community, in its submissions and at the community meeting, advised that existing operations at currently impact negatively on local air quality and provided photos of visible dust being emitted from the quarry. Residents living near the quarry have advised that its operations result in layers of dust on their houses and are concerned that the project would increase these impacts. Members of the local community are also concerned about the potential for quarry operations to release respirable crystalline silica (RCS) into the air.

There are two other nearby hard rock quarries located nearby (Johnniefields Quarry 1.5 km to the east and Lynwood Quarry 2.5 km to the south), which potentially could contribute to cumulative air quality impacts. The wind pattern around Gunlake Quarry is generally dominated by winds from the west-south-west to west, although winds from the east and north-east are also experienced, but at lower speeds.

The AQIA was undertaken against the standard criteria used by the Department and the EPA for assessment purposes, as shown in **Table 8**. The AQIA identified 12 receptor locations where the air quality impacts of the project were assessed. At the time of the assessment, two of these residences (R1 and R3) were owned by Gunlake and the other ten were privately-owned. The location of the twelve receptors and the quarry's air quality monitoring locations are shown in **Figure 10**.

Table 8: Air quality criteria

Pollutant	Averaging Period	Criterion/Standard	Agency
PM ₁₀	Annual mean	30 µg/m ³	EPA
	24-hour max	50 µg/m ³	EPA
PM _{2.5}	Annual mean	8 µg/m ³	Air NEPM Advisory Reporting Standard ¹
	24-hour average	25 µg/m ³	
TSP	Annual mean	90 µg/m ³	NHMRC ²
Deposited Dust	Annual	Max increase of 2 g/m ² /month Max total of 4 g/m ² /month	

1. The Air NEPM is the National Environment Protection Measure for Ambient Air Quality – includes the national air quality standards set by the National Environment Protection Council.
2. The National Health and Medical Research Council.

5.3.1 Existing Air Quality

The AQIA used data from Gunlake and Lynwood Quarries, OEH's air quality monitoring stations at Bargo and Camden, and an air quality monitoring station at Monash in the ACT to characterise baseline air quality in the vicinity of the project as follows:

- TSP annual average levels being around 31.3 µg/m³ (against a standard of 90 µg/m³);
- PM₁₀ annual average levels being about 12.5 µg/m³ (against a criterion of 30 µg/m³);
- PM_{2.5} annual average levels being about 6.7 µg/m³ (against a criterion of 8 µg/m³); and
- deposited average annual dust levels are currently around 1.7 g/m²/month (against a standard of 4 g/m²/month).

5.3.2 Predicted Impacts

The AQIA used dispersion modelling to predict the project's air quality impacts at the twelve residential receptors. The AQIA modelled emissions from the current production rate of 750,000 tpa and production rates of 1 million tpa, 1.5 million tpa and 2 million tpa. At the maximum production rate of 2 million tpa, the AQIA predicted that the cumulative concentrations (the project, plus the operations of nearby quarries, plus background air quality) of emissions at the most affected, privately-owned residence would be:

- TSP annual average levels of up to 36.8 µg/m³ (against a criterion of 90 µg/m³);
- PM₁₀ annual average levels of up to 14.6 µg/m³ (against a criterion of 30 µg/m³);
- PM_{2.5} annual average levels of up to 7.0 µg/m³ (against a criterion of 8 µg/m³); and
- deposited annual average dust levels of up to 2.5 g/m²/month (against a criterion of 4 g/m²/month).

The project is therefore predicted to comply with all annual average air quality criteria at all receptors.

For 24-hour average PM₁₀, the frequency of potential cumulative concentrations greater than the 24-hour criterion of 50µg/m³ is predicted to remain at 0.3%. The frequency of potential cumulative 24-hour average PM_{2.5} concentrations greater than the criterion of 25µg/m³ is predicted to range between

1.2% and 1.3%, relevant to a background exceedance frequency of 1.2%. The AQIA concludes there is a very low probability that worst case emissions from Gunlake Quarry, combined with emissions from neighbouring quarry operations and background, would result in any additional exceedances of the 24-hour average PM₁₀ or PM_{2.5} criteria at surrounding receptors, beyond those that would occur in the absence of Gunlake Quarry.

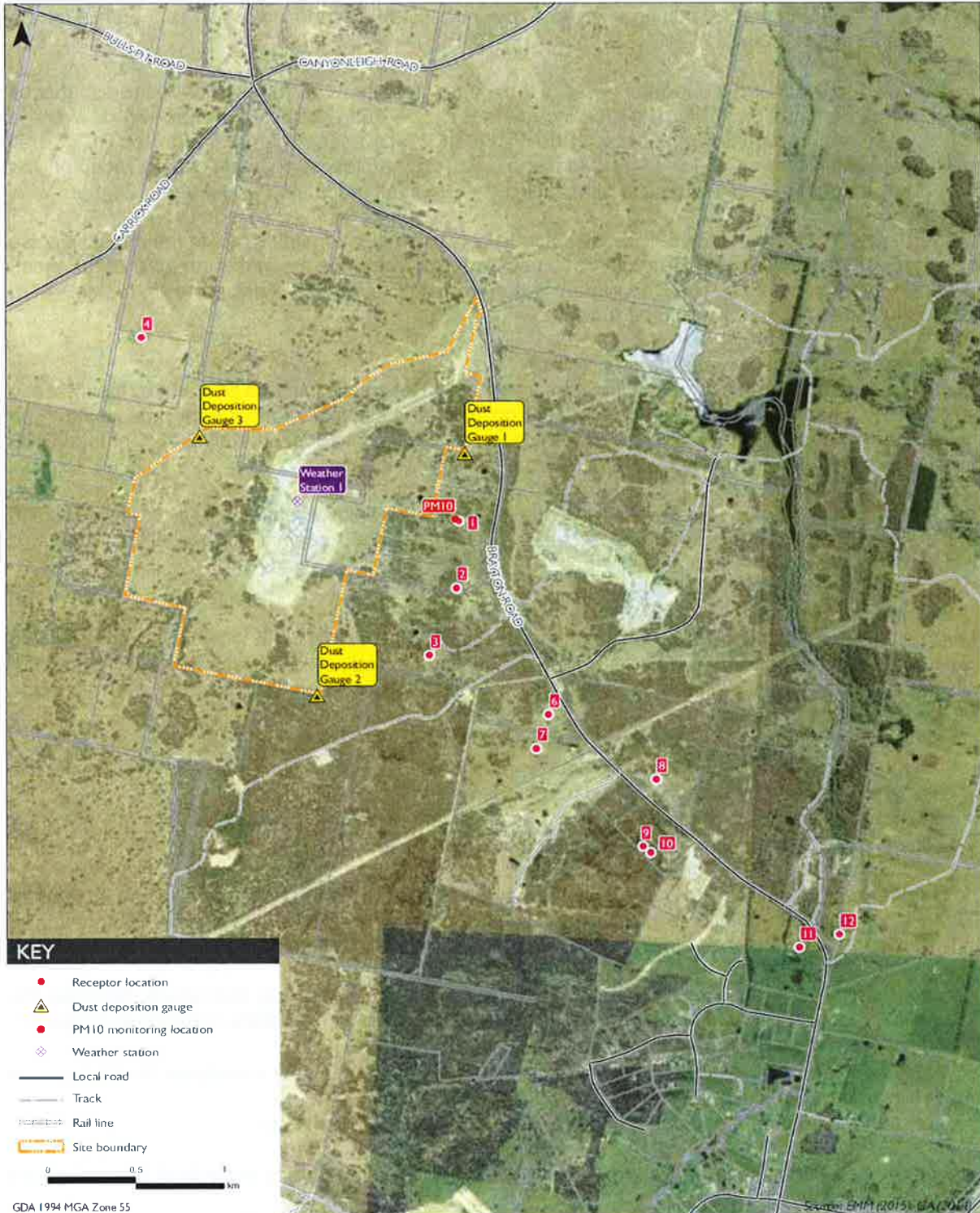


Figure 10: Air quality assessment locations

The Department notes that the risks of exceeding the 24-hour average criteria are very low and are very similar under both existing and proposed operations. The Department is satisfied that Gunlake Quarry would be able to operate in compliance with all standard air quality criteria.

5.3.3 Respirable Crystalline Silica (RCS)

RCS is the portion of airborne crystalline silica that is capable of entering the lungs if inhaled and which may then potentially cause silicosis. It mostly affects workers in occupations such as mining, glass manufacturing and foundry work, after long-term exposure to silica dust.

As the NSW EPA does not provide assessment criteria for RCS, the AQIA used the Victorian EPA's RCS assessment criterion for mining and extractive industries (an annual average of 3 µg/m³) for the purpose of its assessment.

The AQIA used dispersion modelling to predict the annual average RCS for each of the four scenarios (including the contribution of the neighbouring quarries). The AQIA predicted that all annual average RCS concentrations would be well below the Victorian EPA's assessment criterion for RCS at all privately-owned receptors under all four scenarios. At R2, the closest privately-owned receptor, the AQIA predicted that the project contribution to RCS levels at full production would be 0.024 µg/m³.

The Department notes that R2 would receive acquisition and mitigation rights due to the project's noise impacts. Even at this location, the project's expected RCS emissions are less than 10% of the most-relevant Australian criterion. The Department is therefore satisfied that the risk of health impacts from RCS to the local community would be minimal.

5.3.4 Greenhouse Gas Assessment

The project would result in a threefold increase in annual GHG emissions, due primarily to the increase in diesel fuel consumption (on-site and product transport) and electricity demand for processing. The annual Scope 1 and Scope 3 emissions at full production represent approximately 0.03% of total GHG emissions for NSW and 0.008% of total GHG emissions for Australia.

The Department accepts that Scope 1 and Scope 3 emissions would increase as a result of the project, but considers that these increases are acceptable when balanced against the social and economic benefits of the project.

5.3.5 Conclusion

The project is predicted to result in only minimal changes to air quality, with there being no predicted exceedances (either incrementally or cumulatively) at any privately-owned residence near the quarry. Gunlake currently has a number of measures in place to reduce dust emissions at the quarry. These include:

- minimisation of areas to be cleared ahead of extraction;
- revegetation of disturbed areas as soon as practicable;
- use of a water cart on haul roads and hardstand areas;
- use of water sprays on conveyors and processing plant; and
- adjustment or cessation of operations during adverse meteorological conditions.

The Department has, at the EPA's request, recommended a condition requiring increased monitoring of PM₁₀ (specifically an additional HVA5 to the west of quarry operations) to allow the contribution of Gunlake Quarry to regional air quality to be better understood.

In order to ensure that the proposed operations are undertaken in a way that would minimise the project's air quality impacts, the Department has also recommended conditions requiring Gunlake to:

- comply with current air quality criteria;
- implement all reasonable and feasible mitigation and management measures to minimise air quality impacts; and
- prepare and implement a comprehensive Air Quality Management Plan.

Subject to these conditions, the Department is satisfied that the air quality impacts of the project are acceptable.

5.4 Biodiversity

The EIS includes a biodiversity assessment report (BAR) prepared by EMM (Appendix I of the EIS), which assessed the biodiversity impacts of the project in accordance with the *NSW Offset Policy for Major Proposals* (NSW Offsets Policy) and the *Framework for Biodiversity Assessment* (FBA). The BAR also assessed the project's potential impacts on Matters of National Environmental Significance

(MNES) under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Further information on the project's potential biodiversity impacts was included in the RTS (**Appendix D**) and in letters to the Department dated 31 October 2016 and 15 November 2016 (**Appendix F**).

For the purpose of assessing biodiversity impacts, the BAR defined an 'extension area' as being the additional 54 ha of land that would be disturbed as a result of the project. It also defined a 'study area' that includes the 230 ha quarry site as well as a nearby Gunlake-owned property that may be a potential offset area. These two terms are used throughout **Section 5.4**.

5.4.1 Commonwealth Requirements

On 15 October 2015, the Commonwealth Department of the Environment and Energy (DoEE) determined the project to be a 'controlled action' under the EPBC Act. DoEE identified the key Commonwealth issues as being the:

- removal of approximately 15.8 ha of the critically endangered *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community* (Box Gum Woodland CEEC); and
- clearing of about 8.4 ha of habitat suitable for the Regent Honeyeater, listed as critically endangered under the EPBC Act.

DoEE also advised that, in issuing its guidelines for preparing assessment documentation for the project relevant to the EPBC Act, it considered there is potential for significant impacts on the following MNES:

- *Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory*, listed under the EPBC Act as endangered;
- Pink-tailed Worm-lizard (*Aprasia parapulchella*), listed under the EPBC Act as vulnerable; and
- Striped Legless Lizard (*Delma impar*), listed under the EPBC Act as vulnerable.

The *Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory EEC* was subsequently included within the EPBC Act's listing for the *Natural Temperate Grassland of the South Eastern Highlands CEEC*.

The *NSW Offsets Policy* and the FBA are endorsed within the Bilateral Agreement between the Commonwealth and NSW Government's as providing a basis for undertaking biodiversity assessments of MNES.

5.4.2 Biodiversity Context

The study area, like most of the surrounding area, has been largely cleared for agricultural purposes and used for grazing for many years. Historical aerial photos show that much of the Gunlake site was cleared of trees in the 1960s, with only scattered clusters of paddock trees being retained. The woodland vegetation currently on site has regenerated around those paddock trees over the last 50 years. Most of the study area is characterised by shallow soils over weathered ignimbrite. Soils along Chapmans Creek and its tributaries are deeper and more fertile than the soils on the surrounding slopes and hills. Embedded rocks that break the surface of the soil are common over the study area.

5.4.3 Vegetation Communities and Endangered Ecological Communities

There are two native vegetation communities in the study area - a remnant floodplain community located mostly on the deeper soils along the tributaries of Chapmans Creek and a stringybark community on the hillslopes. Despite the previous use of the site for grazing, much of the grassland has not been substantially modified and still comprises mainly native pasture.

Under NSW's vegetation classification system of plant community types (PCTs), the two native vegetation communities in the study area are classified as:

- *Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grasslands* (PCT1330); and
- *Broad-leaved Peppermint – Red Stringybark Grassy Open Forest and Derived Native Grasslands* (PCT734).

The project, involving extension of the quarry pit towards the south and construction of an additional overburden emplacement in the south-western corner of the site, would result in clearing of a total of approximately 54 ha of vegetation. The area of each PCT to be cleared and its condition is set out in

Table 9. The location of the PCTs and their associated derived native grasslands (DNGs) is shown in **Figure 11.**

Table 9: Area of plant community types proposed to be cleared

Vegetation zone	PCT	Condition class	Area (ha)
1	Yellow Box - Blakely's Red Gum Grassy Woodland (PCT1330)	Moderate/Good	7.6
2	Yellow Box - Blakely's Red Gum Grassy Woodland (PCT1330)	Moderate/Good _Derived native grassland	8.2
3	Broad-leaved Peppermint - Red Stringybark Grassy Open Forest (PCT734)	Moderate/Good	4.6
4	Broad-leaved Peppermint - Red Stringybark Grassy Open Forest (PCT734)	Moderate/Good _Derived native grassland	33.5
Total			53.9 ¹

EMM found that 15.8 ha of the *Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grasslands* community proposed to be cleared for the project meets the criteria for the *White Box Yellow Box Blakely's Red Gum Woodland EEC* (Box Gum Woodland EEC) listed under the *Threatened Species Conservation Act 1995* (TSC Act).

Although EMM considered that only 7.8 ha of the EEC met the criteria for the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* (Box Gum Woodland CEEC) listed under the EPBC Act, Commonwealth assessment officers have advised that it is the Commonwealth's opinion that 15.8 ha of the CEEC is impacted by the project. The Department accepts the Commonwealth's determination with regard to the extent of the CEEC and has based its assessment on the proposed clearing of 15.8 ha of Box Gum Woodland that is listed as an EEC under the TSC Act and a CEEC under the EPBC Act.

5.4.4 Threatened Fauna

EMM reviewed the results of previous surveys undertaken in 2006, 2007 and 2014, and undertook a series of flora and fauna surveys in January 2015 and in March 2015, using a combination of plot surveys, rapid assessment surveys and vegetation transects. Fauna diversity in the study area was found to be typical of that which would be expected in an agricultural area, with the majority of species recorded being highly mobile birds and microbats (ie avifauna).

As there are potential feed trees for Koalas in the extension area, EMM specifically surveyed suitable habitat for this species, but recorded no individuals. EMM also undertook an assessment against the Koala EPBC Act Referral Guidelines which identified that the extension area is not expected to comprise habitat critical to the survival of the Koala (Appendix D of the BAR).

No threatened fauna species listed under the EPBC Act were recorded. Six threatened fauna species listed under the TSC Act were recorded in the extension area, namely the:

- Square-tailed Kite;
- Speckled Warbler;
- Diamond Firetail;
- Eastern Bentwing Bat;
- Eastern False Pipistrelle; and
- Little Bentwing Bat.

These species are 'ecosystem credit species' for the purpose of the calculating biodiversity credits under the *NSW Offsets Policy*.

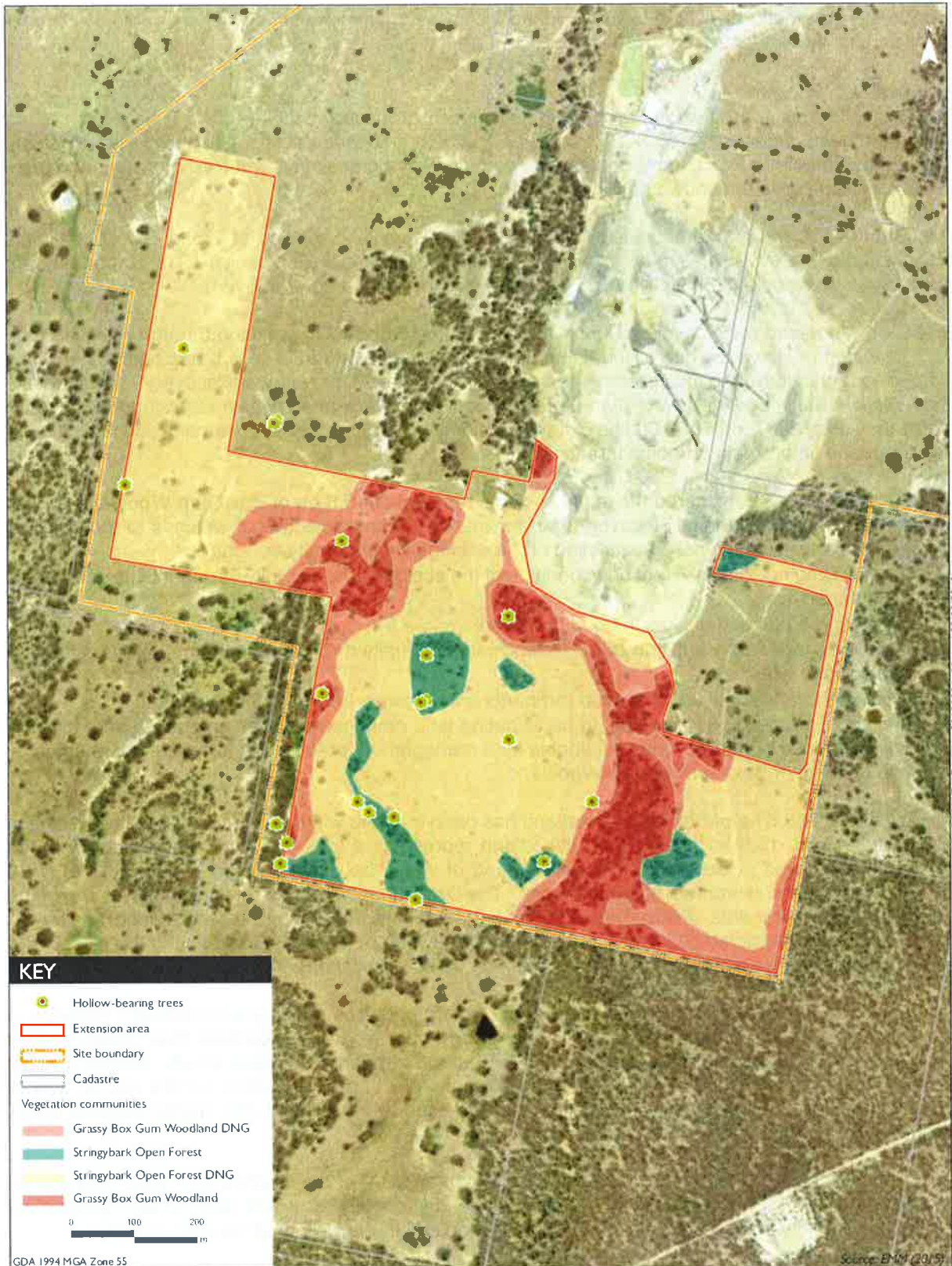


Figure 11: Vegetation Communities in the extension area

5.4.5 Assessment of Direct Biodiversity Impacts

The BAR addresses the Commonwealth assessment requirements and assesses the impacts of all MNES that occur or have potential habitat on the site.

The Department considers that all threatened species and communities protected under Part 3 of the EPBC Act have been adequately documented and assessed in the EIS, the RTS and additional

biodiversity information provided by EMM during the assessment process (see letters dated 31 October 2016 and 15 November 2016 at **Appendix F**).

- **Box Gum Woodland**

The project's principal direct biodiversity impact is the proposed removal of 15.8 ha of Box Gum Woodland listed under both the TSC Act and the EPBC Act, and the removal of 19 hollow-bearing trees. The distribution of the Box Gum Woodland, its derived native grasslands and the hollow bearing trees in the extension area are shown on **Figure 11**.

Box Gum Woodland is characterised by the presence or prior presence of White Box (*Eucalyptus albens*) and/or Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*). The community can occur either as woodland or DNG (when the tree over-storey has been removed).

Box Gum Woodland once covered extensive areas from southern Queensland through NSW and the ACT to Victoria. However, due to the community's occurrence on fertile soils it has been extensively cleared for agriculture and intact remnants are now quite rare. *The National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (May 2011) states that, as of 2007, only 405,000 ha of the community (in varying condition) remain, and that clearing and fragmentation remain on-going threats.

The Department has considered the impacts of the removal of 15.8 ha of Box Gum Woodland CEEC, including against the National Recovery Plan for the CEEC, the objective of which is to promote the recovery and minimise the risk of extinction of the ecological community through:

- achieving no net loss in extent and condition of the ecological community throughout its geographic distribution;
- increasing protection of sites in good condition;
- increasing landscape function of the ecological community through management and restoration of degraded sites;
- increasing transitional areas around remnants and linkages between remnants; and
- bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box-Gum Grassy Woodland.

Approximately 756.6 ha of Box Gum Woodland has been mapped within a 5 km radius of the extension area. Clearing of 15.8 ha of Box Gum Woodland represents a loss of 2% of the community in the locality. As detailed in **Section 5.4.8**, the clearing of would be offset in accordance with the *NSW Offsets Policy* by the retirement of 1,380 credits. The Department notes there would a minor loss of the linkage between remnants of Box Gum Woodland to the south from the proposed clearing. However, this would be counteracted by improved connectivity between other areas, including to the west of the infrastructure area, as a result of the implementation of the proposed Biodiversity Offset Strategy.

The Department has recommended a number of further conditions relating to biodiversity, including a requirement for the preparation of a Biodiversity and Rehabilitation Management Plan (BRMP). This Plan would detail measures to be implemented to manage remnant vegetation on site, including within the 78 ha Biodiversity Areas required under the current project approval (which is to be carried over to the recommended consent) and any additional areas used to offset the 1,380 credits required under the FBA.

On balance, the Department considers that the implementation of the Biodiversity Offset Strategy as described in the RTS and as required in the recommended conditions, would result in an improvement in both the quantity and connectivity of Box Gum Woodland in the vicinity of Gunlake Quarry.

- **Regent Honeyeater**

The Regent Honeyeater (*Anthochaera Phrygia*) is a woodland bird endemic to south-eastern Australia. It has a patchy distribution that extends from southeast Queensland through NSW and the ACT to central Victoria. The Regent Honeyeater has declined significantly over the last three decades, with the national population estimated in 2011 to consist of only 350-400 mature individuals. The Regent Honeyeater is a generalist forager and is reliant on certain species of eucalypt and mistletoe which provide rich nectar flows for food. The loss of woodland habitat, principally due to clearing for agricultural purposes, is considered to be the principal cause for this species' population decline.

The current distribution of the Regent Honeyeater is extremely patchy. There are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in NSW and the Chiltern area in north-east Victoria. The Regent Honeyeater can be found in a range of other habitats including remnant trees in farmland, roadside reserves and travelling stock routes, and in planted vegetation in parks and gardens. The Regent Honeyeater is highly mobile, occurring only irregularly at most sites.

As the land proposed to be cleared for the project contains Yellow Box, a key nectar-producing species identified in the species' National Recovery Plan (2016), targeted searches for Regent Honeyeater were undertaken during the preparation of the BAR. No birds were recorded. The BAR notes that the flora surveys undertaken in December 2014 and January 2015 were completed during the Yellow Box flowering period (September to March). However, Yellow Box trees in the extension area were in poor condition, and no flowering (ie nectar production) was observed.

EMM concluded that the project would not result in the clearing of habitat critical to the survival of the Regent Honeyeater and is therefore unlikely to result in significant impacts on the species as:

- the extension area does not occur in a core or other breeding area;
- Regent Honeyeaters have not been recorded within 20 km of the extension area; and
- the extension area contains poor quality potential foraging habitat for the species.

In consultation with OEH, the Department has reviewed EMM's assessment and agrees with EMM's conclusions that the project would not remove habitat that is critical to the survival of Regent Honeyeater.

However, the project would also result in clearing of approximately 12.2 ha of woodland habitat that provides habitat for threatened birds and microbats and could potentially provide habitat for the Regent Honeyeater, including some areas of Box Gum Woodland and also a small area of *Broad-leaved Peppermint – Red Stringybark Grassy Open Forest*. The clearing of this habitat is proposed to be offset in accordance with the *NSW Offset Policy*.

The Department is satisfied that the biodiversity offset strategy and the management and mitigation actions required by the recommended conditions would result in medium to long term improvement in the extent and quality of habitat suitable for the Regent Honeyeater, should the distribution of the population extend to the vicinity of Gunlake Quarry in the future.

- *Striped Legless Lizard and Pink-tailed Worm Lizard*

DoEE advised, in issuing its guidelines for preparing assessment documentation relevant to the EPBC Act, that it considered there is some potential for significant impacts on the following MNES:

- Pink-tailed Worm-lizard (*Aprasia parapulchella*) – listed as vulnerable; and
- Striped Legless Lizard (*Delma impar*) – listed as vulnerable.

EMM initially originally took a precautionary approach for the Striped Legless Lizard. Although targeted surveys did not find any individuals, the BAR generated species credits to compensate for any impact on this species on the basis that Box Gum Woodland and DNGs could potentially provide habitat.

However, the RTS reviewed the likelihood that the Striped Legless Lizard would occur in the extension area against the requirements of the *National Recovery Plan for the Striped Legless Lizard* and the habitat requirements for the species. The RTS noted that the northern-most population of the Striped Legless Lizard is at Goulburn (25 km south-west of Gunlake Quarry) and that vegetation in the extension area (being principally characterised by grassy woodlands and DNGs) is not suitable habitat for the Striped Legless Lizard.

The issue of whether the site is suitable habitat for the Striped Legless Lizard was discussed with OEH representatives at an on-site meeting at Gunlake Quarry on 15 September 2016. An OEH expert on the species indicated that the extension area is unlikely to contain suitable habitat for the Striped Legless Lizard, and therefore additional targeted surveys and offsets (ie species credits) were not required. OEH has now confirmed its position that the poorly structured DNG on the site is unlikely to be suitable for this species.

EMM also reviewed the likelihood of the Pink-tailed Worm Lizard being present in the extension area in the additional information provided on 31 October 2016 (see **Appendix F**). EMM noted that the closest records for this species were 100 km to the south-west of the site in Queanbeyan and that the predominantly exotic grasslands in the extension area, dominated by Serrated Tussock, do not provide suitable habitat for the Pink-tailed Worm Lizard. EMM therefore found that this species would be very unlikely to occur in the extension area.

The Department is satisfied that the native vegetation in the extension area is unlikely to provide suitable habitat for the Striped Legless Lizard or the Pink-tailed Worm Lizard and that no further actions are required with regard to these species.

- **Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT**

The BAR compared the DNGs in the extension area to the Commonwealth's listing advice and National Recovery Plan for this community and found that they did not meet the listing criteria. Specifically, the dominant native grass in the extension area (Weeping Meadow Grass) is not one of the species included in the listing criteria (Kangaroo Grass, Wallaby Grass, Speargrasses and Red-leg Grass). In addition, native forbs comprise only 10-26% of the species in the community, significantly less than the up to 70% included in the listing criteria.

The Department is therefore satisfied that the DNGs in the extension area do not meet the criteria for the *Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT* community.

Appendix G of this report sets out additional EPBC Act considerations, including the Commonwealth's international obligations, consideration of relevant approved conservation advices, threat abatement plans and recovery plans.

5.4.6 Assessment of Indirect Impacts

The project has potential to indirectly impact on biodiversity values through:

- noise and dust impacts;
- water quality impacts;
- erosion and sedimentation impacts;
- weed and edge effects; and
- groundwater drawdown.

With regard to noise and dust impacts, the Department notes the project is an extension to an existing quarry. The Department considers that, subject to the management measures recommended in the draft conditions, dust and noise impacts are unlikely to be significantly different from those that already exist.

The Department has considered the findings of the groundwater assessment and notes that, apart from areas immediately adjacent to the pit, drawdown in the hard rock is not predicted to increase vertical leakage from the overlying alluvium along Chapmans Creek and its drainage lines. Therefore drawdown is not predicted to significantly decrease the water availability for the overlying Box Gum Woodland and is not predicted to have any indirect impact on this community.

The project could potentially have indirect impacts on biodiversity through erosion and sedimentation, and subsequent deterioration of downstream water quality. However, the Department has recommended conditions requiring the preparation of management plans to manage and monitor ground and surface water impacts. Subject to these conditions the Department is satisfied that any indirect impacts on biodiversity as a result of erosion and sedimentation would not be significant.

5.4.7 Avoidance, Mitigation and Management

The Department has reviewed the options considered by Gunlake for expanding the footprint of the quarry and is satisfied that the proposed option strikes a reasonable balance between not sterilising the resource and minimising the impacts of the project on native vegetation and fauna habitat.

The Department is satisfied that Gunlake has sought to identify land that has already been cleared and disturbed and subsequently contains diminished habitat for native fauna. In designing the pit, Gunlake considered a dual pit layout that had the potential to better protect the Box Gum Woodland along a riparian corridor. However, Gunlake discounted this option on the grounds that it would result in the

sterilisation of approximately 39 Mt of hard rock resource. Further, any significant vegetation growing between the two pits would be unlikely to remain viable due to the dry and harsh conditions that would result in this location.

Gunlake proposes to continue to implement a number of mitigation and management measures currently in place at the quarry. These measures include:

- fencing and exclusion of stock from Biodiversity Areas;
- protection of riparian corridors;
- control of weeds, particularly Serrated Tussock;
- control of feral animals;
- erosion and sedimentation controls; and
- stabilisation of stream banks and gullies and restoration of riparian vegetation;

The Department has recommended a condition that would require the preparation of a Biodiversity and Rehabilitation Management Plan (BRMP) in consultation with OEH and Council. The Department has also recommended a condition requiring Gunlake to pay a bond to ensure that rehabilitation of the site and protection and enhancement of the Biodiversity Areas are undertaken in accordance with detailed performance and completion criteria.

The Department is satisfied that the impacts of the project on biodiversity would be able to be managed and minimised through implementation of the BRMP and other required management plans.

5.4.8 Biodiversity Offset Strategy

The Department is satisfied that Gunlake has taken, or proposes to take, all reasonable and feasible measures to avoid, minimise and manage biodiversity impacts associated with the project and is therefore satisfied that it is appropriate that the project's residual biodiversity impacts are offset under the *NSW Offsets Policy*.

Following the exhibition of the EIS, OEH required some additional verification of the vegetation types. EMM re-surveyed some plots and OEH's concerns regarding vegetation mapping and the delineation of DNGs have now been addressed.

• *Existing Offsets*

Under its existing project approval, Gunlake is required to provide 78.82 ha of biodiversity offsets on the quarry site. The 78.82 ha includes:

- 32.66 ha of Box Gum Woodland to be enhanced and maintained; and
- 46.16 ha of cleared pasture to be regenerated and/or replanted with species representative of pre-clearing vegetation, including species representative of Box Gum Woodland.

The Department notes that Gunlake has identified two offset areas to meet this requirement, albeit in a different location to that depicted in the current project approval. In its EIS, Gunlake put forward a position that this 78.82 ha requirement was excessive and suggested that there was an excess 46.9 ha that could be used to meet part of the offset requirements for the current project. However, following consideration of OEH's views, particularly with regard to the offsetting principle that "offsets must be additional to other legal requirements", Gunlake advised in its RTS that it accepts that the full 78.82 ha is set aside solely to meet its existing obligations.

• *New Offsets*

The total additional area owned by Gunlake that is available for offsets is 175.5 ha (see **Figure 12**). As detailed in the RTS, this land would generate a total of 1,981 ecosystem credits. The project requires 1,380 ecosystem credits to be retired for the proposed clearing of 54 ha of vegetation, as set out in **Table 10**.

The Department and OEH are satisfied that Gunlake has demonstrated that it can meet the requirements of its current approval and that there is sufficient areas of the required vegetation type to meet the credit requirements associated with the clearing of land for the project (see **Table 11**).

The Department has recommended conditions that cover both existing offset requirements and offsets required as a result of the project. The recommended conditions require Gunlake to provide long term funding and security for the existing 78.82 ha Biodiversity Area prior to commencing development of

the new project. Separately, the recommended conditions require Gunlake to retire 1,380 credits associated with the project through a Biobanking Agreement within eighteen months of commencing development of the new project.

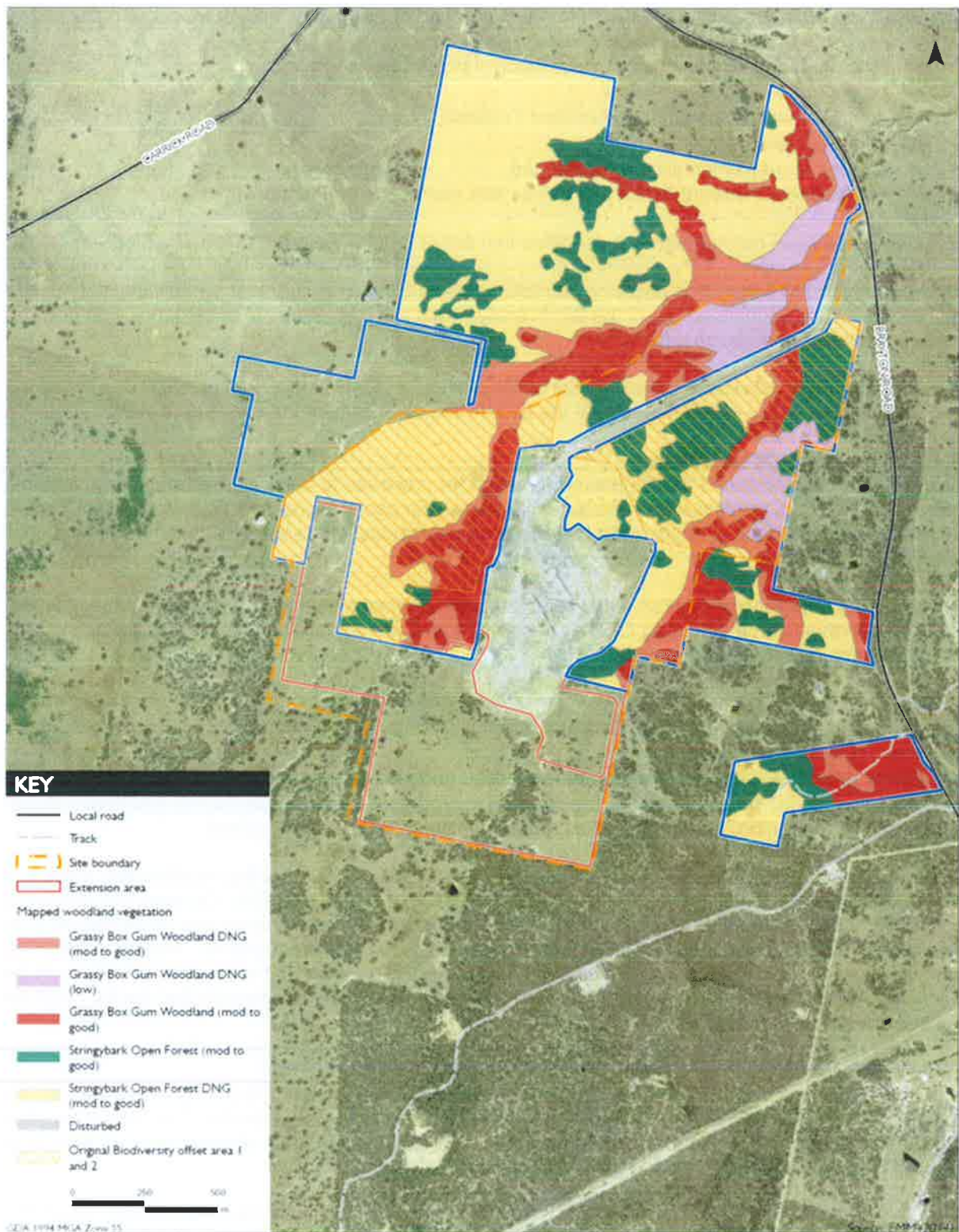


Figure 12: Extent of Gunlake-owned land available to be used for offsetting purposes

Table 10: Credits required to offset biodiversity impacts

Vegetation zone	PCT	Area (ha)	EEC?	Loss in site value score	Ecosystem credit species with the highest multiplier	Credits required to offset impact
1	Yellow Box - Blakely's Red Gum Grassy Woodland (PCT1330)	7.59	Yes	57.97	Barking Owl	373
2	Yellow Box - Blakely's Red Gum Grassy Woodland DNG (PCT1330)	8.24	Yes	22.46	Barking Owl	185
3	Broad-leaved Peppermint - Red Stringybark grassy open forest (PCT734)	4.57	No	39.13	Barking Owl	160
4	Broad-leaved Peppermint - Red Stringybark grassy open forest DNG (PCT734)	33.47	No		Barking Owl	662
Total	-	53.86	-	-	-	1,380

Table 11: Credits available to offset biodiversity impacts

Vegetation type name	Condition	Offset area (ha) ¹	Total credits created by offset	Total credits required
HN614/PCT1330				
Zone 1: Yellow Box - Blakely's Red Gum Grassy Woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good	30.99	291	373
Zone 2: Yellow Box - Blakely's Red Gum Grassy Woodland on the tablelands, South Eastern Highlands Bioregion	Moderate/Good Derived grassland	24.53	326	185
Total for HN614/PCT1330		55.52	617	558
HN514/PCT734				
Zone 3: Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	Moderate/Good	25.22	297	160
Zone 4: Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	Moderate/Good Derived grassland	94.77	1,067	662
Total for HN514/PCT734		119.99	1,364	822
Grand total		175.51	1,981	1,380

Note: 1. Does not include areas already conserved as offset as part of the previous approval.

5.4.9 Conclusion

The assessment of the impacts of the project on biodiversity has been carried out in accordance with the *NSW Offset Policy* and the *Framework for Biodiversity Assessment*.

The Department is satisfied that the project has been designed to avoid, minimise and manage impacts on biodiversity so far as reasonable and feasible. However, the project would still result in impacts on biodiversity, including removal of a total of 12.2 ha of woodland and 41.9 ha of grassland vegetation, including 15.8 ha of Box Gum Woodland EEC/CEEC listed under both the TSC Act and the EPBC Act.

Following its assessment, the Department is satisfied that this impact and other impacts on biodiversity can be adequately managed, mitigated and/or offset and that the development can be undertaken in a way that would result in maintenance or improvement of the biodiversity values of the locality. OEH has advised it is satisfied with the draft conditions relating to biodiversity.

The Department considers that the impacts of the project on MNES have been appropriately addressed, and that potential impacts to the Box Gum Woodland CEEC and the Regent Honeyeater would be effectively managed and offset through recommended conditions which require the provision of substantial biodiversity offsets. On balance, the Department considers the impact of the project on biodiversity, including MNES, is acceptable.

5.5 Groundwater

The EIS includes a Groundwater Assessment prepared by EMM that identifies the project's potential impacts on groundwater resources and assesses their risks and implications on the environment and groundwater users.

The groundwater resources at Gunlake Quarry are principally regulated under the *Water Management Act 2000*, which requires that Gunlake hold a licence for its take of groundwater. The *NSW Aquifer Interference Policy* (AIP) sets out the water licence and impact assessment requirements for aquifer interference activities in NSW with the aim of ensuring that water taken by aquifer interference activities is properly licensed and accounted for in water sharing arrangements.

Water sharing plans establish the rules for sharing water in a defined water source between the needs of the environment and other users, including domestic, agricultural and industrial users. The groundwater water sharing plan that is applicable to Gunlake Quarry is the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011*.

Under this water sharing plan, Gunlake Quarry is located within the Goulburn Fractured Rock Groundwater Source. The groundwater available for extraction from this source is 53,074 ML/year, of which 100 ML/year is allocated for the Goulburn town water supply and 3,114 ML/year is allocated for domestic/stock use. Approximately 46,800 ML/year, or 88%, is unallocated.

There are two groundwater sources relevant to operations at Gunlake Quarry, namely an alluvial system associated with Chapmans Creek and a fractured rock groundwater system within the hard rock resource being quarried. The alluvial system is an unconfined, perched water source located in alluvium along Chapmans Creek, Joaramin Creek and their drainage lines. The alluvium is typically less than 5 m thick and has a low storage capacity. No registered groundwater users access the alluvial water associated with these creeks.

Within a 5 km radius of Gunlake Quarry, there are 15 groundwater bores which access the fractured rock groundwater source. Nine of these bores are groundwater monitoring bores at Lynwood Quarry and five are registered for private use (ie stock or domestic/stock purposes). The closest private-use bore is located 1.2 km east of Gunlake Quarry (see **Figure 13**).

Groundwater levels in the fractured rock groundwater source across the site are between 6.3 to 22.5 m below ground level. Groundwater flow is generally towards the north-east, reflecting the topography. A groundwater monitoring network, comprising four piezometers, was installed at the site in 2007. Data from 2007 and from 2014/2015 indicates that groundwater quality at Gunlake Quarry is generally of poor quality, being brackish to saline. Due to its salinity and low yield, the fractured rock groundwater source in the vicinity of the quarry has only marginal extraction value.

5.5.1 Predicted Impacts on Groundwater

Gunlake proposes that the quarry pit extension would be developed in four stages over the project's proposed 30 year lifespan, as shown in **Table 12**.

Table 12: Indicative development of quarry pit

Stage	Timing (years)	Depth to quarry floor (m BGL)	Elevation of quarry floor (m AHD)
1	1-5	13	650
2	5-10	26	637
3	10-20	65	598
4	20-30	91	572

Notes: m BGL = metres below ground level.

m AHD = m Australian height datum.

The Groundwater Assessment includes an analytical groundwater flow model that predicts:

- Stage 1 (the first 5 years) excavation would be above the groundwater table and there would be no groundwater impacts;
- Stage 2 (Years 5-10) excavation would intercept the groundwater table and the 2 m drawdown contour would extend up to 300 m from the footprint of the pit;
- Stage 3 (Years 10-20) the 2 m drawdown contour would extend up to 1 km from the edge of the pit footprint; and
- Stage 4 (Years 20-30) the 2 m drawdown contour would extend up to 1.5 km from the edge of the pit footprint.

The groundwater flow model also predicts:

- the maximum drawdown of 78 m would occur in the south-western corner of the pit during Years 20 to 30;
- any drawdown of more than 20 m would be confined to within 200 m of the footprint of the pit; and
- average groundwater inflows into the pit of:
 - 0 ML/year for Years 1-5;
 - 23 ML/year for Years 5-10;
 - 37 ML/year for Years 10-20; and
 - 34 ML/year for Years 20-30.

Following completion of quarrying, dewatering of the quarry pit would be discontinued. However, the void would continue to receive runoff from rainfall and some groundwater inflows. Water loss would occur solely through evaporation. Groundwater inflows are predicted to decline to insignificant rates 20 years after completion of the project. The pit lake that would form is predicted to gradually rise for 60-70 years until it reaches equilibrium at approximately 600 m AHD. The pit lake is predicted to be a perpetual evaporative sink, remaining well below the pre-quarrying groundwater level.

5.5.2 Groundwater Licensing

Gunlake would be required to hold a Water Access Licence equivalent to the volume of water taken from the Goulburn Fractured Rock Groundwater Source during each year of its operations. The predicted maximum groundwater inflows which would need to be licensed is 37 ML/year. The Department is satisfied that Gunlake would be able to obtain a licence by purchasing some of the 3,051 shares that currently exist for this water source. The Department has recommended a condition requiring Gunlake to obtain any necessary groundwater licences under the Water Management Act 2000 prior to taking any groundwater.

5.5.3 Drinking Water SEPP

Gunlake Quarry is located within Sydney's drinking water catchment. The *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (Drinking Water SEPP) provides that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development would have a neutral or beneficial effect on water quality.

The Department notes that, as extraction progresses below the water table, a hydraulic gradient would be created directing groundwater flow towards and into the pit. The Department is subsequently satisfied that the project would not impact on groundwater quality beyond the boundaries of the site.

5.5.4 Assessment of Groundwater Impacts

The groundwater resource at Gunlake Quarry is classified as 'less productive' under the AIP due to its marginal water quality and its measured yields of less than 5 litres/second. The Groundwater Assessment considered the project's groundwater impacts against the thresholds for key minimal impact considerations for 'less productive' sources, which define a drawdown of 2 m as a significant impact requiring mitigation. The Department notes that the nearest privately-owned groundwater bore is outside the predicted maximum extent of the 2 m drawdown contour.

However, on the Gunlake site itself, there are four springs and also areas of Box Gum Woodland within the predicted drawdown zone. It is predicted that two of these springs would have a reduced flow rate and two springs would cease to flow as a result of the project. As these springs do not support

groundwater dependent ecosystems or hold any significant environmental value, the Department agrees with the Groundwater Assessment's conclusion that no mitigation under the AIP is required with regard to impacts on these springs.

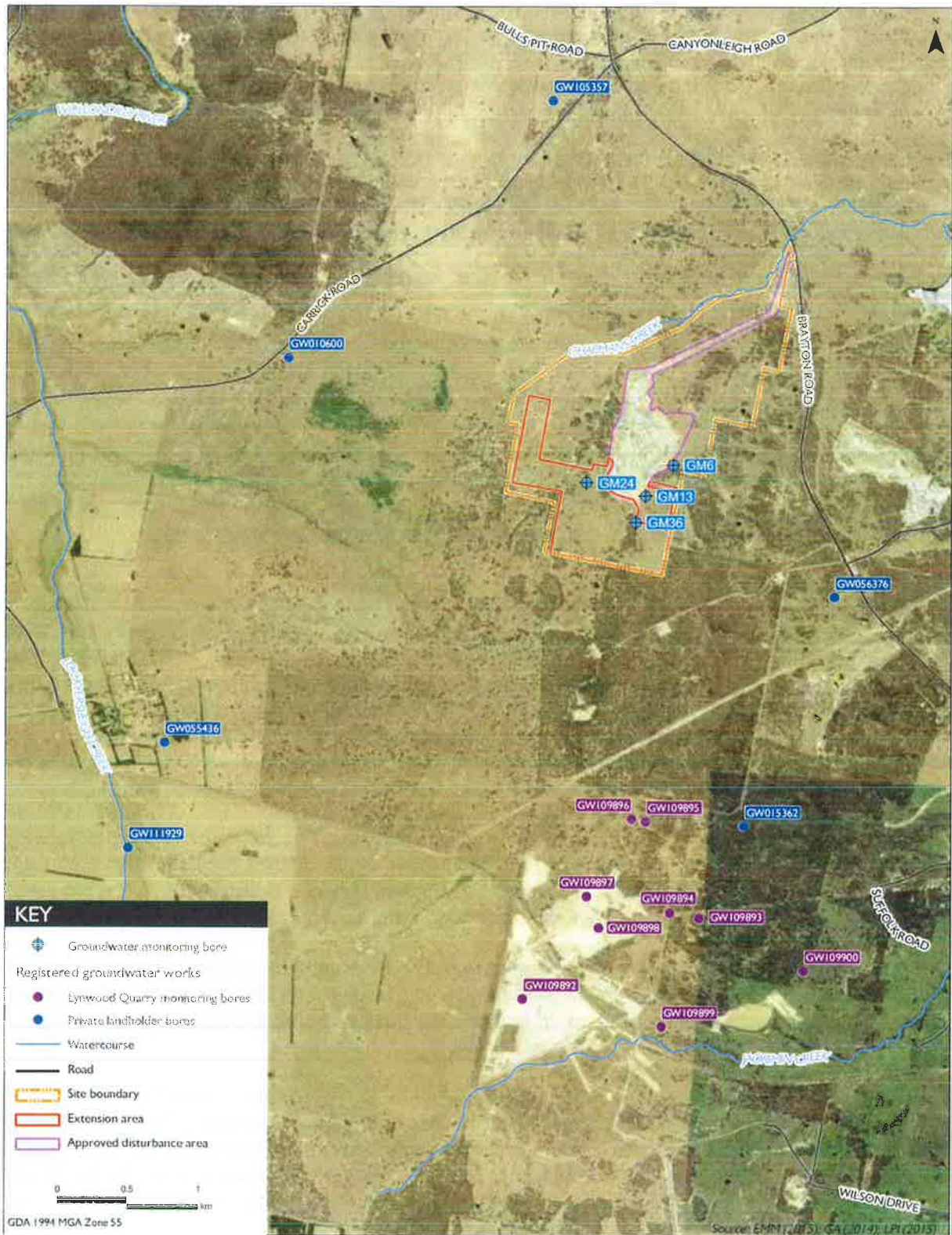


Figure 13: Location of Groundwater Bores on and around the Gunlake Quarry site

The distribution of the Box Gum Woodland across the site suggests that the vegetation is reliant on rainfall and also perched groundwater within the alluvium of Chapmans Creek and drainage lines. As this alluvium is not connected to the underlying fractured rock groundwater source, the Department is satisfied that there would be minimal impact on the Box Gum Woodland as a result of the predicted fractured rock groundwater drawdown associated with the project.

As Lynwood Quarry is located about 1.5 km to the south of Gunlake Quarry, there is potential for additional drawdown in the area between the two quarries. However, the Department notes that there are no registered groundwater users in this area and therefore no additional impacts to private users are predicted. The two quarries have a predicted combined take of up to 48.1 ML/year and the Department is satisfied that there is sufficient unallocated water within the groundwater source to enable both Gunlake Quarry and Lynwood Quarry to obtain licences for their predicted water take.

In summary, the Department is satisfied that the project's groundwater impacts would be minor. The Department is also satisfied there is sufficient water available within the market for Gunlake to purchase licences for predicted groundwater inflows to the pit of up to 37 ML/year. As requested by agencies and in line with contemporary practice, the Department has recommended conditions requiring Gunlake to prepare a Groundwater Management Plan and to obtain all necessary water licences for the project.

5.6 Surface Water

The EIS includes a Surface Water Assessment undertaken by Royal Haskoning DHV of the project's impacts on surface water.

Gunlake Quarry is located within the upper reaches of the Chapmans Creek Catchment. As shown in **Figure 14**, Chapmans Creek runs along the northern boundary of the quarry. It flows into Jaorimin Creek about 3 km downstream of the quarry. Both Chapmans Creek and Jaorimin Creek are ephemeral, flowing only during and immediately after large rainfall events. There are no licensed surface water users that rely on extraction from either Chapmans or Jaorimin Creek in the area immediately downstream of the quarry.

The land within Chapmans Creek catchment has been predominantly cleared and typically is used for grazing livestock. Many creek channels across the catchment are degraded, with moderate to severe bed lowering and bank erosion. The Surface Water Assessment suggests that degradation of the creek channels on the Gunlake site is most likely due to grazing pressure as well as the possible effects of soil sodicity.

The quality of surface water at Gunlake Quarry has been monitored since 2007. Both physical parameters and chemical parameters (pH, sodium, chloride, nitrogen, phosphorus and metals) have been monitored at three sites, including a site located downstream of the quarry at the Brayton Road weir. Forty nine rounds of monitoring have been undertaken.

Generally, monitoring shows that electrical conductivity (EC - an indicator of salinity) is higher downstream of Chapmans Creek weir than at the site. The Surface Water Assessment attributed this to the historically degraded state of Chapmans Creek and the leaching of salts from sodic subsoils followed by concentration of these salts through evaporation in shallow pools within the creek.

Monitoring showed that Total Suspended Solid (TSS) concentrations downstream of the quarry were generally below 20 mg/l, indicating that the quarry operations are not generally contributing sediment laden water to downstream receiving waters.

5.6.1 Assessment of Surface Water Impacts

As shown in **Figure 14**, the project would remove several first and second order tributaries of Chapmans Creek. Surface water flow from the site would also be reduced due to the retention of water within the proposed footprint of the surface water management system footprint. The Department has considered the size of the proposed surface water management system footprint (135 ha) relative to the contributing catchment areas of Chapmans and Jaorimin Creek (4,100 ha), and is satisfied with the Surface Water Assessment's finding the project would have a negligible impact on surface water flows beyond the confluence of Chapmans and Jaorimin Creek.

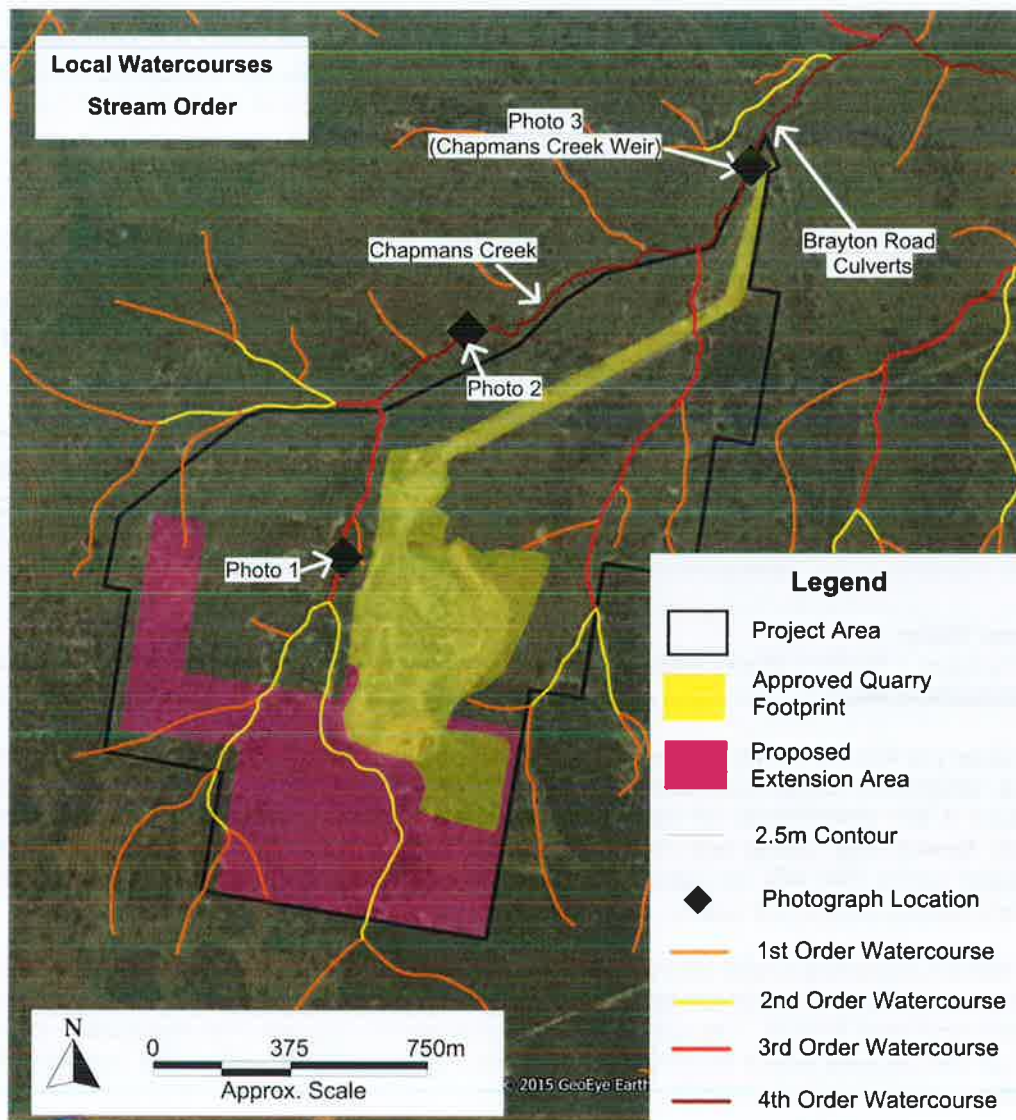


Figure 14 - Location of watercourses in the project area

As Gunlake Quarry is located within the Sydney drinking water catchment, the provisions of the Drinking Water SEPP apply to the project (see also **Section 5.5.3**). The Drinking Water SEPP requires that a consent authority must not grant consent to development on land within the Sydney drinking water catchment unless it is satisfied that the proposed development would have a neutral or beneficial effect on water quality.

Surface water quality at Gunlake Quarry is currently managed through the:

- separation of clean and dirty water by using diversion drains to divert clean water around the disturbance area and minimise the volume of water entering the water management system;
- provision of appropriately-sized sedimentation basins to capture and treat runoff from disturbed areas;
- management of excess water that may accumulate in the pit; and
- minimisation of the volume and frequency of water discharges from the site by using water from the sedimentation basins for dust suppression and process water.

The proposed water management strategy for the project would continue to be based on the principles of diverting clean water around the disturbance areas and capturing water from disturbed areas in a series of dams to be re-used as process water. The location and catchments of the sedimentation dams would change as extraction and waste emplacement progresses, however, all dams would be designed and constructed to provide adequate sedimentation treatment.

From Years 10 to 30, after reaching its maximum footprint, the pit would have a catchment of approximately 53 ha. During extended periods of wet weather, substantial volumes of water would accumulate in the pit, requiring dewatering. The proposed surface water management system proposes that a pit sump, with a capacity of 20 ML and additional flood storage, would be maintained throughout the quarry life. The water from the pit sump would be pumped to a pit dewatering dam that would hold 30 ML of water. During times of water surplus, water would be released from the pit dewatering dam. Gunlake would monitor water quality prior to release and treat the water in this dam by adjusting pH or by flocculation if required. The location of the pit sump, the pit dewatering dam and other elements of the surface water management plan proposed for Years 10 to 30, is shown in **Figure 15**.

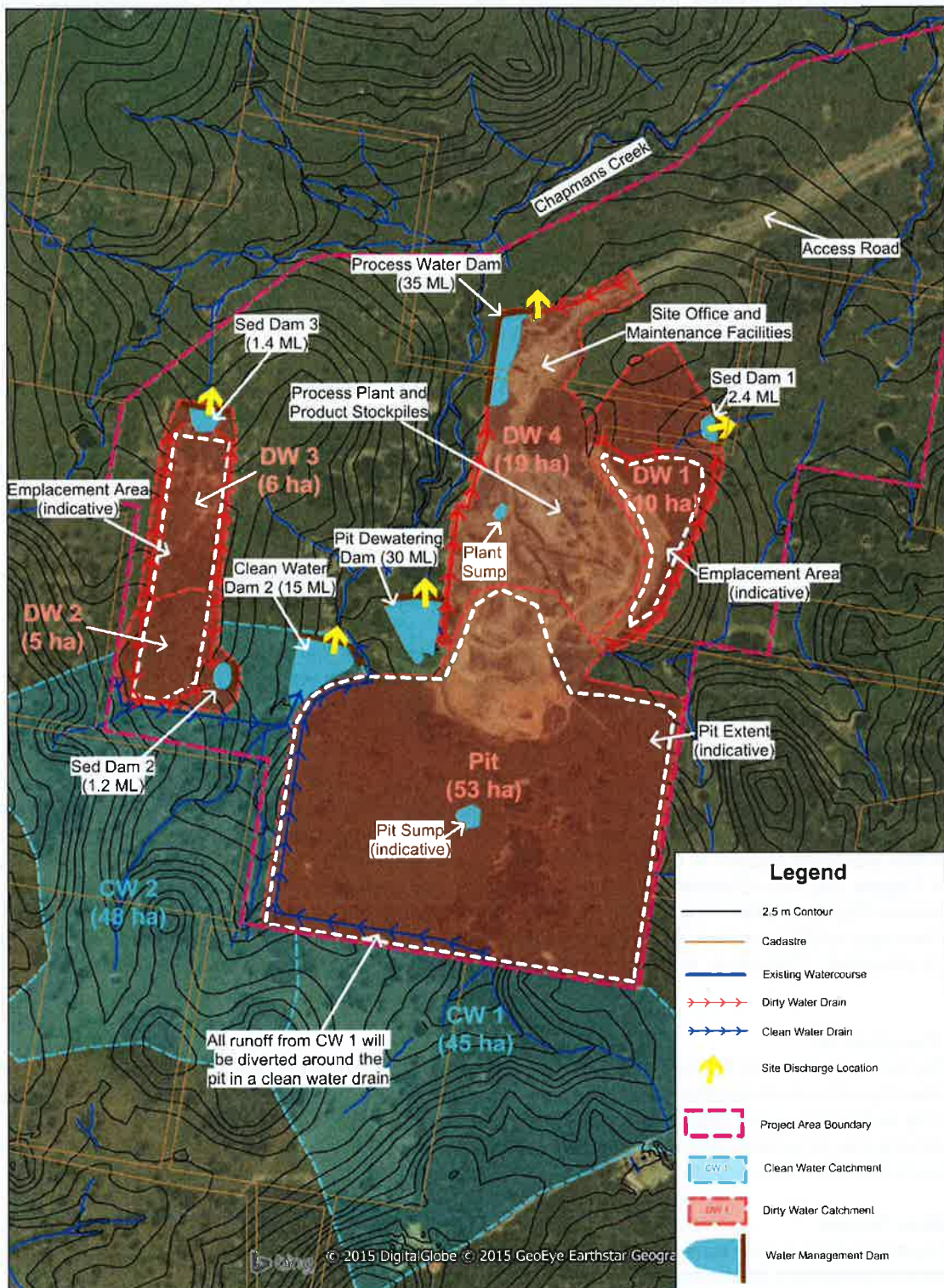


Figure 15: Water Management Strategy for Years 10 to 30

5.6.2 Site Water Balance

Water is used on-site in the processing plant (primarily for dust suppression) and for dust suppression on the haul roads.

It is predicted that the project would use between 100 – 110 ML/year of water. Water demand from the processing plant is predicted to increase from 13.7 ML/year to 36.4 ML/year. Water demand for dust suppression on the haul roads is predicted to increase from 41 to 66 ML/year in a wet (10th percentile) year and 45 to 73 ML/year in a dry (90th percentile) year.

Gunlake proposes to source this water from the Process Water Dam (35 ML capacity), the Pit Dewatering Dam (30 ML capacity), the Pit Sump (20 ML capacity) and Cleanwater Dam 2 (15 ML capacity). Collectively, these storages provide 100 ML of storage capacity. After accounting for evaporation losses, the storages would provide approximately 7 to 8 months of process water supply.

The surface water assessment includes a site water balance model for dry (10th Percentile), median (50th Percentile) and wet (90th Percentile) years. In order to account for a range of climatic conditions, the model incorporated a 115 year simulation period based on available rainfall records. The model also took into account evaporation rates (based on the surface areas of the dams) and groundwater inflows to the pit.

The model showed that during its first year, the project would be vulnerable to a water shortage if rainfall is below average. This is due to limited catchment of the pit in Year 1 (29 ha compared to 53 ha once fully developed) and the lack of groundwater inflow.

If water shortfalls occur, Gunlake has identified a number of contingencies that could be put in place, including:

- reducing water usage through the use of chemical dust suppressants;
- temporarily reducing the scale of operations to ensure that dust management objectives are met; and
- bringing water to the site by tanker.

The model shows that the risk of water shortages declines significantly as the footprint of the pit is increased and groundwater flows into the pit commence, with water shortages unlikely post Year 10.

The Department is satisfied that Gunlake has designed the water management system to minimise the potential for process water shortages and is likely to have sufficient water for its operations under most climatic conditions.

5.6.3 Surface Water Licensing

Surface Water licensing for the project is regulated by the *Water Management Act 2000*. However, most of the surface water runoff on the quarry site is excluded from the Act's licencing provisions as it is dirty water (ie from dams solely for the capture, containment or recirculation of drainage) and the only water source that would be subject to licensing is the capture of clean water from Cleanwater Catchment Area 2 (see **Figure 15**) into Cleanwater Dam 2. The proposed volume of this dam is 15 ML. Under the Harvestable Rights provisions of the *Water Management Act 2000*, a landowner can capture up to 10% of the average runoff from their land. Gunlake has a harvestable right of 17 ML/year, with only 1 ML/year already allocated. Therefore, the capture of water in Cleanwater Dam 2 is within Gunlake's harvestable rights.

5.6.4 Conclusion

The Department is satisfied that the proposed water management strategy has been designed to minimise impacts on downstream water quality and flows. The Department is also satisfied that there would be sufficient water available for the proposed operations under most climatic conditions. The Department has recommended a condition that requires Gunlake to prepare a Water Management Plan in consultation with relevant agencies.

5.7 Other Issues

The Department has considered other issues relevant to the project. A summary of the assessment and recommendations in relation to these issues is included in **Table 13**.

Table 13: Assessment of other issues

Issue	Assessment	Conclusion and Recommendation
<i>Land Resources and Agriculture</i>	<p>The site has an area of approximately 228 ha, of which about 99 ha (including existing disturbed areas) would be disturbed as a result of the project.</p> <p>Previous studies indicated that soil fertility across the site is moderately low and generally the site is only suitable for grazing purposes.</p> <p>The EIS includes a Land Resources and Rehabilitation Study that assesses the potential impact of the project on the site's land capability.</p> <p>Based on OEH's <i>Land and Soil Capability Mapping of NSW</i>, the 99 ha of land to be disturbed is classified as LSC Class 5 – Severe limitations (55 ha) and LSC Class 6 – Very severe limitations (44 ha).</p> <p>Most of the Class 6 land is in the southern part of the site, in the area proposed for extension of the quarry pit and the new overburden emplacement area.</p> <p>Following quarrying, about 48 ha of the 99 ha of disturbed land, predominantly the pit area, would become LSC Class 8 – Extreme limitations, and would be unsuitable for agricultural production.</p> <p>The remainder of the disturbed land would be able to be rehabilitated to LSC Class 6 and would be suitable for grazing purposes.</p>	<p>The Department accepts there would be a loss of about 50 ha of agricultural land as a result of the project, with the extracted quarry pit remaining a deep, water-filled void with near-vertical rock walls.</p> <p>The Department considers that this loss is acceptable, given the significant economic benefits of the project and the general availability of similar agricultural land nearby.</p> <p>The Department notes that other areas of the site, including the overburden emplacement areas, would be able to be rehabilitated to support grazing or biodiversity purposes post-quarrying.</p>
<i>Aboriginal Cultural Heritage</i>	<p>The EIS includes an Aboriginal Cultural Heritage Assessment (ACHA) which addressed the potential impacts of the project on Aboriginal cultural heritage values.</p> <p>The ACHA included the results of a field survey and a test excavation program. The assessment was undertaken in consultation with Aboriginal stakeholders.</p> <p>The field survey, conducted in July 2015 across the entire extension area, identified 15 Aboriginal sites. All 15 sites comprised stone artefacts (12 open stone artefact sites and three isolated finds). The highest concentration of artefacts was found on the hill crest in the proposed overburden emplacement area.</p> <p>An archaeological test excavation program was carried out across the extension area over five days in October 2015 with the aim of characterising the subsurface archaeological deposits of known surface sites. 42 individual 1 m x 1 m test pits were excavated, 15 of which contained subsurface artefacts. A total of 89 artefacts were recovered during the test excavations.</p> <p>No new Aboriginal sites were recorded as a result of the test excavations, with most artefacts recovered being from the 15 sites already identified during the field survey. The paucity of subsurface artefacts was attributed to the poor integrity of the soil deposit, which is severely eroded.</p> <p>The ACHA concluded that the surface artefact distribution offered a better representation of</p>	<p>Archaeological investigations at Gunlake Quarry and Lynwood Quarry suggest that the archaeological resources of the region are relatively consistent and predictable.</p> <p>The Department notes that the majority of sites to be impacted are of low archaeological value and typical of sites found in the surrounding area.</p> <p>OEH has recommended a number of conditions to ensure adequate protection of Aboriginal cultural heritage, including updating of the Aboriginal Heritage Management Plan (AHMP) in consultation with Registered Aboriginal Parties and OEH within six months of the commencement of the project.</p> <p>The AHMP would include procedures for managing the discovery of any additional Aboriginal objects.</p> <p>The 11 sites that would be impacted by the project are proposed to be salvaged by surface artefact collection and detailed recording.</p> <p>The Department is satisfied that the project would have a very low impact on Aboriginal cultural heritage values and that appropriate measures would be put in place to manage sites and artefacts that are impacted.</p>

	<p>the local archaeological record than the test excavations.</p> <p>The ACHA assessed 14 of the 15 sites identified as having low archaeological significance with one site being assessed as having moderate significance. 11 of the 15 sites would be impacted by the project, with 4 being avoided.</p>	
<i>Historic Heritage</i>	<p>Apart from dams, drainage diversion bunds, vehicle tracks and livestock fences, no items of potential historic heritage significance have been found on site.</p>	<p>The Department agrees with the EIS's findings that, given previous use of the site for grazing and the paucity of any historic heritage finds, there is very limited, if any, potential for items of historic heritage to be found on the site.</p>
<i>Visual Impact</i>	<p>The terrain in the vicinity of Gunlake Quarry is undulating. Generally the quarry operations are not particularly visible from surrounding areas. A ridge between the quarry and Brayton Road to the east blocks views of the quarry from most of this road. However, there are glimpses of the quarry site from Brayton Road to the north and high points along Carrick Road to its west.</p> <p>The existing overburden emplacement area, to the east of the quarry pit, also provides a visual screen for properties located to the east.</p> <p>Isolated parts of surrounding properties have long distance views of the site (from approximately 5 km away).</p> <p>In terms of lighting, the quarry is currently approved to undertake some operations 24 hours a day (except between 6 pm Saturday to 2 am Monday and on Public Holidays).</p>	<p>The natural topography of the area and existing vegetation shields the active areas of the quarry from most surrounding public and private viewpoints.</p> <p>The proposed additional emplacement area and pit extension would not significantly alter visual impacts of the quarry.</p> <p>Gunlake has recently purchased the property (R4) that had a view of quarrying operations from the west.</p> <p>The Department has recommended a condition requiring the new emplacement area to be progressively shaped and rehabilitated to blend with the surrounding landscape.</p> <p>The Department has also recommended a standard condition relating to minimising the impacts of night lighting.</p> <p>The Department is satisfied that any visual changes resulting from project would not significantly alter existing visual impacts of the development from any private or public viewpoint.</p>
<i>Economic Assessment</i>	<p>An economic assessment of the project was undertaken by Gillespie Economics. The economic assessment included a cost benefit analysis (CBA) which evaluated the net benefit of the project in accordance with standard State government guidelines.</p> <p>The CBA indicated the project would have net production benefits of \$16 million to NSW. In addition, Gillespie estimated the market and non-market employment benefits of the project would be in the order of \$11 million.</p> <p>Overall, the economic assessment estimated that the project would have a net benefit to NSW of between \$16 and \$27 million (present value, 7% discount rate).</p> <p>The assessment considered the value of the residual environmental, social and cultural impacts of the project and found these to be less than \$1 million.</p> <p>Therefore, the CBA indicated that the project is justified from an economic efficiency perspective.</p> <p>The economic assessment also included a local effects analysis (LEA) to assess the effects of the project on the locality in terms of local employment, non-labour project expenditure, and the environmental and social effects on the local community.</p>	<p>The Department accepts that findings of the economic assessment that, from an economic efficiency perspective, the project is desirable and justified, having a net benefit to the NSW community of between \$16 and \$27 million.</p> <p>The project would provide on-going socio-economic benefits to the local community, including additional employment opportunities. It would also contribute to the long-term supply of construction materials to the Sydney market.</p> <p>The Department has carefully considered the key environmental issues associated with the project and its impacts on the amenity of the local community. As detailed in Section 5, the Department is satisfied that the project would be able to be managed to ensure that its impacts comply with relevant criteria and do not result in an unacceptable impact on members of the local community.</p>

The local effects analysis found that the project would make the following maximum annual incremental contributions (above the contributions of the existing operations) to the Goulburn Mulwaree local government area for 22 years:

- \$40 million in annual direct and indirect regional output or business turnover;
- \$10 million in annual direct and indirect regional value added;
- \$3 million in annual direct and indirect household income; and
- 60 direct and indirect jobs.

For the additional eight years of the project life (when the project approval for the existing quarry would have lapsed), the annual incremental contribution to the Goulburn Mulwaree local government area are predicted to be:

- \$68 million in annual direct and indirect regional output or business turnover;
- \$22 million in annual direct and indirect regional value added;
- \$6 million in annual direct and indirect household income; and
- 150 direct and indirect jobs.

Rehabilitation

Gunlake has provided both short and long term objectives for rehabilitation of the quarry. The final void would be below ground level and would contain water. The walls above the pit lake would be largely rock and close to vertical. A fence or safety bund would be placed around the perimeter to prevent accidental access. The remainder of the site would be able to be used for grazing or biodiversity purposes.

The Department has recommended conditions requiring Gunlake to prepare and implement a Biodiversity and Rehabilitation Management Plan and to lodge a bond with the Department to ensure that rehabilitation is carried out to the satisfaction of the Secretary.

Gunlake has advised, both with regard to its current approval and any future consent, that it would prefer not to lodge a bond, but would rather meet the intended outcome of the requirement through another mechanism, such as a restrictive covenant on the land title, an insurance bond or by allowing the Department to lodge a caveat over the land title.

The Department has considered Gunlake's proposed options but remains of the opinion that a bond (typically a bank guarantee) held by the Department is the most sure and effective way to ensure that quarry sites are appropriately rehabilitated.

The Department notes that a requirement for a bond has been included in more than 50 quarry approvals over the last 15 years.

The Department considers that the requirement for a bond should be consistently applied to State significant extractive industries and has included its standard requirement for a bond in the recommended conditions.

6. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of consent for the project (see **Appendix H**). These conditions are required to:

- prevent, minimise, and/or offset adverse impacts of the project;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

7. CONCLUSION

The Department has assessed the project in accordance with the requirements of the EP&A Act, including the objects of the Acts and the principles of ecologically sustainable development.

Although the Department accepts that the increased traffic noise associated with the additional trucks is predicted to comply with the relevant criteria in the RNP, the Department recognises that the significant increase in the number of trucks, particularly during the night, is likely to be considered intrusive by some residents who live along the primary transport route.

During the assessment process, the Department therefore required Gunlake to examine in detail any other possible alternative way of transporting its products to its concrete batching plants and other markets in Sydney. Gunlake subsequently provided an in-depth analysis of the options and costs for using rail transport to transport its products which found that the cheapest rail option would cost around \$120 million more than the continued use of the primary and secondary transport routes. This would result in the project changing from having net social benefits to NSW of between \$16 and \$27 million, to having net costs of between \$94 and \$105 million.

Gunlake also considered whether it might be possible to construct a private haul road through the Lynwood Quarry to the south. However this option would cost \$44 million more than the base case, resulting in the project changing from having net social benefits to NSW of between \$16 and \$27 million, to having net costs of between \$17 and \$28 million.

The Department has considered the cost benefit analysis and is satisfied that any rail option, as well as the private haul road option through Lynwood Quarry, would result in the project being unviable.

In recommending conditions relating to transport, the Department has focussed on ensuring that the primary transport route is substantially upgraded and that traffic management measures are put in place to ensure that trucks associated with the project are driven safely and with regard to the amenity of the residents who live along Gunlake's transport routes. This includes conditions limiting Gunlake's monthly dispatches of quarry products to existing levels until a 500 m acceleration lane is constructed at the intersection of Red Hills Road and the Hume Highway.

The Department has carefully considered the noise impacts of the project on the amenity of nearby residents, particularly the three privately-owned properties where PSNLs are predicted to be exceeded. In accordance with the VLAMP, the Department has recommended conditions that would give both acquisition and 'mitigation on request' rights to one of these properties and 'mitigation on request' rights to the second. For the third property, only minor noise levels exceedances are predicted in worst-case meteorological conditions and, under the VLAMP, mitigation measures are not required.

The project would result in the clearing of 15.8 ha of Box Gum Woodland that is listed as an EEC or EEEEC under State or Commonwealth legislation respectively. The Department is satisfied that, in designing the project, Gunlake has avoided impacts on important native vegetation communities as far as is reasonable and practicable. Therefore the Department is satisfied it is appropriate to allow the vegetation to be cleared, subject to it being offset via Gunlake's proposed biodiversity offset package.

The Department is satisfied that the impacts of the project with regards to air quality, water quality, Aboriginal cultural heritage and visual amenity are acceptable and can be managed to comply with all contemporary criteria and standards. The Department has recommended conditions to require compliance with relevant performance measures and standards to ensure that any residual impacts are effectively minimised and mitigated.

The Department is of the view that these conditions represent current best practice for the regulation of quarries in NSW, provide a high level of protection for the local environment and protection for the amenity of the local community.

Gunlake Quarry is an established quarry, located in relatively close proximity to the Hume Highway. The CBA of the project indicated the project would have a net benefit to NSW of between \$16 and \$27 million, and from an economic efficiency perspective, is justified. The project would provide on-going socio-economic benefits to the local community, including additional employment opportunities, and would allow Gunlake to assist in meeting the high demand for construction materials in Sydney.

The Department is satisfied that the benefits of the project outweigh its residual costs and considers that the project is in the public interest and is approvable, subject to strict conditions of consent.

8. RECOMMENDATION

It is recommended that the Planning Assessment Commission, as delegate of the Minister for Planning:

- **considers** the findings and recommendations of this report, noting that the Department considers that the project is approvable, subject to conditions; and
- if the Commission determines to approve the development application, **signs** the attached instrument of approval.



Howard Reed

Director Resource Assessments

7-12-16



Oliver Holm

Executive Director

Resource Assessments & Compliance

13/12/16