Gunlake Quarry Continuation Project (SSD-12469087)

Environmental Impact Statement

Prepared for Gunlake Quarries Pty Ltd
September 2021

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Certification

For submission of an environmental impact statement (EIS) under Part 4, Division 4.1 of the NSW Environmental Planning and Assessment Act 1979.

Environmental Impact Statement prepared by

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Applicant

Gunlake Quarries Pty Ltd

Description of development

Gunlake seeks a new development approval for the Continuation Project that allows:

- ongoing Quarry operations;
- a maximum of 375 inbound and 375 outbound daily truck movements with no more than 4.2 million tonnes per annum (Mtpa) of saleable products transported from the site in any calendar year;
- 24-hours Quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday (with maintenance permitted outside of these hours);
- an extraction depth of 546 metres Australian Hight Datum (mAHD); and
- a 30-year Quarry life (from the date of Continuation Project approval).

Land to be developed

The Quarry is located at 715 Brayton Road, Marulan, and quarry activities take place on Lot 13 DP 1123374 and Lot 1 DP1246715 (the 'Quarry site').

Certification

We certify that the contents of this EIS have been prepared in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979*, Schedule 2 of the Environmental Planning and Assessment Regulation 2000 and the NSW Department of Planning, Industry and Environment Secretary's Environmental Assessment Requirements issued for the development. To the best of our knowledge, it contains all available information that is relevant to the environmental assessment of the development to which the statement relates. The information contained in this EIS is neither false nor misleading.

Dr Philip Towler
Associate Director
20 September 2021

Katie Ward
Associate
20 September 2021

Summary

ES1 Introduction

Gunlake Quarries Pty Ltd (Gunlake) operates a hard rock quarry (the 'Quarry') located at 715 Brayton Road, Marulan, NSW. The Quarry is approximately 7 kilometres (km) north-west of Marulan in the Goulburn Mulwaree local government area. The land surrounding the Quarry is rural land with a low population density.

Quarry operations commenced in 2009. The tonnage of saleable product dispatched by the Quarry has steadily increased since receiving the Extension Project approval in 2017. With an infrastructure boom in the Greater Sydney region, Gunlake forecast that demand for products from the Quarry will continue to increase. It is proposed to increase the tonnage of saleable products dispatched from the Quarry in response to this increased demand. This is known as the Gunlake Quarry Continuation Project (the 'Continuation Project').

The Continuation Project operations would remain similar to the approved Extension Project. The ignimbrite hard-rock resource will continue to be extracted and processed using the methods currently employed at the Quarry, with proposed changes primarily relating to the increased rate of extraction, processing and transport.

This environmental impact statement (EIS) accompanies a new State significant development (SSD) application for the Continuation Project.

ES2 Project background

ES2.1 Quarry approvals

The Quarry was originally approved in 2008 under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This approval (PA07-0074) was surrendered in 2018 after an SSD approval was granted for the Gunlake Quarry Extension Project (the 'Extension Project'). The Extension Project (SSD 7090) was approved in 2017 by the NSW Land and Environment Court (LEC) Approval 2017/108663.

Two applications have been made to modify the Extension Project Approval.

A Modification Application (MOD1) has been made to amend the offsets required by the Extension Project Approval. MOD1 was filed with the LEC in March 2019 and a hearing was held in February 2021. The application has not been determined.

A second Modification Application (MOD2), primarily to increase daily truck movements, was approved by the NSW Land and Environment Court (LEC) Approval 2020/00327172 on 9 June 2021 (the 'Extension Project Approval'). The Extension Project Approval limits the transport of saleable products from the Quarry to 2.6 million tonnes in any calendar year.

ES2.2 Environmental management

The Quarry operates in accordance with Gunlake's environmental policy and planning framework as documented in the Gunlake Quarry Environmental Management Strategy and associated environmental management plans.

These plans are regularly reviewed and updated in accordance with the Extension Project Approval and will be reviewed and updated should the Continuation Project be approved.

ES3 Gunlake Quarry Continuation Project

Gunlake seeks a new development approval for the Continuation Project that allows:

- ongoing Quarry operations;
- a maximum of 375 inbound and 375 outbound daily truck movements with no more than 4.2 million tonnes per annum (Mtpa) of saleable products transported from the site in any calendar year;
- 24-hours Quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday (with maintenance permitted outside of these hours);
- an extraction depth of 546 metres Australian Hight Datum (mAHD); and
- a 30-year Quarry life (from the date of Continuation Project approval).

ES4 Engagement

Gunlake has been actively engaging with the Quarry's stakeholders since 2008, including through the Gunlake Quarry Community Consultative Committee (established in 2013), the Gunlake website, community programs, newsletters, the community telephone line/email, and direct consultation with stakeholders.

Community and stakeholder engagement has been conducted specifically for the Continuation Project, including with local, State and Commonwealth government agencies, Registered Aboriginal Parties, the local community and residents. A community information session was held in December 2020 and meetings and interviews have been conducted with local residents and key stakeholders.

Matters raised in the engagement activities have been considered in the preparation of the EIS. Gunlake will continue its stakeholder engagement program to ensure matters raised by the community and other stakeholders are understood and addressed. Future engagement and consultation activities for the Continuation Project will include: public exhibition of this EIS; newsletters; and preparing a Submissions Report responding to the submissions received during the public exhibition.

ES5 Assessment of impacts

A range of detailed technical assessments were prepared by professional specialists in accordance with the Secretary's environmental assessment requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) on 6 May 2021, relevant legislation, policies and guidelines. This EIS describes the assessment methods used, the existing environment, the predicted impacts of the Continuation Project and the proposed management measures that will be implemented by Gunlake.

ES5.1 Traffic and transport

The Continuation Project will increase Quarry product truck movements along the Primary Transport Route (Brayton, Ambrose and Red Hills Roads from the Quarry entrance to the Hume Highway) from a maximum of 245 outbound and 245 inbound truck movements per day to a maximum of 375 outbound and 375 inbound truck movements per day. No changes are proposed to Gunlake Quarry traffic volumes on the Secondary Transport Route.

The Traffic Impact Assessment found that the five key intersections along the Primary Transport Route and the South Marulan Interchange currently operate with a level of service A (the highest category). Modelling that included forecast local traffic growth (to 2051), traffic from other local quarries and Gunlake Quarry Continuation Project (based on maximum truck movements) found that all intersections will continue to operate with a level of service A.

The Road Safety Assessment Report, which includes a Road Safety Audit, found that the road upgrades implemented following the Extension Project approval (practical completion August 2018) meet and exceed conditions of the Extension Project Approval. The application of the principles in the relevant Austroads guidelines ensure existing cross-sections, road geometry and intersection geometry support the proposed additional heavy vehicle movements. Impacts on road safety for all road users are considered to be negligible, with no major road safety hazards from the proposed increase in heavy vehicle volumes identified.

The Road Safety Audit found that key road safety hazards along the Primary Transport Route are appropriately managed and the level of road safety risk to road users is in the low to moderate range and is generally considered acceptable for a road of this type and traffic function. However, three aspects were highlighted for improvement: the road width across major culverts; installation of T-intersection warning signage on each approach to the intersections of Ambrose/Brayton Road and the Ambrose/Red Hill Road; and an inspection and renewal program to address deterioration in surface condition, line marking, guideposts, and other delineation, etc. Gunlake are in discussions with the road authority, Goulborn Mulwaree Council, regarding any future road upgrades and the inspection and renewal program.

It is not proposed to increase truck movements along the Secondary Transport Route (a maximum of 38 outbound trucks) so the Continuation Project will not impact current road safety on this route.

ES5.2 Noise and vibration

The Noise Impact Assessment found that noise levels from Quarry operations are predicted to be at, or below, (ie comply with) the relevant project noise trigger levels at all assessment locations with the exception of Receptor 2 (R2). This receptor is an existing dwelling that qualifies for voluntary acquisition in accordance with Schedule 3 Condition 1 of the Extension Project Approval. The predicted incremental change to noise levels at R2 compared to current noise emissions is negligible (<2 dB).

The future total road traffic noise levels, inclusive of Gunlake Quarry trucks associated with the Continuation Project, are predicted to satisfy the relevant road traffic noise criteria at the nearest potentially affected residences on Brayton Road, Ambrose Road and Red Hills Road. It is not proposed to change the number of quarry product trucks approved to use the Secondary Transport Route so there will be no change to road traffic noise levels along this route.

Blasting is proposed to continue up to twice per week as currently approved. Blasting has been conducted within the relevant criteria during the Extension Project and there are no changes to blasting vibration impacts predicted as a result of the Continuation Project.

ES5.3 Air quality

The Air Quality Impact Assessment found that ambient background airborne particulate concentrations are the major contributor to cumulative concentrations in the Quarry's airshed. Dispersion modelling of airborne particulate concentrations and deposition rates predicted that emissions from Continuation Project operations will not result in exceedance of any applicable criteria at any neighbouring assessment location.

ES5.4 Greenhouse gas emissions

The Air Quality Impact Assessment greenhouse gas (GHG) assessment found that the Continuation Project is predicted to generate 9,784 tonnes CO_2-equivalent per year of Scope 1 emissions and 8,748 tonnes CO_2-equivalent per year of Scope 2 emissions. Annual scope 1 and 2 GHG emissions generated represent approximately 0.0136% of total GHG emissions for NSW and 0.0035% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2019.

ES5.5 Groundwater

The Groundwater Assessment found that groundwater impacts are predicted to be minor and locally confined to around the quarry pit. A drawdown of 2 m is predicted to extend up to 1.3 km from the edge of the pit at the end of the Continuation Project (2051). This is less that the predicted maximum extent of the 2-m drawdown predicted for the Extension Project due to refinements in the model and the collection of additional groundwater monitoring data.

The groundwater inflows to the pit will remain low – a maximum of 68 megalitres per year is predicted over the life of the Continuation Project. No impacts to landholder bores are predicted. There are no high priority groundwater-dependent ecosystems in the project vicinity in accordance with the minimal impact considerations under the Aquifer Interference Policy.

Groundwater dewatering for quarry development is predicted to intercept some baseflow that would have discharged into the Chapmans Creek ephemeral watercourse. With no groundwater discharge to the surrounding environment, the potential risks to surface water quality and/or resources are low.

No cumulative groundwater impacts are predicted.

The final landform will create an inward hydraulic gradient. Salinities within the pit may increase slightly over time, however, there is negligible risk to groundwater in the regional fractured rock or adjacent surface water resources. There will be no impact on the beneficial use class ('less productive' and used for stock) of the groundwater source.

ES5.6 Surface water

The Surface Water Assessment found that the increased production, Quarry life and pit depth of the Continuation Project will reduce the likelihood and magnitude of overflows occurring from the water management system compared with the Extension Project. This is because the process water use associated with higher production will more than offset the predicted groundwater inflows. As overflows will be reduced, the Continuation Project is not predicted to result in a negative impact to water quality in the downstream catchments relative to the approved Quarry.

The Continuation Project is not expected to have any measurable change in flooding regime in downstream waterways.

ES5.7 Biodiversity

The Continuation Project has been designed to avoid additional adverse impacts to biodiversity by restricting disturbance to previously approved areas.

The Biodiversity Development Assessment Report identified that the Continuation Project will not have any direct impacts to native vegetation or habitat for threatened species. It will also not result in any direct or indirect impacts

to threatened species or communities or migratory species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Small portions of plant community types (PCT) 1256 and PCT 1330 are predicted to be impacted at a local scale by groundwater drawdown. However, the impacts to groundwater-dependent ecosystems arising from the Continuation Project are predicted to be minor in both extent and/or nature and represent a low risk of impact to groundwater-dependent ecosystems. The Continuation Project impacts to groundwater-dependent ecosystems are not predicted to increase as the predicted area of drawdown for the Continuation Project is less than the predicted area of drawdown for the approved Extension Project.

ES5.8 Aboriginal heritage

EMM consulted with the Registered Aboriginal Parties as part of preparation of the EIS. The Continuation Project activities will not include ground disturbance activities that have not been previously approved. Gunlake is seeking to re-include a small area approved to be disturbed by the original Quarry Approval but which is outside of the Extension Project disturbance boundary. If there are any Aboriginal heritage items within this area, they will be managed in accordance with the Quarry's Aboriginal Heritage Management Plan.

ES5.9 Land resources and rehabilitation

As described in the Land Resources and Rehabilitation report, Gunlake will continue to progressively rehabilitate areas where possible, although there are limited opportunities as most of the disturbed quarry areas will continue to be used during the Gunlake Quarry Continuation Project. The proposed final rehabilitation of the Quarry site at the end of the Quarry's life will not change as a result of the Continuation Project.

ES5.10 Waste

With the ongoing implementation of Gunlake's waste management measures, increased waste volumes are not predicted to result in any impacts.

ES5.11 Hazards

As determined by the SEPP 33 [State Environmental Planning Policy No. 33 — Hazardous and Offensive Development] screening, the Quarry is not potentially hazardous or offensive industry. The Continuation Project would not involve the construction or use of additional structures within bushfire prone land that would require bushfire risk management. No significant risks to public safety or public utilities have been identified.

ES5.12 Social

The Social Impact Assessment reviewed outcomes from engagement as part of ongoing Quarry operations and as part of the preparation of this EIS. In-depth interviews were conducted with local residents, key stakeholders, and service providers as part of the Social Impact Assessment. The in-depth interviews involved a discussion of the values, vulnerabilities and strengths of the local community, as well as the identification of perceived impacts and benefits as a consequence of the Continuation Project. Each of the service provider interviews also offered insights into the potential impacts and benefits of the Continuation Project to specific areas of service in the community. Data collected during in-depth interviews and outcomes of EIS engagement were used to inform the Social Impact Assessment.

The Continuation Project will provide long term livelihood benefits from ongoing and increased employment, community investment and involvement, and training and apprenticeship opportunities.

Gunlake currently provides community support in the form of their annual contribution commitments to organisations within the local and regional area. Gunlake also maintains partnerships with local employment and training services in the local and regional area, such as TAFE, Mission Australia, and the Goulburn District Education Foundation, to find apprenticeship and employment opportunities for local workers. Gunlake will continue to explore funding and grant opportunities, apprenticeship and training opportunities, and local employment within the local and regional area where need is determined.

Public safety related to increased truck movements on the primary transport route was a primary concern raised by stakeholders. Gunlake and Goulburn Mulwaree Council have implemented a road maintenance work plan and budget to enhance and maintain safety measures along the Primary Transport Route. Gunlake implements driver inductions, and enforces a driver code of conduct that requires compliance with road safety procedures and prohibits unsafe driving practices.

ES5.13 Economic

The Economic Assessment found that the Continuation Project is desirable and justified from an economic efficiency perspective, with incremental net production benefits to NSW of $74 million (accounting for environmental costs) compared to ongoing Extension Project operations.

The Continuation Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure. Quarry operations and associated product transport under the Continuation Project will provide 228 direct jobs, comprising 90 quarry jobs and 138 transport jobs (full-time equivalent jobs, drawn from a pool of about 200 drivers).

Standard regional economic impact assessment using input-output analysis estimates that the combined quarrying and transport components of the Continuation Project will provide the following annual direct and indirect annual effects to the local economy:

- $277 million in output;
- $115 million in value-added;
- $47 million in gross wages; and
- 731 jobs.

ES5.14 Historical heritage

No historical heritage sites have previously been identified within or in proximity to the Quarry site and, therefore, no impacts to historic heritage will result from the Gunlake Quarry Continuation Project.

ES5.15 Visual impacts

There will be no change to the existing visual amenity of the Quarry site as a result of the Continuation Project.

ES6 Evaluation of the project

ES6.1 Objects of the EP&A Act and biophysical, economic and social impacts of the development

An assessment of the consistency of the Continuation Project with the objects set out in Clause 1.3 of the EP&A Act found that it will meet each relevant object. It will meet the principles of ecologically sustainable development outlined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

ES6.2 Site suitability

The suitability of the site, with respect to potential land use conflicts with existing and future surrounding land uses, is demonstrated by the original Quarry Approval (MP 07_0074) and the Extension Project Approval (NSW LEC Approval 2017/108663). The Gunlake Quarry site is suitable for the Continuation Project as it will not result in any significant changes to impacts on existing or future surrounding land uses and will use suitable transport infrastructure to deliver saleable products to their markets.

ES6.3 Continuation Project justification

ES6.3.1 Utilisation of the rock resource

The Quarry is close to the Hume Highway and about 100 km from Greater Sydney, Australia's biggest construction materials market. The Quarry has a proven state significant rock resource of approximately 180 million tonnes of ignimbrite that continues well over 100 m below the surface. The Primary Transport Route provides a high-quality link between the Quarry and the Hume Highway.

The hard rock is suitable for uses in a range of quarry products including concrete and sealing aggregates, rail ballast, manufactured sand and road bases. To date, only a small proportion of the 180 million tonnes of the resource has been quarried. If approved, the Continuation Project will increase the amount of aggregate and other saleable products supplied by the Quarry to the Sydney and local markets (from up to 2.6 Mtpa, as currently approved, to up to 4.2 Mtpa) without increasing the previously approved disturbance area or significantly changing impacts from quarry operations.

ES6.3.2 The environment

The Quarry operates in accordance with Gunlake's environmental policy and planning framework that are documented in the Gunlake Quarry Environmental Management Strategy (Gunlake 2020a) and associated environmental management plans. These plans describe environmental monitoring and reporting to assess Quarry compliance with the Extension Project Approval and EPL conditions. These plans are regularly reviewed and updated in accordance with the Extension Project Approval and will be reviewed and updated should the Continuation Project be approved.

The Continuation Project has been designed to restrict disturbance to previously approved areas. Operations will remain similar to the currently approved Extension Project operations, and truck movements will only increase on the recently upgraded Primary Transport Route that has ample capacity for these truck movements. Therefore, there will be minimal impacts from the Continuation Project.

ES6.3.3 The community

The Quarry has an ongoing community engagement program and specific engagement regarding the Continuation Project was undertaken as part of preparing this EIS. Ongoing engagement will continue throughout Continuation Project operation.

Gunlake Quarry is one of a number of quarries in the local area. The local community recognises the importance of these quarries to the local economy and acknowledge Gunlake's contributions to the local community.

Public safety related to increased truck movements on the primary transport route was a primary concern raised by stakeholders. Gunlake and Goulburn Mulwaree Council have implemented a road maintenance work plan and budget to enhance and maintain safety measures along the Primary Transport Route, which is fully funded by Gunlake Section 7.11 contributions. Gunlake implements driver inductions, and enforces a driver code of conduct

that requires compliance with road safety procedures and prohibiting unsafe driving practices such as tailgating, convoying and speeding.

As described in this EIS, the upgraded Primary Transport Route enables increased truck movements while maintaining road safety.

The Continuation Project will provide long-term livelihood benefits from ongoing and increased employment, community investment and involvement, and training and apprenticeship opportunities.

The Continuation Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure. Quarry operations and associated product transport under the Continuation Project will provide 228 direct jobs, comprising 90 quarry jobs and 138 transport jobs (full-time equivalent jobs, drawn from a pool of about 200 drivers).

The Economic Assessment found that the Continuation Project is desirable and justified from an economic efficiency perspective, with net production benefits to NSW of $74 million (accounting for environmental costs) in addition to the net production benefits of the approved Extension Project.

Standard regional economic impact assessment using input-output analysis estimated that the combined quarrying and transport components of the Continuation Project will provide the following annual direct and indirect annual effects to the local economy:

- $277 million in output;
- $115 million in value-added;
- $47 million in gross wages; and
- 731 jobs.

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1 Introduction

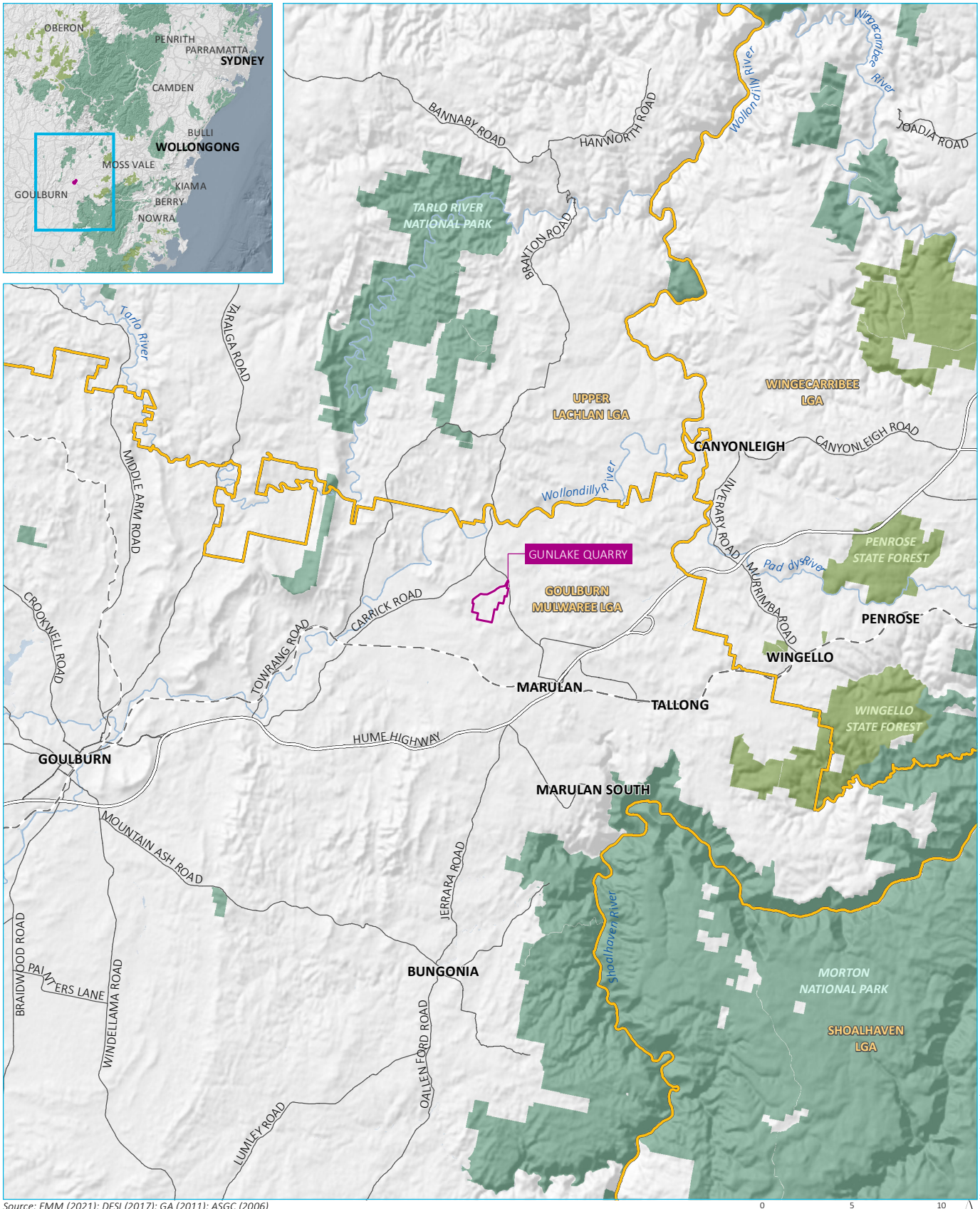
1.1 The project

Gunlake Quarries Pty Ltd (Gunlake) operates a hard rock quarry (the 'Quarry') located at 715 Brayton Road, Marulan NSW. The Quarry is approximately 7 kilometres (km) north-west of Marulan in the Goulburn Mulwaree local government area (see Figure 1.1).

Since receiving the Extension Project approval in 2017 (SSD 7090, NSW Land and Environmental Court Approval 20017/108663), the tonnage of saleable product dispatched by the Quarry has steadily increased. With an infrastructure boom in the Greater Sydney region, Gunlake forecast that demand for products from the Quarry will continue to increase. It is proposed to increase the tonnage of saleable products dispatched from the Quarry in response to this increased demand. This is known as the Gunlake Quarry Continuation Project (the 'Continuation Project'). The Continuation Project operations would remain similar to the currently approved Extension Project operations, with proposed changes primarily relating to the increased rate of extraction, processing and transport. No vegetation clearance beyond that previously approved would be required.

Gunlake seeks a new development approval for the Continuation Project that allows:

- ongoing Quarry operations;
- a maximum of 375 inbound and 375 outbound daily truck movements with no more than 4.2 million tonnes per annum (Mtpa) of saleable products transported from the site in any calendar year;
- 24-hours Quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday (with maintenance permitted outside of these hours);
- an extraction depth of 546 metres Australian Hight Datum (mAHD); and
- a 30-year Quarry life (from the date of Continuation Project approval).



Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006)

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KEY

- Site boundary
- Local government area
- Rail line
- Highway
- Major road
- River
- Waterbody
- NPWS reserve
- State forest

Regional context

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 1.1

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The following aspects of the Quarry's operations are **not** proposed to be changed (see Section 3.3):

- the average and maximum number of approved truck movements along the Secondary Transport Route;
- the Quarry operation hours, and the hours that the Primary and Secondary Transport Routes are used; or
- the hours and frequency of blasting.

No increase to the previously approved (PA 07_0074/NSW LEC Approval 2017/108663) surface disturbance area is proposed.

The objectives of the Continuation Project are to:

- meet future demand for premium aggregates and civil products for the residential, industrial and commercial construction sectors;
- increase the supply of low-cost construction materials into the Sydney and regional markets;
- allow approved resources to be used more efficiently and sustainably; and
- provide significant benefits for the regional and local economies.

This environmental impact statement (EIS) accompanies a new State significant development (SSD) application for the Continuation Project. Gunlake submitted a request for Secretary's environmental assessment requirements (SEARs) to the Department of Planning, Industry and Environment (DPIE) on 18 December 2020, along with supporting documentation describing the project, stakeholder engagement, key matters to be addressed in the EIS and the proposed assessment methods. The SEARs were issued on 6 May 2021. An outline of how the SEARs have been addressed in this EIS is provided in Appendix A.

1.2 The applicant

The Gunlake Group, consisting of Gunlake Concrete and Gunlake Quarries, is an Australian family-owned business that has rapidly expanded to meet customer and market demands, particularly across the Greater Sydney area, Southern Highlands and Tablelands.

Gunlake Group currently owns and operates five concrete plants in Sydney, a National Association of Testing Authorities accredited material testing laboratory, a cement import and distribution terminal at Port Kembla and Gunlake Quarry. The group has other sites in the planning and development stages. Throughout its operations, Gunlake currently employs over 200 staff, numerous contractors and is the largest independent quarry and concrete production company in NSW.

The Applicant is:

Edward O'Neil
Managing Director
Gunlake Quarries Pty Ltd
ABN: 55118686963
Level 2, 53 Cross Street
Double Bay NSW 2028

Gunlake's nominated contact is:

David Kelly
Head of Development
Gunlake Quarries Pty Ltd
Level 2, 53 Cross Street
Double Bay NSW 2028

1.3 Project background

1.3.1 Approvals history

The Quarry was originally approved in 2008 under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This approval (PA07_0074) was surrendered in 2018 after an SSD approval was granted for the Gunlake Quarry Extension Project (the 'Extension Project'). The Extension Project (SSD 7090) was approved in 2017 by the NSW Land and Environment Court (LEC) Approval 2017/108663.

Two applications have been made to modify the Extension Project Approval.

A Modification Application (MOD1) has been made to amend the offsets required by the Extension Project Approval. MOD1 was filed with the LEC in March 2019 and a hearing was held in February 2021. The application has not been determined.

A second Modification Application (MOD2) was filed with the LEC in November 2020, primarily to increase daily truck movements:

- from an average of 185 inbound and 185 outbound movements to an average of 220 inbound and 220 outbound movements; and
- from a maximum of 245 inbound and 245 outbound movements to a maximum of 295 inbound and 295 outbound movements.

The MOD2 application was approved by the NSW LEC Approval 2020/00327172 on 9 June 2021 (the 'Extension Project Approval'). The Extension Project Approval allows increased truck movements as listed above and limits the transport of saleable products from the site to 2.6 million tonnes in any calendar year.

1.3.2 Environmental management

i Environmental policy and system

Gunlake's environmental policy and planning framework are documented in the *Gunlake Quarry Environmental Management Strategy* (Gunlake Quarries 2020a).

The key environmental objectives of Gunlake Quarries are:

- to satisfy all statutory requirements;
- to be recognised as a company that operates in an environmentally responsible manner with due consideration for its role and responsibilities in the community; and
- to ensure the provision of a consistent and uniform approach to environmental management, including high standards of environmental protection.

The Gunlake Quarry Environmental Management Strategy (Gunlake Quarries 2020a) provides the Quarry's planning framework including the Quarry management structure; responsibilities and authorities; resources and training; inspection requirements; reporting requirements; process planning; communications; and execution and implementation.

ii Environmental management plans

The Quarry operates according to the following environmental management plans that have been approved by the DPIE Planning Secretary:

- Aboriginal Heritage Management Plan;
- Air Quality Management Program;
- Rehabilitation and Biodiversity Offset Management Plan;
- Soil and Water Management Plan;
- Noise and Blast Management Plan; and
- Traffic Management Plan.

These plans are regularly reviewed and updated in accordance with the Extension Project Approval and will be reviewed and updated should the Continuation Project be approved.

1.3.3 Feasible alternatives

The primary alternative to the Continuation Project is for the Quarry to operate as currently approved (ie the 'no project' alternative). This will mean that the objectives of the Continuation Project as detailed in Section 1.1 will not be realised. Specifically, the consequences of the Quarry continuing to operate as approved are that:

- less quarry and concrete products will be made available for the residential, industrial and commercial construction sectors, which could increase the cost of these products and overall construction costs which may discourage development that will benefit local and regional communities;
- potential low-grade construction products will be placed as waste on the Quarry's emplacements rather than being sold and used due to the lower tonnage and truck movement limit preventing the more efficient and sustainable use of the existing hard-rock resource; and
- the socio-economic benefits of the Continuation Project to the local, regional and state communities will not be realised.

1.3.4 Strategies adopted to avoid or minimise project impacts

The key strategies that have been adopted to avoid or minimise the impacts of the Continuation Project include:

- using the Primary Transport Route, which has been substantially upgraded by Gunlake, to minimise road transport impacts (see Section 2.1.2);
- not proposing any increase to truck movements on the Secondary Transport Route from those approved by the original Quarry consent (PA07_0074) issued in 2008;
- continuing implementation of the mitigation and management measures that were adopted for the Extension Project, including enclosing the primary crusher to reduce noise emissions;
- extracting the resource from within the currently approved footprint and using currently approved extraction methods; and

- implementing a project specific engagement program in addition to ongoing engagement for the Quarry (refer to Section 5 for further information on engagement methods and outcomes).

The Quarry's disturbance footprint, as approved by the original quarry consent (PA07_0074) and the Extension Project Approval (SSD 7090), was designed to avoid or minimise impacts where possible. For unavoidable biodiversity impacts of the Quarry, biodiversity offsets have been established in accordance with the Framework for Biodiversity Assessment (OEH 2014) and the EPBC Act Environmental Offsets Policy (SEWPaC 2012). These offsets result in a net biodiversity gain.

1.4 Related development

The Continuation Project includes the activities approved by the Extension Project Approval, as modified by MOD2. The Extension Project Approval provides biodiversity offset requirements to compensate for the impacts to biodiversity as a result of the original quarry (including modifications) and the Extension Project. A Modification Application (MOD1) has been made to amend the required offsets. MOD1 was filed with the LEC in March 2019 and a hearing was held in February 2021. The application has not been determined.

It is envisaged that the Extension Project Approval will be surrendered should the Continuation Project be approved. However, the MOD1 offset amendment, if approved, would be incorporated into the Continuation Project.

2 Strategic context

2.1 Project justification

2.1.1 Need for quarry products

There is increasing demand for construction materials in both the greater Sydney and local regional markets due to the implementation of a huge infrastructure program by the State and Federal governments in NSW, particularly in Greater Sydney. This has resulted in an increased demand for premium aggregates as well as civil products such as road base, drainage aggregates, crusher dust for the residential, industrial and commercial construction sectors.

There are a range of government strategies/plans which support the growing need for construction materials in the local, regional and Greater Sydney markets including:

- Local Strategic Planning Statement (Goulburn Mulwaree Council 2020);
- Western Sydney Aerotropolis Plan (Western Sydney Planning Partnership 2020);
- Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission 2018);
- Building Momentum – State Infrastructure Strategy 2018–2038 (Infrastructure NSW 2018);
- Future Transport 2056 Strategy (Transport for NSW 2018);
- A 20-Year Economic Vision for Regional NSW 2018–2038 (NSW Government 2018);
- Greater Sydney Services and Infrastructure Plan (Transport for NSW 2018);
- Regional NSW Services and Infrastructure Plan (Transport for NSW 2018);
- South East and Tablelands Regional Plan 2036 (Department of Planning and Environment 2017);
- Barton Highway Improvement Strategy (Roads and Maritime Services 2017);
- Tablelands Regional Community Strategic Plan 2016–2036 (Cardno 2016); and
- Sydney to Canberra Corridor Regional Strategy (Department of Planning 2008).

The high quality of Gunlake's quarry and concrete products mean that that the Continuation Project will help to meet the increased future demand.

2.1.2 Transport benefit

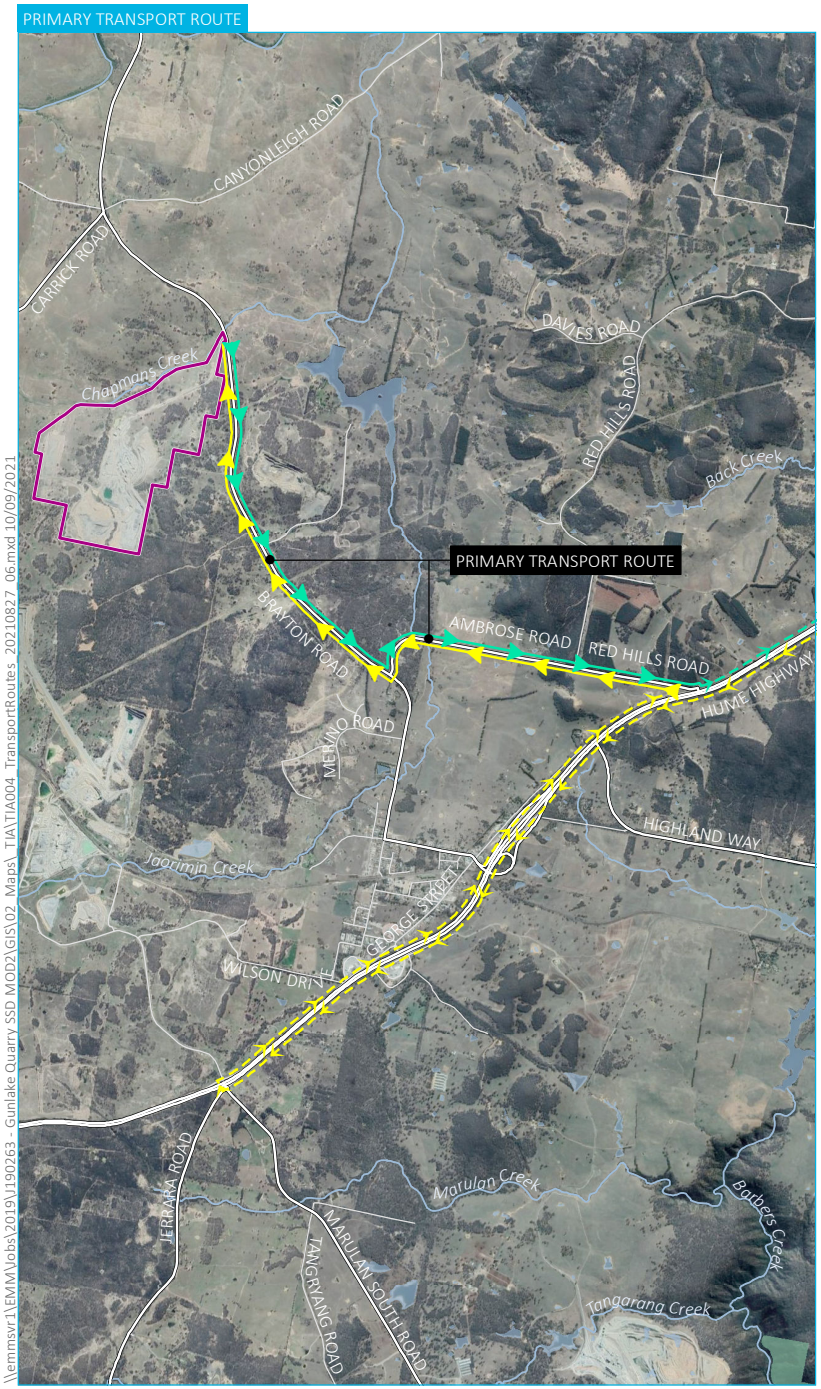
The Quarry has approval to use two transport routes to reach the Hume Highway, the Primary Transport Route and the Secondary Transport Route (Figure 2.1).

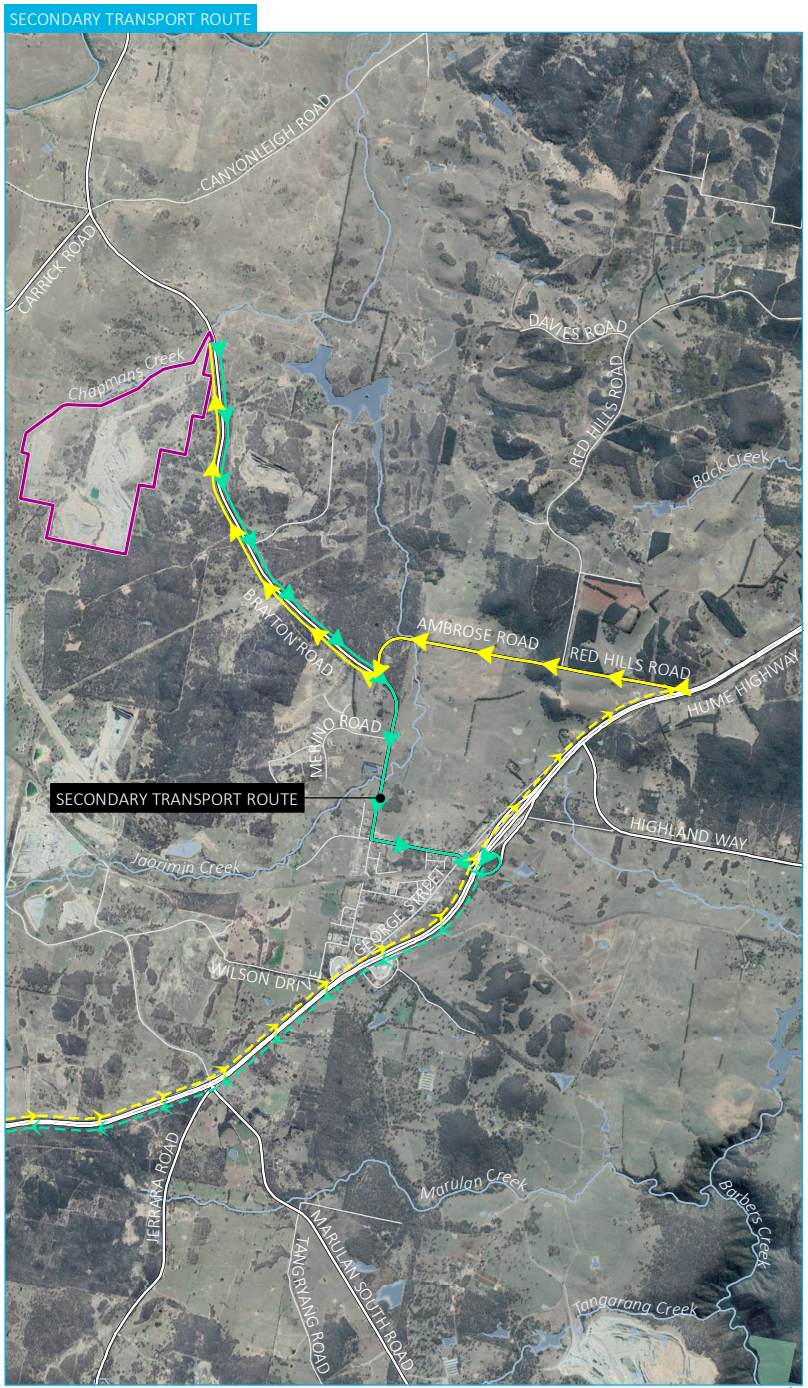
Since the Extension Project Approval was granted in 2017, the Primary Transport Route has been substantially upgraded in accordance with the Austroads Guidelines so that it meets the requirements for rural roads with 1,000 to 3,000 average vehicle movements per day, exceeding the requirements of the Extension Project Approval conditions. An example of the upgrade of Ambrose Road is provided in Photograph 2.1 (prior to upgrade) and Photograph 2.2 (following upgrade).

Gunlake has implemented all of the traffic management and road safety changes required by the Extension Project Approval (Conditions 25, 27 and 28 of Schedule 3) and has continued to introduce higher payload trucks to its transport fleet.

The increased truck movements under the Continuation Project will all occur on the recently upgraded Primary Transport Route that has been designed to accommodate comfortably the additional truck movements.

The number of approved truck movements along the Secondary Transport Route and the approved operation and transport hours will not change under the Continuation Project.





KEY

- Site boundary
- Inbound transport route
- Inbound transport route (highway)
- Outbound transport route
- Outbound transport route (highway)
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve

\\emmsvr1\EMM\Jobs\2019\190263 - Gunlake Quarry SSD MOD2\GIS\02 Maps\ TIA\TIA004 TransportRoutes 20210827 06.mxd 10/09/2021

Source: EMM (2021); Google Earth (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

N

Transport routes

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 2.1

EMM
creating opportunities

Photograph 2.1 Ambrose Road – looking west (July 2017)

Photograph 2.2 Ambrose Road – looking west (July 2018)

2.1.3 Economic and social benefit

The Continuation Project will have the following socio-economic benefits:

- local employment opportunities with an increase in full-time jobs at the Quarry from the current approximately 52–55 full-time jobs to 70 full-time jobs;
- continued, and increased, opportunities for the approximately 200 contract truck drivers that deliver saleable products, on either a full-time or part-time basis with many of these drivers transitioning from a part-time to a full-time basis;
- increase reliance on, and ongoing employment of, 20 contractors;
- an increasing reliance on local ancillary businesses;
- increased contribution to the local economy;
- increased Gunlake support for local community events; and
- increased local road contributions (Section 7.11) to Council for transport route maintenance.

There will also be a significant public benefit beyond Marulan and the local area with the increased supply of low-cost construction materials into the Sydney and regional markets.

Details of the economic and social benefits of the Continuation Project are provided in Sections 6.11 and 6.12 respectively.

2.2 Key features of the site and surrounds

The Quarry is located at 715 Brayton Road, Marulan and quarry activities take place on Lot 13 DP 1123374 (the 'Quarry site'). There are biodiversity management areas in Lot 13 DP1123374, Lot 12 DP1123374, Lot 271 DP750053 and Lot 1 DP841147. These lots are all owned by Gunlake Quarries Pty Ltd.

The local context of the Quarry site is shown in Figure 2.2 and described below.

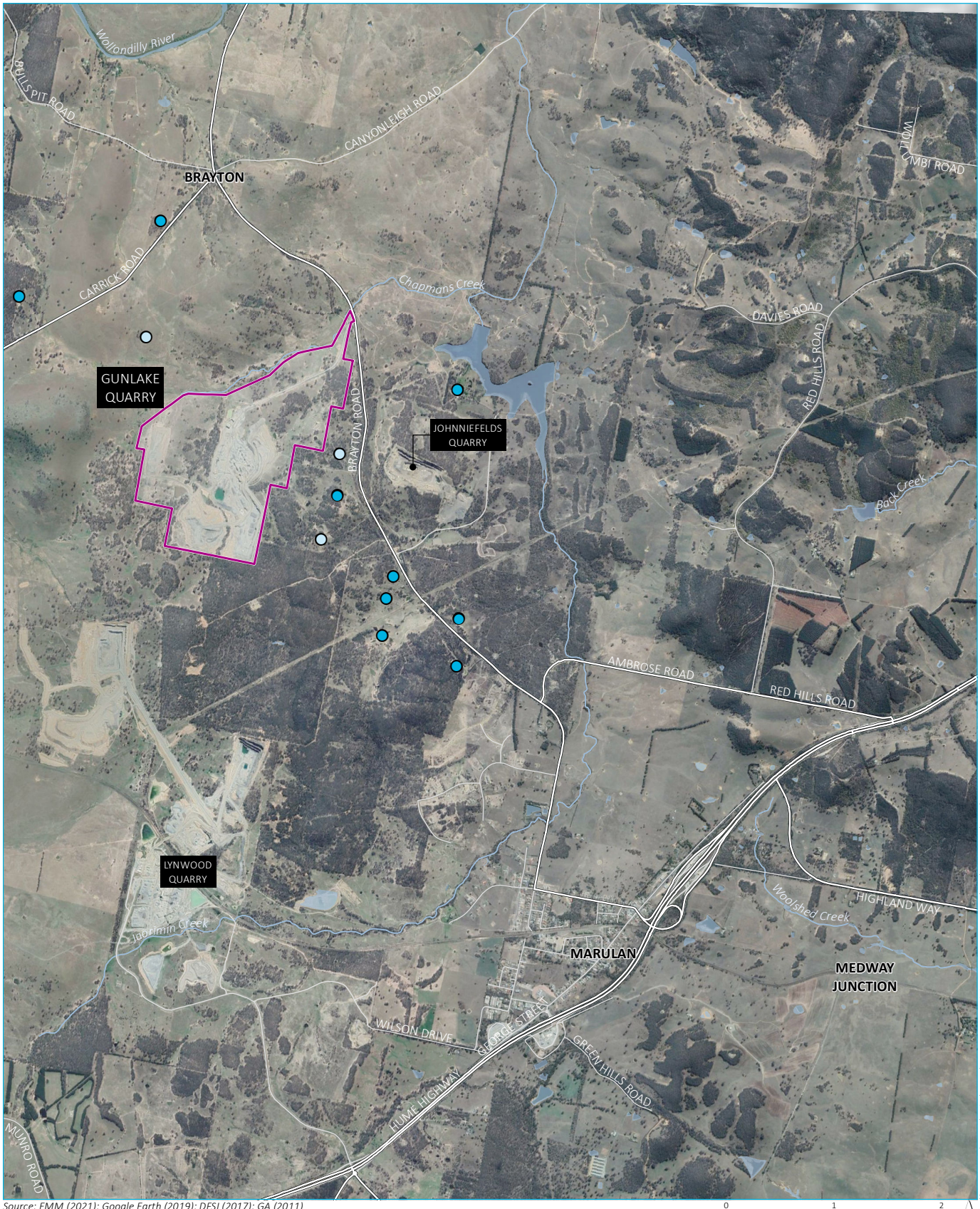
Land surrounding the Quarry site is predominately used for agriculture, generally grazing with low population density. Built features immediately surrounding the Quarry site include dams, access tracks and fences.

There are four residences within 1 km of the Quarry site, two of which are owned by Gunlake. There are scattered rural residences further from the Quarry site. The nearest town is Marulan, about 7 km south-east of the Quarry site.

At their closest points, Johnniefelds Quarry is about 1 km to the east of the Quarry site and Lynwood Quarry's Granite Pit is about 750 m to the south of the Quarry site. Both quarries are operated by Holcim (Australia) Pty Limited. Johnniefelds Quarry is currently non-operational and is under 'care and maintenance'.

The local Aboriginal land council for the site and its surrounds is Pejar Local Aboriginal Land Council.

The native vegetation in the Quarry site and surrounds has been highly modified by historical clearing and grazing. The patches of remnant vegetation largely occur in drainage lines. There are some large blocks of native vegetation to the south and south-east of the Quarry site. A large portion of the Quarry site and land immediately to the east and south is mapped as having terrestrial biodiversity value under the Goulburn Mulwaree Local Environmental Plan 2009 (Goulburn Mulwaree LEP). The entire Quarry site and surrounding lands is mapped as bushfire prone land. The majority of the approved disturbance area has been cleared as part of Quarry operations.



Source: EMM (2021); Google Earth (2019); DFSI (2017); GA (2011)

0 1 2 km

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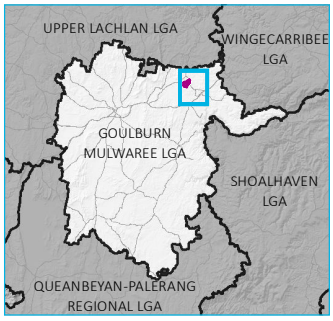

KEY

- Site boundary
- Residence
- Owned by Gunlake
- Major road
- Minor road
- Named watercourse
- Waterbody

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Local context

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 2.2

EMM
creating opportunities

There are two creek systems in the Quarry site, Chapmans Creek and an unnamed tributary of Chapmans Creek. Chapmans Creek is an ephemeral watercourse located on the Quarry site's northern boundary. Chapmans Creek flows north-east into Joarimin Creek. Joarimin Creek is also ephemeral and drains to the Wollondilly River, approximately 8.6 km north-east of the Quarry site. The Wollondilly River is a perennial river and is a tributary in the Warragamba Dam catchment area which is part of the Sydney Drinking Water Catchment area.

2.3 Cumulative impacts with other development

Developments in the vicinity of the Quarry that have the potential to generate cumulative impacts with the Continuation Project include Johnniefelds Quarry and Lynwood Quarry. These developments have been allowed for in the cumulative assessments for noise, air quality and traffic (see Section 6). Although, Johnniefelds Quarry is currently non-operational, the cumulative assessments have conservatively assessed impacts under a full operation scenario.

Potential cumulative impacts include use of transport routes by local traffic (transport and noise impacts); agricultural and residential uses generating air quality emissions (dust generation and wood heater emissions); and social impacts and benefits associated with other quarries and industries around Marulan. These impacts have been accounted for through the incorporation of background data into modelling.

2.4 Agreements with other parties

2.4.1 Acquisition and mitigation

Two private residences have acquisition and/or mitigation rights under the Extension Project approval:

- R2 which is subject to acquisition on request or to additional mitigation on request as a result of noise emissions from the Quarry; and
- R7 which is subject to additional mitigation on request as a result of noise emissions from the Quarry.

2.4.2 Road maintenance

Gunlake pay a Section 7.11 contribution to Goulburn Mulwaree Council in accordance with the Goulburn Mulwaree Local Infrastructure Contributions Plan 2021. The contributions collected by Council from Gunlake are used to fund road maintenance and rehabilitation of the Primary and Secondary Transport Routes. Council has a fully funded and budgeted road maintenance program for the transport routes using the Gunlake Section 7.11 contributions.

3 Project description

3.1 Approved and proposed project description

As noted in Section 1.1, the Continuation Project operations will remain similar to the currently approved Extension Project operations, with proposed changes primarily relating to the rate of extraction, processing and transport.

A new SSD application is considered appropriate as opposed to a modification of the Extension Project (see Section 4.2). The Continuation Project approval (if granted) would therefore apply to all quarry operations. Consequently, the project description in this chapter includes the Quarry as approved by the Extension Project Approval combined with the proposed Continuation Project.

It is envisaged that the Extension Project Approval will be surrendered should the Continuation Project be approved.

3.2 Project overview

Gunlake seeks a new development approval for the Continuation Project that allows:

- ongoing quarry operations;
- a maximum of 375 inbound and 375 outbound daily truck movements with no more than 4.2 Mtpa of saleable products transported from the site in any calendar year;
- 24-hours quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday (with maintenance permitted outside of these hours);
- an extraction depth of 546 m AHD; and
- a 30-year quarry life (from the date of Continuation Project approval).

3.3 Currently approved Extension Project versus proposed Continuation Project

A summary of the key elements of the approved Extension Project compared to the Continuation Project is provided in Table 3.1.

Table 3.1 Extension Project compared to the Continuation Project

Project element	Approved Extension Project	Proposed Continuation Project
Extraction method	Blasting and excavation.	Blasting and excavation.
Resource	Ignimbrite hard-rock.	Ignimbrite hard-rock.
Extraction	Quarry pit - pit depth of 572 m AHD.	Quarry pit - pit depth of 546 m AHD (ie 26 m deeper than for the Extension Project). No change to pit disturbance area.
Operations	Onsite rock processing, including crushing and screening.	Onsite rock processing, including crushing and screening.

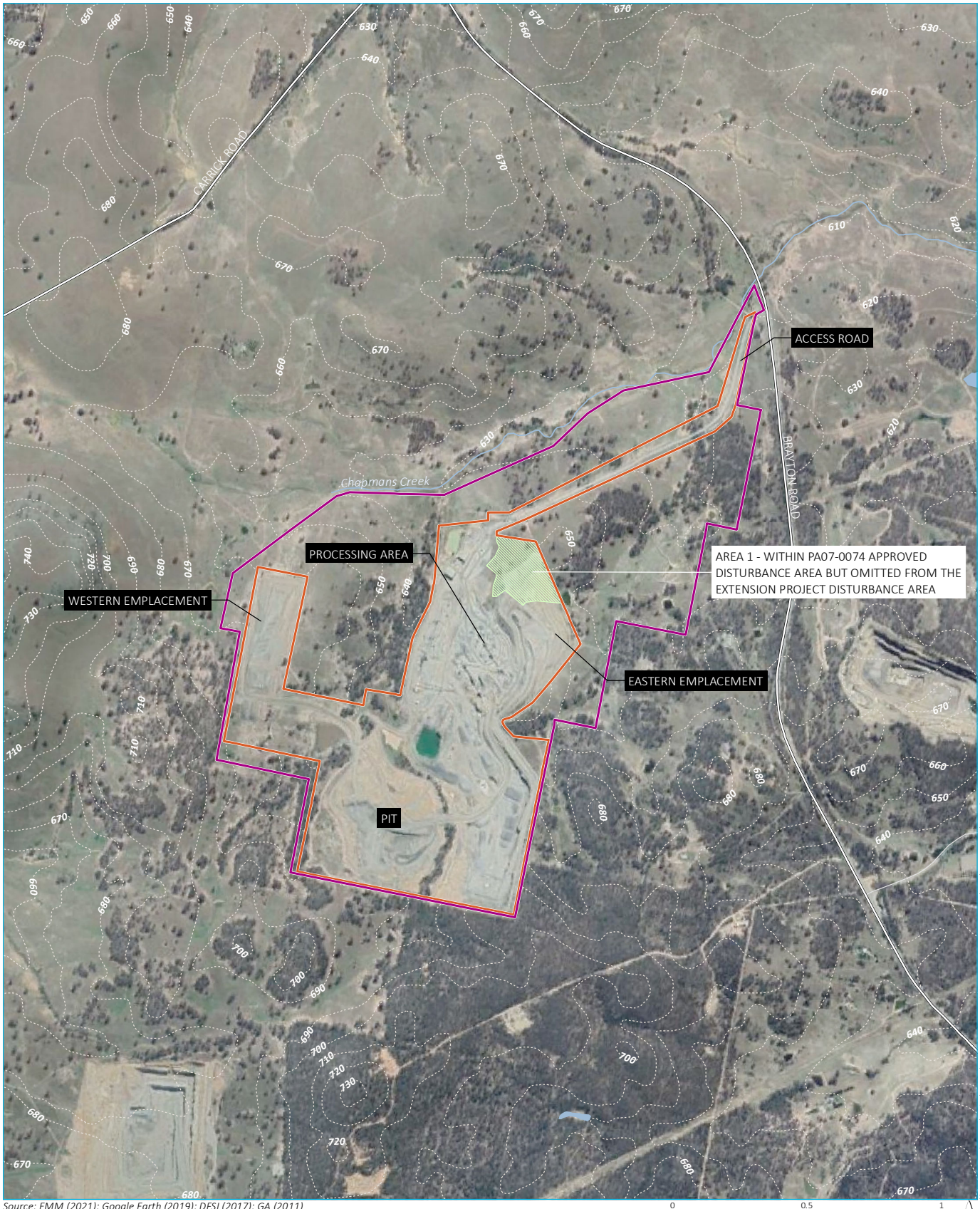
Table 3.1 Extension Project compared to the Continuation Project

Project element	Approved Extension Project	Proposed Continuation Project
Saleable product transport	Transport of up to 2.6 Mtpa of saleable products. Truck movements limited to: • a maximum of 295 inbound movements and 295 outbound movements, including no more than 38 outbound truck movements on the Secondary Transport Route, per working day; and • an average of 220 inbound movements and 220 outbound movements, including no more than 25 outbound movements on the Secondary Transport Route, per working day (averaged over the working days in each quarter).	Transport of up to 4.2 Mtpa of saleable products. Truck movements limited to: • a maximum of 375 inbound movements and 375 outbound movements, including no more than 38 outbound laden movements on the Secondary Transport Route, per working day; and • an average of no more than 25 outbound movements on the Secondary Transport Route, per working day (averaged over the working days in each quarter).
General infrastructure	Offices, amenity buildings, processing plant and other minor infrastructure.	Offices, amenity buildings, processing plant and other minor infrastructure.
Management of wastes	Overburden is emplaced in designated emplacement areas. Receipt of up to 30,000 tonnes of cured concrete per calendar year for beneficial reuse/recycling. No other classified waste materials to be received on site.	Overburden is emplaced in designated emplacement areas. Receipt of up to 50,000 tonnes of cured concrete per calendar year for beneficial reuse/recycling. No other classified waste materials to be received on site.
Hours of operation	24-hours quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday. Maintenance anytime (provided that the activity is not audible at any privately-owned residence).	24-hours quarry operations Monday to Saturday, except 6 pm Saturday to 2 am Monday. Maintenance anytime (provided that the activity is not audible at any privately-owned residence).
Blasting	Up to twice weekly.	Up to twice weekly.
Quarry life	To 30 June 2042.	Extension of the quarry life to 30 years from the date of approval.

3.4 Project area

Quarrying operations will remain within the Quarry site on Lot 13 DP 1123374 and Lot 1 DP1246715. The proposed Continuation Project footprint is provided in Figure 3.1. No changes to the previously approved (PA07_0074/NSW LEC Approval 2017/108663) disturbance area are proposed. There will continue to be biodiversity management areas in Lot 13 DP1123374, Lot 12 DP1123374, Lot 271 DP750053 and Lot 1 DP841147.

It is proposed to rectify the Extension Project disturbance boundary to include Area 1 (see Figure 3.1) for which impacts have previously approved and for which biodiversity offsets have been provided.



Source: EMM (2021); Google Earth (2019); DFSI (2017); GA (2011)

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GDA 1994 MGA Zone 55

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KEY

- Site boundary
- Continuation project disturbance area
- Area 1
- Major road
- Minor road
- Topographic contour (10 m interval)
- Named watercourse
- Waterbody

Quarry site

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 3.1

EMM creating opportunities

3.5 Physical layout and design

3.5.1 Site infrastructure

Quarry site infrastructure used will include, but is not limited to, the following:

- processing plant areas;
- product stockpiles;
- weighbridges;
- site offices and amenities;
- toilet and ablution facilities;
- hardstand and truck/machinery/quarry plant parking areas;
- light vehicle parking facilities;
- maintenance workshops and wash bay;
- bunded fuel storage and bays; and
- access roads.

3.5.2 Extraction area and resource

The Quarry extracts hard rock from a proven resource of approximately 180 million tonnes of ignimbrite. The rock resource is within the Devonian Bindook Volcanic Complex which comprises a north-northeast trending series of volcanic units located north of the intrusive Marulan Granite. The igneous rock deposit continues well over 100 m below the ground surface. To date, only a small proportion of the resource has been quarried.

The Quarry's approved extraction area is located in the south of the Quarry site (Figure 3.1). Extraction to a depth of 546 mAHD is proposed.

The site layout, extraction plans and cross sections are provided in Appendix B.

3.5.3 Emplacement areas

The Eastern and Western emplacements will continue to be used during the Continuation Project (Figure 3.1). These emplacement areas have been located to maximise their acoustic and visual screening properties. They have been designed to enable the external walls to be progressively shaped and rehabilitated.

The emplacements will continue to be progressively vegetated to stabilise the landform.

3.5.4 Access

The Quarry will continue to be accessed from Brayton Road via the Quarry's private access road. The access road has two lanes, is sealed, and is approximately 1.5-km long. There is an acceleration lane on Brayton Road for trucks leaving the Quarry.

3.5.5 Water management

The Quarry has a surface water management system for the capture, management and storage of dirty and clean water. The surface water management system is documented in the Gunlake Quarry Soil and Water Management Plan (Gunlake 2020b) that has been approved by the Planning Secretary. The approved surface water management system is presented in the surface water assessment in Appendix F.6. The key water management strategy adopted across the site is containment and management of potentially sediment-laden runoff from disturbed areas and reuse where feasible. Water enters the Quarry pit as rainfall runoff from the pit area and will enter from groundwater inflows when the pit base reaches the groundwater table. Key aspects of the approved water management strategy are:

- a clean water diversion system to divert runoff from the clean water catchment that is south of the pit;
- the Process Water Dam, the Pit Dewatering Dam (to be constructed once the groundwater table is intercepted), pit sump and sedimentation dams to collect runoff from dirty water catchments;
- use of stored water for process water and for plant and haul road dust suppression to reduce dam water levels and minimise the frequency and volume of discharges;
- release of water during periods of water surplus when dam water quality is suitable (see Figure 5.1 of the surface water assessment, EIS Appendix F.6);
- capture of rainwater from the administration office and maintenance shed roofs, with harvested water used for non-potable uses in the bathrooms and kitchen facilities; and
- operation of a septic system to manage wastewater from the Quarry's amenities.

The Quarry water management system will continue to be used for the Continuation Project. Management and monitoring of soil and water will continue to be conducted in accordance with the Gunlake Quarry Soil and Water Management Plan (Gunlake 2020b). This plan will be reviewed and updated following approval of the Continuation Project.

3.5.6 Lighting

Permanent lighting in the processing area ensures safe operating conditions. This lighting is positioned downwards and away from sensitive receptors to minimise emissions and nuisance impacts to surrounding landowners and road users.

3.5.7 Fuel

Fuel and oil will continue to be stored within bunded areas or in self-bunded containers.

3.5.8 Explosives

Explosives for blasting will continue to be delivered to the Quarry as required.

3.6 Uses and activities

3.6.1 Quarrying

Key quarrying activities that will continue as part of the Continuation Project are:

- removal of vegetation, topsoil and overburden from the pit area (which will remain the same as approved by the Extension Project);
- storage of overburden in emplacement areas;
- drilling and blasting;
- loading rock to off-road haul trucks at the quarry face and transport to the processing area or an emplacement;
- processing (including crushing and screening) of the quarried rock;
- road truck loading;
- transport of saleable products to markets; and
- use of Quarry infrastructure.

These activities are described further below.

i Vegetation clearing

Vegetation is cleared in progressive campaigns. In each campaign, the extent of clearing is just sufficient for the subsequent months of quarrying.

Prior to any major vegetation clearing and surface disturbance, the following erosion and sedimentation prevention measures will be implemented as required:

- construction of a temporary diversion bank upslope of the area to be cleared to divert clean water into natural drainage lines or designated storage dams; and
- construction of catch drains or banks down slope of the area to be cleared to direct runoff to sediment basins or storage dams for use in dust suppression.

ii Soil removal and stockpiling

Topsoil and subsoil is stripped using an excavator or dozer and placed directly onto completed sections of the final landform. Where this is impractical and stockpiling is necessary, the topsoil and subsoil is stockpiled separately.

iii Surface overburden removal and emplacement

Surface overburden is removed using an excavator and loaded to dump trucks. Surface overburden is removed progressively in front of the quarry bench.

iv Blasting

Blasting will continue to occur up to twice weekly (refer to Section 3.6.7).

v Rock extraction

Rock from the base of the blasted face is loaded to off-road haul trucks. The rock is hauled to the processing area, and overburden is hauled to an emplacement via the Quarry's internal haul roads.

The pit will continue to be developed in a series of benches with haul roads progressively developed within the pit.

vi Processing

Rock is processed to form saleable products in the processing area. This area includes primary, secondary, tertiary and quaternary crushers; screens; conveyors; radial stackers; and stockpiles.

Once crushed to the required size, product is dispatched to a stockpile by radial stacking conveyors.

Overburden from the processing area is hauled to an emplacement via the Quarry's internal haul roads.

vii Dispatch

Stockpiled products are generally loaded by a front-end loader to road trucks for delivery to markets.

3.6.2 Quarry product transport

i Transport routes

All saleable products are transported from the Quarry to markets by truck. The Continuation Project will continue to use the currently approved Primary and Secondary Transport Routes.

Trucks delivering saleable products to markets to the north and returning from these destinations use the Primary Transport Route which consists of the following roads:

- Brayton Road between Ambrose Road and the Gunlake Quarry access road;
- Ambrose Road between Brayton Road and Red Hills Road; and
- Red Hills Road between Ambrose Road and the Hume Highway.

The eastern end of Red Hills Road can only be accessed from the northbound side of the Hume Highway. Inbound quarry trucks, returning from the north, are required to pass the Red Hills Road intersection and use the South Marulan Road interchange, approximately 3.5 km south-west of Marulan, to leave the southbound highway, cross the interchange bridge and join the northbound highway before travelling north to exit the highway at Red Hills Road (Figure 2.1).

The Primary Transport Route between the Quarry and the Hume Highway is about 7.7-km long.

The Secondary Transport Route is only used by outbound trucks travelling to markets south of the Quarry. The Secondary Transport Route consists of Brayton Road between the Quarry access road and the Hume Highway's southbound access ramp at Marulan.

ii Saleable product transport

The Continuation Project will transport no more than 4.2 Mtpa of saleable products from the site in any calendar year.

There will be no more than 375 inbound and 375 outbound daily truck movements on any given day to/from the Quarry.

Gunlake currently has approval for a daily average of 25 outbound truck movements, and a daily maximum of 38 outbound trucks movements on the Secondary Transport Route. It is not proposed to change the number of trucks that are allowed to use the Secondary Transport Route.

3.6.3 Other transport

There will also be a small number of transport movements associated with employee travel (light vehicles), fuel deliveries and service vehicles.

3.6.4 Rehabilitation and decommissioning

Gunlake progressively rehabilitates completed quarry areas. Rehabilitation of the Eastern and Western emplacements has commenced with land forming and revegetation works completed in some areas.

The full horizontal extent of the pit will be developed (the first bench) with deeper benches progressively developed, increasing the quarry pit depth. There will be no opportunity to progressively rehabilitate the quarry pit until final quarry depth is reached.

A Rehabilitation and Biodiversity Offset Management Plan (Gunlake 2015) has been prepared for the Quarry as required under the Extension Project Approval. This plan will be updated and will continue to be implemented for the Continuation Project.

At closure, Gunlake will decommission and remove the site infrastructure and roads not to be retained in the final landform.

3.6.5 Water use

The Quarry uses water for dust suppression within the quarry site.

3.6.6 Waste management

Overburden is placed in the emplacements as described in Section 3.5.3.

The management of other waste generated on site includes:

- General waste is segregated and collected for off-site recycling or disposal by licensed contractors. General waste includes:
    - office and amenities waste including putrescibles;
    - office and amenities recyclables (eg paper);
    - maintenance recyclables (eg scrap); and
    - hydrocarbons (eg oils and greases).
- Tyres – are segregated on-site for off-site recycling or disposal by licensed contractors.
- All domestic wastewater is diverted to a septic system.
- The Quarry receives and stores cured concrete waste, which is recycled for use at the Quarry in saleable products. It is proposed to receive up to 50,000 tonnes of cured concrete per calendar year for beneficial reuse/recycling.

Further information on waste management is provided in Section 6.9.

3.6.7 Hours of operation

The approved hours of operation vary according to the activity being undertaken (Table 3.2). It is not proposed to change these hours.

Table 3.2 Approved hours of operation

Activity	Day	Time
Construction	Monday to Friday	7 am to 6 pm
	Saturdays	8 am to 1 pm
	Sundays and public holidays	None
Blasting	Monday to Friday	9 am to 5 pm
	Saturdays, Sundays and public holidays	None
Quarrying operations (excluding overburden removal/emplacement and drilling)	Monday to Saturday	24-hours except 6 pm Saturday to 2 am Monday
	Sundays and public holidays	None
Overburden removal/emplacement and drilling	Monday to Saturday	7 am to 6 pm
	Sundays and public holidays	None
Loading and dispatch	Monday to Saturday	24-hours except 6 pm Saturday to 2 am Monday
	Sundays and public holidays	None
Transportation on the primary transport route	Monday to Saturday	24-hours except 6 pm Saturday to 2 am Monday
	Sundays and public holidays	None
Transportation on the secondary transport route	Monday to Saturday	6 am to 7 pm
	Sundays and public holidays	None
Maintenance	Monday to Saturday	Anytime*
	Sundays and public holidays	Anytime*

* Provided that the activity is not audible at any privately-owned residence.

The following activities will continue to be carried out on the Quarry site outside the hours listed in Table 3.2:

- delivery or dispatch of materials as required by Police or other authorities; and
- emergency work to avoid the loss of lives, property and/or to prevent environmental harm.

In such circumstances, Gunlake notifies the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3.6.8 Quarry life

The Quarry currently has approval to undertake quarrying operations until 30 June 2042. The Continuation Project proposes to extend the quarry life for 30 years from the date of its approval.

3.6.9 Construction

No significant new capital works are proposed as part of the Continuation Project. Upcoming activities as part of the continued operation of the quarry are the installation of additional weighbridge and repairing and resealing the private quarry access road.

Over the 30-year quarry life, the Quarry's processing and other infrastructure will be maintained, upgraded, replaced and/or moved within the areas described above to ensure safe and efficient quarry operations.

3.6.10 Decommissioning and rehabilitation

Progressive rehabilitation will be ongoing during the operations where possible.

The Quarry infrastructure will be decommissioned at the completing of quarry operations as defined by the Quarry Approval. Final rehabilitation will then be completed to meet the final rehabilitation objectives. Further information on rehabilitation is provided in Section 6.8 and Appendix F.8.

4 Statutory context

This chapter identifies the key relevant statutory requirements for the Continuation Project having regard to the EP&A Act and EP&A Regulation, and other relevant NSW legislation and environmental planning instruments, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This section addresses:

- permissibility;
- power to grant approval (ie approval pathway);
- other approvals;
- pre-conditions to exercising the power to grant approval; and
- mandatory matters for consideration.

Relevant statutory requirements are considered in detail in the assessment sections of the EIS (Chapter 6) and supporting technical reports in Appendix F.

This chapter identifies the statutory requirements relevant to the assessment and evaluation of the Continuation Project. Statutory requirements, including administrative requirements, relevant to the continued operation of the quarry are provided in Appendix C.

4.1 Permissibility

The Quarry site is zoned RU1 – Primary Production and RU2 – Rural Landscape under the Goulburn Mulwaree LEP. Development for the purpose of extractive industries is permitted with consent in these zones. Hence, the Continuation Project is permissible with consent.

4.2 Approval pathway

As noted in Section 1.3.1, the Extension Project (SSD 7090) is approved by LEC Approval 2017/108663.

The Continuation Project operations would remain similar to the approved Extension Project. However, given the increase in production and truck movements, the Continuation Project is not considered to be "substantially the same development" as the currently approved Extension Project. Therefore, the proposed Continuation Project cannot be approved through a modification to LEC Approval 2017/108663 under Section 4.55 of the EP&A Act and a new SSD approval is being sought. The application seeks to reapprove all existing Quarry components and activities as well as the expanded activities and product transport.

Approval for the Continuation Project is sought under Division 4.7 of the EP&A Act. The Continuation Project is classified as SSD as it meets both the requirements of clause 8 of the State Environmental Planning Policy (State and Regional Development) 2011, namely:

- it is permissible development under an environmental planning instrument (the Goulburn Mulwaree LEP); and
- it is for an extractive industry that extracts more than 500,000 tonnes per annum and from a total resource of more than 5 million tonnes.

The consent authority for SSD is the Minister for Planning and Open Spaces or delegate.

4.3 Other approvals

This section identifies the other approvals that are required to carry out the Continuation Project and explains why they are required. These approvals are outlined in Table 4.1 and have been grouped into the following categories:

- integrated approvals: which are approvals that cannot be refused and are required to be issued consistently under section 4.42 of the EP&A Act if the project is approved;
- the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- other approvals: approvals that are not expressly integrated into the SSD assessment process; and
- approvals not required: approvals that would be required if the project was not SSD as per Section 4.41 of the Act.

Table 4.1 Approvals and licenses required

Approval	Requirement
Integrated approvals	
An environment protection licence (EPL) under Chapter 3 of the NSW *Protection of the Environment Operations Act 1997*	A variation to the Quarry's existing EPL No. 13012 will be required to increase the annual capacity to extract and process material.
EPBC Act approval	
An approval under Part 3, Division 1 of the EPBC Act	A referral under the EPBC Act was submitted for the Extension Project to the Commonwealth Department of the Environment on 4 September 2015 (EPBC reference 2015/7557). The referral identified the Extension Project as a potential Controlled Action due to the presence of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland, listed as a Critically Endangered Ecological Community under the EBPC Act. On 15 October 2015, Department of the Environment determined that the Extension Project is a controlled action, with the relevant controlling provision being "[l]isted threatened species and communities (Sections 18 & 18A)". EPBC Act approval for the Extension Project was granted on 26 October 2017. This required biodiversity offsets to be provided to compensate for the impacts of the Extension Project. Gunlake has provided offsets accordingly. The Continuation Project will not require clearance of any EPBC-listed vegetation, other than that for which offsets have previously been provided. As there are no additional significant impacts on the matters of national environmental significance, it has been confirmed by the Department of Agriculture, Water and the Environment that a new referral is not required. However, a variation to EPBC Approval 2015/7557 will need to be sought to vary the conditions of the existing approval to reflect the NSW Continuation Project development approval.

Table 4.1 Approvals and licenses required

Approval	Requirement
Other approvals	
Water access licence	A water access licence under the *Water Management Act 2000* is required for predicted take from the Goulburn Fractured Rock Groundwater Source.
Approval under section 138 of the *Roads Act 1993*	Approval may be required under Section 138 of the *Roads Act 1993* from the Council for any works in, on or over a public road.
Approvals not required	
An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*	Impacts to Aboriginal Cultural Heritage have previously been assessed (see Section 6.7). The Quarry operates under the Aboriginal Heritage Management Plan (EMM 2020) approved by the Secretary. Clearance activities will continue to be managed in accordance with this plan.
A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.	The Continuation Project would require a water use approval and a controlled activity approval, if not for Section 4.41 of the EP&A Act.

4.4 Pre-conditions to approvals

Pre-conditions to exercising the power to grant approval for the Continuation Project are provided in Table 4.2.

Table 4.2 Preconditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011, Clause 10	1. A consent authority must not grant consent to the carrying out of development under Part 4 of the Act on land in the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality. 2. For the purposes of determining whether the carrying out of the proposed development on land in the Sydney drinking water catchment would have a neutral or beneficial effect on water quality, the consent authority must, if the proposed development is one to which the NorBE Tool applies, undertake an assessment using that Tool.	The project is located within the Sydney drinking water catchment.	Section 6.5
Goulburn Mulwaree Local Environmental Plan 2009, Clause 7(2) Terrestrial Biodiversity	(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development is consistent with the objectives of this clause and— (a) the development is designed, sited and managed to avoid the potential adverse environmental impact, or (b) if a potential adverse impact cannot be avoided, the development— (i) is designed and sited so as to have minimum adverse impact, and (ii) incorporates effective measures so as to have minimal adverse impact, and	Parts of the Quarry Site are mapped as having terrestrial biodiversity values. No direct impacts to biodiversity are predicted.	Section 6.6

Table 4.2 Preconditions to being able to grant approval for the project

Statutory reference	Pre-condition	Relevance	Section in EIS
	(iii) mitigates any residual adverse impact through the restoration of any existing disturbed or modified area on the site.		

4.5 Mandatory matters for consideration

The mandatory conditions that must be satisfied before the consent authority may grant approval to the Continuation Project are listed in Appendix C.

5 Engagement

5.1 Ongoing consultation

Gunlake has been actively engaging with the Quarry's stakeholders since 2008 through the Gunlake Quarry Community Consultative Committee (CCC) that was established in 2013, the Gunlake website, community programs, newsletters, the community telephone line/email, and direct consultation with stakeholders. Gunlake employs a Community and Stakeholder Relations Manager for ongoing consultation activities.

A summary of recent ongoing engagement activities is provided in Appendix D.1.

5.2 Continuation Project consultation

5.2.1 Agency project briefing

Prior to the SEARs being issued for the project, a briefing letter was submitted to DPIE and a scoping meeting was held on 25 November 2020 to provide a summary of the proposed project and EIS approach. Following the meeting, the *Gunlake Quarry Continuation Project Scoping Report* was submitted in December 2020.

5.2.2 Letters appended to SEARs

The following State and local government agencies provided responses to the request for SEARs:

- DPIE Biodiversity and Conservation Division;
- EPA;
- DPIE Water;
- Geological Survey of NSW, Mining, Exploration and Geoscience;
- Heritage NSW;
- Heritage Council of NSW;
- Transport for NSW;
- Water NSW; and
- Goulburn Mulwaree Council.

Matters raised in the agency responses have been considered in the preparation of the EIS.

5.2.3 Agency and stakeholder engagement

In addition to the ongoing consultation conducted by Gunlake, specific consultation was conducted for the Continuation Project, including:

- meeting with key stakeholders;
- meetings and letter correspondence with government agencies;

- letter and newsletters to transport route residents;
- letter correspondence with Registered Aboriginal Parties;
- CCC meetings;
- community newsletters distributed though the Discover Marulan newsletter – 2,000 printed copies and email distribution to 1,200 recipients; and
- a Community Information Session in Marulan (December 2020).

The community information session held in December 2020 discussed the Gunlake Quarry Extension Project Modification 2 application (see Section 1.3.1) and the Continuation Project. A further community information session was advertised for August 2021 but had to be cancelled due to COVID-19 restrictions.

A summary of the engagement activities conducted for the Continuation Project is provided in Appendix D.2.

5.3 Consultation outcomes

5.3.1 Community views

The community views regarding ongoing Quarry operations and the Continuation Project have been understood through:

- the ongoing and Continuation Project consultation activities described above;
- the 2020 application process to modify the Extension Project Approval to allow increased truck movements on the Primary Transport Route, which included public exhibition of the *Gunlake Quarry Extension Project Statement of Environmental Effects* (EMM 2021) and the receipt of submissions from two interest groups and six community members; and
- in-depth interviews with local residents and key stakeholders from 7 July 2021 to 31 August 2021 as part of the preparation of the Gunlake Quarry Continuation Project Social Impact Assessment (Appendix F.10).

A summary of the key potential impacts, benefits and opportunities of the Continuation Project that were identified by the community are presented in Table 5.1.

Table 5.1 Potential impacts, benefits and opportunities identified by the community

Themes	Impacts	Benefits	Opportunities
	• Concern that truck movements and associated noise would impact on the value of property along the Primary Transport Route into the future, thereby impairing or compromising their investment.	• Ongoing local employment • Increased local employment • Job opportunities for youth • Procurement of local goods and services	• Collaboration with local employment and training services and organisations in town • Training support for local youth, both financially and through work experience opportunities
	• Impacts to community character (ie quietness and country feel) due to population growth and development of the local area	• Population retention, particularly amongst youth • Community economic development and growth • Community cohesion	• Additional community funding and shared value opportunities

Table 5.1 Potential impacts, benefits and opportunities identified by the community

Themes	Impacts	Benefits	Opportunities
	• Increased pressure on local emergency services • Increased demand for trades services	• Multiplier effect of extractive industries – providing jobs, demand for schools, demand for services, and demand on infrastructure which contribute to increased provision of local services and infrastructure (growth) • Provision of reliable water supply for Rural Fire Brigade when needed, as well as provision of machinery and water cart if needed	• Partnerships between the Continuation Project and emergency service providers • Police and Community Youth Club engagement through the company to assist support for local youth • Preparation of consequence management plans which include assessment of risks or gaps in emergency services responses in consultation with local emergency services
	• Increased pressure on rentals within the local area, in consideration of current high rental housing prices and lack of rental housing availability • Impacts to property values related to increased truck movements	• Increased development of housing associated with increased population	• Purchasing of local housing and offering of subsidised rent for local employees
	• Increased traffic in the local area • Increased road noise in the local area from increased truck movements and use of air brakes • Noise during operation from quarry activities such as blasting and crushers • Amenity impacts related to dust from quarry operation • Amenity impacts related to pollution from trucks	• Sustainable long-term employment contributing to maintained population and way of life in the local area	• Potential for road upgrades with associated improvement in road safety
 	• Additional truck movements increasing potential for traffic accidents, particularly related to current speed limits of 100 km/h and concealed driveways along the Primary Transport Route • Increased roadkill • Rail transport has not been proposed.	• Improved social determinants of health related to reduced disadvantage associated with increased employment and business opportunities	• Reduction of the speed limit along the Primary Transport Route.

Detail of the consultation and responses to the key themes identified by the community are addressed in the Social Impact Assessment Report in Appendix F.10.

5.3.2 Aboriginal stakeholders consultation

During preparation of the EIS, a consultation letter was provided to the Gunlake Quarry Registered Aboriginal Parties (RAPs) to provide information on the Continuation Project and to discuss Aboriginal cultural heritage matters. Recipients were invited to make comment on the letter and proposed management measures.

The list of RAPs and the consultation letter sent out is provided in Appendix D.3. Of the 28 Registered Aboriginal Parties consulted, responses were received from two RAPs, as follows:

- Corrroboree Aboriginal Corporation – agreed with the project information; and
- Gulgunya Ngunawal Heritage Aboriginal Consultancy – noted no objection to the proposal of the Continuation Project as all cultural heritage management measures have previously been met.

The email responses from the RAPs are provided in Appendix D.3.

5.3.3 Agency consultation outcomes

In accordance with the requirements of the SEARs, consultation with government authorities was conducted during preparation of the EIS in the form of letter correspondence and meetings, as listed in Appendix D.2.

Key outcomes of the Continuation Project engagement with agencies is as follows:

- **EPA**: during a meeting between Gunlake and the EPA on 26 July 2021, the EPA confirmed receipt of consultation letter and noted that they had nothing further to add from what was provided with the SEARs.
- **The Commonwealth Department of Agriculture, Water and the Environment (DAWE)**: in a telephone discussion and subsequent email, the Director of Southern NSW Assessments Section of DAWE confirmed that a new referral is not required for the Continuation Project, but that Gunlake will need to seek variation to the conditions of the existing approval to reflect the updated NSW Conditions of Consent, when they are issued (email provided in Appendix D.4).
- **Transport for NSW**: Gunlake met with Transport for NSW in July 2021 to discuss key issues raised in response to the TfNSW letter attached to the SEARs.
- **Goulburn Mulwaree Council**: during a meeting held on 19 July 2021 to discuss the Continuation project and Council's response to the SEARs Gunlake confirmed with Goulburn Mulwaree Council that a road safety assessment was being conducted as part of the EIS process and that the results would be shared and discussed with Council.

5.4 Engagement to be conducted

5.4.1 Continuation Project

Gunlake will continue its stakeholder engagement program to ensure matters raised by the community and other stakeholders are understood and addressed. Future engagement and consultation activities for the Continuation Project may include the following:

- public exhibition of this EIS;
- producing and distributing newsletters;
- community information sessions, depending COVID-19 restrictions; and

- preparing a Submissions Report responding to the submissions received during the public exhibition.

5.4.2 Ongoing consultation

Gunlake will continue with ongoing consultation activities as described in Appendix D.1 throughout operation of the Continuation Project. Principal engagement and consultation activities that will continue are:

- ongoing Gunlake CCC meetings;
- ongoing participation in local stakeholder briefings and meetings, when required;
- ongoing operation of the community telephone line (02 4841 1344), Community email address, (community@gunlake.com.au) and community contact form on the Gunlake website (https://www.gunlake.com.au/quarry-community/); and
- regularly updating and promoting information, including the Gunlake website, with information on environmental monitoring and management, local community initiatives and other relevant information.

The Annual Environmental Review, summarising Gunlake's activities and performance in key areas, will continue to be prepared and made publicly available on the website.

6 Assessment and mitigation of impacts

6.1 Traffic and transport

A Traffic Impact Assessment (TIA) (Appendix F.1) and a Road Safety Assessment Report (RSAR) (Appendix F.2) have been prepared for the Continuation Project and are provided in Appendix F. A Road Safety Audit is provided in Appendix C of the RSAR. The TIA and RSAR were prepared with reference to relevant guidelines and policies, as outlined in Section 1.2 of the TIA and Section 3 of the RSAR. The relevant SEARs and how they are addressed are summarised in Appendix A of this report, Section 1.2 of the TIA (Appendix F.1) and Section 1.3 of the RSAR (Appendix F.2).

A summary of the existing environment, impact assessment and management measures is provided below.

The feasibility of transporting saleable products from the Quarry was extensively assessed during the assessment of the Extension Project that was approved in 2017 and road transport is the only feasible method for products to be transported from the Quarry.

6.1.1 Existing environment

The Quarry has approval to use two transport routes to reach the Hume Highway, the Primary Transport Route and the Secondary Transport Route. Trucks delivering saleable products to markets to the north and returning from these destinations use the Primary Transport Route, which consists of the following roads:

- Brayton Road (classified as a collector road) between Ambrose Road and the Gunlake Quarry access road;
- Ambrose Road between Brayton Road and Red Hills Road; and
- Red Hills Road between Ambrose Road and the Hume Highway.

The Secondary Transport Route is only used by outbound trucks travelling to markets south of the Quarry. The Secondary Transport Route consists of Brayton Road between the Quarry access road and the Hume Highway's southbound access ramp at Marulan. The transport routes are shown in Figure 2.1 in Section 2.1.2.

Ambrose Road was constructed by Gunlake so that the majority of the quarry trucks would not need to travel through Marulan to reach the Hume Highway and no quarry trucks would need to travel through Marulan to reach the Quarry from the Hume Highway.

Since the Extension Project Approval was granted in 2017, the Primary Transport Route has been substantially upgraded in accordance with the Austroads Guidelines so that it meets the requirements for rural roads with 1,000 to 3,000 average vehicle movements per day, exceeding the requirements of the Extension Project Approval conditions. Gunlake has implemented all of the traffic management and road safety changes required by the Extension Project Approval (Conditions 25, 27 and 28 of Schedule 3) and has continued to introduce higher payload trucks to its transport fleet. The transport routes are currently permitted for all vehicles up to 26 m in length (including rigid vehicles, truck and dogs, B-doubles and A-doubles). The types of vehicles used currently and in the future are as dictated by TfNSW road restrictions.

Gunlake and Goulburn Mulwaree Council have implemented a road maintenance work plan and budget to ensure that the transport routes are appropriately maintained by Council using Gunlake Section 7.11 Contributions. Implementation of this arrangement ensures the condition and serviceability of the routes maintain the levels of road safety performance provided by the road upgrades.

Due to the remote location of the site, there are no public bus services near the Quarry which could be used by Quarry staff or visitors. There is no pedestrian or cycling infrastructure at the vicinity of the site due to the rural nature of the locality.

School buses travel along Brayton Road in the vicinity of the site in both directions each school day. The school buses drop off and collect school children along this route. As part of the road upgrades of Brayton Road financed by Gunlake, safe school bus collection/drop off points have been built along Brayton Road.

i Key intersections

The key intersections utilised by Quarry trucks are:

- Brayton Road/Ambrose Road;
- Hume Highway/Red Hills Road;
- George Street/Brayton Road;
- Hume Highway on Ramp/Hume Highway Off Ramp/Jerrara Road; and
- Hume Highway Off Ramp/Jerrara Road/Marulan South Road.

The intersections were surveyed for 24-hour periods on Thursday, 10 September 2020 and Wednesday, 16 September 2020. The traffic volume data show that with the exception of the Hume Highway leg of the Hume Highway/Red Hills Road intersection, the intersections are generally not heavily trafficked.

The Brayton Road/George Street intersection has relatively higher traffic volumes along the north-west and south-west approaches. This is mainly because of the residential development along these sections of the road, contributing to higher traffic volumes.

ii Existing traffic volumes

Tube counts were undertaken at three locations over a seven-day period from 10 June 2020. The tube count data are presented in Figure 3.3 of the TIA (Appendix F.1) and show that Ambrose Road carried just below 400 vehicles per day with 60% heavy vehicles. Brayton Road, west of Ambrose Road, carried close to 800 vehicles per day with an average 42% heavy vehicles. Both the volumes and heavy vehicle proportion is lower for the count undertaken east of Ambrose Road, with below 600 vehicles per day with an average 15% heavy vehicles. This is expected given that the Primary Transport Route bypasses Marulan township.

iii Road safety

The upgrades to the Primary Transport Route since 2017 included:

- a wide centreline treatment to increase separation of opposing traffic streams;
- new and extended steel guardrail to prevent vehicles impacting roadside hazards and/or traversing steep embankments and culvert drop-offs;
- provide a minimum 3.0 metre clear zone;
- provision of wide sealed and unsealed shoulders that provide drivers the opportunity to recover a drifting or errant vehicle;

- enhanced delineation with guideposts, line marking, and retro-reflective pavement markers;
- upgrade of the Quarry Entrance intersection on Brayton Road to improve vehicle separation and downstream merge arrangements; and
- constructed roadside bus bays to permit public transport services (particularly school services) to move off the traffic lanes.

Gunlake implements a corporate policy that restricts quarry trucks to a maximum of 80 km/h along the transport routes (and lower where signposted). This requirement is implemented through the Truck Driver Code of Conduct that is part of the Gunlake Quarry Traffic Management Plan (Gunlake 2020c).

Crash data from Transport for NSW Centre for Road Safety indicates that over the five-year period from 2015 to 2019, three crashes have been documented along the Primary Transport Route and two along the Secondary Transport Route. None of the crashes involved Gunlake trucks.

6.1.2 Impact assessment

i Vehicle movements and intersection performance

An assessment of the potential traffic impact of the Continuation Project was conducted by modelling cumulative future traffic volumes to the end of the proposed Quarry life (2051). The future traffic volumes included:

- existing background traffic volumes (based on traffic survey data, with Gunlake truck numbers on the survey dates excluded);
- conservative linear growth in background traffic: 0.5% linear growth per annum on arterial roads and 1% per annum linear growth on local roads;
- future traffic from non-Gunlake sources, including the approved quarries and mines in the area, assuming they are operating at full approved capacity; and
- maximum Continuation Project truck numbers.

The future maximum vehicle volumes were used to model the potential impact of the Continuation Project on intersection performance using the SIDRA intersection model. This found that the five key intersections will continue to operate with a level of service 'A', meaning good operation with an average delay of 14 seconds or less per vehicle during the life of the Continuation Project (assuming this is 2051).

ii Road safety

The impacts of increased heavy vehicle movements on the Primary Transport Route were assessed by ARRB to be as follows:

- The road upgrades implemented following the Extension Project approval (practical completion August 2018) meet and exceed conditions of the Extension Project Approval. The application of the principles in the relevant Austroads guidelines ensure existing cross-sections, road geometry and intersection geometry support the proposed additional heavy vehicle movements.
- The recorded crash history along the Primary Transport Route does not indicate an existing or developing road safety problem that would be exacerbated by the Continuation Project.

- The speed limit on Ambrose Road is 100 km/h. The incline on Ambrose Road travelling towards the Hume Highway slows loaded trucks, which can require following light vehicles along the uphill section of Ambrose Road to reduce their speed. However, the light vehicle volume is low, and there is only a small increase in travel time experienced by light vehicle drivers over a short length of the Primary Transport Route. Free-flow conditions soon become available when joining the Hume Highway. The provision of a climbing lane is not supported as the travel time and road safety impact is considered low and the cost and environmental impacts to provide the climbing lane would be significant.

- Impacts on road safety for all road users are considered to be negligible, with no major road safety hazards from the proposed increase in heavy vehicle volumes identified.

Key road safety hazards along the Primary Transport Route are appropriately managed and the level of road safety risk to road users is in the low to moderate range and is generally considered acceptable for a road of this type and traffic function. However, three aspects were highlighted for improvement:

a) The current road design on the Primary Transport Route exceeds the requirements outlined in the Austroads guidelines. However, there are reduced width sections along the route across the major culverts.

b) Line marking and guideposts along the Primary Transport Route are generally in a good condition, however gaps/deficiencies were noted at certain points along the route. One factor in line marking durability is the effect of traffic, particularly at intersections where the 'scrubbing' action from the tyres of turning vehicles directly impacts line marking. Increased traffic volumes may increase the rate of deterioration of lines along the route.

c) While a visual assessment of the road pavement surface shows it to be in a generally good condition with very few examples of unevenness, broken edges, potholes, shoves, etc., a build-up of gravel was noted along sections of road. This is typical, especially in rural areas, but can be exacerbated by increased traffic volumes.

It is not proposed to increase truck movements along the Secondary Transport Route so the Continuation Project will not impact current road safety on this route.

6.1.3 Management measures

Quarry transport operations will continue to be managed in accordance with the *Gunlake Quarry Traffic Management Plan* (Gunlake 2020c), including the appended Truck Driver Code of Conduct (Appendix E). This plan will be reviewed and updated as required following approval of the Continuation Project.

The following actions are recommended by ARRB to improve road safety along the Primary Transport Route:

- road-widening to accommodate an extension of the wide centreline treatment and the approved typical cross-section through locations adjacent to major culverts to provide a consistent road treatment;

- T-intersection warning signage should be installed on each approach to the intersections of Ambrose/Brayton Road and the Ambrose/Red Hill Road; and

- an inspection and renewal program should be set to ensure the deterioration in surface condition, line marking, guideposts, and other delineation, etc. is identified and addressed in a timely manner.

Gunlake are in discussions with the road authority, Goulburn Mulwaree Council, regarding any future road upgrades and the inspection and renewal program.

6.2 Noise and vibration

A Noise Impact Assessment (NIA) has been prepared by EMM and is provided in Appendix F.3. The NIA was prepared with reference to relevant guidelines and policies, as outlined in Section 1.2 of Appendix F.3. The relevant SEARs and how they are addressed, are summarised in Appendix A of this report and Section 1.2 of the NIA. A summary of the existing environment, impact assessment and management measures is provided below.

Given that construction activities are not proposed as part of the Continuation Project, construction noise impacts have not been assessed.

6.2.1 Existing environment

i Ambient noise levels

Given the rural nature of the locality and based on historical noise data collected in the vicinity, existing ambient noise levels are at or below the minimum levels provided in the *Noise Policy for Industry* (NPfI) (EPA 2017). Therefore, as per the NPfI, the minimum rating background level for daytime is 35 dB and for evening and night is 30 dB.

ii Existing Quarry noise limits

Operational noise limits for the current Quarry operations are provided in Schedule 3 of the Extension Project Approval and are reproduced in Table 3.1 of the NIA (Appendix F.3). The Quarry operates under an Environment Protection Licence (EPL 13012), which includes the Extension Project Approval noise level limits.

Traffic noise associated with operation of the Quarry is addressed in Schedule 3 Condition 9 of the Extension Project Approval with a requirement to undertake traffic noise compliance assessments.

iii Existing noise mitigation and management

Gunlake Quarry is ideally located from a noise emission perspective given the distance and natural topographic shielding between the Quarry and the nearest private residences.

The Gunlake Quarry operates in accordance with the Gunlake Quarry Noise and Blast Management Plan (Gunlake 2020d). Noise management measures to minimise off-site noise impacts include:

- construction of the Eastern emplacement that forms a noise bund east of the processing area;
- primary crusher station enclosures;
- mobile fleet operations reduced during the evening and night periods;
- all mobile plant and fixed noise sources are maintained to ensure that noise emissions do not increase over time;
- inclusion of noise management provisions in relevant on-site work inductions;
- quarterly operator-attended noise compliance surveys; and
- prompt response to any community issues relating to noise.

iv Existing Quarry noise emissions

Noise emissions from the Quarry are measured on a quarterly basis. As summarised in the Gunlake Quarry Project Annual Reviews, noise compliance monitoring has found that the Quarry noise levels are compliant with the relevant noise limits.

The road traffic noise compliance assessment conducted in August 2020 found that road traffic noise levels generated by Gunlake Quarry and other road users during day and night periods satisfied the relevant Extension Project conditions.

6.2.2 Operational noise Impact assessment

i Method

Operational noise emissions from the Quarry have been assessed at the nearest noise sensitive receptors (referred to as 'assessment locations'), which comprise private residences. Details of the assessment locations and other neighbouring properties are described in Table 2.2 of the NIA (Appendix F.3) and are shown in Figure 6.1.

Operational noise levels were predicted using the iNoise software, which calculates total noise levels at assessment locations from the concurrent operation of multiple noise sources. The model considers factors such as the lateral and vertical location of plant, source-to-receptor distances, ground effects, atmospheric absorption, topography of the surface facilities area and surrounds and applicable meteorological conditions. Noise levels from the Quarry have been predicted for noise-enhancing weather conditions. This provides a conservative approach since the noise levels for noise-enhancing conditions represent the upper range of noise levels from the Quarry at the assessment locations.

Equipment sound power levels have been based on measurements undertaken at the site for preparation of the *Extension Project Noise and Vibration Assessment* (EMM 2016a) and updated, where required, based on measurements undertaken in February 2021. A summary of the representative acoustically-significant fixed and mobile equipment considered in the noise model is provided in Table 5.1 of the NIA (Appendix F.3).

Further detail on the noise impact assessment method is described in Sections 4 and 5 of the NIA (Appendix F.3).

ii Noise limits and criteria

Both the increase in noise level above background levels (ie the intrusiveness of a source) and the absolute noise level, are important in determining how a community will respond to noise from industrial sources. To ensure both of these factors are considered, the EPA provides two separate noise trigger levels: intrusiveness and amenity. The fundamental difference being intrusiveness noise levels apply over 15 minutes in any period (day, evening or night), whereas the amenity noise levels apply to the entire assessment period (day, evening or night).

Project Noise Trigger Levels, as per the NPfI, are the more stringent of either the project intrusive or amenity noise levels. Details of the project intrusive noise level, the amenity noise level and the resulting Project Noise Trigger Levels for day, evening and night periods are provided in Section 4.3 of the NIA (Appendix F.3). The Project Noise Trigger Levels provide a benchmark for assessing a proposed or existing industrial development.

Source: EMM (2021); Google Earth (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

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KEY

- Site boundary
- Noise assessment location
- Other property*
- Major road
- Minor road
- Vehicular track
- Named watercourse

* R1, R3 and R4 are owned by Gunlake.

Assessment locations

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 6.1

EMM
creating opportunities

iii Impact prediction

Predicted noise levels for each period of operation are provided in Table 6.1.

Indicative operational noise contours are provided in Annexure A of the NIA (Appendix F.3) for night-time operations under noise-enhancing meteorological conditions.

Table 6.1 Operational noise predictions, noise-enhancing meteorological conditions

Assessment location	Period[1]	Predicted noise level (dB)	Project Noise Trigger Level (dB)
R2	Day	47 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	46 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	46 $L_{Aeq,15\ minute}$ / 47 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R5	Day	35 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	35 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	34 $L_{Aeq,15\ minute}$ / 40 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R6	Day	36 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	35 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	35 $L_{Aeq,15\ minute}$ / 35 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R7	Day	31 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	31 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	30 $L_{Aeq,15\ minute}$ / 36 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R8	Day	33 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	32 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	31 $L_{Aeq,15\ minute}$ / 37 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R9	Day	36 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	35 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	35 $L_{Aeq,15\ minute}$ / 38 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R10	Day	33 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	32 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	32 $L_{Aeq,15\ minute}$ / 35 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R12	Day	31 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	30 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	30 $L_{Aeq,15\ minute}$ / 34 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R13	Day	32 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	32 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	31 $L_{Aeq,15\ minute}$ / 35 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R14	Day	30 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	30 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	30 $L_{Aeq,15\ minute}$ / 33 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}

Table 6.1 Operational noise predictions, noise-enhancing meteorological conditions

Assessment location	Period[1]	Predicted noise level (dB)	Project Noise Trigger Level (dB)
R15	Day	<30 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	<30 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	<30 $L_{Aeq,15\ minute}$ / 30 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}
R16	Day	<30 $L_{Aeq,15\ minute}$	40 $L_{Aeq,15\ minute}$
	Evening	<30 $L_{Aeq,15\ minute}$	35 $L_{Aeq,15\ minute}$
	Night	<30 $L_{Aeq,15\ minute}$ / <30 L_{Amax}	35 $L_{Aeq,15\ minute}$ / 52 L_{Amax}

1. R1, R3 and R4 are owned by Gunlake, while R11 is a shed not a residence.
2. 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: all remaining periods.

Noise levels from Quarry operations are predicted to be at, or below, (ie comply with) the relevant project noise trigger levels at all assessment locations with the exception of R2 (Table 6.1).

In accordance with *Voluntary Land Acquisition and Mitigation Policy* (NSW Government 2018), the predicted Quarry noise level at R2 would be considered a significant impact. In assessing the feasibility and reasonableness of additional noise mitigation measures due to this predicted impact, the following factors have been considered in accordance with methodology provided in the NPfI:

- the predicted incremental change in noise levels at R2 compared to current noise emissions is negligible (<2 dB);
- Gunlake have previously implemented (and will continue to implement) noise mitigation and management measures (Section 6.2.5); and
- operation of the Quarry complies with current noise limits for R2 as per the Extension Project Approval.

R2 is an existing dwelling that is currently exposed to Quarry noise and qualifies for voluntary acquisition in accordance with Schedule 3 Condition 1 of the Conditions of Consent of the Extension Project Approval. These voluntary acquisition rights will continue to apply at this residence.

6.2.3 Road traffic noise impact assessment

i Method

The existing road traffic noise levels on the Primary Transport Route have been characterised based on the results of the road traffic noise compliance monitoring (refer Section 3 of the NIA, Appendix F.3) and the results of additional road traffic noise monitoring in November 2020 by EMM. The nearest residential facades potentially affected by the proposed increase in traffic are located on Brayton Road (west of Ambrose/Red Hills Road) and on Ambrose/Red Hills Road. The road traffic noise impacts of Continuation Project Gunlake Quarry traffic have been assessed based on the changes in traffic volumes.

ii Criteria

The principle guidance to assess the impact of noise from project-related road traffic on public roads is the *Road Noise Policy* (RNP) (DECCW 2011).

The road traffic noise assessment criteria for residential assessment locations, reproduced from Table 3 of the RNP for relevant road categories, are provided in Section 4.5 of the NIA (Appendix F.3).

iii Impact prediction

Road traffic noise predictions for the Continuation Project are presented in Table 6.2.

Table 6.2 Continuation Project road traffic noise predictions

Road section	Existing (non-Gunlake) road traffic noise levels[1] $L_{Aeq,period}$, dB	Calculated Gunlake Quarry road traffic noise levels[2] $L_{Aeq,period}$, dB	Total road traffic noise levels[3] $L_{Aeq,period}$, dB	RNP Criteria $L_{Aeq,period}$, dB
Day period (7 am to 10 pm)				
Brayton Rd – west of Ambrose/Red Hills Rd	47	48	51	60
Ambrose/Red Hills Rd	33	39	40	60
Night period (10 pm to 7 am)				
Brayton Rd – west of Ambrose/Red Hills Rd	41	47	48	55
Ambrose/Red Hills Rd	30	36	37	55

1. Existing road traffic noise levels have been predicted using the US Federal Highway Administration model and calibrated to measured road traffic noise levels as well as road traffic volumes that were undertaken concurrently with noise monitoring. This excludes Gunlake Quarry traffic.
2. This level considers the maximum of 375 inbound and 375 outbound movements over 24 hours.
3. Logarithmic sum of road traffic noise levels from existing road traffic and Gunlake Quarry truck movements.

The future total road traffic noise levels, inclusive of Gunlake Quarry trucks associated with the Continuation Project, are predicted to satisfy the relevant road traffic noise criteria at the nearest potentially affected residences on Brayton Road, Ambrose Road and Red Hills Road.

It is not proposed to change the number of quarry product trucks approved to use the Secondary Transport Route (a maximum of 38 outbound trucks) so there will be no change to road traffic noise levels along this route.

6.2.4 Blasting impact assessment

Blasting is currently undertaken up to twice weekly at the Quarry, between 9 am to 5 pm, Monday to Friday. This will continue for the Continuation Project. Blast design will still continue to be managed by site personnel and the blasting contractor to control airblast overpressure and ground vibration.

There were 65 blasts at the Quarry between July 2018 and June 2020. During this time, the ground vibration criterion (5 mm per second) has been met on all occasions. The airblast overpressure criterion (115 dB, Lin Peak) was marginally exceeded on one occasion, in August 2018. Notwithstanding, this exceedance satisfied the allowable exceedance limit of 5% per total number of blasts over a period of 12 months. Furthermore, no blasts exceeded the upper criterion of 120 dB, Lin Peak.

There would be no change to vibration impact as a result of the Continuation Project compared with existing conditions, which are within relevant criteria.

6.2.5 Management measures

Quarry noise operations will continue to be managed in accordance with the *Gunlake Quarry Noise and Blast Management Plan* (Gunlake 2020d). This plan will be reviewed and updated as required following approval of the Continuation Project.

Existing noise mitigation and management measures as listed in Section 6.2.1iii will continue to be implemented and maintained for the Continuation Project (Appendix E).

6.3 Air quality

An Air Quality Impact Assessment (AQIA), including a greenhouse gas assessment, has been prepared by EMM and is provided in Appendix F.4. The AQIA was prepared with reference to relevant guidelines and policies, as outlined in Section 1.2 of Appendix F.4. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.2 of the AQIA.

A summary of the existing environment, impact assessment and management measures is provided below.

6.3.1 Existing environment

i Existing sources of emissions

Under existing operational conditions, sources of atmospheric emissions associated with the Quarry include:

- removal, handling, hauling and dumping of topsoil and overburden;
- removal, handling, hauling and dumping of hard rock product, including drilling and blasting in the quarry pit;
- material processing (crushing, screening and conveying);
- wind erosion from stockpiles and exposed surfaces;
- transportation (hauling) of product and overburden along unpaved internal roads, the paved site access road and paved public roads; and
- diesel fuel combustion by Quarry plant and equipment.

In addition to dust emission sources from the Quarry, the National Pollutant Inventory (EPA 2021a) and the NSW EPA environment protection licence (EPA 2021b) databases were reviewed to identify any significant existing sources of air pollutants within 5 km of the Quarry. The review identified the existing Holcim-owned Lynwood Quarry and the Johnniefelds Quarry.

Other sources of air pollutant emissions that contribute to background air quality include:

- dust entrainment due to vehicle movements along unsealed and sealed town and rural roads with high silt loadings;
- dust emissions from agricultural activities;
- fuel combustion-related emissions from on-road and non-road engines;

- wind generated dust from exposed areas within the surrounding region, which can be exacerbated by drought; and
- seasonal emissions from household wood burning for heating during winter.

More remote sources which contribute episodically to suspended particulates in the region include dust storms and bushfires.

ii Air quality monitoring data

Gunlake maintains an air quality monitoring network at the Quarry for annual environmental compliance reporting. In addition to data from the Quarry's air quality monitoring network, data from a number of sources have been referenced to quantify background particulate matter levels, including the Australian Capital Territory Government Florey air quality monitoring station, the NSW DPIE air quality monitoring stations at Goulburn and Bargo, and the Boral Peppertree Quarry high volume air samplers.

Monitoring datasets were combined to calculate a regional average concentration for each day of the 2018 calendar year. The concentrations adopted from the regional background datasets are:

- annual average TSP – 29.6 µg/m^3, derived from the annual average PM_{10} concentration using the relationship between PM_{10} and TSP measurements at the Peppertree Quarry site (Boral 2021);
- 24-hour PM_{10} – 2.8 µg/m^3 to 74.7 µg/m^3, daily varying concentrations from regional average dataset for the 2018 calendar year;
- annual average PM_{10} – 14.5 µg/m^3, regional average dataset for the 2018 calendar year;
- 24-hour $PM_{2.5}$ – 1.5 µg/m^{3}to 25.1 µg/m^3, daily varying concentrations from regional average dataset for the 2018 calendar year;
- annual average $PM_{2.5}$ – 6.9 µg/m^3, regional average dataset for the 2018 calendar year; and
- annual dust deposition – 2.8 g/m^2/month, from the average of the three Quarry dust deposition gauges during 2018.

There are three and two existing exceedances of the applicable criteria for 24-hour average PM_{10} and $PM_{2.5}$, respectively, in the adopted regional background datasets.

6.3.2 Impact assessment – air quality

i Method

Fugitive dust sources associated with the Quarry were quantified through the application of NPI emission estimation techniques and USEPA AP-42 emission factor equations. Particulate matter mitigation measures were accounted for in the calculated annual emissions where appropriate. A detailed breakdown of emissions by source is presented in Annexure B of the AQIA.

Atmospheric dispersion of pollutants was modelled using the AERMOD dispersion model (version v21112). The modelling incorporated fine resolution terrain for the Quarry site based on a drone survey completed in February 2021. Simulations were undertaken for the 12-month 2018 calendar year using the AERMET-generated file based largely on the Gunlake onsite meteorological monitoring station dataset. Air quality impacts from the Quarry have been assessed at the nearest sensitive receptors (referred to as 'assessment locations').

Incremental (Quarry only) and cumulative concentrations and deposition rates were modelled. For each day of the 2018 modelling period, cumulative concentrations were quantified through the combination of the following:

- the daily-varying predictions of impacts from Quarry emissions;
- the concurrent daily-varying predictions of impacts from neighbouring quarries; and
- the concurrent daily-varying concentrations from the regional background dataset.

Section 5.1.3 of the Approved Methods for Modelling states that in the event of existing ambient air pollutant concentrations in exceedance of applicable impact assessment criteria, the assessment must:

> …demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical.

As there are three existing exceedance days in the 24-hour average PM_{10} background dataset, the fourth highest cumulative concentration was assessed to analyse if emissions from the Quarry will lead to additional exceedances of the applicable criteria. Similarly, as there are two existing exceedance days in the 24-hour average $PM_{2.5}$ background dataset, the third highest cumulative concentration was assessed.

ii Incremental (Quarry-only) impact assessment

The predicted incremental (Quarry only) concentrations and deposition rates are presented in Section 7.2 of the AQIA. As the assessment criteria are applicable to cumulative concentrations, it is not possible to assess incremental concentrations for compliance for the majority of parameters. However, a dust deposition of up to 0.4 g/m^2/month is predicted at the nearest assessment location, which is within the incremental criteria of 2 g/m^2/month.

iii Cumulative (Quarry plus neighbouring quarries plus background) results

Predicted cumulative TSP, PM_{10} and $PM_{2.5}$ concentrations and dust deposition rates at surrounding assessment locations are presented in Table 6.3.

Table 6.3 Cumulative (Quarry plus neighbouring quarries plus background) concentration and deposition results

Assessment location ID	Predicted cumulative concentrations (µg/m³) or deposition rates (grams/m²/month)					
	TSP	PM_{10}		$PM_{2.5}$		Dust deposition
	Annual	24-hour (4th highest)	Annual	24-hour (3rd highest)	Annual	Annual
Criterion	**90**	**50**	**25**	**25**	**8**	**4**
R1*	39.8	48.9	19.5	22.6	7.9	3.7
R2	38.3	47.1	18.0	22.4	7.6	3.6
R3*	35.5	46.1	17.1	22.5	7.4	3.3
R4*	31.5	45.5	15.6	22.1	7.1	2.9
R5	30.4	45.0	14.9	21.9	7.0	2.9
R6	30.6	45.0	15.2	21.9	7.0	2.9
R7	40.0	48.1	18.2	22.8	7.8	3.7
R8	35.0	46.1	16.9	22.5	7.5	3.3
R9	33.6	45.4	16.2	22.4	7.4	3.1
R10	33.4	45.4	16.3	22.1	7.3	3.1

Note: the fourth and third highest cumulative concentrations are presented for 24-hour average PM_{10} and $PM_{2.5}$ due to three and two existing exceedance events respectively.
* = Gunlake owned property

Ambient background concentrations are the major contributor to cumulative concentrations. The predicted concentrations and deposition rates for all pollutants and averaging periods presented in Table 6.3 are below the applicable NSW EPA assessment criteria and the air quality criteria specified in Schedule 3 Condition 14, Table 6, of the Extension Project Approval. As such, no additional exceedances of the impact assessment criteria are predicted as a result of the Continuation Project.

6.3.3 Greenhouse gas assessment

i Method

The GHG emission sources included in this assessment, representing the most significant sources associated with the Quarry, are listed in Table 6.4.

Annual GHG emissions from the Quarry were estimated using the methodologies outlined in the *National Greenhouse Accounts Factors* workbook (DISER 2020), using fuel energy contents and scope 1, 2 and 3 emission factors for diesel and electricity use in NSW. Further description of the methodology and scope 1, 2 and 3 emission factors is provided in Section 9 of the AQIA (Appendix F.4).

Table 6.4 Scope 1, 2 and 3 emission sources

Scope 1	Scope 2	Scope 3
Direct emissions from diesel combustion by onsite mobile plant and equipment.	Indirect emissions associated with the consumption of purchased electricity.	Indirect emissions from the extraction, production and transport of diesel. Indirect emissions from the transport of product from site. Indirect emissions from electricity lost in delivery in the transmission and distribution network. Indirect emissions from fuel for employee travel.

ii Greenhouse gas (GHG) emission estimates

The estimated annual GHG emissions for each emission source for the Continuation Project are presented in Table 6.5. Details of the GHG emissions calculations are provided in Annexure D of the AQIA.

The significance of the Quarry's GHG emissions relative to NSW and national GHG emissions is made by comparing annual average GHG emissions calculations for the Continuation Project against the most recent available total GHG emissions inventories (calendar year 2019) for NSW (136,579 kilotons carbon dioxide equivalent, CO_2-e) and Australia (529,298 kilotons CO_2-e).

Annual average GHG emissions (scope 1 and 2) generated by the Continuation Project represent approximately 0.0136% of total GHG emissions for NSW and 0.0035% of total GHG emissions for Australia.

Table 6.5 Estimated annual GHG emissions – Continuation Project (tonnes CO_2-e per year)

Source	Scope 1	Scope 2	Scope 3	Total
Diesel combustion	9,784	-	2,989	12,774
Electricity consumption	-	8,748	972	9,720
Petrol consumption	-	-	13	13
Total	**9,784**	**8,748**	**3,974**	**22,506**

6.3.4 Management measures

Quarry operations will continue to be managed in accordance with the *Gunlake Quarry Air Quality Management Plan* (Gunlake 2020e). This plan will be reviewed and updated as required following approval of the Continuation Project (Appendix E).

6.4 Groundwater

A groundwater assessment has been prepared by EMM and is provided in Appendix F.5. The groundwater assessment was prepared with reference to relevant guidelines and policies, as outlined in Section 3 of Appendix F.6. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.2 of the groundwater assessment.

A summary of the existing environment, impact assessment and management measures is provided below.

6.4.1 Existing environment

i Climate and hydrogeology

The annual mean rainfall is 623 mm and monthly mean rainfall is 55 mm per month with little variability over the year based on Bureau of Meteorology Brayton (Longreach) station (070143) records, which is located 3.5 km north of the Quarry site. Since 2017, below average rainfall conditions have been observed, with a recent reversal in 2020 to above average rainfall conditions.

Groundwater in the Quarry area is associated with the regional fractured rock system. Localised, perched groundwater is expected to be associated with Chapmans Creek. Regional groundwater flow is towards the north-east, with eventual discharge to the Wollondilly River. On a local scale, the groundwater flows north-east, generally following the topography.

ii Groundwater levels and quality

Groundwater monitoring has been undertaken by Gunlake since 2007. Groundwater levels range from 634.9 to 659.5 m AHD (6.3 to 22.5 metres below ground level). Groundwater levels in 2007 (prior to quarrying) were similar to those in 2020, indicating that quarry operations to date have not impacted ground level levels.

Tests completed at eight shallow exploration boreholes at Gunlake Quarry (Cook 2008) indicate the fractured rock system has a low permeability, with the derived hydraulic conductivity ranging from 0.01 to 0.78 metres per day. The groundwater salinity is also suggestive of a low flow system, such that groundwater residence times are sufficient to result in brackish conditions.

Groundwater in the Quarry area is generally of poor quality when assessed against the default guideline values for water quality drinking water and the protection of freshwater species.

iii Water Sharing Plans

Water Sharing Plans define how much water is available to be shared across all uses. They have water provisions for environmental purposes such as the needs of rivers and high priority groundwater dependent ecosystems. Remaining water is then available to be shared across the existing and future extractive uses (such as town water supply, irrigation and domestic and stock). The two Water Sharing Plans that manage the water resources in the Quarry area are:

- The Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (Surface Water WSP); and
- The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011 (Groundwater WSP), Goulburn fractured rock groundwater source.

iv Groundwater receptors

Potentially sensitive groundwater receptors in vicinity of the Continuation Project are listed in Table 6.6.

Table 6.6 Potential groundwater receptors

Receptor type	Description
Registered landholder bores	Nine local groundwater works (bore/well/spear point/excavation) are registered for private use within approximately 6 km of the Quarry for the purpose of agriculture and water supply. An additional 30 groundwater works were identified within 5 km of the Quarry, which comprise groundwater monitoring or exploration bores owned by the Lynwood Quarry and other industries.
Groundwater-dependant ecosystems	The Continuation Project Biodiversity Development Assessment Report (BDAR) (Appendix F.7) identifies nine plant community types (PCTs) within the groundwater modelling domain. The majority were identified as having a low groundwater dependency, while two PCTs were determined to have a proportional or opportunistic association with groundwater: • PCT 1256 - Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion; and • PCT 1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion.
Local watercourses with groundwater baseflows	The local surface water features in the vicinity of the Quarry are ephemeral and do not receive large contributions from groundwater. The Wollondilly River to the north of the Quarry may receive some baseflow contributions from groundwater springs.
Groundwater seeps	Nine possible seeps have been identified within a 1.5 km radius of the centre of the Quarry (Figure 4.3 of the groundwater assessment). The seeps are associated with sub-vertical geological discontinuities which allow discrete groundwater discharge (fracture seeps).

6.4.2 Impact assessment

i Method

A groundwater flow model was used to predict the potential groundwater impacts from the Continuation Project. Hydraulic properties assigned to the model were based on the results from monitoring and hydraulic testing at the Quarry and groundwater studies completed in the area as described in Section 6 of Appendix F.5. The analytical model considered varying recharge based on measured rainfall and pit dewatering associated with the Quarry advancing through the end of 2051, and a 1,000-year post-closure period.

While nine possible seeps were identified as part of previous assessments, discharges from these seeps are not significant, in that they do not contribute to surface water flow and are not a significant consideration in determining potential impacts to terrestrial groundwater-dependent ecosystems, so were not considered further.

Projects that intercept groundwater need to consider the NSW *Aquifer Interference Policy* (NOW 2012). The *Aquifer Interference Policy* requires consideration of the potential impacts of an aquifer interference activity in respect to the water table, water pressure and water quality. Proponents must estimate the water take (including incidental take) from each water source and connected water sources. Changes to water table, water pressure and water quality are then assessed against minimal impact considerations for each water source.

ii Potential impacts during Quarry operations

Groundwater impacts were predicted to be minor and locally confined to around the quarry pit. Groundwater inflows to the pit of up to 68 ML/year are predicted over the life of the Continuation Project.

A drawdown of 2 m is predicted to extend up to 1.3 km from the edge of the pit at the end of the Continuation Project (2051). This is less that the predicted maximum extent of the 2-m drawdown predicted for the Extension Project due to refinements in the model and the collection of additional groundwater monitoring data.

There are no impacts predicted at nearby landholder bores and there are no high priority groundwater dependent ecosystems in the project vicinity in accordance with the minimal impact considerations under the *Aquifer Interference Policy*.

There is low risk of impact to groundwater-dependent ecosystems (refer to Section 6.6). The Continuation Project impacts to groundwater-dependent ecosystems are not predicted to increase as the predicted area of drawdown for the Continuation Project is less than the predicted area of drawdown for the approved Extension Project.

Groundwater dewatering for quarry development is predicted to intercept some baseflow that would have discharged into the Chapmans Creek ephemeral watercourse.

With no groundwater discharge to the surrounding environment, the potential risks to surface water quality and/or resources are low.

No cumulative groundwater impacts are predicted.

iii Potential impacts of post-Quarry operations

The final landform will create an inward hydraulic gradient preventing the discharge of water from the pit into the fractured rock groundwater source. Salinities within the pit may increase slightly over time, however because of the inward gradient, there is negligible risk to groundwater in the regional fractured rock or adjacent surface water resources. There will be no impact on the beneficial use class of the groundwater source (ie less productive and used for stock).

6.4.3 Management measures

Quarry operations will continue to be managed in accordance with the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b). This plan will be reviewed and updated as required following approval of the Continuation Project (Appendix E).

Gunlake are required to hold water access licences for the predicted groundwater take over the lifespan of Continuation Project. Gunlake currently hold a licence for 37 ML/year allocation. A peak groundwater take of 68 ML per year is predicted for the Continuation Project, constituting 0.002% of the 46,809 unit shares (ML per year) of unassigned water within the Groundwater Water Sharing Plan. Therefore, water for the Continuation Project will be able to be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of the Water Sharing Plan.

6.5 Surface water

A surface water assessment has been prepared by EMM and is provided in Appendix F.6. The surface water assessment was prepared with reference to relevant guidelines and policies, as outlined in Section 3 of Appendix F.6. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.2 of the surface water assessment.

A summary of the existing environment, impact assessment and management measures is provided below.

6.5.1 Existing environment

i Hydrology and hydrogeology

The Quarry is located within the upper reaches of the Chapmans Creek catchment. Chapmans Creek is an ephemeral watercourse that drains to the north-east, flowing into Jaorimin Creek approximately 3 km downstream of the Quarry. The catchment area and riparian zones of Chapmans Creek have been predominantly cleared and are used as grazing land. Observations of Chapmans Creek during routine monitoring undertaken by Gunlake indicate that the upper reaches are predominantly dry and only flow following heavy rainfall events, while the lower section towards Brayton Road at the Quarry property boundary consists largely of unconnected stagnant pools which respond quickly to rainfall events and tend to dry rapidly in periods of dry weather.

There are no identified surface water users upstream of the confluence of Chapmans Creek with Jaorimin Creek, with the exception of farm dam water supplies for stock water supply.

As described in Section 6.4, groundwater residence time is low with rapid recharge and discharge following rainfall and the alluvial/colluvial aquifer is a marginal water source for water supply.

ii Quarry site water management

A surface water management strategy was developed as part of the Extension Project EIS. Following approval of the Extension Project, this strategy was incorporated into the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b). The approved surface water management system for the Quarry is presented in Chapter 5 of the surface water assessment (Appendix F.6).

The key water management strategy adopted across the site is containment and management of potentially sediment-laden runoff from disturbed areas and reuse where feasible. Key features of the surface water management strategy are:

- a clean water diversion system diverts runoff from the clean water catchment that is south of the Quarry pit;
- runoff from dirty water catchments is collected and treated within the Process Water Dam, the Pit Dewatering Dam (to be constructed once the groundwater table is intercepted), pit sump or one of the on-site sedimentation dams; and
- stored water in the dams is reused to meet Quarry water demands, reducing overflows and/or controlled releases of water.

Currently, runoff volumes from the dirty water catchments and the pit exceed the volume of process water required in median and wet years. During median and dry years, water is harvested from clean-water dams to supplement process water supply from the pit sump and Process Water Dam.

iii Surface water quality

Surface water quality at the Quarry has been monitored since 2007 at six locations including two upstream/pre-quarrying monitoring sites, two receiving water monitoring sites and two Quarry water management system sites. A summary of the results is provided in Appendix F.6. Key findings are:

- background water quality is highly variable, which is a result of the highly intermittent flow regime of Chapmans Creek;

- there are elevated levels of nutrients (total nitrogen and total phosphorus) attributed to agricultural land use, with some of the highest concentration recorded in 2007 prior to the commencement of Quarry operations in 2009;
- recorded total suspended solids concentrations following rainfall events indicate that the Quarry operation is not contributing sediment-laden water to downstream receiving waters; and
- recorded concentrations of metals (arsenic, cobalt, manganese, nickel and zinc) were generally below the default guideline values.

6.5.2 Impact assessment

No increase to the previously approved (PA07_0074/NSW LEC Approval 2017/108663) surface disturbance area is proposed. As such, the Continuation Project would not directly disturb any additional watercourses, riparian land or water-related infrastructure. An assessment of the water impacts from increased production is described below.

i Method

A water balance model of the Quarry was prepared for the Extension Project (RHDHV 2016). The model was prepared using standard industry methods and was applied to assess the effectiveness of the Quarry's water management system, estimate discharges and determine water licensing requirements. The model was updated for the Continuation Project to incorporate the revised groundwater inflow estimates and an increase in plant water use due to the higher production rates. Three scenarios were assessed:

- Scenario 1 (2022 to 2026): 0 ML/year of groundwater inflows into the pit as pit excavation is above the groundwater table. Predicted water use of 37 to 40 ML/year.
- Scenario 2 (2027 to 2051): 68 ML/year groundwater inflows during pit excavation below the groundwater table (see Section 6.4.2). Predicted water use of 36 to 80 ML/year.
- Post closure: predicted peak groundwater inflows of 54 ML/year.

ii Downstream impacts

Water balance modelling described in Section 5.4 of Appendix F.6 found that the Continuation Project will reduce the likelihood and magnitude of overflows occurring from the water management system compared with the Extension Project. This is because the process water use associated with higher production will more than offset the predicted groundwater inflows. However, in wet years there could still be up to 296 ML/year of overflows. While any overflows from the Quarry will unavoidably result in some changes to the hydrologic regime of Chapmans Creek, the impacts are expected to be negligible downstream of the confluence of Chapmans and Jaorimin Creek. This is due to the size of the Quarry's surface water management system footprint (135 ha) relative to the contributing catchment areas of Chapmans and Jaorimin Creeks, which have a collective area of 4,100 ha.

The proposed water quality management measures (Section 6.5.3) are expected to be effective in mitigating the potential water quality impacts. Gunlake will monitor the water quality of water released and will provide additional treatment, such as pH adjustment or flocculation if required. The water release rate can be controlled through the pump pit dewatering rate (or dam inflow rate) to ensure water quality objectives are achieved. Gunlake will continue to implement the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b) and will progressively improve the surface water management system if required should any underperformances be identified by the monitoring.

As overflows will be reduced, the Continuation Project is not predicted to result in a negative impact to water quality in the downstream catchments relative to the approved Quarry. It is therefore classified as having a neutral or

beneficial effect (NorBE) on downstream water quality within the Sydney Drinking Water Catchment area in accordance with the *State Environmental Planning Policy* (Sydney Drinking Water Catchment) 2011.

The Continuation Project is not expected to have any measurable change in flooding regime in downstream waterways as no changes to the previously approved disturbance footprint are proposed.

The Continuation Project will not extend the approved disturbance area within riparian land.

iii Water use

The Quarry's process water requirements for the Continuation Project will continue to be primarily met by the water management dams. However, water use could exceed inflow volumes during a dry year during Scenario 1 (2022 to 2026) when pit extraction is above the groundwater table. No water shortages are predicted during Scenario 2 (2027 to 2051). If water shortfalls occur, the Quarry may implement one or more of the following contingencies:

- reduce water usage through the use of chemical dust suppressants;
- obtain water from existing farm dams;
- seek an external water source and tanker water to the Quarry; or
- temporarily reduce the scale of the operation to ensure dust management objectives are being achieved.

iv Post closure

Runoff from the pit footprint will be permanently captured within the final void, resulting in a permanent reduction in stream flows in the downstream waterways. No water quality impacts are predicted as no spillage from the final void to receiving waters is likely to occur.

6.5.3 Management measures

Quarry operations will continue to be managed in accordance with the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b). This plan will be reviewed and updated as required following approval of the Continuation Project (Appendix E).

6.6 Biodiversity

A Biodiversity Development Assessment Report (BDAR) has been prepared by EMM and is provided in Appendix F.7. The BDAR was prepared with reference to relevant guidelines and policies as outlined in Section 2 of Appendix F.7. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.4.2 of the BDAR.

The Extension Project Approval disturbance area is around 100 ha. Prior to surrendering the original approval for the Quarry (PA07_0074) on 1 August 2018, the Eastern overburden emplacement was extended and the haul road into the pit was completed, both within the footprint approved by PA07_0074. Biodiversity offsets have been provided for vegetation clearance within these areas. By oversight, these areas were omitted from the Extension Project disturbance area. It is proposed to rectify this as part of the Continuation Project which will result in approximately an additional 4.5 ha being added to the Extension Project disturbance area (refer Figure 3.1).

A summary of the existing environment, impact assessment and management measures is provided below.

6.6.1 Method

A desktop assessment of available vegetation data derived from extensive field surveys previously undertaken across the Gunlake Quarry (Ecotone 2008, Biosis 2014, EMM 2016b and EMM 2018), supplemented by regional vegetation mapping datasets, was used to identify plant community types (PCTs) and potential terrestrial groundwater-dependent ecosystems within the 'prescribed impact area' (Figure 6.2). The 'prescribed impact area' is the area where groundwater drawdown of 2 m or greater is predicted to occur over the life of the Quarry where prescribed (uncertain) biodiversity impacts have the potential to occur.

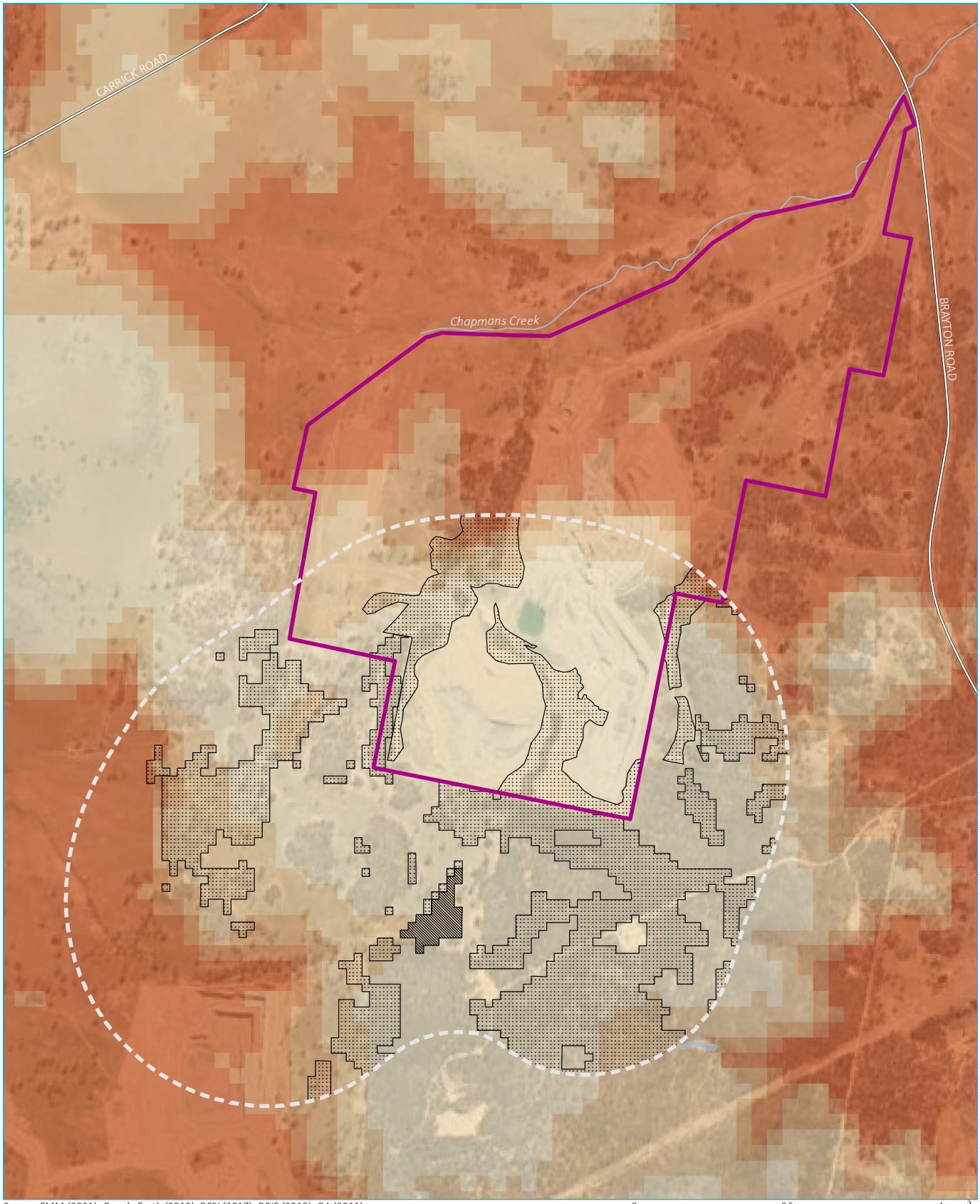
The species associated with PCTs mapped within the prescribed impact area were assessed using the vegetation associations reports from the threatened biodiversity data collection to generate lists of predicted ecosystem credit species and of threatened species credit species. Ecosystem credit species are those threatened species which are considered under the Biodiversity Assessment Method (DPIE 2020) to have habitat that can be reliably predicted to occur within a PCT. Species credit species are those threatened species which, under the Biodiversity Assessment Method, are considered to require assessment of habitat (or components of habitat) for those particular species.

Groundwater dependent ecosystems were assessed in accordance with the NSW Government *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (Serov et al. 2012). The groundwater dependence of each PCT was rated from 'entirely/obligate' (ie the PCT could not survive without groundwater) to 'non-dependent' (Table 6.7), based on the correlation between the spatial distribution of PCTs and the spatial distribution of groundwater levels prior to quarrying (ie prior to 2009).

Table 6.7 Criteria used for determining groundwater dependence on PCTs

Dependence on groundwater	Criteria
Entirely/obligate	More than 75% of the PCT is mapped in areas with groundwater at 2 mbgl or less.
Facultative - high	More than 50% of the PCT is mapped in areas with groundwater at 2 mbgl or less, and more than 75% of the PCT is mapped in areas with groundwater at 5 mbgl or less.
Facultative - proportional	More than 75% of the PCT is mapped in areas with groundwater at 5 mbgl or less, but less than 50% of the PCT is mapped in areas with groundwater at 2 mbgl or less.
Facultative - opportunistic	More than 75% of the PCT is mapped in areas with groundwater at 20 mbgl or less, but less than 75% of the PCT is mapped in areas with groundwater at 5 mbgl.
Non-dependent	Evenly distributed across groundwater levels, with generally less than 50% of the PCT mapped in areas with groundwater at 10 mbgl or less.

mblg = metres below ground level



Source: EMM (2021); Google Earth (2019); DFSI (2017); DPIE (2015); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

KEY

- Site boundary
- Prescribed impact area
- Major road
- Named watercourse
- Waterbody

Groundwater dependent ecosystem

- 1256 | Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion
- 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands

Depth to groundwater (post-mining)

- < 2 mbgl
- 2 - 5 mbgl
- 5 - 10 mbgl
- 10 - 20 mbgl
- > 20 mbgl

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Groundwater drawdown and GDEs

Gunlake Quarry Continuation Project
Environmental Impact Statement
Figure 6.2

EMM
creating opportunities

6.6.2 Existing environment

i Native vegetation

Five PCTs were identified within the prescribed impact area (Table 6.8) based on regional mapping.

Table 6.8 PCTs and alignment with threatened ecological communities

Plant community type	Threatened ecological community association	
	BC Act	**EPBC Act**
PCT 731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	Not listed	Not listed
PCT 888 - Inland Scribbly Gum - Brittle Gum low woodland of the eastern tablelands, South Eastern Highlands	Not listed	Not listed
PCT 1150 - Silvertop Ash - Blue-leaved Stringybark shrubby open forest on ridges, north east South Eastern Highlands Bioregion	Not listed	Not listed
PCT 1256 - Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion	Not listed*	Not listed*
PCT 1330- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)

* While aligned with Montane Peatlands and Swamps TEC under the BC Act and EPBC Act; the PCT does not include the characteristic dominant species for the TEC, and was concluded not to meet the description of the TECs.

ii Ecosystem credit species and threatened species

There are 26 bird species, three reptiles and ten mammal ecosystem credit species predicted by the Biodiversity Assessment Method Calculator to occur in the prescribed impact area.

There are 11 bird species, 25 plants, three reptiles, 13 mammals, one insect and five frogs threatened species credit species predicted by the Biodiversity Assessment Method Calculator to occur in the prescribed impact area.

iii Groundwater-dependent ecosystems

Analysis of the distribution of PCTs in relation to the regional groundwater levels indicate that PCT 1256 has a 'Facultative – proportional' groundwater dependency. Facultative association is used to describe an ecosystem that is not entirely dependent on groundwater and may rely on groundwater on a seasonal basis or only during extended drought periods. At other times, water requirements may be met by soil or surface water. Within the regional vegetation datasets, this PCT is mapped south of the Quarry. The PCT was classified as having a facultative-proportional reliance on groundwater because of the uncertainty in regional vegetation datasets, and the inherent uncertainty in groundwater mapping.

It was determined that PCT 1330 has a 'Facultative – opportunistic' groundwater dependency. PCTs which are considered facultative – opportunistic are not considered to wholly depend on groundwater for survival; however,

they are likely to use groundwater opportunistically to survive where surface water sources are absent or low, particularly during times of drought.

The other communities, PCT 731, PCT 888 and PCT 1150, are considered non-dependent on groundwater.

6.6.3 Impact assessment

The Continuation Project has been designed to minimise additional adverse impacts to biodiversity by restricting disturbance to previously approved areas.

i Ecosystem credit species and threatened species

The existing quarry pit will be deepened as part of the Continuation Project but will not have any direct or indirect surface impacts.

There will not be any direct impacts to native vegetation or habitat for threatened species.

ii EPBC-listed threatened species or communities

The Continuation Project will not result in any direct or indirect impacts to threatened species or communities or migratory species listed under the EPBC Act. The project will not result in a significant impact to any Matters of National Environmental Significance and referral of the project to the DAWE is not required.

iii Groundwater-dependent ecosystems

The predicted area of drawdown for the Continuation Project is less than the predicted area of drawdown for the approved Extension Project due to refinements in the analytical model and the collection of additional groundwater monitoring data. Small portions of PCT 1256 and PCT 1330 are predicted to be impacted at a local scale by groundwater drawdown. However, the impacts to groundwater-dependent ecosystems from Quarry operations are predicted to be minor in both extent and/or nature and represent a low risk of impact to groundwater-dependent ecosystems. The Continuation Project impacts to groundwater-dependent ecosystems are not predicted to increase as the predicted area of drawdown for the Continuation Project is less than the predicted area of drawdown for the approved Extension Project.

6.6.4 Management measures

i Biodiversity offsets

The Extension Project Approval provides biodiversity offset requirements to compensate for the impacts to biodiversity as a result of the original quarry (including modifications) and the Extension Project. A Modification Application (MOD1) has been made to amend the required offsets. MOD1 was filed with the LEC in March 2019 and a hearing was held in February 2021. The application has not been determined.

As the Continuation Project will not result any direct impacts to native vegetation or habitat for threatened species, and that impacts to groundwater-dependent ecosystems are considered highly unlikely to occur, additional offsets are not required.

Groundwater monitoring will continue as described in the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b). The monitoring results will be compared to the drawdown predictions in the Groundwater Assessment (Appendix F.5) throughout the life of the quarry and two years after closing to determine if the actual drawdown it is less than or similar to the predicted drawdown.

Quarry operations will continue to be managed in accordance with the *Gunlake Quarry Rehabilitation and Biodiversity Offset Management Plan* (Gunlake 2015). This plan will be reviewed and updated as required following approval of the Continuation Project. This includes the progressive rehabilitation of quarry areas where practicable and the rehabilitation of the Quarry following its closure.

6.7 Aboriginal heritage

6.7.1 Existing environment

i Original Quarry area

Australian Archaeological Survey Consultants prepared an Aboriginal Cultural Heritage Assessment (ACHA) for the original Quarry layout and associated infrastructure (AASC 2007). Three small artefact scatters, each with four to six artefacts of low significance were identified in the Quarry footprint. These sites were named GL1, GL2 and GL3. A further two sites, GL4 and GL5 (one isolated find and one artefact scatter comprising two artefacts), were identified on the Ambrose Road alignment - over 4 km south-east of the Quarry.

Sites GL1 to GL5 were subsequently collected under the original Project Approval (PA07_0074). The contents of sites GL1, GL2 and GL3 were reburied together close to their original location north of the Quarry site access road. This new location was registered on the Aboriginal Heritage Management System as "GL123 (Gunlake Quarry) relocated GL1, GL2 and GL3". The contents of GL4 and GL5 were reburied together close to the original location of GL4. This new location was registered on the Aboriginal Heritage Management System as "GL45 (Gunlake Quarry) relocated GL4 and GL5".

Cultural Heritage Management Australia prepared an ACHA for a modification to the originally approved Quarry to extend the pit and overburden embankment areas (PA07_0074, Modification 2) (CHMA 2014). No additional Aboriginal objects or places were identified as part of this ACHA.

The locations of the Aboriginal heritage sites within the Quarry site and their reburied locations are shown in Figure 6.3. The management status of these sites is detailed in Table 5.1 of the Gunlake Quarry Aboriginal Heritage Management Plan (AHMP) (EMM 2020).

ii Quarry Extension Project area

An ACHA was prepared for the Extension Project (EMM 2016). As part of preparing the ACHA, an EMM archaeologist accompanied by five Aboriginal sites officers surveyed the extension area. The survey covered the entire extension area and identified 15 Aboriginal sites comprising stone artefacts, 12 of which were open stone artefact sites and three of which were isolated finds (Figure 6.3).

The ACHA included a test excavation program and 89 artefacts were recovered from 42 m^2 of test pits, generally on the ground surface. The paucity of subsurface artefacts was attributed to the poor integrity of the soil deposit, which was severely truncated by erosion. It was concluded that the surface artefact distributions offered a better representation of the local archaeological record.

All of the Aboriginal sites identified, except one, were assessed to have low archaeological significance. The cluster site GL14 (GL14a, GL14b, GL14c and GL14d) was assessed to have moderate archaeological significance. This was because it was an extensive artefact scatter with good examples of artefact types and raw materials. However, it lacked archaeological integrity because of the highly eroded skeletal soils on this landscape.

In June 2018, a salvage collection of Aboriginal stone artefacts was conducted within the disturbance footprint of the Extension Project. Collection was completed at sites GL5; GL6; GL7; GL8; GL9; GL14a,b,c,d; GL10; and GL11 (Figure 6.3).

iii Aboriginal heritage management

Gunlake Quarry operates in accordance with the *Gunlake Quarry Aboriginal Heritage Management Plan* (AHMP, EMM 2020), which was approved by the Secretary of DPIE on 14 April 2018. The AHMP was updated in March 2020 to include the outcomes of salvage measures implemented in June 2018. The AHMP consolidates management measures for the original Quarry area, the Quarry extension area and a portion of Ambrose Road. The Continuation Project falls wholly within the area to which the AHMP applies.

iv Existing conditions

The disturbance area approved as part of the original Quarry (PA07_0074) and Extension Project (SSD 7090, NSW Land and Environmental Court Approval 20017/108663) has been largely cleared, and the soil removed and stockpiled.

Prior to surrendering the original approval for the Quarry (PA07_0074) on 1 August 2018, the Eastern overburden emplacement was extended and the haul road into the pit was completed, both within the footprint approved by PA07_0074. By oversight, these areas were omitted from the Extension Project disturbance area. It is proposed to rectify this as part of the Continuation Project and re-include one of these omitted areas into the Continuation Project boundary, referred to as 'Area 1' (Figure 6.3).

The landscape in of Area 1 comprises of a portion of a broad hill crest and upper hill slope with a south-westerly aspect. The area is between 300 m and 400 m from Chapmans Creek (3rd order stream) and over 200 m north of an unnamed ephemeral tributary. Area 1 has porphyritic geology and thin sandy loam soils on crests and upper slopes, which are characteristic of the Quarry site. It shares similar landscape characteristics to crests and upper landforms in the broader Quarry site.

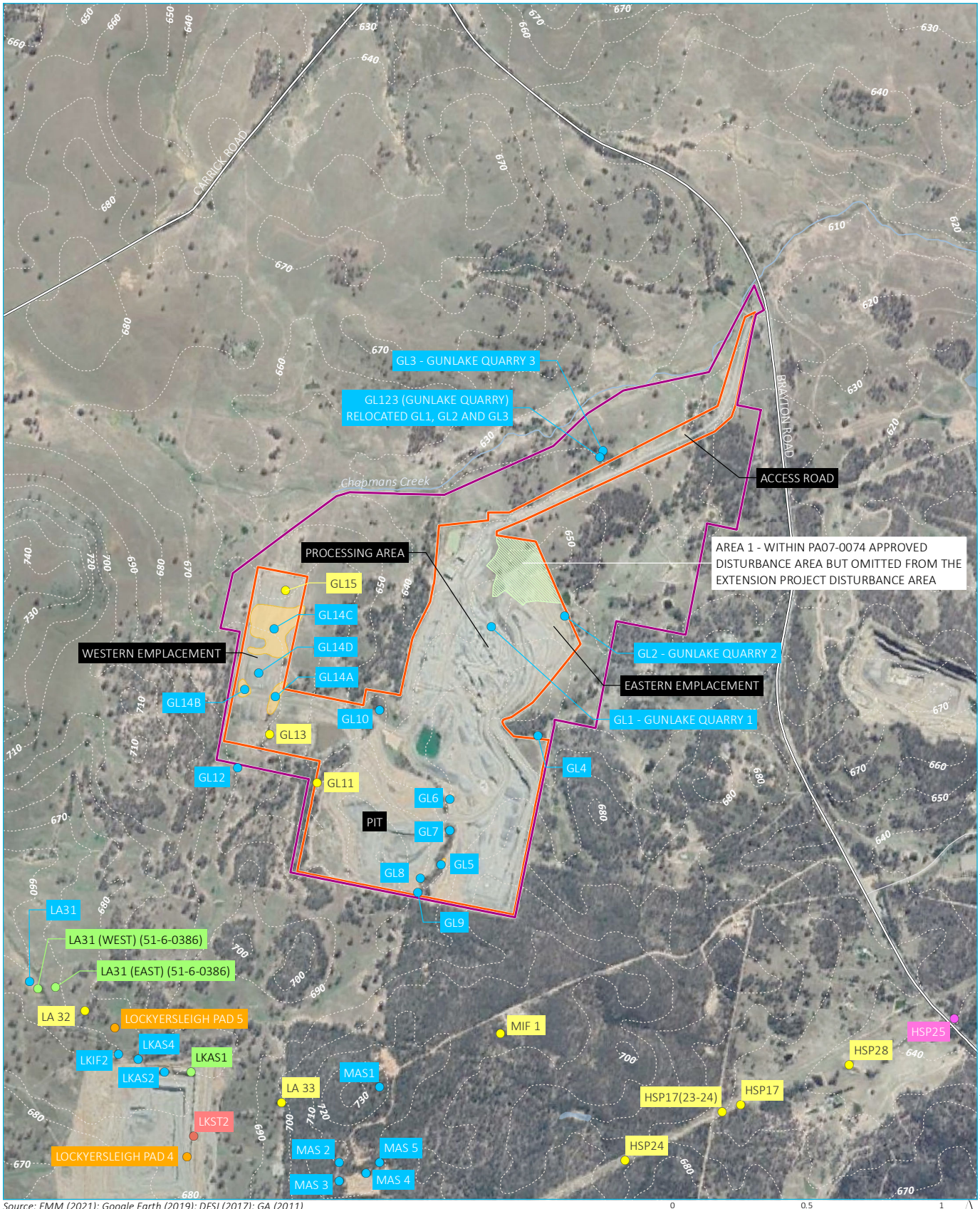
Concentrated stone artefact scatters (refer site G14 on Figure 6.3) have been found on similar hill crests and upper slopes within the Quarry site. As noted above, previous test excavation on crest landforms within the Extension Project area indicate minimal subsurface archaeological deposits, as erosional processes have left most of archaeological material on the ground surface (EMM 2016c). Therefore, there is potential for Aboriginal stone artefacts to occur on the ground surface in low to moderate densities within Area 1, but they are unlikely to occur as subsurface deposits.

6.7.2 Impact assessment

As the original Quarry and Extension Project disturbance areas have been largely cleared and the soil removed, there will be no impacts to Aboriginal heritage in these areas beyond those previously approved.

Ground disturbance in Area 1 has the potential to impact Aboriginal objects if they are present. It is predicted that any stone artefacts in this area would represent Aboriginal objects of low to moderate archaeological significance, and that disturbance of these artefacts (if present) could be mitigated through surface collection in accordance with the AHMP.

Consultation was conducted with Registered Aboriginal Parties for the Quarry as described in Section 5.3.2. No objections to the Continuation Project were received.



Source: EMM (2021); Google Earth (2019); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

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KEY

- Site boundary
- Continuation project disturbance area
- Area 1
- Major road
- Minor road
- Topographic contour (10 m interval)
- Named watercourse
- Waterbody
- Aboriginal site area

AHIMS record

- Open artefact site
- Isolated find
- Isolated find with PAD
- Modified tree
- Open artefact site with PAD
- PAD

Aboriginal heritage context

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Figure 6.3

EMM creating opportunities

6.7.3 Management measures

Quarry operations will continue to be managed in accordance with the Gunlake Quarry Aboriginal Heritage Management Plan (EMM 2020). This plan will be reviewed and updated as required following approval of the Continuation Project.

Area 1 will be managed in accordance with the AHMP, including the Aboriginal site management and new finds procedures as described in Appendix E.

6.8 Land resources and rehabilitation

A Land Resources and Rehabilitation Assessment (LR&RA) has been prepared by EMM and is provided in Appendix F.8. The LR&RA was prepared with reference to the Soil and Rehabilitation Assessment (EMM 2016) prepared for the Extension Project. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.2 of the LR&RA (Appendix F.8).

A summary of the existing environment, impact assessment and management measures is provided below.

6.8.1 Existing environment

The *Extension Project Soil and Rehabilitation Assessment* (EMM 2016d) identified the following key soil and land capability features at the Quarry site and surrounds:

- four soil landscapes are present: Bindook Road, Garland, Midgee and Wyangala;
- two soil types are present: Kurosol (44.1 ha) and Natric Kurosol (55 ha) soils;
- soils have a class 2 fertility (moderately low) and generally only support plants suitable for grazing;
- the Hydrologic Soil Group is C (slow infiltration) for Kurosol and D (very slow infiltration) for Natric kurosols; and
- pre-quarrying land and soil capability classes were 5 (severe limitations) for the Natric Kurosols and 6 (very severe limitations) for the Kurosols.

The disturbance area approved as part of the original Quarry (PA07_0074) and Extension Project (SSD 7090, NSW Land and Environmental Court Approval 20017/108663) has been largely cleared, and the soil removed and stockpiled.

The Quarry operates under the *Gunlake Quarry Soil and Water Management Plan* (Gunlake 2020b) and the *Gunlake Quarry Rehabilitation and Biodiversity Offset Management Plan* (Gunlake 2015).

6.8.2 Impact assessment

The *Extension Project Soil and Rehabilitation Assessment* (EMM 2016d) identified the following potential impacts to soil and land capability from Quarry operations:

- the potential to reduce the capability and agricultural suitability of the soil and landscape through contamination, compaction and erosion from:
  - the excavation of soil;
  - temporary to long-term storage of soil in stockpiles;

- permanent storage of overburden;
- machinery usage; and
- the storage of fuel and chemicals;

- the removal of disturbed land from agricultural production during operations; and
- the permanent removal of the pit area from agricultural production.

No substantial changes to activities that have the potential to impact soil resources are proposed as part of the Continuation Project. The increased pit depth will not result in additional soil excavation.

The *Extension Project Soil and Rehabilitation Assessment* (EMM 2016d) found that the land and soil capability for the post-mining landscape (excluding the pit area) will range from Class 6–8 (very high to extremely severe limitations) for the Kurosols and Class 5–8 (high to extremely severe limitations) for the Natric Kurosols.

The post-quarrying land and soil capability will not change as a result of the Continuation Project. The final void will contain standing water and the walls above the water will be largely rocks. While the submerged base of the void will be deeper (546 m AHD) for the Continuation Project than for the Extension Project (572 m AHD), the equilibrium water level range (599–609 m AHD) will be virtually unchanged (refer to Figure 3.1 of the LR&RA, Appendix F.8).

6.8.3 Management measures

Quarry operations will continue to be managed in accordance with the *Gunlake Quarry Rehabilitation and Biodiversity Management Plan* (Gunlake 2015). This plan will be reviewed and updated as required following approval of the Continuation Project.

Mitigation measures will continue to be implemented during operations, with a focus on runoff, erosion and sediment control (Appendix E).

The *Extension Project Soil and Rehabilitation Assessment* (EMM 2015) included a rehabilitation strategy, with the following objectives:

- stabilise all earthworks, drainage lines and disturbed areas no longer required for Quarry-related activities to minimise erosion and sedimentation;
- reduce the visibility of the activities from surrounding properties and the local road network;
- provide a low maintenance, geotechnically stable and safe landform, which is commensurate with the future land uses on and around the project area;
- blend the created landforms within the project area with the surrounding landform as far as possible; and
- revegetate the disturbed areas with native tree, shrub and grass species and/or pasture species to a meet a final land use of light grazing.

Further detail of proposed rehabilitation works is provided in Appendix F.8 and the *Rehabilitation and Biodiversity Offset Management Plan* (Gunlake 2015).

Gunlake will undertake ongoing rehabilitation monitoring throughout and beyond the operation of the Continuation Project. Areas being rehabilitated will be regularly inspected and assessed against the short and long-term rehabilitation objectives outlined above. Where rehabilitation success appears limited, maintenance activities

will be initiated. Further, should areas of excessive erosion and sedimentation be identified, remedial works will be undertaken.

6.9 Waste

6.9.1 Waste quantities and management

Estimates of the waste streams that are generated or received at the Quarry and the measures that are implemented to minimise, manage or dispose of these waste streams are detailed in Table 6.9.

Table 6.9 Continuation Project waste quantities and management

Waste stream		Waste management measures
Type	**Approximate quantity**	
Cured concrete waste	Up to 50,000 tonnes per annum received and stored at the site, up to 2,500 tonnes stored at any one time	The cured concrete waste is recycled for use at the Quarry or in saleable products.
Sewage/waste water	As required	The quarry uses a Council-approved septic system to manage wastewater from the Quarry's amenities.
General domestic-type wastes from the on-site buildings and routine maintenance consumables	Domestic waste 4 m^3 per week Recyclable paper/cardboard 3 m^3 per fortnight	Waste is segregated into the following streams on-site: • 'domestic' waste including putrescibles; and • waste paper and cardboard. The wastes are placed in designated wheelie bins for collection and off-site recycling or disposal by licensed contractors.
Metals	20 tonne recycling skip bin per month	Stored temporarily on site in laydown area. Collected and disposed off-site by licensed contractors.
Hydrocarbons eg oils and greases	Less than 10,000 litres stored	Stored temporarily on site in waste oil and grease containers at workshop. Collected and disposed off-site by licensed contractors.
Tyres	2–4 waste tyres per month	Stored temporarily on site in laydown area. Collected and disposed off-site by licensed contractors.

6.9.2 Impact assessment

No impacts from waste storage or handling have been identified as a result of Quarry operations. No additional waste types will be generated as result of the Continuation Project. No changes to waste management measures are proposed.

With the ongoing implementation of Gunlake's waste management measures, waste is not predicted to result in any impacts.

6.9.3 Management measures

As no additional wastes types will be generated or accepted, current waste management practices will continue to be used (Appendix E).

6.10 Hazards

6.10.1 Method

This section considers whether the Quarry is a potentially hazardous or offensive development according to State Environmental Planning Policy No. 33 — Hazardous and Offensive Development (SEPP 33). SEPP 33 requires the consent authority to consider a project's potential to cause hazards or be offensive, including consideration of the location of the development and the way in which it is to be carried out. A development is classified as a hazardous or offensive development if the thresholds in Applying SEPP 33 — which compare the quantities of stored or used hazardous materials to the distance from publicly accessible areas — are exceeded.

The Quarry site is within bushfire prone land and contains public assets (overhead powerline and substation), therefore, potential hazards associated with these aspects have been considered in this section.

6.10.2 Impact assessment

An assessment of potential hazards and public safety risks associated with the Quarry is provided in Table 6.10.

Table 6.10 Potential hazards and public safety risks

Hazard	Assessment
Potentially hazardous industry	An assessment of the storage and transport of hazardous materials against *Applying SEPP 33* is provided in Appendix F.9 and determined that the Quarry is not a potentially hazardous industry.
Potentially offensive industry	The air, noise, and water emissions from the Continuation Project have been assessed to determine if the project is classified as a potentially offensive industry under SEPP 33 (Appendix F.9). Based on the findings of this EIS (as summarised in Appendix F.9), the Continuation Project will not result in unacceptable levels of pollution. Significant and moderate noise emissions are predicted at one residence, which will be offered acquisition rights in accordance with the VLAMP. Therefore, the Quarry is not a potentially offensive industry.
Explosives and blasting	Explosives are transported to the Quarry as needed for blasting. Blasting at the Quarry is conducted by a licensed contractor and is monitored in accordance with the *Gunlake Quarry Noise and Blast Management Plan* (Gunlake 2020d), which has been prepared with reference to AS 2187.2-2006 "*Explosives – Storage, Transport and Use*" and has approved by the Planning Secretary. The Noise and Blast Plan describes procedures for the notification of surrounding landowner and occupiers prior to blast events, which include email/telephone notification of residences within 2 km of the Quarry pit. Gunlake is committed to the safety of the general public. Blasting at the Quarry is 'routine' (ie no special blasting practises are required) and well established processes for blasting are followed. Given the location of the Quarry pit on private land, the small number of surrounding residences, the distance to these residences and the existing safety and management procedures, the risk to public safety from blasting is minimal.
Bushfire	The NSW Rural Fire Service online bushfire prone land tool identifies that the Quarry site is within a designated bush fire prone area. The Continuation Project would not involve the construction or use of additional structures within bushfire prone land that would require bushfire risk management. The Continuation Project would not alter the bushfire risk of the existing Quarry.
Utilities	There is an 11-kV Essential Energy overhead powerline that runs alongside Brayton Road. At the point where the powerline crosses the Quarry's access road (approximately 800 m from the intersection with Brayton Road and approximately 500 m from operational activities), the powerline has been located underground. There is a 22-kv line and three electrical substations located within the Quarry site. The substations are locked to prevent access by unauthorised persons.

Table 6.10 Potential hazards and public safety risks

Hazard	Assessment
Other public safety risks	The Quarry boundary is fenced and the front gate is locked when the Quarry is not operating to prevent unauthorised access to the site. There is high chain-link fence around the Quarry pit. Visitors to the site are required to check in and out at the Quarry's administration building.

6.10.3 Management measures

Gunlake Quarry operates under a pollution incident response plan (Gunlake 2021), which is implemented in the event of an incident. The Continuation Project would continue to operate in accordance with the pollution incident response plan.

6.11 Social

A Social Impact Assessment (SIA) has been prepared by EMM and is provided in Appendix F.10. The SIA was prepared with reference to relevant guidelines and policies, as outlined in Section 3 of the SIA. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Section 1.2 of the SIA.

A summary of the SIA methods, existing environment, impact assessment and management measures is provided below.

6.11.1 Method

The SIA addresses the social impacts and benefits of the Continuation Project to the local area, the region, and to NSW. It considers whether the Continuation Project will increase the demand for community infrastructure and services. The SIA methodology comprised:

- Social baseline study – a social baseline study was prepared using demographic, health, housing, and socio-economic data from the Australian Bureau of Statistics (ABS), government agencies, and local government; published literature and social research; government policies and plans; and documents relating to similar resource projects.
- Field study – community consultation was conducted using social research methods, which included in-depth interviews to collect qualitative and quantitative data. Community and stakeholder engagement is described in Section 5 of this report and Section 6 of the SIA.
- Social impact identification – the findings of the social baseline, field study and EIS technical reports were considered along with local plans and policies to identify social impacts and benefits.
- Social risk assessment – each of the social impacts identified was assessed to predict the nature and scale of potential social impacts for the life of the Continuation Project and post closure. A social risk approach was adopted to assess the consequence and likelihood of potential positive and negative social impacts with and without social mitigation measures.
- Social impact mitigation and management – a mitigation and management framework was prepared with consideration of potential social impacts and benefits.

The SIA considers the 'area of social influence' (see Table 6.11) where the Contribution Project may contribute to social impacts based on supply chains, haulage of products, the scale and nature of the Continuation Project and its associated activities, etc.

Table 6.11 Area of social influence

Areas	Geographic area	ABS data category	Referred to in the SIA and this Section as:
Local area of social influence	Marulan suburb	Marulan State Suburb Code	Local area
	Brayton suburb	Brayton State Suburb Code	
	Carrick suburb	Carrick State Suburb Code	
Regional area of social influence	Goulburn Mulwaree region	Goulburn Mulwaree LGA	Regional area
	Wingecarribee region	Wingecarribee LGA	
State of New South Wales	State of New South Wales	New South Wales STE [state]	NSW

Further information on the SIA method is provided in Chapter 3 of the SIA (Appendix F.10).

6.11.2 Existing environment

i Demographics

According to the 2016 Census of Population and Housing, the local area has a total population of 1,487 people. Most of these people reside in Marulan (1,178), with a small portion residing in Brayton (173) and Carrick (136). The population of the regional area is estimated to increase by 5,712 people from 79,259 in 2016 to 84,971 in 2041 (DPIE 2019), representing a total increase of 7.2% and an average annual increase of 0.3%. The population is, on average, older in the local area and regional area compared to NSW as a whole. This may be indicative of the rural character of the region, with fewer tertiary education and job opportunities for young people.

ii Employment

In 2016, the unemployment rate in the local area was 5.8%, which is higher than the regional area (4.7%) but lower compared to NSW (6.3%). Youth unemployment was significantly lower in the local area (6.8%) compared to the regional area (9.6%) and NSW (13.6%).

In the local area, the top three occupations are technicians and trades workers (15.9%), labourers (14.8%), and machinery operators and drivers (12.9%) (ABS 2016). Construction is the top industry of employment in the local area providing 12.9% of employment, followed by health care and social assistance (10.3%), and accommodation and food services (8.5%). This differs from the regional area where the top three industries of employment are health care and social assistance (13.4%), retail trade (10.1%), and construction (9.7%) (ABS 2016).

iii Social infrastructure and services

In the local area there are two general practitioner services, one preschool facility, one primary school, a rural fire brigade, a police station, a youth club, and a Country Women's Association branch. The local area is well serviced by a range of schools, childcare and health services, located in the regional area.

iv Vulnerable groups and vulnerabilities

In the local area, 5.2% of the of people have a need for assistance in one or more of the three core activities of self-care, mobility and communication due to a long-term health condition (lasting 6 months or longer), a disability (lasting 6 months or longer), or old age. This is slightly lower than that in the rest of NSW (5.4%), while the population within the regional area has a slightly greater need for assistance (6.0%).

According to the 2016 Census estimations, rates of homelessness in the regional area are lower than NSW rates, with a rate of 35.0 homeless persons per 10,000 persons in Goulburn Mulwaree LGA and 19.2 homeless persons per 10,000 persons in Wingecarribee LGA compared to a rate of 50.4 homeless persons in NSW (ABS 2016). The context of COVID-19 creates additional risk of housing instability and homelessness for persons experiencing financial hardship.

At the time of the 2016 Census, 3.1% of the total population within the local area and 2.8% of the regional area population identified as Aboriginal and/or Torres Strait Islander.

6.11.3 Impact assessment

i Continuation Project Social impacts and benefits

A summary of the key potential social impacts and benefits identified are provided in Table 6.12. The full assessment of impacts and benefits are provided in Section 8 of the SIA.

Table 6.12 Key social impacts and benefits

Impact/benefit	Mitigated impact / enhanced benefit
Public safety impact related to increased truck movements along the Primary Transport Route	**Low (impact)**
Public safety concerns related to increased truck movements on the Primary Transport Route was the primary potential impact raised by stakeholders during in-depth interviews. Stakeholders raised concerns related to the current speed limit of 100 km/h along the Primary Transport Route, concealed driveways, and cars speeding to pass slower moving trucks as potentially increasing risks of vehicle crashes. It is recommended that Gunlake continue to advocate for a reduction in the speed limit from 100 km/h to 80 km/h along the Primary Transport Route.	
Accessibility related to demand on emergency services	**Low (impact)**
Increased truck movements on the Primary Transport Route and existing demand on emergency services (particularly ambulance services) were key issues raised by local emergency service providers from the perspective of responding to potential incidents. Adherence to Gunlake's current consultation strategies with emergency services are anticipated to manage potential accessibility impacts related to demand on emergency services to ensure that the likelihood and consequence of potential impacts are not increased as a consequence of the Continuation Project.	
Amenity related to traffic noise	**Medium (impact)**
In-depth interview participants raised concerns that noise from increased truck movements would detract from the current amenity of the local community and affect some residents located along the Primary Transport Route. Concerns were raised related to general road noise, road noise associated with the road seal, and use of air brakes. Although there is no evidence to suggest that road noise will increase in exceedance of road traffic noise criteria, Gunlake will continue to monitor their community engagement mechanism to assess whether there is an increase in issues related to road noise specifically.	
Community benefit related to community investment and involvement	**Significant (benefit)**
Gunlake participates in numerous local community programs and events, including ongoing annual funding/grant commitments, recent community commitments and initiatives, and memberships. Gunlake's community contributions in the form of grants, sponsorships and donations were noted and commended by several stakeholders during in-depth interviews. Gunlake will continue to provide community support in the form of their annual contribution commitments to organisations within the local and regional area. Gunlake will also continue to explore funding and grant opportunities within the local and regional area where need is determined and will continue to adopt a shared value approach in their identification of community investment and involvement opportunities.	
Livelihood related to training and apprenticeship opportunities	**Significant (benefit)**
During in-depth interviews, stakeholders noted the benefits associated with providing training and upskilling opportunities to local workers and youth in the local and regional areas. Gunlake will continue partnerships with local employment, apprenticeship and training services in the local and regional area, such as TAFE, Mission Australia, and the Goulburn District Education Foundation, to find apprenticeship and employment opportunities for workers who have been upskilled, started an apprenticeship program, or who are interested in beginning an apprenticeship program. Training and upskilling programs should focus on engaging and training/educating disadvantaged, Aboriginal and/or Torres Strait Islanders, unemployed, and young people with a view to employing recent graduates.	
Livelihood related to ongoing and increased local employment	**Moderate (benefit)**
During in-depth interviews, participants across a range of stakeholder groups consistently identified employment arising from the Continuation Project as a significant potential benefit, both related to ongoing employment and increased employment opportunities from the Continuation Project. Gunlake will continue to adopt a preferential approach to hiring which prioritises employment of workers with relevant skills residing within the local area, then the regional area, followed by hiring outside of these areas. Gunlake will also continue to work with local employment, apprenticeship and training agencies to enhance the potential of hiring of local and regional workers (see Section 8.5.4). Partnership with local employment and training agencies should specifically target at-risk youth and people struggling to find employment by providing direct employment opportunities.	

ii Cumulative impact

There are several concurrent development projects operating or intended to operate in and around the area of social influence. These projects may contribute cumulative impacts in addition to those of the Continuation Project. A summary of potential cumulative impacts of nearby SSD projects as identified through the NSW DPIE (2021) Major Projects website in construction and operational phases is given in Section 8.6 of the SIA.

A total of 24 SSD projects were identified within the area of social influence, consisting of 15 in Goulburn Mulwaree LGA and 9 in Wingecarribee LGA. Of these projects, 10 have been approved, 6 are currently preparing EIS, 2 are responding to submissions, 2 have been withdrawn, 2 are responding to recommendations, one is preparing SEARs, and one requires more information. The three main development types are extractive industries, electricity generation (including solar, wind and other), and waste collection, treatment, and disposal. All six extractive industry SSDs were quarries (three have been approved), highlighting the strong existing quarrying industry within the local area. Depending on if and when each project proceeds, this could impact the availability of skilled workforce in the local area, requiring additional Project workforce to be sourced from outside the local and regional areas. Other development types within the area of social influence included manufacturing, coal mining, hospitals, minerals mining, coal mining and livestock.

Potential impacts of concurrent developments may include:

- impacts on local construction and general labour workforce availability;
- impacts on the capacity and availability of local service providers, accommodation providers, emergency services and local business as a result of non-resident or relocating workforce; and
- cumulative amenity and traffic impacts (discussed in Sections 6.1, 6.2, 6.3 and SIA Chapter 8.6).

However, potential cumulative benefits may also be associated with the high number of SSD projects in the local area, such as:

- increase in local job availability supported by a number of SSDs to drive industry growth in the local region;
- long-term employment and economic opportunities for local businesses and suppliers;
- improvements to local infrastructure;
- general growth and community development, such as new shops and businesses opening, improvements to public infrastructure and recreation facilities, general population growth and increased housing developments; and
- the potential for population and community growth to create opportunities for more schools, childcare facilities, hospitals, specialists, and recreational activities, as well as more general social, health, emergency, and community services.

6.11.4 Management measures

Gunlake will continue to conduct ongoing community and stakeholder engagement as described in Section 5, including maintaining a dedicated phone number and email for correspondence. Further, Gunlake will continue to implement management measures in accordance with existing environmental management plans.

These plans will be reviewed and updated as required following approval of the Continuation Project.

The following measures will be implemented as part of the Continuation Project to reduce social impacts or to enhance the benefits of the Continuation Project:

- communicating with residents within the 2 km radius who are not already registered to advise them of the blasting notification procedure and enable them to register, if interested;
- liaising with other quarries in the area with the intention of addressing potential cumulative noise and vibration impacts from blasting to minimise the potential impact collectively;
- continuing to provide community support in the form of annual contributions, finding and grants to organisations within the local and regional area where need is determined;
- continuing to prioritise local hiring and local procurement where feasible and where practical to enhance the potential direct economic benefits to employees and contractors, as well as to the local and regional areas through local spending;
- continuing to work with local employment, apprenticeship and training agencies to enhance the potential of hiring of local and regional workers thereby minimising the need to hire workers from outside of the local and regional areas; and
- maintaining existing relationships with local emergency services to ensure that any accessibility impacts related to demand on emergency services are identified and communicated early and consistently, including ongoing provision of project updates to emergency services and updating emergency response protocols and procedures in consultation with emergency services, as required due to any flagged service capacity issues.

6.12 Economic

An economic assessment has been prepared by Gillespie Economics and is provided in Appendix F.11. The Economic Assessment was prepared with reference to relevant guidelines and policies as outlined in Section 1.2 of Appendix F.7. The relevant SEARs and how they are addressed are summarised in Appendix A of this report and Table 1.1 of the economic assessment.

A summary of the existing environment, impact assessment and management measures is provided below.

6.12.1 Existing environment

The Quarry currently provides about 52–55 full-time positions, and about 20 contractors work on the Quarry site. Additionally, approximately 200 truck drivers deliver Quarry products, on either a full-time or part-time basis.

As of September 2020, 32.7% of the Gunlake Quarry workforce lived in Marulan (within the local area), another 30.9% lived in Goulburn Mulwaree LGA (within the regional area), 21.7% lived in Wingecarribee LGA (within the regional area).

6.12.2 Impact assessment

The Continuation Project economic assessment presents:

- a cost benefit analysis which is the primary way that economists evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest;

- a local effects analysis assessing impacts of the Continuation Project on local residents net employment, non-labour project expenditure and environmental and social impacts on the local community; and

- a supplementary local effects analysis, using traditional input-output analysis to assess the broader economic activity project footprint in relation to output, value-added, income and employment.

The economic assessment generally considers the 'incremental' costs, benefits and effects of the Continuation Project. The 'incremental' values do not include the costs, benefits and effects of the approved Extension Project to the end of its currently approved life (ie to 2042).

i Cost benefit analysis

The cost benefit analysis considers the incremental costs and benefits of the Continuation Project (to 2051) compared to the "without" Continuation Project scenario, ie continued Quarry operations in accordance with the Extension Project Approval until 2042.

The cost benefit analysis indicated that, compared to the Extension Project, the Continuation Project would have incremental net production benefits to NSW of $74 million (present value at 7% discount rate) comprising an additional $64 million in quarrying benefits and $10 million in ex-quarry transport benefits. This includes the costs of environmental mitigation costs. The main residual environmental impacts of the Continuation Project, that have not already been incorporated into the estimate of net production benefits, relate to GHG emissions ($2,000), and the opportunity cost of groundwater WALs ($130,000). The value of these incremental residual economic costs is considerably less than the estimated net production benefits of the Continuation Project. Consequently, the Continuation Project is estimated to have net social benefits to NSW, and hence is desirable and justified from an economic efficiency perspective.

ii Local effects analysis

As well as providing net social benefits to NSW, the Continuation Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure.

Quarry operations and associated product transport under the Continuation Project will provide a total 228 direct jobs, comprising 90 quarry jobs and 138 full-time equivalent (FTE) transport jobs, drawn from a pool of about 200 drivers). The local effects analysis assumes that people filling the quarry and transport positions already reside in the local area and would have otherwise been already employed and that job vacancies created by these people filling the Project jobs remain unfilled. On this basis, the incremental net income and incremental net employment to local residents as a result of the Continuation Project is predicted to ramp up to $1.7 million in net income and 22 jobs from 2026 to 2042 and the increments to increase to $6.2 million in net income and 79 jobs in 2043 and beyond. The total (as opposed to incremental) effects from the Quarry as a whole will ramp up to $6.2 million from 2026.

The main local environmental impacts are internalised into the production costs of Gunlake via mitigation, offset and compensation costs. Residual local environmental impacts after mitigation, offset and compensation are likely to be immaterial.

iii Supplementary local effects analysis

The supplementary local effects analysis, using input-output analysis, is not restricted to a focus on the existing labour force in the local area and does not assume an absence of job chain effects. In this framework, the quarrying and transport components of the Continuation Project (including currently approved operations) are estimated to provide the following annual direct and indirect annual effects to the local economy:

- $277 million in output;
- $115 million in value-added;
- $47 million in gross wages; and
- 731 jobs.

6.12.3 Management measures

Quarry operations will continue to be managed to provide an economic benefit to the local, regional, NSW and Australian economy.

Gunlake currently implements management measures specifically to provide benefits to the local and regional economies. As part of the Continuation Project, Gunlake will continue to:

- implement a preferential approach to hiring which prioritises employment of workers with relevant skills residing within the local area, then the regional area, followed by hiring outside of these areas;
- work with local employment, apprenticeship and training agencies to enhance the potential of hiring of local and regional workers thereby minimising the need to hire workers from outside of the local and regional areas;
- provide apprenticeship and training opportunities and actively transition apprentices and trainees into long-term stable employment;
- support local business by utilising their established supply networks and providing sufficient opportunities and information for local businesses to secure new supply contracts; and
- wherever possible and practical, work with the Marulan Chamber of Commerce, local businesses, and the local community to prioritise and use local goods and services.

6.13 Other

A summary of the existing environment, impact assessment and management measures for visual and historical heritage are provided in Table 6.13.

Table 6.13 Other matters

Aspect	Existing environment	Impact assessment	Management measures
Visual	Gunlake Quarry is located in a rural setting and is surrounded by undulating terrain. The Quarry site ranges from 636 m AHD at the northern end to approximately 700 m AHD at the southern end. A topographic ridge lies between the Quarry and residences and traffic on Brayton Road. The existing topography of the local area, together with areas of vegetation, generally screen Quarry activities from public viewpoints, including the local road network. Brayton Road to the north and Carrick Road to the west have minimal views of the Quarry. However, vehicles on these roads only have transient views of the site, largely obscured by vegetation, and distance and motion effects. The Eastern Emplacement provides a visual screen for any potential views from the east, as the Quarry operations and infrastructure area are largely behind the emplacement. The Quarry is generally not visible from adjacent properties other than from the residence approximately 1.2 km north-west of the infrastructure area (Residence R4 – owned by Gunlake). Isolated parts of surrounding properties also have long-distance views of the site. However, these views are generally at least 5 km from the Quarry. Permanent lighting is currently installed at the infrastructure area to ensure safe operating conditions. This lighting is positioned to direct light downwards and away from sensitive receptors in order to minimise light emissions and nuisance impacts to surrounding landowners and road users. Lights are generally left off and only used as required.	There will be no changes to the currently approved Quarry operations that will be visible from public or private sensitive viewpoints. While the pit depth would increase, this would not be visible from vantage points in the public domain. No new emplacements or other new landforms are proposed as part of the Continuation Project. Continued progressive rehabilitation of the Quarry and the use of the Eastern Emplacement area to the east as a visual screen will further shield the Quarry from public viewpoints. There will be no change to the existing visual amenity of the Quarry site as a result of the Continuation Project.	Gunlake will continue to consult with surrounding landowners regarding the visual amenity of the Quarry and will implement any reasonable additional controls to further reduce their visual impact if necessary.
Historical heritage	No items of historical heritage have been identified in previous assessments of historical heritage significance at the Quarry (AASC 2007, Olsen 2014 and EMM 2016). The likelihood of unknown items of historical significance within the Quarry site is negligible.	No historical heritage sites have previously been identified within or in proximity to the Quarry. The Continuation Project is not predicted to impact historical heritage.	*The Gunlake Quarry Aboriginal Heritage Management Plan* (EMM 2020) includes an unexpected finds protocol which will be implemented should an artefact/item/site of potential historical heritage be found.

7 Justification of the Project

This EIS has considered the potential impacts associated with the Continuation Project, as well as the need for the project and alternative development options. This chapter provides a justification of the project on economic, social and environmental grounds and considers the proposal against the relevant objects of the EP&A Act. A justification for the Continuation Project based on the increased utilisation of the rock resource, with consideration of the environment and community, is then provided.

7.1 Objects of the EP&A Act

The objects of the EP&A Act are set out in Clause 1.3 of the Act. An assessment of the consistency of the Continuation Project with the objects of the EP&A Act is provided below with each object provided in a text box followed by a description of how the Continuation Project will meet the objective.

7.1.1 Promote social and economic welfare

a)	to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources

The Continuation Project will continue, and enhance, the social and economic contribution of the Quarry.

The Continuation Project will increase the amount of aggregate and other saleable products to the Sydney and local markets (from up to 2.6 Mtpa as currently approved to up to 4.2 Mtpa) without increasing the previously approved disturbance area or significantly changing impacts from quarry operations.

The Gunlake Quarry Continuation Project will provide long term livelihood benefits from ongoing and increased employment, community investment and involvement, and training and apprenticeship opportunities. Gunlake currently provides community support in the form of their annual contribution commitments to organisations within the local and regional area. Gunlake also maintains partnerships with local employment and training services in the local and regional area, such as TAFE, Mission Australia, and the Goulburn District Education Foundation, to find apprenticeship and employment opportunities for local workers. Gunlake will continue to explore funding and grant opportunities, apprenticeship and training opportunities, and local employment within the local and regional area where need is determined.

The Economic Assessment found that the Continuation Project is desirable and justified from an economic efficiency perspective, with net production benefits to NSW of $74 million (accounting for environmental costs) in addition to the net production benefits of the approved Extension Project.

Increasing the amount of saleable products from the Quarry will allow the more efficient use of the ignimbrite resource and will preserve other undeveloped hard rock resources in NSW.

7.1.2 Facilitate ecologically sustainable development

b)	to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment

This EIS describes the economic, environmental and social context of Gunlake Quarry and the potential impacts of the Continuation Project to allow informed consideration of these aspects in determining the Continuation Project application.

7.1.3 Orderly and economic use and development of land

c)	to promote the orderly and economic use and development of land

The Continuation Project will not require the development of additional land.

Since the Extension Project Approval was granted in 2017, the Primary Transport Route has been substantially upgraded in accordance with the Austroads Guidelines so that it meets the requirements for rural roads with 1,000 to 3,000 average vehicle movements per day, exceeding the requirements of the Extension Project Approval conditions. Gunlake has implemented all of the traffic management and road safety changes required by the Extension Project Approval (Conditions 25, 27 and 28 of Schedule 3) and has continued to introduce higher payload trucks to its transport fleet. The increased truck movements under the Continuation Project will all occur on the recently upgraded Primary Transport Route that has been designed with ample capacity for these truck movements.

The Continuation Project is therefore an orderly and economic use of the existing Quarry site and the transport routes.

7.1.4 Delivery and maintenance of affordable housing

d)	to promote the delivery and maintenance of affordable housing

The Continuation Project will meet increasing demand for the Quarry's construction products, some of which are used for housing construction.

7.1.5 Protect the environment

e)	to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats

The Continuation Project has been designed to minimise additional adverse impacts to biodiversity by restricting disturbance to previously approved areas.

The existing quarry pit will be deepened as part of the Continuation Project but will not have any direct or indirect surface impacts to animals and plants, ecological communities and their habitats.

Small portions of two plant community types are predicted to be impacted at a local scale by groundwater drawdown. However, the impacts to groundwater-dependent ecosystems from Quarry operations are predicted to be minor in both extent and/or nature and represent a low risk of impact to groundwater-dependent ecosystems. Impacts to GDEs are not predicted to increase, as the predicted area of drawdown for the Continuation Project is less than the predicted area of drawdown for the approved Extension Project.

7.1.6 Sustainable management of built and cultural heritage

f)	to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)

No historical heritage sites have previously been identified within or in proximity to the Quarry and the Continuation Project is not predicted to impact historical heritage.

The Continuation Project will not increase the previously approved disturbance area. Aboriginal heritage will continue to be managed in accordance with the *Gunlake Quarry Aboriginal Cultural Heritage Management Plan* (EMM 2020).

7.1.7 Good design and amenity of the built environment and proper construction and maintenance of buildings

g)	to promote good design and amenity of the built environment,
h)	to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants

No significant new capital works are proposed as part of the Continuation Project. Over the 30-year quarry life, the Quarry's processing and other infrastructure will be maintained, upgraded, replaced and/or moved to ensure safe and efficient quarry operations.

7.1.8 Sharing of the responsibility for environmental planning and assessment

i)	to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State

This is a matter for the different levels of government in the State. As summarised in Chapter 5, a wide range of government agencies have been consulted regarding the Continuation Project, including Goulburn Mulwaree Council.

7.1.9 Increased opportunity for community participation

j)	to provide increased opportunity for community participation in environmental planning and assessment.

As described in Chapter 5, there have been a range of engagement activities to inform the community about the Continuation Project and to seek community (and other stakeholder) feedback. This EIS provides further detailed information regarding the project and its potential impacts. It will be placed on public exhibition by DPIE and community members will be able to make formal submissions. Gunlake will prepare a report responding to these submissions.

7.2 Biophysical, economic and social impacts of the development

The SEARS require that the EIS include 'the reasons why the development should be approved, having regard to the biophysical, economic and social impacts of the development, including the principles of ecologically sustainable development'.

The principles of ecologically sustainable development are outlined in Schedule 2 of the EP&A Regulation. The consistency of the Continuation Project with each of these principles is provided in Table 7.1.

Table 7.1 Continuation Project – consistency with the principles of ecologically sustainable development

Principle	Summary	Consistency
Precautionary principle	The precautionary principle means that if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	During the project planning phase and preparation of this EIS, experts identified and assessed the potential environmental impacts of the Continuation Project in accordance with current government policies and guidelines. This included reviewing the Quarry's current mitigation, management and monitoring measures and, where required, proposing additional measures. Taking these measures into account, it is considered that there would be no threat of serious or irreversible damage to the environment. Therefore, the Continuation Project is consistent with the precautionary principle.
Social equity including inter-generational equity	Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of current and future generations.	A range of mitigation and compensatory measures are proposed that will minimise the impacts of the Continuation Project during operation and rehabilitation after closure will ensure that the parts of the Quarry site are available for ongoing use while the quarry pit will be made stable and safe. The Continuation Project is being developed to provide civil and construction materials, such as concrete aggregate, that will be used in part to construct public infrastructure, commercial and industrial development and housing that will be used by current and future generations.
Conservation of biological diversity and maintenance of ecological integrity	Conservation of biological diversity and ecological integrity should be a fundamental consideration.	The conservation of biological diversity and ecological integrity was a fundamental consideration in the development of the Continuation Project. The BDAR was prepared to assess potential impacts of the Continuation Project (see Section 6.6). No direct impacts to native vegetation or habitat for threatened species will occur as a result of the Continuation Project.
Improved valuation and pricing of environmental resources	Environmental factors should be included in the valuation of assets and services.	The economics assessment (Appendix F.11) provides monetary estimates of the intangible environmental, cultural and social impacts of the proposal. The costs and benefits analysis (see Section 6.12.2i) found that benefits of the Continuation Project will outweigh the small environmental costs. While these are estimates, they provide an indication of the economic value of environmental resources associated with the project. Overall, the economics assessment found the Continuation Project is desirable and justified from an economic efficiency perspective.

The Continuation Project is consistent with the principles of ecologically sustainable development.

7.3 Suitability of the site

The suitability of the site, with respect to potential land use conflicts with existing and future surrounding land uses, is demonstrated by the original Quarry Approval (PA07_0074) and the Extension Project Approval (NSW LEC Approval 2017/108663).

The Continuation Project will not increase the previously approved disturbance area or significantly change impacts from Quarry operations so the site will be suitable for the Continuation Project.

The Continuation Project will increase truck movements on the recently upgraded Primary Transport Route that has been designed with ample capacity for these truck movements. Truck movements will not change on the Secondary Transport Route.

The Gunlake Quarry site is suitable for the Continuation Project as it will not result in any significant changes to impacts on existing or future surrounding land uses and will use suitable transport infrastructure to deliver saleable products to their markets.

7.4 Continuation Project justification

7.4.1 Utilisation of the rock resource

The Quarry is close to the Hume Highway and about 100 km from Greater Sydney, Australia's biggest construction materials market. The Quarry has a proven state significant rock resource of approximately 180 million tonnes of ignimbrite. The Primary Transport Route provides a high-quality link between the Quarry and the Hume Highway.

The hard rock is suitable for uses in a range of quarry products including concreted and sealing aggregates, rail ballast, manufactured sand and road bases. To date, only a small proportion of the 180 million tonnes of the resource has been quarried.

The high quality of the Quarry's products, and the concrete and other civil construction products that it is used for, has seen increasing demand for the Quarry's products in the greater Sydney and local regional markets for use in the residential, industrial and commercial construction sectors. This demand is forecast to increase further as a result of the extensive infrastructure construction projects in NSW. If approved, the Continuation Project will increase the amount of aggregate and other saleable products supplied to the Sydney and local markets (from up to 2.6 Mtpa as currently approved to up to 4.2 Mtpa) by the Quarry without increasing the previously approved disturbance area or significantly changing impacts from quarry operations.

7.4.2 The environment

The Quarry operates in accordance with Gunlake's environmental policy and planning framework that are documented in the *Gunlake Quarry Environmental Management Strategy* (Gunlake 2020a) and associated environmental management plans. These plans describe environmental monitoring and reporting to assess Quarry compliance with the Extension Project Approval and EPL conditions. These plans are regularly reviewed and updated in accordance with the Extension Project Approval and will be reviewed and updated should the Continuation Project be approved.

The Continuation Project has been designed to restrict disturbance to previously approved areas. Operations will remain similar to the currently approved Extension Project operations, and truck movements will only increase on the recently upgraded Primary Transport Route that has ample capacity for these truck movements. Therefore, there will be minimal impacts from the Continuation Project.

7.4.3 The community

The Quarry has an ongoing community engagement program and specific engagement regarding the Continuation Project was undertaken as part of preparing this EIS. Ongoing engagement will continue throughout Continuation Project operation.

Gunlake Quarry is one of a number of quarries in the local area. The local community recognises the importance of these quarries to the local economy and acknowledge Gunlake's contributions to the local community.

Public safety related to increased truck movements on the primary transport route was a primary concern raised by stakeholders. Gunlake and Goulburn Mulwaree Council have implemented a road maintenance work plan and budget to enhance and maintain safety measures along the Primary Transport Route, which is fully funded by Gunlake Section 7.11 contributions. Gunlake implements driver inductions, and enforces a driver code of conduct that requires compliance with road safety procedures and prohibiting unsafe driving practices such as tailgating, convoying, and speeding.

As described in this EIS, the upgraded Primary Transport Route enables increased truck movements while maintaining road safety.

Gunlake currently provides community support in the form of their annual contribution commitments to organisations within the local and regional area. Gunlake also maintains partnerships with local employment and training services in the local and regional area, such as TAFE, Mission Australia, and the Goulburn District Education Foundation, to find apprenticeship and employment opportunities for local workers.

The Continuation Project will provide long-term livelihood benefits from ongoing and increased employment, community investment and involvement, and training and apprenticeship opportunities.

The Continuation Project will provide direct economic activity, including jobs, to the local area economy, and indirect economic activity to the local area via both wage and non-wage expenditure. Quarry operations and associated product transport under the Continuation Project will provide 228 direct jobs, comprising 90 quarry jobs and 138 transport jobs (full-time equivalent jobs, drawn from a pool of about 200 drivers).

The Economic Assessment found that the Continuation Project is desirable and justified from an economic efficiency perspective, with net production benefits to NSW of $74 million (accounting for environmental costs) in addition to the net production benefits of the approved Extension Project.

Standard regional economic impact assessment using input-output analysis estimated that the combined quarrying and transport components of the Continuation Project will provide the following annual direct and indirect annual effects to the local economy:

- $277 million in output;
- $115 million in value-added;
- $47 million in gross wages; and
- 731 jobs.

Glossary

Item	Definition
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
AEP	Annual exceedance probability
AHD	Australian Height Datum
AHMP	Aboriginal Heritage Management Plan
Area 1	Prior to surrendering the original approval for the Quarry (MP07_0074) on 1 August 2018, the Eastern overburden emplacement was extended and the haul road into the pit was completed, both within the footprint approved by MP07_0074. By oversight, these areas were omitted from the Extension Project disturbance area. It is proposed to rectify this as part of the Continuation Project and re-include one of these omitted areas into the Continuation Project boundary, referred to as 'Area 1' (identified on Figure 3.1).
ARRB	The Australian Road Research Board
AQIA	Air quality impact assessment (provided in Appendix F.4)
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report (provided in Appendix F.7)
CCC	Gunlake Quarry Community Consultative Committee
$C0_2$-e	Carbon dioxide equivalent – a unit based on the global warming potential of different greenhouse gases
DA	Development Application
DAWE	The Commonwealth Department of Agriculture, Water and the Environment
dB	Decibels
DPIE	Department of Planning, Industry and Environment
eg	For example
EIS	Environmental impact statement
EMM	EMM Consulting Pty Limited
EPA	Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental planning and Assessment Regulation 2000
EPL	Environment Protection Licence
GHG	Greenhouse Gas
Gunlake	Gunlake Quarries Pty Ltd
ha	Hectare
km	Kilometre
LAeq,15mins	Equivalent continuous sound level over 15 minutes
LEC	Land and Environment Court

Item	Definition
ABS	Australian Bureau of Statistics
LEP	Local Environmental Plan
LGA	Local Government Area
Lin Peak	Linear Peak – the maximum level or air pressure fluctuation measured in decibels without frequency weighting
LR&RA	Land Resources and Rehabilitation Assessment (provided in Appendix F.8)
m	Metres
mm	Millimetres
mbgl	Metres below ground level
Mitigation	Activities associated with reducing the impacts of the development
ML	Megalitres
MOD1	A Modification Application to amend the offsets required by the Extension Project Approval. MOD1 was filed with the LEC in March 2019 and a hearing was held in February 2021. The application has not been determined.
MOD2	A Modification Application filed with the LEC in November 2020, primarily to increase daily truck movements. The MOD2 application was approved by the NSW Land and Environment Court (LEC) Approval 2020/00327172 on 9 June 2021 (the 'Extension Project Approval')
Mtpa	Million tonnes per annum
µg	Micrograms
NIA	Noise impact assessment report (provided in Appendix F.3)
NorBE	Neutral or beneficial effect in accordance with the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
NPfI	Noise Policy for Industry (EPA 2017)
NSW	New South Wales
OEMP	Operational environmental management plan
Overburden	Any extracted unsalable material
PCT	Plant community type
PHA	Preliminary hazard analysis
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in aerodynamic equivalent diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic equivalent diameter
POEO Act	NSW *Protection of the Environment and Operations Act 1997*
Prescribed impact area	The area where prescribed (uncertain) biodiversity impacts have the potential to occur. In the BDAR, this is the area where groundwater drawdown of 2 m or greater is predicted to occur over the life of the Quarry
Primary Transport Route	Route from the site along Brayton Road, Ambrose Road and Red Hills Road
Quarrying operations	The extraction, processing, stockpiling and transportation of extractive materials carried out on the site, the associated removal of vegetation, topsoil and overburden, and the associated emplacement of overburden
Quarry products	Includes all saleable quarry products, but excludes tailings and other wastes

Item	Definition
ABS	Australian Bureau of Statistics
RAPs	Registered Aboriginal Parties
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The restoration of land disturbed by the development to a good condition and for the purpose of establishing a safe, stable and non-polluting environment
RL	Reduced level
RNP	Road Noise Policy (DECCW 2011)
RSA	Road Safety Audit
RSAR	Road Safety Assessment Report (provided in Appendix F.2)
SEARs	Secretary's Environmental Assessment Requirements
Secondary Transport Route	Route from the site to the Marulan interchange on the Hume Highway, along Brayton Road, across George Street, and under the Hume Highway
SEPP	State Environmental Planning Policy
SEPP 33	State Environmental Planning Policy No. 33 — Hazardous and Offensive Development
SIA	Social Impact Assessment (provided in Appendix F.10)
SSD	State Significant Development
TEC	Threatened ecological community
The Continuation Project	The Project as described in Section 3
The Extension Project	The Quarry as it is currently operating and approved under SSD 7090, NSW Land and Environmental Court Approval 20017/108663, and modified by MOD2
The Quarry	Gunlake Quarries Pty Ltd hard rock quarry located at 715 Brayton Road, Marulan
TIA	Traffic impact assessment (provided in Appendix F.1)
Truck movements	Truck movements mean heavy vehicle one-way trips, either entering or leaving the site
TSP	Total suspended particles
SRD	State Regional Development
WSP	Water Sharing Plan

References

AASC 2007, *Proposed hard rock Quarry Marulan NSW: Preliminary Archaeological Assessment.* Prepared by Australian Archaeological Survey Consultants for AASC for Gunlake Quarries Pty Ltd.

ABS 2016, *Census of Population and Housing: General Community Profiles*, Australian Bureau of Statistics.

Anglicare Australia 2021, *Rental Affordability Snapshot*, https://www.anglicare.asn.au/wp-content/uploads/2021/05/rental-affordability-snapshot-national-report.pdf.

Austroads 2020, *Guide to Road Design Part 3 Geometric Design*, AGRD03-20, Austroads.

CHMA 2014, *Gunlake Quarry, Marulan, NSW, Modification to Quarry Pit and Overburden Emplacement, Aboriginal Cultural Heritage Assessment*. Prepared for Gunlake Quarries Pty Ltd.

ARRB 2021, *Road Safety Assessment Report.* Prepared by Australian Road Research Board for Gunlake Quarries Pty Ltd.

Biosis 2014, *Extensions to Gunlake Quarry, Marulan: Supplementary Flora and Fauna Assessment*. Prepared for Olsen Environmental Consulting on behalf of Gunlake Pty Ltd.

Cook and Associates Pty Ltd (Cook) 2008, *Gunlake Quarry Project, Environmental Assessment Volume II, Part 3 Groundwater Impact Assessment* February 2008, prepared for Gunlake Quarries Pty Ltd.

DECCW 2011, *Road Noise Policy*. NSW Department of Environment Climate Change and Water.

DISER - Department of Industry, Science, Energy and Resources 2020, *National Greenhouse Accounts Factors*, October 2020DPIE 2019, *Population Projections*, Department of Planning, Industry and Environment, https://www.planning.nsw.gov.au/Research-and-Demography/Population-projections.

DPIE 2020, *Biodiversity Assessment Method*, NSW Department of Planning, Industry and Environment, Sydney.

DPIE 2021, *Major Projects*, https://www.planningportal.nsw.gov.au/major-projects. NSW Department of Planning, Industry and Environment.

Ecotone 2008, *Flora and Fauna Survey and Ecological Impacts Assessment Report: Proposed Hard Rock Quarry, Haul Road and Bypass Roads Near Marulan*, prepared for Gunlake Quarries Pty Ltd.

EMM 2016a, *Extension Project Noise and Vibration Assessment*, prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EMM 2016b, *Gunlake Quarry Extension Project Environmental Impact Statement*, prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EMM 2016c, *Gunlake Quarry Extension Project Aboriginal cultural heritage assessment, including the results of an archaeological test excavation*, prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EMM 2016d, *Soil and rehab assessment, Gunlake Extension Project,* prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EMM 2018, *Gunlake Quarry Biobank Site*, *Biodiversity Assessment Report,* prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EMM 2020, *Gunlake Quarry Aboriginal Heritage Management Plan,* Project Approval 07-0074 and Development Consent SSD 709, prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Limited 21 March 2020 (revised version from original 2018 version).

EMM 2021, *Gunlake Quarry Extension Project Statement of Environmental Effects,* prepared by EMM Consulting Pty Limited for Gunlake Quarries Pty Ltd.

EPA 2017, *Noise Policy for Industry*. NSW Environment Protection Authority.

EPA 2021b, EPL search, https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences.

Gillespie Economics 2016, *Gunlake Quarry Extension Project Economic Assessment*, prepared for Gunlake Quarries Pty Ltd.

Goulburn Mulwaree Council 2020, *Local Strategic Planning Statement.*

Goulburn Post 2021, *New Report Reveals Rental Affordability Forces More Goulburn Families into Financial Hardship*, Goulburn Post, https://www.goulburnpost.com.au/story/7239727/new-report-reveals-rental-affordability-forces-more-goulburn-families-into-financial-hardship/

Gunlake 2015, *Rehabilitation and Biodiversity Offset Management Plan*, October 2015.

Gunlake 2020a, *Gunlake Quarry Environmental Management Strategy,* March 2020.

Gunlake 2020b, *Gunlake Quarry Soil and Water Management Plan,* March 2020.

Gunlake 2020c, *Gunlake Quarry Traffic Management Plan,* March 2020.

Gunlake 2020d, *Gunlake Quarry Noise and Blast Management Plan,* March 2020.

Gunlake 2020e, *Gunlake Quarry Air Quality Management Plan,* March 2020.

Gunlake 2021, Pollution Incident Response Flow Chart, July 2021, Version 2.3.

NSW Government 2018, *Voluntary Land Acquisition and Mitigation Policy*.

NSW Office of Water (NOW) 2012, *NSW Aquifer Interference Policy; NSW Government policy for licensing and assessment of aquifer interference activities*, NSW government.

National Pollutant Inventory 2021a, NPI Search by Map – facility search, http://www.npi.gov.au/npidata/action/load/map-search

NSW Office of Environment and Heritage 2014, *Framework for Biodiversity Assessment.*

RHDHV 2016, *Gunlake Quarry Extension Project: Surface Water Assessment*, prepared as Appendix G for Gunlake Quarry Extension Project Environmental Impact Statement.

Serov P, Kuginis L, Williams JP, 2012, *Risk Assessment Guidelines for Groundwater Dependent Ecosystems*, Department of Primary Industries, Office of Water, NSW Government.

SEWPaC – Department of Sustainability, Environment, Water, Population and Communities, 2012 *EPBC Act Environmental Offsets Policy*.