Carlon's Quarry Expansion Project

Environmental Impact Statement

Blendee Partnership

Version 0

28 October 2022

Statement of Validity

Project details	
Project name	Carlon’s Quarry Expansion Project
Secretary’s environmental assessment requirements reference	EAR 1622
Land to be developed	Lot 3 DP 834359 1033 Kingstown Road, Balala, NSW, 2358
Applicant details	
Applicant name	Blendee Partnership
Applicant address	13 Dangar Street, Uralla NSW 2350
Environmental Impact Assessment prepared by	
Lead author	Mark Vile
Profession	Environmental Scientist (20 years’ experience)
Qualifications	Bachelor of Environmental Science (Hons)
Role	Director of Onward Consulting Pty Ltd
Co-authors	Michael Gale – Senior Environmental Consultant Linden Burch – Environmental Project Manager

Declaration

The undersigned declares that this EIS:

- has been prepared in accordance with the *Environmental Planning and Assessment Regulation 2021*
- contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates;
- does not contain information that is false or misleading;
- addresses the Planning Secretary’s environmental assessment requirements (SEARs) for the project;
- identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments;
- contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development;
- contains a consolidated description of the project in a single chapter of the EIS;
- contains an accurate summary of the findings of any community engagement; and
- contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.

Approval	
Signature	
Date	28 October 2022
Lead author	Mark Vile
Address	187 Kirkwood Street, Armidale, NSW, 2350

Document review

Version	Date	Description	Prepared	Approved
0	28/10/2022	Submission	Linden Burch, Mike Gale, Rebecca Murray and Blake Gorton	Mark Vile

Summary

Introduction

Blendee Partnership operate an existing approved quarry located on Kingstown Road, Balala (**the Project Site**), approximately 10 kilometres west of Uralla, within the Uralla Shire Local Government Area (**LGA**) in the New England region of NSW (**Figure 1**). Due to high demand for gravel material in the region from construction of renewable energy developments, Blendee Partnership is proposing to expand the size of its existing quarry and increase the approved production rate.

Onward Consulting Pty Ltd has prepared this Environmental Impact Statement (**EIS**) on behalf of Blendee Partnership (**the Applicant**) to accompany a development application (**DA**) for designated development. This summary provides an overview of the EIS, including the Project Site and surrounds, proposed activities and project justification, strategic and statutory context, stakeholder engagement and environmental assessment.

The development application seeks consent to develop a proposed gravel quarry extractive industry facility (the Project) located on the Project Site. The Project is designated development under clause 26(1) of Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (**EP&A Regulation**) as the Applicant proposes to obtain or process for sale, or reuse, more than 30,000 m^3 of extractive material per year with a total disturbance area of more than 2 hectares (**ha**) of land. The Project also constitutes integrated development under section 4.46 of the Act because it requires approvals, licenses and permits under other planning and environmental legislation.

Project site

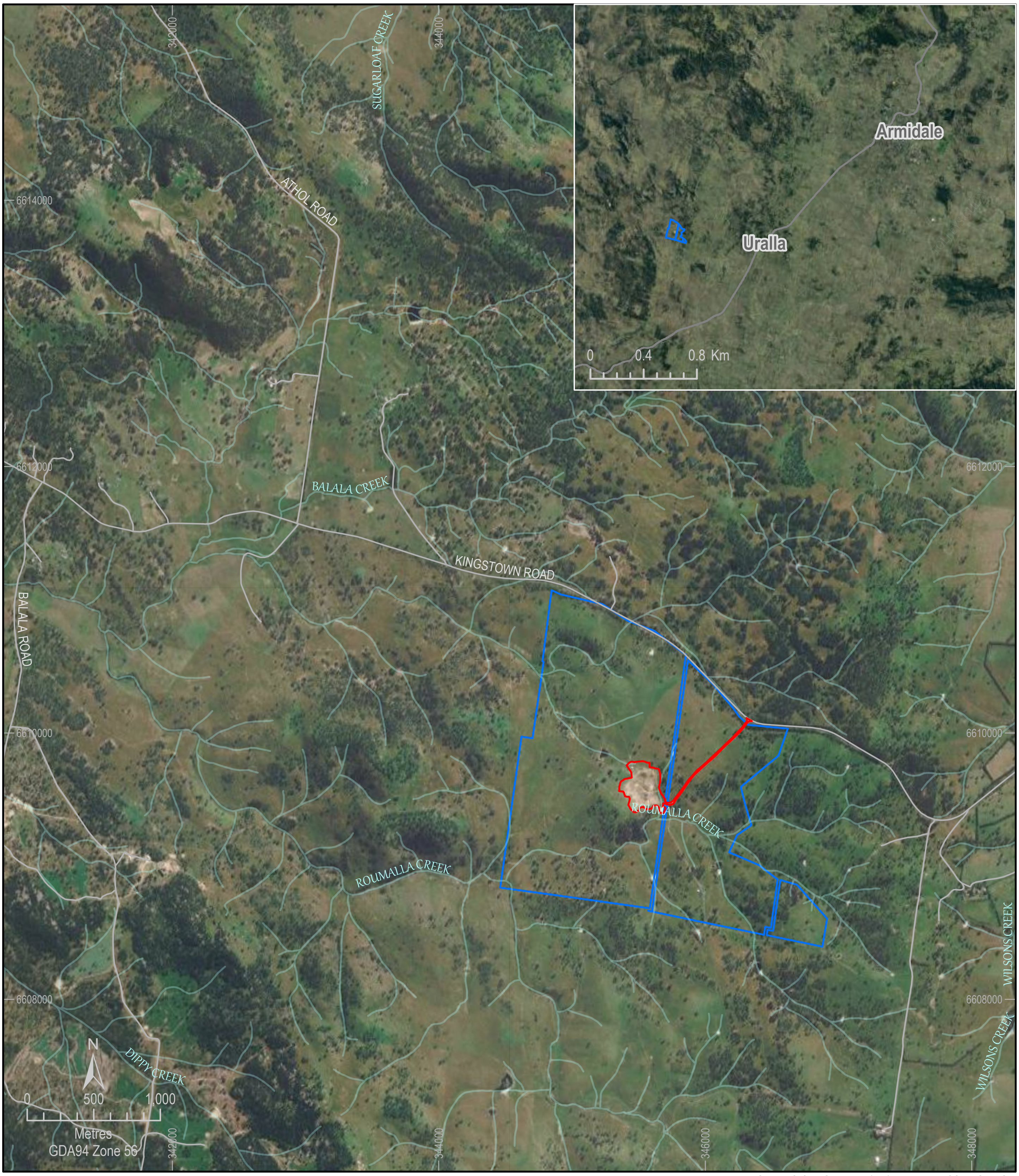
The Project Site (**Figure 1**) is located wholly within freehold land on Lot 3 DP 834359, which is zoned RU2 Rural Landscape. The Project Site encompasses Crown roads contained within the Project Site. The existing approved quarry has been operated by the Applicant since development consent was granted on 27 August 2002 (DA 3291). Kingstown Road and the New England Highway at Uralla provide main road links from the Project site to customers in the region.

The Project Site and surrounding land have been historically cleared and improved for agricultural activities, namely cattle and sheep grazing. Intact vegetation in the surrounding environment is limited to hillcrests, drainage lines, the Kingstown Road corridor and scattered paddock trees. Within the Project Site, intact vegetation is located immediately south of the pit disturbance area and there are scattered paddock trees.

Project objectives

The objectives of the Project are to:

- provide a long-term source of high-quality gravel to the local market;
- produce up to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum) of saleable product for distribution per annum;
- minimise to the greatest extent possible, the impact to the local environment and community; and
- ensure the post-extraction landform is suitable for future uses consistent with the surrounding land uses.



Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Highway
- Roads
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 1

Project Site

The Project

The Application seeks development consent for the use of the Project Site for the extraction and sale of up to 120,000 m^3 of gravel per annum to meet the increasing demand for gravel material in the New England region for the construction market. **Figure 2** shows the proposed site layout of the Project. **Table 1** provides a summary of the Project.

Table 1 Project description summary

Element	Detail
Proposed land use	Extractive Industry
Extraction method	– Gravel extraction via mechanical excavation – Explosives may be required for small unconfined surface blasts on an occasional basis only when consolidated rock is encountered
Material handling and processing	– Loading gravel to trucks – Mobile crushing plant to operate periodically on a campaign format
Extraction rate	– 120,000 m^3 maximum per annum, averaging 80,000 m^3 per annum – Extraction from the resource will not exceed a total of 5 million tonnes
Surface disturbance	– Increase the existing disturbance area by approximately 0.99 ha – Cumulative total disturbance of up to 9.9 ha
Infrastructure	– Private unsealed access road – No permanent infrastructure facilities additional to the existing open-sided shelter structure to accommodate a single bulldozer
Operational fleet	Three bulldozers, five front end loaders, two excavators, one skid-steer loader and one forklift
Product transport	– Transport of product gravel undertaken by trucks with capacity between 8 and 38 tonnes via the public road network to customers (typically located within Uralla LGA) – Daily maximum truck movements = 60 – Daily average truck movements = 38
Quarry access	From Kingstown Road via the main private unsealed access road
Water management	– Continued use of sediment pond for primary sediment control – Construction of a drain to divert clean water around the existing sediment pond
Operational workforce	Two casual contractors
Hours of operation	Monday to Saturday between 7 am and 6 pm

Access

The quarry would continue to be accessed via the existing all weather gravel road to its intersection with the Kingstown Road, with the majority of truck movements along Kingstown Road toward Uralla. The Applicant proposes to upgrade the intersection of the quarry access road with Kingstown Road to include appropriate turn treatments with a sealed approach to the cattle grid.

Source:© OpenStreetMap (and) contributors, CC-BY-SA

LEGEND

- Proposed Development Extent
- Proposed Quarry Extension Areas
- Indicative Quarry Extraction Area
- Existing sediment pond
- Existing shelter structure
- Approximate location of clean water drain
- Approximate location of dirty water drain
- Roads
- Watercourses
- 10 m contours

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 2

Proposed site layout

Extraction

The Indicative Quarry Extraction Area occupies approximately 8 ha of the Proposed Development Extent (9.9 ha) (**Figure 2**).

Extraction is expected to remain similar to the current operation, whereby rock material generally breaks apart when using conventional extraction methods. Excavated material would be stockpiled prior to loading onto trucks using excavators or loaders for delivery to customers.

Explosives may be required for small unconfined surface blasts on an occasional basis only when consolidated rock is encountered, and occasional use of mobile crushing plant is expected to be undertaken in campaign format to crush oversized material or to shape to client specifications.

Transportation

Transport would continue to predominantly require the use of truck and dog and rigid configurations, with a maximum capacity up to 38 tonnes. The transport vehicles would be operated by the customers of the quarry.

The proposed extension would increase the number of truck movements to an average of 38 movements per day, with a maximum of 60 movements per day and a maximum of 20 truck movements per hour during peak periods of operation.

Site infrastructure and services

The existing infrastructure at the site, comprising an open-sided shelter structure to accommodate a single bulldozer, will continue to be used. No additional infrastructure is proposed as part of this Application. There would be no amenities, permanent storage of diesel fuel, greases and oils or other chemicals or explosives, or services such as electricity established on site.

A diversion drain for dirty and clean water would be constructed to the east of the site to divert clean water around the existing sediment pond into Roumalla Creek to reduce discharges from the sediment pond to Roumalla Creek.

Hours of operation

The proposed hours of extraction, processing, product loading and transportation are Monday to Saturday between 7 am and 6 pm.

Rehabilitation

A rehabilitation and final land use plan has been prepared for the Project. The Project Site would be progressively rehabilitated in accordance with that plan.

The proposed final land use for the Project Site would be low intensity grazing, primarily on the stockpiling, infrastructure and ancillary areas. Remaining areas, including the final void and would be designated for passive biodiversity conservation. These land uses are consistent with the surrounding land uses and the objectives of the RU2 land use zone.

Mitigation measures

The environmental impact assessment process adopted the mitigation hierarchy approach to avoid impacts, minimise impacts and after that to compensate for potential impacts. Modifications to the project description were informed by the input of environmental specialists and the community. Where it was not practicable to avoid impacts through amendments to the Project design, mitigation measures were identified to manage residual impacts. **Appendix C** provides a summary of the proposed mitigation measures for the Project.

Project justification

The following section outlines the strategic need and justification for the Project.

Employment

The Project would provide employment of two casual contractors to run the operations and indirect employment for truck drivers associated with product transport. The Project would contribute approximately $250,000 per year in wages and associated benefits to contractors which is anticipated to be largely spent within the Uralla LGA and surrounding region, representing a positive impact on economic activities within the Uralla LGA.

Reduce the cost of construction and infrastructure projects

An increase in demand for gravel material in the New England region is being driven by the renewable energy industry, via the gazettal of the New England Renewable Energy Zone (**REZ**). The REZ is predicted to produce in the order of 8 gigawatts (**GW**) of renewable electricity by 2030. This scale of development will require significant gravel material for upgrading local and State roads, development of internal access tracks, and foundations for wind turbines and other supporting infrastructure.

The Project is located in close proximity to existing approved and future proposed renewable energy projects. Therefore, the Project will support the planned future growth of the region and maintain local supply of cost-efficient quarry materials close to markets, resulting in transportation cost savings for large scale renewable projects and road infrastructure projects.

Suitability of the site

The Project Site contains extensive gravel resources and is located within proximity to markets for these resources to enable a local source of cost-sensitive gravel resources to the regional market.

The Project Site is located within a Rural Landscape zone and the development is consistent with the objectives of the zone and permissible with consent. The Project is compatible with surrounding rural land uses and can co-exist with these existing uses.

Adverse impacts are managed

The environmental impact assessment process adopted the mitigation hierarchy approach to avoid impacts, minimise impacts and after that to compensate for potential impacts. Modifications to the project description were informed by the input of environmental specialists and the community. These amendments are described in **Section 2.4**.

The environmental mitigation measures proposed in **Section 6** have been compiled in **Appendix C**. These measures are based on assessments conducted in accordance with various government guidelines, policies, and plans. These measures would be implemented following approval of the Project.

Rehabilitation of the Project Site

The Project incorporates a progressive rehabilitation and final land use plan. The proposed final land use of grazing and passive biodiversity conservation is compatible with the surrounding land uses and the objectives of the RU2 land use zone.

Strategic context

The following section provides a summary of the local and regional strategic documents relevant to the Project and an analysis of cumulative impacts and feasible alternatives considered for the Project.

Land use planning context

The Project is considered to be generally consistent with the planning priorities and strategic objectives outlined in the following documents:

- *Uralla Shire Local Strategic Planning Statement;*
- *Uralla Shire Council Community Strategic Plan 2017 – 2027; and*
- *New England North West Strategic Regional Land Use Plan 2036.*

The Project would support existing and upcoming future major renewable energy projects in the region, allowing further development and continued growth of the renewable energy sector. Gravel supplied from the quarry would be used for the development of roads and infrastructure related to these projects. The Project would also support the development and maintenance of public roads and supporting infrastructure in the Uralla LGA and surrounding regions. Gravel supplied from the quarry would be used for road and civil works, contributing to communities by supporting safe access throughout the town and broader region.

The support of both local and State significant projects delivering transport, renewable energy and other essential infrastructure will also contribute to regional investment through employment opportunities and the use of local goods and services.

Cumulative impacts

Given the Project's location in a rural landscape, the main cumulative impacts would be in relation to the other quarry developments or developments that have the potential to generate heavy vehicle traffic. Another quarry is in operation on Kingstown Road, approximately 22 km west of Uralla. The quarry is operated by Ducats Earthmoving Pty Ltd who are based in Armidale. Production quantities are not known, however it is envisaged that the quarry operates sporadically to meet the demand for its products in the broader region.

These cumulative impacts associated with the Project are addressed in **Section 6**.

Feasible alternatives

If the Project were not to proceed, the existing quarry would not be expanded and would operate at a reduced capacity, with an associated reduction in the operational life of the quarry. The consequences of not proceeding with the Project include:

- The opportunity to secure access to a long-term, local supply of cost-efficient gravel for the construction market in the New England region would be foregone.
- Further development of renewable energy and infrastructure projects and the continued growth of the renewable energy sector could be tempered because of increased costs of development for these projects.
- A source of direct and indirect employment opportunities for the local community would be lost.
- The adverse impacts of the Project outlined in **Section 6** would not occur, even though it is considered that the level of predicted impacts arising from the Project are acceptable with the implementation of proposed mitigation measures for the Project.

Following evaluation of several study area options, the Proposed Quarry Extension Areas (comprising 0.99 ha) shown have been proposed as the additional disturbance areas for the purpose of clearing and excavation. The Proposed Quarry Extension Areas form part of the Proposed Development Extent, on which the environmental impact assessment provided in **Section 6** has been based upon.

The Proposed Quarry Extension Areas avoid disturbance to threatened ecological communities classified as 'good' condition vegetation zone and minimise disturbance to threatened ecological communities classified as 'moderate' condition vegetation zone. A significant impact on biodiversity values is also avoided by minimising overall disturbance of vegetation to below the area threshold of 1 ha for clearing at the Project Site. Assessments of significance determined that the proposed clearing will not have a significant impact on threatened species or ecological communities.

The Proposed Quarry Extension Areas also ensure that the possible scarred tree will not be impacted by the Project (located approximately 660 m from the Proposed Development Extent), and the mitigation measures outlined in **Section 6.6.5** are sufficient to manage activities that have the potential to result in reduced local and regional Aboriginal heritage values.

Coinciding with the reduction in the Project disturbance area, the maximum production rate was reduced from 150,000 m^3 per annum (or approximately 270,000 tonnes per annum) to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum). The reduction in maximum production rate has the effect of reducing the predicted project-related traffic using the road network, minimising the potential traffic impacts associated with the Project.

Statutory context

The following section provides a summary of the statutory context for the Project.

Declaration of Designated and Integrated Development

Section 4.10 of the EP&A Act states that:

(1) Designated development is development that is declared to be designated development by an environmental planning instrument or the regulations.

Schedule 3 of the EP&A Regulation lists development that is for the purposes of an extractive industry facility to be designated development if the facility obtains or processes for sale, or reuse, more than 30,000 cubic metres of extractive material per year and will have a total disturbance area of more than 2 ha of land. As the Project would produce for sale more than 30,000 cubic metres of extractive material per year and the total disturbance (existing and proposed) will exceed 2 ha, it is declared designated development.

The Project is also classified as integrated development under section 4.46 of the Act because it requires approvals under other legislation, including an Environmental Protection Licence under the *Protection of the Environment Operations Act 1997* and consent to carry out works in, on or over a public road under section 138 of the *Roads Act 1993*.

Approval and assessment pathway

The primary approval that is required for the Project is a development consent under the EP&A Act. Division 4.3 and Division 4.8 provides the approval process for a designated development and integrated development, respectively.

Section 4.12(8) of the EP&A Act provides that a development application for designated development is to be accompanied by an EIS (this document), which is the document by which environmental impacts are assessed, prior to a decision being made by the consent authority on whether to approve an application.

Permissibility

The Project Site is zoned RU2 Rural Landscape under the *Uralla Local Environmental Plan 2012*. Extractive industries are permitted with consent in the RU2 Zone.

Approvals required

The following approvals are required for the Project:

- Development consent under the *Environmental Planning & Assessment Act 1979;*
- Environmental Protection Licence under the *Protection of the Environment Operations Act 1997*; and
- Section 138 approval under the *Roads Act 1993.*

Engagement

Consultation

As the Project is classified as designated development, a Scoping Report was prepared, and the then Department of Planning, Industry and Environment (**DPIE)** (now Department of Planning and Environment) consulted with relevant regulatory agencies to inform the development of the Project SEARs.

During the preparation of the EIS, consultation was carried out with nearby landowners, Government agencies, Aboriginal community and other key stakeholders using a range of methods including face-to-face emails, teleconferences, letters, phone conversations and emails.

Issues raised

The key issues raised by stakeholders included noise impacts, dust and air quality impacts, traffic impacts and water impacts.

Section 5 provides a detailed summary of the key issues raised during the preparation of the SEARs and EIS and outlines where those issues are addressed in the EIS.

Response to issues raised

The following matters were raised by USC as a key stakeholder in relation to potential traffic impacts associated with the Project:

- material tracking onto Kingstown Road and sealing of the quarry access road entry, and
- concerns regarding road safety and pavement impacts are to be addressed, including when pavements are saturated during wet weather.

These matters have been addressed by the traffic mitigation measures proposed for the Project as outlined in **Section 6.8**.

Environmental assessment

Noise

Muller Acoustic Consulting undertook a Noise Impact Assessment and is presented in **Appendix D**.

The predicted noise levels satisfied the relevant daytime Project Noise Trigger Levels at each assessed sensitive receiver during calm meteorological conditions. The traffic noise contribution from the quarry is predicted to remain below the relevant daytime period assessment criterion for the most affected receivers adjacent to the haul route.

Although noise levels are predicted to meet the relevant noise assessment criteria and no further mitigation measures are required, the Applicant would prepare an Environmental Management Plan (**EMP**) to proactively address any potential residual noise impacts.

Blasting and vibration

Muller Acoustic Consulting undertook a Noise and Blasting Impact Assessment and is presented in **Appendix D**.

The Project may require small unconfined surface blasts on occasion when consolidated rock is encountered, anticipated to occur at an average rate of one blast every two years.

Blast overpressure and vibration predictions calculated to each assessed sensitive receiver are below the relevant overpressure and ground vibration criteria for blasting. There is no significant infrastructure in the locality of the Project that would experience effects of vibration from occasional blasting.

Air

Zephyr Environmental undertook an Air Quality Assessment for the Project and is presented in **Appendix E**.

A dispersion model was used to predict air quality concentrations and dust deposition rates at each assessed sensitive receiver, assessing both the contribution from the Project alone and combined with the existing background levels to determine cumulative impacts. The following particulate matter emissions were assessed:

- annual average PM_{10}, $PM_{2.5}$ and dust deposition rates; and
- maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations.

A single 'worst case' operating scenario has been adopted for the purposes of predictive modelling, incorporating the maximum annual production rate of 120,000 m^3.

The air dispersion modelling indicates that the predicted annual average the PM_{10} and $PM_{2.5}$ and dust deposition at the closest sensitive receivers are all predicted to comply with the NSW EPA air quality criteria. The cumulative 24-hour assessment showed that there were no sensitive receivers predicted to experience maximum 24-hour cumulative PM_{10} and $PM_{2.5}$ concentrations above the NSW EPA air quality criteria. Therefore, no exceedances of the NSW EPA air quality criteria are predicted as a result of the Project.

Although air quality is predicted to meet the relevant air quality assessment criteria and no further mitigation measures are required, the Applicant would prepare an EMP to proactively address any potential residual air quality impacts.

Water

WRM Water & Environment prepared a Water Assessment for the Project and is presented in **Appendix F**.

The Project will increase the quarry extraction area by up to 0.99 ha. The surface runoff from the Indicative Quarry Extraction Area will drain to the existing sediment pond. The increase in quarry extraction area represents less than 0.3% of both the northern tributary catchment to the western property boundary and the portion of the Roumalla Creek catchment to the Project Site. The loss of catchment flows in Roumalla Creek would be negligible and therefore, the potential impact on water quantity in Roumalla Creek due to the Project is considered negligible.

The existing sediment pond is located on a mapped first order stream, which is considered a "minor stream" in accordance with the *Water Management (General) Regulation 2018*. In addition, the existing sediment pond's primary function is to control erosion to prevent contamination of a water source. As such, it is considered an "excluded works" dam under Schedule 1 of the Regulation and does not require licensing.

The key objective of the proposed water management system for the Project is to separate runoff from areas unaffected by quarry operations ('clean water') and area disturbed by quarry operations ('dirty water'). The Project would design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond, thus reducing the catchment draining to the existing approved sediment pond by approximately 70%.

The erosion and sediment controls would be implemented to identify measures to minimise soil erosion and transport of sediment off-site and would be incorporated in the design of the dirty water / clean water drain to be installed as part of the Project. A surface water quality monitoring program and response plan would be implemented to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues. **Section 6.4** provides a detailed assessment of the Project against the typical water quality and river flow objectives for receiving waters in NSW. Measures to proactively control potential surface water quality impacts would be documented within an EMP.

The existing quarry has not intersected any groundwater and no groundwater is expected to be intersected by the Project. No groundwater licences are expected to be required under the *Water Management Act 2000*. Accordingly, further assessment of groundwater impacts of the Project has not been undertaken in this EIS.

Biodiversity

Stringybark Ecological prepared a Biodiversity Assessment and is presented in **Appendix G**.

A field assessment was undertaken initially identify the need for a Biodiversity Development Assessment Report (BDAR). The project will require clearing of 0.99 ha of grassland within areas of the Threatened Ecological Community (*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community)* recorded during survey. The Applicant has sought to avoid, minimise and mitigate biodiversity impacts in the first instance as part of the Project design and has modified the originally proposed quarry extraction area to preferentially disturb areas of vegetation in poorer condition. As the development footprint is 0.99 ha the Project does not trigger the requirement to prepare a BDAR under the *Biodiversity Conservation Act 2016* (**BC Act**). In place of a BDAR, a Biodiversity Assessment was prepared to assess the potential impacts of the Project on biodiversity values.

No threatened species were identified in the Proposed Quarry Extension Area or assessed as likely to occur. Whilst there is potential for threatened species to be vicinity of the Project Site, tests of significance in accordance with the BC Act and the *Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) have determined the Project will not have a significant impact on these species.

No core or potential koala habitat was identified within the Proposed Quarry Extraction Areas. To reduce the likelihood of vehicles strikes to koalas on the Kingstown Road by Project developed traffic, the Applicant will enforce an 80 km/h speed limit for quarry trucks between the Project and the 50 km/h zone at Uralla and educate drivers about watching for and avoiding koalas in the site induction and safety briefings.

Potential impacts to downstream aquatic habitat would be minor and generally restricted to transport of sediment off-site. The impacts would be mitigated by the surface water control measures described above.

Aboriginal cultural heritage

OzArk Environment & Heritage prepared an Archaeological Technical Report and is presented in **Appendix H**.

A field assessment was undertaken with assistance of the Iwatta Aboriginal Corporation to identify and record Aboriginal cultural heritage values within the Project Study Area. Field investigations identified one possible scarred tree on a hill crest in the northern boundary of the Project Study Area in SU3, but outside of the Proposed Development Extent. The possible scarred tree is located approximately 660 m from the Proposed Development Extent and the condition of the tree is very poor – dead with significant rot and numerous fallen limbs all about on the cleared ground surface.

The possible scarred tree will not be impacted by the Project, and the mitigation measures outlined in **Section 6.6.5** would be documented within an EMP and are sufficient to manage activities that have the potential to result in reduced local and regional Aboriginal heritage values. An Aboriginal Heritage Impact Permit (**AHIP**) under section 90 of the *National Parks and Wildlife Act 1974* is therefore not required.

Historic heritage

OzArk Environment & Heritage undertook an assessment of historic heritage and is presented in **Appendix I**.

Desktop searches concluded that all identified heritage items are located more than 4 km from the Proposed Development Extent. During the field survey undertaken to assess Aboriginal cultural values, no items of historic heritage significance were recorded within the Proposed Development Extent. Therefore, the potential impacts of the Project on historic heritage are considered negligible.

Traffic and transport

Constructive Solutions undertook a Traffic Impact Assessment and is presented in **Appendix J**.

The Project would result in an increase in traffic using the road network on weekdays, with the maximum average daily truck movements of 60 per day based on the maximum quarry production rate of 120,000 m^3 per annum. Laden trucks transporting gravel products from Carlon's Quarry turn right at the quarry access onto the Kingstown Road and travel 10.3 km to the New England Highway. A very small percentage of the materials are transported west on Kingstown Road.

The impact on the New England Highway intersection, from an intersection performance perspective, are considered negligible therefore SIDRA analysis has not been undertaken. The New England Highway intersection is generally considered suitable for the increase in vehicle movements. The increase in turning traffic is not anticipated to affect traffic interaction as the majority of the heavy vehicles will turn left into the northbound lane and return via the channelised right turn lane.

The amendments to the haulage frequencies and payloads associated with the Project are achievable with amendments to the existing road network and implementation of applicable mitigation measures summarised in **Section 6.8**, which would be documented within an EMP.

The current quarry intersection was determined to be insufficient to cater for the increase in heavy vehicle movements and may not have suitable dimensional capacity provided to avoid any conflict between opposing vehicles. The Applicant proposes to upgrade the intersection of the quarry access road with Kingstown Road to improve the left and right turn treatments from the Kingstown Road into the quarry access road, including a seal that would extend at least to the cattle grid to prevent gravel and soil material tracking onto the Kingstown Road.

Land resources

The existing quarry currently coexists with surrounding agricultural activities without adverse effect and no change is predicted as a result of the Project.

The assessment establishes a baseline assessment of current land use, soils and land capability prior to the Project and considers the potential impacts associated with the Project on agricultural land and exploration activities in proximity to the Project to ensure compatibility during operation and after decommissioning.

Potential land use conflicts have been assessed in accordance with the Land Use Conflict Risk Assessment which determined that all identified potential risks are low following inclusion of the proposed mitigation measures in the risk assessment.

Soil and land capability would be maintained by implementation of a soil conservation techniques during stripping, stockpiling and rehabilitation activities. Excluding the retained walls of the extraction area, implementation of the proposed soil management and rehabilitation methods would provide for the establishment of the land and soil classification (**LSC**) Classes equivalent to those of the pre-quarry environment.

Waste

The Project is anticipated the generate the following waste streams:

- excavated material (topsoil and overburden);
- general domestic waste (putrescible and non-putrescible);
- used oils and greases;
- tyres and batteries; and
- stormwater runoff from the Indicative Quarry Extraction Area.

Non-production wastes are expected to be generated in small volumes and as there is no dedicated workshop or amenities, operators and drivers would collect and remove waste as it is generated. Apart from excavated material, no waste is disposed at site and all waste is segregated for off-site recycling or disposal off-site at a licensed waste facility.

Hazards

The Project Site is identified as being located in a bushfire prone area. The Project will not involve construction of additional buildings or structures that would require bushfire risk management, and there are no habitable buildings within 2.5 km of the Project Site. Therefore, the Project will not alter the current bushfire risk of the existing quarry.

Potential ignition sources associated with the project include sparks caused by machinery and vehicles, and hot works undertaken during equipment maintenance and repairs. Measures to proactively control potential bushfire control measures would be documented within an EMP.

The Department of Planning and Environment provides a checklist and a risk screening procedure in the “Applying SEPP 33” guideline to help determine whether a development proposal falls within the definition of potentially hazardous industry. The screening procedure considers the type and quantity of dangerous goods associated with the proposal and whether the quantities would represent a potential hazard.

Section 6.11.3 provides details of the screening procedure for the Project and concludes that it does not classify under the definition of a potentially hazardous industry.

Visual

The Project will have limited visibility from the public domain, including Kingstown Road, due to the high visual absorption resulting from to the undulating nature of the surrounding landscape, and remnant vegetation across the landscape and in the Kingstown Road corridor. Impacts from lighting outside of daylight hours during autumn and winter would generally be associated with vehicle headlights along the access road. Therefore, the potential visual impacts associated with the Project are considered negligible.

Social and economic

The Project seeks to recover a maximum of 120,000 m^3 of gravel from the existing quarry per annum. The gravel is suitable for gravel re-sheeting, gravel roads and as a select sub-grade for road construction. The Project would support the development and maintenance of public roads as well as roads and infrastructure for major renewable energy projects either currently under construction or proposed within the Uralla LGA and surrounding LGAs.

The Project is an extension to an existing quarry and due to the limited scale of the extension the potential adverse impacts to the local economy, environment and community are expected to be limited and would be further managed by the mitigation measures outlined in **Appendix C**.

The Project will contribute to local and State significant development projects through the supply of gravel required for the construction of internal access tracks and pads for renewal energy projects in the New England REZ. The Project would also benefit the local and surrounding community through the supply of competitively priced, conveniently located, rock products to local markets for aggregates, road base and general fill. The Project will therefore provide longer-term indirect economic, social and environmental benefits provided by the projects that it will enable.

Rehabilitation

The Project would be rehabilitated to create a final landform that integrates with the surrounding landscape and support agricultural activities consistent with surrounding land uses. The proposed final land use for the quarry is grazing and in areas not suitable for agricultural activities, such any steep slopes in the void, passive biodiversity conservation. Where practicable, rehabilitation activities would be undertaken progressively as new areas of disturbed land become available for rehabilitation.

Soil resources would be quantified and conserved throughout all stages of the Project including during stripping, stockpiling and respreading. Upon completion of the Project a geotechnical review would be undertaken to assess the stability of the final void and proposed final landform is stable and safe.

Contents

Figures

Tables

1. Introduction

Blendee Partnership operate an existing approved quarry located on Kingstown Road, Balala, approximately 10 kilometres west of Uralla, within the Uralla Shire Local Government Area (**LGA**) in the New England region of NSW (**Figure 1-1**). Due to high demand for gravel material in the region from the construction of renewable energy developments, Blendee Partnership is proposing to expand the size of its existing quarry and increase the approved production rate.

Onward Consulting Pty Ltd has prepared this Environmental Impact Statement (**EIS**) on behalf of Blendee Partnership (**the Applicant**) to accompany a development application (**DA**) for a designated development under Part 4 Division 4.3 of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). Blendee Partnership (ABN 87 516 185 157) is a family partnership entity located at 13 Dangar Street, Uralla.

The Applicant seeks consent to develop a proposed gravel quarry extractive industry facility (the Project) located at 1033 Kingstown Road, Balala (**the Project Site**). The Project is designated development under clause 26(1) of Schedule 3 of the *Environmental Planning and Assessment Regulation 2021* (**EP&A Regulation**) as the Applicant proposes to obtain or process for sale, or reuse, more than 30,000 m^3 of extractive material per year with a total disturbance area of more than 2 hectares (**ha**) of land. The Project also constitutes integrated development under section 4.46 of the EP&A Act as it requires additional approvals, licences or permits under other planning and environmental legislation. These additional approvals, licenses, and permits include an Environmental Protection Licence (**EPL**) issued by the NSW Environment Protection Agency (**EPA**) under the *Protection of the Environment Operations Act 1997* (**POEO Act**) and consent to carry out works in, on or over a public road under section 138 of the *Roads Act 1993* (**Roads Act**).

A request for the Secretary's Environmental Assessment Requirements (**SEARs**), supported by the *Carlon's Quarry Request for Secretary Environmental Assessment Requirements* (Onward Consulting, 2021) (Scoping Report), was made to the then Department of Planning, Industry and Environment (**DPIE**) (now Department of Planning and Environment [**DPE**]) on 20 September 2021. The SEARs were issued by DPIE on 3 December 2021 in accordance with section 4.12(8) of the EP&A Act and section 176 of the EP&A Regulation. A compliance table has been included in **Appendix A, Table A-1** which identifies where the requirements of the SEARs have been addressed. Additional issues raised by other statutory agencies through formal correspondence (attached to the SEARs) are also provided in **Appendix A, Table A-2** including a cross reference to the section of the EIS where the issues raised have been addressed.

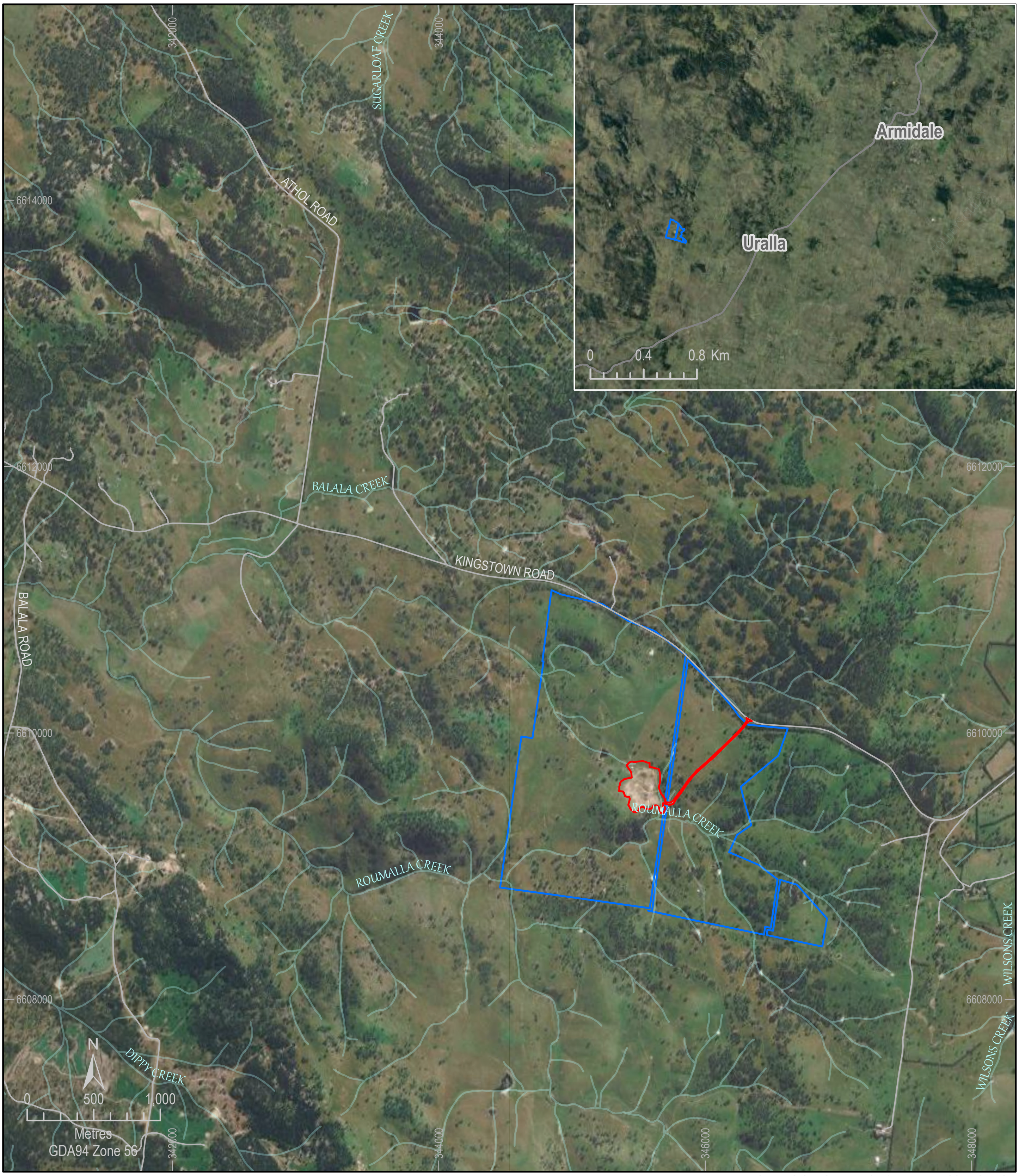
This EIS has been prepared in accordance with Part 4, Division 4.3 – '*Development that needs consent (except complying development)'* of the EP&A Act and the requirements of Part 8, Division 5 of the EP&A Regulation. The EIS intends to inform stakeholders and the community about the Project, including its social, economic, and environmental impacts, mitigation measures and benefits.

The Northern Regional Planning Panel is the consent authority for the DA.

1.1 Overview

Carlon's Quarry is an existing gravel quarry (known as Carlon's Gravel Pit) approved by the Uralla Shire Council (**USC**) on 27 August 2002 under development consent DA 3291 in accordance with the Part 4 of the EP&A Act.

To meet the increased demand for gravel materials within the New England region, the Applicant is proposing to increase the size of the quarry to a maximum of 9.9 ha, inclusive of the existing disturbance area, and increase the maximum production rate to 120,000 m^3 (or approximately 216,000 tonnes) per annum with an approximate average of 80,000 m^3 (or approximately 144,000 tonnes).



Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Highway
- Roads
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 1-1

Regional context

1.2 Project objectives

The objectives of the Project are to:

- provide a long-term source of high-quality gravel to the local market;
- produce up to 120,000 m3 per annum (or approximately 216,000 tonnes per annum) of saleable product for distribution per annum;
- minimise to the greatest extent possible, the impact to the local environment and community; and
- ensure the post-extraction landform is suitable for future uses consistent with the surrounding land uses.

1.3 Project summary

The Application seeks development consent for the use of the Project Site for the extraction and sale of up to 120,000 m^3 of gravel per annum to meet the increasing demand for gravel material in the New England region for the construction market. **Table 1-1** provides a summary of the Project.

Table 1-1: Project description summary

Element	Detail
Proposed land use	Extractive Industry
Extraction method	– Gravel extraction via mechanical excavation – Explosives may be required for small unconfined surface blasts on an occasional basis only when consolidated rock is encountered
Material handling and processing	– Loading gravel to trucks – Mobile crushing plant to operate periodically on a campaign format
Extraction rate	– 120,000 m^3 maximum per annum, averaging 80,000 m^3 per annum – Extraction from the resource would not exceed a total of 5 million tonnes
Surface disturbance	– Increase the existing disturbance area by approximately 0.99 ha – Cumulative total disturbance of up to 9.9 ha
Infrastructure	– Private unsealed access road – No permanent infrastructure facilities additional to the existing open-sided shelter structure to accommodate a single bulldozer
Operational fleet	Three bulldozers, five front end loaders, two excavators, one skid-steer loader and one forklift
Product transport	– Transport of product gravel undertaken by trucks with capacity between 8 and 38 tonnes via the public road network to customers (typically located within the Uralla LGA) – Daily maximum truck movements = 60 – Daily average truck movements = 38
Quarry access	From Kingstown Road via the main private unsealed access road
Water management	– Continued use of sediment pond for primary sediment control – Construction of a drain to divert clean water around the existing sediment pond
Operational workforce	Two casual contractors
Hours of operation	Monday to Saturday between 7 am and 6 pm

Under the DA, the Applicant seeks to maintain approval for all aspects of the existing operation, as approved under DA 3291. Existing operations are described in **Section 1.4**. Should the new development consent be granted, the current DA 3291 would be surrendered following commencement of the Project and all relevant approved activities would be transferred to the new development consent for the Project.

1.4 Existing operations

The existing approved quarry has been operated by the Applicant since approval was granted on 27 August 2002, supplying high quality gravel material for the construction and upgrade of roads, and for the foundations of buildings and other infrastructure. Production has been variable based on demand from the construction market, with up to approximately 41,500 m^3 per year extracted.

The existing project layout is shown in **Figure 1-2** and includes the following components:

- quarry extraction area;
- sediment pond;
- quarry access road; and
- open-sided shelter structure to accommodate a single bulldozer.

The total existing disturbance associated with the project components is approximately 8.9 ha, with the existing quarry extraction area surveyed using a handheld GPS unit.

There are no amenities, permanent fuel and chemicals storage, or services such as electricity or water connected to the site.

The surface geology of the quarry is characterised by sedimentary rocks of Devonian and Carboniferous age (NSW Government, 2022), with the quarry itself containing interbedded cherts and mudstone (USC, 2002). No exploration drilling or geophysical surveys have been undertaken for the Carlon’s Quarry to enable more accurate mapping and resource estimation.

Topsoil and subsoil are stripped and stockpiled on the pit boundary. The rock material generally breaks apart when excavated and stockpiled, and typically does not require further processing. Quarrying has generally been progressing towards the south-west and the north. Stockpiled gravel is loaded by front end loader or excavator to road haul trucks for delivery to customers.

Machinery used to operate the quarry currently includes:

- three bulldozers;
- two front end loaders;
- one excavator;
- one skid-steer loader; and
- one forklift (only used during equipment servicing).

The haulage route is via a private all weather gravel access road to its intersection with Kingstown Road. From this intersection, the majority of truck movements are along Kingstown Road toward Uralla. Transport of the quarry material is typically undertaken using trucks with capacity between 8 and 24 tonnes and include truck and dog configurations and rigid configurations (operated by customers of the quarry).

Infrastructure for the current operation is limited to internal access roads and external boundary fencing and an open-sided shelter structure to accommodate a single bulldozer located in the northeast corner of the quarry.

The existing hours of operation are 7.30 am to 5 pm on weekdays. Work is permitted on weekends in response to emergency situations when road works have to be carried out for safety reasons. Two casual contractors currently operate the quarry, with onsite works responding to orders from customers.

Surface runoff from the site drains to an existing sediment pond located in the southeast corner of the quarry (**Figure 1-2**), which functions as the primary sediment control measure for the quarry.

Rehabilitation has not yet commenced as all areas within the current total disturbance area remain active and operational.

1.5 Document structure

This EIS comprises a main report supported by appendices. The main report is arranged under the following headings:

Section 1 – Introduction	Introduces the Project, provides an overview of the EIS and an overview of the existing quarry operations.
Section 2 – Strategic context	Outlines the strategic planning context for the Project.
Section 3 – Project description	Provides a detailed description of the Project, including proposed extraction and production, infrastructure, operational fleet, product transport, hours of operation, surface disturbance and water management.
Section 4 – Statutory context	Presents the statutory approval process for designated and integrated development and describes how the Project addresses the relevant statutory provisions.
Section 5 – Engagement	Describes the consultation and engagement undertaken in relation to the EIS, outcomes of consultation and ongoing stakeholder involvement.
Section 6 – Assessment of impacts	Assesses the potential environmental, social, and economic impacts including a description of the existing environment and a description of the proposed measures that would be implemented to avoid, minimise, compensate, and monitor the potential impacts of the Project.
Section 7 – Project justification	Provides an evaluation and justification for the Project, having regard to the economic, environmental, and social impacts and strategic benefits.
Section 8 – References	Lists the documents referenced within the main text of the EIS.
Section 9 – Abbreviations and glossary	Defines the abbreviations and terms used in the main text of the EIS.

The main report is supported by appendices including a SEARs compliance table (**Appendix A**), a statutory compliance table (**Appendix B**), a summary of mitigation measures (**Appendix C**) and the specialists assessment reports outlined in **Table 1-2**.

Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI

LEGEND

- Existing Development Extent
- Existing sediment pond
- Existing shelter structure
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 1-2

Existing project layout

Table 1-2: Specialists assessment reports

Report	Prepared by	Appendix
Noise and vibration assessment	Muller Acoustic Consulting Pty Ltd	Appendix D
Air quality assessment	Zephyr Environmental Pty Ltd	Appendix E
Water assessment	WRM Water and Environment Pty Ltd	Appendix F
Biodiversity assessment	Stringybark Ecological Pty Ltd	Appendix G
Archaeological assessment	OzArk Environment & Heritage	Appendix H
Historic heritage assessment	OzArk Environment & Heritage	Appendix I
Traffic assessment	Constructive Solutions Pty Ltd	Appendix J
Land use conflict analysis	Onward Consulting Pty Ltd	Appendix K

1.6 Project team

The EIS for the Project was prepared by Onward Consulting Pty Ltd on behalf of Blendee Partnership with technical input provided by a number of specialists as outlined in **Table 1-3** who formed the Project team for the preparation of the EIS. Mr Mark Vile, Director of Onward Consulting is the EIS lead author.

Table 1-3: Project team

Specialist component	Organisation
Noise and vibration	Muller Acoustic Consulting Pty Ltd
Air quality	Zephyr Environmental Pty Ltd
Surface water	WRM Water and Environment Pty Ltd
Biodiversity	Stringybark Ecological Pty Ltd
Aboriginal archaeology	OzArk Environment & Heritage
Historic heritage	OzArk Environment & Heritage
Traffic and transport	Constructive Solutions Pty Ltd
Land resources	Onward Consulting Pty Ltd
Waste	Onward Consulting Pty Ltd
Hazards	Onward Consulting Pty Ltd
Visual	Onward Consulting Pty Ltd
Social and economic	Onward Consulting Pty Ltd
Rehabilitation	Onward Consulting Pty Ltd

2. Strategic context

2.1 Land use planning context

2.1.1 Uralla Shire Local Strategic Planning Statement

The *Uralla Shire Local Strategic Planning Statement* (**LSPS**) plans for the Uralla Shire community's economic, social, and environmental land use needs over the next 20 years to 2040. Uralla Shire is a highly liveable rural area where there is a great sense of wellbeing. The largest industry in the Uralla Shire continues to be primary production. More recent developments include proposals to construct major renewable energy (solar and wind) infrastructure, battery energy storage systems, and industrial land subdivision.

The Uralla Shire LSPS sets a clear line of sight between the key strategic directions of:

- productivity;
- liveability;
- sustainability; and
- infrastructure

The LSPS is based on local characteristics and opportunities and is supported by a planning framework including the New England North West Regional Plan 2036. The LSPS is aligned with both the New England North West Regional Plan 2036 and the Uralla Shire Community Strategic Plan 2017 – 2027 (**Section 2.1.2**).

The Project is consistent with several planning priorities under the LSPS, primarily to support and manage rural landscapes and to manage and enhance infrastructure, including renewable energy development.

2.1.2 Uralla Shire Council Community Strategic Plan 2017 – 2027

The *Uralla Shire Council Community Strategic Plan 2017 – 2027* establishes the community goals for a 10-year period and outlines strategies and measures to achieve these goals. The Project would contribute to a number of the community's main priorities and aspirations which are identified in the Community Strategic Plan and detailed in **Table 2-1**.

Table 2-1: Alignment with Uralla Shire Council Community Strategic Plan

Goal	Strategy	Response
Growing and diversified employment, education and tourism opportunities.	Support and encourage existing business and industry to develop and grow.	The Project will support existing and future renewable energy projects in the region, allowing further development and continued growth of the renewable energy sector. Gravel supplied from the quarry would be used for the development of roads and infrastructure related to these projects, which will provide opportunities for local employment.

Goal	Strategy	Response
A safe and efficient network of arterial roads and supporting infrastructure; and town streets, footpaths and cycleways that are adequate, interconnected and maintained.	– Provide an effective road network that balances asset conditions with available resources and asset utilisation – Maintain, renew and replace council bridges and culverts as required. – Provide a network of town and village streets that balances asset condition with available resources and asset utilisation. – Maintain existing walking and cycling networks across the region. – Facilitate the enhancement and expansion of accessible walking and cycling networks where strategically identified and interconnect them with other transport and recreation facilities.	The Project will support the development and maintenance of public roads and supporting infrastructure in the Uralla LGA. Gravel supplied from the quarry would be used for road and civil works, contributing to communities by supporting safe access throughout the town and broader region.
Communities that are well serviced with essential infrastructure	– Developing a strategically located network of quality, accessible and safe public amenities that are adequately maintained and renewed – Implement Council's strategic asset management plans and continue to develop asset systems, plans and practice for infrastructure assets to minimise whole of life costs – Provide the infrastructure to embellish public spaces, recreation areas and parkland areas – Ensure adequate public car-parking and kerb and gutter infrastructure is provided, maintained and renewed	The Project will support the development and maintenance of essential infrastructure in the Uralla LGA. Gravel supplied from the quarry would be used for infrastructure projects, contributing to communities through provision of essential infrastructure throughout the town and broader region.

2.1.3 New England North West Strategic Regional Land Use Plan 2036

The *New England North West Strategic Regional Land Use Plan 2036* (**SRLUP**) has been developed to guide the NSW Government's land use planning priorities and decisions for the New England North West region, providing an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions.

The Plan sets out four regionally focused goals:

- a strong and dynamic regional economy;
- a healthy environment with pristine waterways;
- strong infrastructure and transport networks for a connected future; and
- attractive and thriving communities.

The region has been identified as one of the key renewable energy hubs in NSW under the SRLUP. The Project is considered to be generally consistent with the SRLUP as it will support local and State significant projects delivering transport and renewable energy infrastructure and networks as well as contributing to regional investment through employment opportunities and the use of local goods and services.

2.2 Key features of the Project Site and surrounds

Carlon's Quarry is located at Lot 3 DP 834359, 1033 Kingstown Road Balala (**Figure 1-1**) and is located wholly within freehold land, with the exclusion of the identified Crown road traversing the Project Site (**Figure 2-1**).

There are four sensitive receivers located within 4 km of the Project Site boundary, with the closest sensitive receiver, "Wilsons Creek" located approximately 2.5 km to the east. The nearest town is Uralla, located approximately 10 km east of the quarry.

The Project Site and surrounding land have been historically cleared and improved for agricultural activities, namely cattle and sheep grazing. Intact vegetation in the surrounding environment is limited to hillcrests, drainage lines, the Kingstown Road corridor and scattered paddock trees. Within the Project Site, intact vegetation is located immediately south of the pit disturbance area consistent with scattered paddock trees.

There are two stream systems on the Project Site adjacent to the existing quarry, classified as Strahler order 1. (**Figure 1-2**). One drainage line feeds into the upper reaches of Roumalla Creek, located 200 m south of the Project Site with an unnamed tributary of Balala Creek situated to the north-east. Balala Creek flows into Roumalla Creek approximately 4 km west of the site.

2.3 Cumulative impacts

Given the Project's location is within a rural landscape, the main cumulative impacts would be in relation to other quarry developments or developments that have the potential to generate heavy vehicle traffic. There is a sand quarry in operation on Kingstown Road, approximately 22 km west of Uralla. The sand quarry is operated by Ducats Earthmoving Pty Ltd based in Armidale. Production quantities are unknown however it is envisaged that the quarry operates sporadically to meet the demand for sand in the broader region.

Cumulative impacts associated with the Project are addressed in **Section 6**.

2.4 Feasible alternatives

Section 192 of the EP&A Regulation requires an analysis of any feasible alternatives to the proposed development, including the consequences of not carrying out the development. A discussion of project alternatives is presented within this section.

2.4.1 Consequences of not proceeding with the Project

If the Project was not to proceed, the existing quarry would not be expanded and would operate at a reduced capacity, with an associated reduction in the operational life of the quarry. The consequences of not proceeding with the Project include:

- The opportunity to secure access to a long-term, local supply of cost-efficient gravel for the construction market in the New England region would be foregone.
- Further development of renewable energy and infrastructure projects and the continued growth of the renewable energy sector could be tempered because of increased costs of development for these projects.
- A source of direct and indirect employment opportunities for the local community would be lost.
- The adverse impacts of the Project outlined in **Section 6** would not occur, even though it is considered that the level of predicted impacts arising from the Project are acceptable with the implementation of proposed mitigation measures for the Project.

The benefits of proceeding with the Project are considered to outweigh the predicted impacts on the environment that may result if the Project is approved. **Section 7** provides further detail regarding the strategic need and justification for the Project.

Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI, © State of New South Wales (Department of Planning and Environment)

LEGEND

- Proposed Development Extent
- Existing sediment pond
- Existing shelter structure
- Crown land
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 2-1

Crown land

2.4.2 Alternative locations

The alternative to extending the existing operation is for the demand to be met either by existing quarries in the region, or from newly developed quarries.

Whilst gravel resources are available in the New England region, it is not always feasible to extract sufficient resources to meet the significant increase in demand given the quantity of available resources present, and the environmental and financial constraints associated with developing new resources.

The Project seeks to extend an existing operating quarry. Continuation of existing quarry operations is likely to result in improved environmental outcomes compared to the development of a new greenfield site.

2.4.3 Project design principles and disturbance area evolution

The disturbance area and key components of the Project were refined by considering a range of environmental risks and impacts. The evolution of the design and the remaining sections of this EIS, references the following key terms:

- **Project Site** – Lot 3 of DP 834359 (**Figure 1-1**).
- **Existing Development Extent** – the current extent of surface development within the Project Site.
- **Project Study Area** – the originally proposed quarry extraction area of 32 ha (as described in the Scoping Report) (**Figure 2-2**).
- **Alternative Study Area** – high-level constraints identified vegetation zones of 'moderate' and 'good' condition within the listed Threatened Ecological Community (**TEC**; see **Section 2.4.3.1**). The Alternative Study Area investigated an area with vegetation zones in a 'poor' condition state up to approximately 32 ha (consistent with the Project Study Area).
- **Proposed Development Extent** – the proposed extent of surface development, which forms the basis of this environmental impact assessment.
- **Proposed Quarry Extension Areas** – additional disturbance areas (comprising 0.99 ha) created by clearing and excavation, located wholly within the Proposed Development Extent.
- **Indicative Quarry Extraction Area** – indicative area in which quarry extraction is proposed (**Figure 3-1**), located wholly within the Proposed Development Extent.

2.4.3.1 Biodiversity and Aboriginal cultural heritage

The project description originally described in the Scoping Report, included a proposed increase in the size of the quarry extraction area to approximately 32 ha (**Project Study Area**) to support a maximum production rate of 150,000 m^3 per annum. Based on preliminary assessments conducted during the scoping phase, it was understood from a review of NSW State Government mapping, that the Project Site was likely to contain patches of Plant Community Type (**PCT**) 510 (*Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion*) adjacent to the originally proposed quarry extraction area.

Stringybark Ecological conducted a Biodiversity Assessment Report, as presented in **Appendix G** (Stringybark Ecological, 2022). Ecological investigations conducted across the Project Study Area identified the occurrence of intact PCT 510 and PCT 510 as derived native grassland (Stringybark Ecological, 2022). PCT 510 is considered to be potentially part of the listed TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community*. Three PCT 510 vegetation zones were identified with different condition states ranging from 'poor' through to 'good.'

An Alternative Study Area was considered that would retain the originally proposed 32 ha development extent but limit disturbance to preferentially disturb areas of vegetation zoned as 'poor' condition to minimise impact on the biodiversity values of the site (**Figure 2-2**).

Following evaluation of several study area options, the Proposed Quarry Extension Areas (comprising 0.99 ha, as shown in **Figure 2-2**) is proposed as the additional disturbance area for the purpose of clearing and excavation. The Proposed Quarry Extension Areas form part of the Proposed Development Extent, on which the environmental impact assessment provided in **Section 6** has been based upon.

The Proposed Quarry Extension Areas avoid disturbance to TECs classified as ‘good’ or ‘moderate’ condition vegetation zones. A significant impact on biodiversity values is also avoided by minimising vegetation clearance to less than 1 ha. Assessments of significance (**Section 6.5**) determined that the proposed clearing will not have a significant impact on threatened species, populations or ecological communities.

A field assessment conducted for the identification of Aboriginal heritage was undertaken within the Project Study Area and the Alternative Study Area (Oz Ark, 2022). The assessment identified a potential scarred tree (Aboriginal Heritage Information Management System [**AHIMS**] 20-6-0081) located in northern extent of the Alternative Study Area (**Figure 6-10**). The possible scarred tree is located approximately 660 m from the Proposed Development Extent. The possible scarred tree will not be impacted by the Project, and the mitigation measures outlined in **Section 6.6.5** are sufficient to manage activities that have the potential to impact local and regional Aboriginal heritage values.

2.4.3.2 Traffic

The project description originally described within the Scoping Report included a proposed increase in the maximum production rate to 150,000 m^3 per annum. Coinciding with the reduction in the Project disturbance area described in **Section 2.4.3.1**, the maximum production rate was reduced from 150,000 m^3 per annum (or approximately 270,000 tonnes per annum) to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum).

The reduction in maximum production rate has the effect of reducing the predicted Project-related traffic that would utilise the road network, minimising the potential traffic impacts associated with the Project as outlined in **Section 6.8**.

Source:© OpenStreetMap (and) contributors, CC-BY-SA, ESRI, AHIMS

LEGEND

- Lot 3 / DP834359 boundary
- Project Study Area
- Alternative Study Area
- Proposed Development Extent
- Proposed Quarry Extension Areas
- Existing sediment pond
- Existing shelter structure
- Aboriginal site
- Roads
- Watercourses

PCT 510 condition

- Poor
- Moderate
- Good

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 2-2

Project disturbance area evolution

3. Project description

3.1 Introduction

Development consent is sought under Division 4.3 of the EP&A Act for the use of the site as an extractive industry, as defined in clause 2.2 of the *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy **SEPP**). The extracted material is comprised of gravel, which generally does not require any further processing prior to being distributed to market.

The key components of the Project for which development consent is sought for include the following:

- Up to 120,000 m^3 of material to be extracted per annum with an average of 80,000 m^3 of material extracted per annum.
- Additional operational fleet to include three front end loaders and one excavator.
- Extension of the total quarry disturbance area by approximately 0.99 ha (cumulative total disturbance of up to 9.9 ha associated with the Proposed Development Extent), including construction of a drain to divert clean water from operational areas.
- An increase in truck movements to an average 38 movements per day and a maximum of 60 movements per day.
- Extend weekday operations to Saturday, with hours of operation from 7am to 6pm each day.

As the quarry is a brownfield extractive industry site, there would be no construction phase for the Project. As part of the DA, the Applicant seeks to maintain approval for all aspects of the existing operations as approved under DA 3291. Accordingly, construction-related impacts have not been assessed as part of this EIS.

3.2 Project overview

A summary of the Project showing changes to existing operations is provided in **Table 3-1**. The proposed site layout is shown in **Figure 3-1**.

Table 3-1: Project overview

Element	Current operations	Proposed operations
Extraction method	Gravel extraction via mechanical excavation	– No change to general excavation method – Explosives may be required for small unconfined surface blasts on an occasional basis only when consolidated rock is encountered
Material handling and processing	Loading gravel to trucks	– No change to loading operations – Mobile crushing plant to operate periodically on a campaign format
Extraction rate	Variable annual extraction based on demand, up to approximately 41,500 m^3 per annum	– 120,000 m^3 maximum per annum, averaging 80,000 m^3 per annum – Extraction from the resource will not exceed a total of 5 million tonnes
Surface disturbance	Approximately 8.9 ha total disturbance associated with the Existing Development Extent	– Increase the existing disturbance area by approximately 0.99 ha – Cumulative total disturbance of up to 9.9 ha associated with the Proposed Development Extent
Infrastructure	– Private unsealed access road – No permanent infrastructure facilities, apart from an existing open-sided shelter structure to accommodate a single bulldozer	No change

Element	Current operations	Proposed operations
Operational fleet	Three bulldozers, two front-end loaders, one excavator, one skid-steer loader and one forklift	Three bulldozers, five front end loaders, two excavators, one skid-steer loader and one forklift
Product transport	– Transport of product gravel undertaken by trucks with capacity between 8 and 24 tonnes via the public road network to customers (typically located within Uralla LGA) – Daily maximum truck movements = 50	– Transport of product gravel undertaken by trucks with capacity between 8 and 38 tonnes via the public road network to customers (typically located within the Uralla LGA) – Daily maximum truck movements = 60 – Daily average truck movements = 38
Quarry access	From Kingstown Road via the main private unsealed internal access road	No change
Water management	Sediment pond for primary sediment control	– Continued use of sediment pond for primary sediment control – Construction of a drain to divert clean water around the existing sediment pond
Operational workforce	Two casual contractors	No change
Hours of operation	Weekdays between 7.30 am and 5 pm	Monday to Saturday between 7 am and 6 pm

Source:© OpenStreetMap (and) contributors, CC-BY-SA

LEGEND

- Proposed Development Extent
- Proposed Quarry Extension Areas
- Indicative Quarry Extraction Area
- Existing sediment pond
- Existing shelter structure
- Approximate location of clean water drain
- Approximate location of dirty water drain
- Roads
- Watercourses
- 10 m contours

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 3-1

Proposed site layout

3.3 Detailed project description

3.3.1 Resource, quarry products and markets

The proposed extension would access the same resource and the extracted saleable products would remain unchanged.

The demand for gravel material is expected to encounter peaks when a large project, such as a renewable energy development, is undergoing construction, with close to current levels expected where large projects are not being constructed.

3.3.2 Quarrying method

3.3.2.1 Progression

To date, resource extraction has generally progressed north and south. Future pit progression would be approximately 0.62 ha to the north and 0.37 ha to the west (**Figure 3-1**). The following key constraints informed the design of the Proposed Quarry Extension Areas:

- Avoiding disturbance to TECs classified as ‘good’ condition vegetation zones and minimising disturbance to TECs classified as ‘moderate’ condition vegetation zone.
- Avoiding a significant impact to vegetation and biodiversity values by minimising the overall disturbance of vegetation to below the area threshold of 1 ha for clearing at the Project Site as defined by the NSW *Biodiversity Conservation Act 2016* (**BC Act**).

3.3.2.2 Extraction

Topsoil and subsoil would continue to be stripped and stockpiled on the pit boundary prior to gravel extraction.

Extraction is expected to remain similar to the current operation, whereby rock material generally breaks apart when using conventional extraction methods. Excavated material would be stockpiled prior to loading onto trucks using excavators or loaders for delivery to customers.

Occasional use of mobile crushing plant is expected to be undertaken in campaign format to crush oversized material or to shape to client specifications.

Explosives may be required for small unconfined surface blasts on an occasional basis only when consolidated rock is encountered, which is nominally expected once every two years.

3.3.2.3 Equipment

Extraction will continue to require the same equipment. However, the number of front end loaders and excavators will increase (**Table 3-1**). Mobile crushing plant would be used periodically in campaign format.

3.3.3 Transportation

3.3.3.1 Transport routes

The quarry would continue to be accessed via the existing all weather gravel access road to its intersection with Kingstown Road, with the majority of truck movements along Kingstown Road toward Uralla.

Transport would continue to predominantly require the use of truck and dog configurations and rigid configurations. However, the maximum capacity would be increased up to 38 tonnes. The transport vehicles would be operated by the customers of the quarry.

The proposed extension would increase the number of truck movements to an average of 38 movements per day, with a maximum of 60 movements per day and a maximum of 20 truck movements per hour during peak periods of operation.

3.3.3.2 Road upgrades

The intersection of the quarry access road with Kingstown Road would be upgraded to include appropriate turn treatments and associated intersection controls. The access road would be sealed to the existing cattle grid to prevent material tracking onto Kingstown Road. A heavy-duty wearing course over the primary section of the access road would also be considered to improve the durability of the pavement and its susceptibility to failure.

Maintenance of Kingstown Road and localised shoulder widening would be the responsibility of and undertaken by the USC, with the Applicant making payment for the Section 7.11 developer contribution toward the maintenance, including delineation, signage, vegetation removal and localised shoulder widening within the USC area. The contribution rate of $0.111 per tonne per km was current as at June 2021.

3.3.4 Site infrastructure and services

The continuation of use of the existing site infrastructure and services described in **Section 1.4** is proposed. There would be no amenities established on site, or services such as electricity or water connected to the site.

There would be no permanent storage of diesel fuel, greases, oils or other chemicals on site. Minor quantities of diesel fuel, greases and oils may be temporarily stored in small self-bunded tanks when brought to site during machinery and plant maintenance and refuelling.

Explosives for blasting will not be stored on site. Minor quantities of explosives would be transported to the quarry for small unconfined surface blasts on an occasional basis only if consolidated rock is encountered.

A diversion drain for dirty and clean water would be constructed to the east of the site to divert clean water around the existing sediment pond into Roumalla Creek. This measure is proposed to reduce the catchment draining to the sediment pond by approximately 70%, and significantly reduce discharges from the sediment pond to Roumalla Creek.

3.3.5 Hours of operation

The proposed hours of extraction, processing, product loading and transportation are Monday to Saturday between 7 am and 6 pm.

3.3.6 Workforce

The current workforce consists of two casual contractors and is expected to remain the same, with working hours expected to be full time during peak periods, reducing to current levels where there are no large construction activities being undertaken.

The Applicant would not employ transport operators directly, with all transportation activities contracted or supplied by clients, in accordance with current practice.

4. Statutory context

Designated development approval is being sought for the Project under the designated and integrated development provisions of Part 4 of the EP&A Act. This section outlines the statutory context for the Project.

4.1 Power to grant consent

The Project is classified as designated development under clause 26 of Schedule 3 of the EP&A Regulation as it is defined as a designated extractive industry proposing to obtain or process for sale, or reuse, more than 30,000 m^3 of extractive material per year and the total disturbance (existing and proposed) would exceed 2 ha. Division 4.3 of the EP&A Act provides the designated development approval and assessment pathway.

Section 2.19 of the *State Environmental Planning Policy (Planning Systems) 2021* declares particular designated development (specified in Schedule 6) to be regionally significant development for the purposes of the EP&A Act. Clause 7(1) of Schedule 6 identifies extractive industry facilities that meet the requirements of designated development under section 26 of Schedule 3 of the EP&A Regulation: The Project meets the requirements for designated development and therefore is declared to be regionally significant development.

Section 4.5 of the EP&A Act states that the consent authority for development of a kind that is declared by an environmental planning instrument as regionally significant development is the regional planning panel for the area in which the development is to be carried out.

As the Project is classified as regionally significant development, the Northern Regional Planning Panel would be the consent authority.

4.2 Permissibility

The Uralla Local Environment Plan (**LEP**) is the principal legislation relating to the permissibility of the Project. Under the Uralla LEP, the Project Site is zoned as RU2 Rural Landscape. Extractive industries are permitted with consent in the RU2 Zone. **Section 7.4.1.1** provides a detailed assessment of the Project against the objectives of the RU2 Zone.

4.3 Other approvals

The Project is classified as integrated development under section 4.46 of the EP&A Act meaning the Project requires additional approvals, licences or permits as outlined in **Table 4-1**.

Table 4-1: Additional approvals

Legislation	Description
POEO Act	Section 48 of the POEO Act requires an EPL for a premises at which any scheduled activities listed in Schedule 1 of the Act is carried on. Schedule 1, Clause 19 lists extractive activity involving extraction, processing, or storage of more than 30,000 tonnes of materials per annum as a scheduled activity. Therefore, the Project will require licensing under the POEO Act.
Roads Act[1]	Section 138 of the Roads Act requires consent from the appropriate roads authority for any works carried out in, on or over a public road. The Project proposes upgrading the intersection of the quarry access road with Kingstown Road. Therefore, a section 138 approval would be required.

[1] As per section 4.1, the Project is classified as regionally significant development and the Northern Regional Planning Panel is the consent authority. Therefore, for this Project, section 138 of the *Roads Act 1993* is a relevant trigger with respect to integrated development.

4.4 Pre-conditions to exercising the power to grant approvals

Table 4-2 outlines the preconditions to be satisfied by the consent authority prior to exercising their power to grant approval and relevant cross reference to the section of the EIS where the requirements have been addressed.

Table 4-2: Pre-conditions to exercising the power to grant approvals

Statutory reference	Pre-condition	Relevance	Relevant section in EIS
State Environmental Planning Policy (Resources and Energy) 2021 (Resources and Energy SEPP) – clause 2.17	The consent authority must consider: – the existing uses and approved uses of land in the vicinity of the development for the purposes of extractive industry, and whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses – evaluate and compare the respective public benefits of the development and the land uses – evaluate any measures proposed by the applicant to avoid or minimise any incompatibility	The Project is an existing extractive industry surrounded by agricultural land uses. The Project will also involve the temporary conversion of agricultural land for quarrying.	Section 5.3 Section 6.9 Section 6.14
Resources and Energy SEPP – clause 2.22	If the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within 7 days after receiving the development application, provide a copy of the application to each roads authority for the road and the Roads and Traffic Authority (if it is not a roads authority for the road). The consent authority does not determine the application until it has taken into consideration any submissions that it receives in response from any roads authority or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application and must provide them with a copy of the determination.	The Project will involve the transportation of material on public roads. Accordingly, the consent authority must provide the application to the relevant road authority and consider any submission it receives from the authority when making a determination.	Not applicable

4.5 Mandatory matters for consideration

Table 4-3 outlines the matters that the consent authority is required to consider in deciding whether to grant approval and identifies the section of the EIS where the requirement has been addressed. **Appendix B** provides a statutory compliance table that outlines the statutory requirements of the Project, and also identifies the section of the EIS where the requirement has been addressed.

Table 4-3: Mandatory matters for consideration

Statutory reference	Mandatory consideration	Relevant section in EIS
Consideration under the EP&A Act and EP&A Regulation		
Section 1.3	Relevant objects of the Act:	
	– 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	Section 7
	– to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment	Section 7
	– to promote the orderly and economic use and development of land	Section 7
	– to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats	Section 6.5
Section 4.15	Relevant environmental planning instruments:	
	– *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and energy SEPP)	Section 5 and Section 6.9
	– *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP)	Section 6.9 and Section 6.11
	– *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity Conservation SEPP)	Section 6.5
	– Uralla LEP	Section 6
	Relevant proposed environmental planning instruments:	
	– Non relevant to the Project	N/A
	Relevant planning agreement or draft planning agreement:	
	– Non relevant to the Project	N/A
	Development control plans:	
	– Uralla Development Control Plan 2021 (Uralla [**DCP**])	Section 6
	The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.	Section 6 and Section 7
	The suitability of the site for the development	Section 7
	The public interest	Section 7
Mandatory relevant considerations under environmental planning instruments		
Resources and Energy SEPP – clause 2.17	Compatibility of the proposed extractive industry with other uses	Section 5 and Section 6.5
Resources and Energy SEPP – clause 2.19	Compatibility of proposed development with mining, petroleum production or extractive industry in vicinity	Section 5 and Section 6.9
Resources and Energy SEPP – clause 2.20	Whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner to ensure:	
	– that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable	Section 6.4
	– that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable	Section 6.5

Statutory reference	Mandatory consideration	Relevant section in EIS
	– that greenhouse gas emissions are minimised to the greatest extent practicable.	Section 6.3
	An assessment of the greenhouse gas emissions (including downstream emissions) of the development, having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.	Section 6.3
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) – clause 3.7	Departmental guidelines: – Applying SEPP 33	Section 6.11
Resilience and Hazards SEPP – clause 4.6	Whether the land is contaminated.	Section 6.9
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) – Part 3.2	The council must be satisfied as to whether or not the land to which the SEPP applies is a core or potential koala habitat only on information obtained by it, or the applicant, from a person who is qualified and experienced in tree identification.	Section 6.5
Uralla LEP	– Objectives and land use for RU2 zone	Section 6.9
	– Section 5.10 – Heritage conservation	Section 6.6 and Section 6.7
	– Section 6.1 – Earthworks	Section 6.9
Considerations under other legislation		
Biodiversity Conservation Act 2016 – section 7.13	The likely impacts of the development on biodiversity values as assessed in the biodiversity development assessment report. Following design evolution, the development has been	Section 6.5 and Appendix G
Biodiversity Conservation Act 2016 – section 7.16	Whether the proposed development is likely to have serious and irreversible impacts on biodiversity values.	Section 6.5 and Appendix G
Native Title Act 1993 (Cth)	The *Native Title Act 1993* recognises the rights and interests of Indigenous people to land and aims to provide for the recognition and protection of common law native title rights. Areas of land where native title may exist include public road reserves and other Crown land. A search of the National Native Title Tribunal Registers on 18 May 2022 found one Native Title Claim, Gomeroi People (NC2011/006, NSD37/2019) that extends over the Project Site. The Project Site consists of freehold land which is exempt from native title claim and Crown Land. The access road into the Project crosses a Crown road, however Aboriginal Land Claims and Native Title do not apply to Crown roads.	Not applicable.
Development Control Plans		
Uralla DCP	Consideration has been given to the following provisions:	
	– Chapter 4.3 Biodiversity	Section 6.5
	– Chapter 4.4. Bushfire	Section 6.11
	– Chapter 4.5 Access to Rural Properties – General	Section 7
	– Chapter 13.11 Integrated, Designated Development and other Categories of Development	Section 7
	– Chapter 14 Contaminated Land	Section 6.9

5. Engagement

5.1 Statutory agencies

5.1.1 Secretary's Environmental Assessment Requirements

As the Project is classified as designated development, a Scoping Report was prepared, and SEARs were requested. The SEARs were issued by the then DPIE (now DPE) on 3 December 2021.

The SEARs are intended to guide the structure and content of the EIS and reflect the responsibilities and concerns of NSW Government agencies in relation to the environmental assessment for the Project. A summary of key issues raised in the SEARs and the section of the EIS where these are addressed is provided in **Appendix A**.

Additional issues raised by statutory agencies through formal correspondence attached to the SEARs are also summarised in **Appendix A**, as well as citing the relevant section of the EIS which addresses each issue. Engagement with Crown Lands via phone and email correspondence was undertaken throughout the assessment in relation to the use of a Crown road for the Project. The Applicant has submitted the relevant applications to obtain authorisation for the continued maintenance of and access to the Crown road via a direct crossing as described further in **Section 6.8.2**.

The following changes to the project description (outlined in **Section 2.4.3**), compared to that which was originally described in the Scoping Report, have been made:

- Maximum size of the Indicative Quarry Extraction Area has been reduced from 32 ha to 8 ha.
- Maximum production rate has been reduced from 150,000 m^3 per annum (or approximately 270,000 tonnes per annum) to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum).

5.1.2 Roads authorities

The following consultation with USC and Transport for NSW (**TfNSW**) as the roads authorities was undertaken to provide an overview of the Project and to identify any requirements in relation to the proposed Traffic Impact Assessment (**Section 6.8**):

- Meeting with USC on 10 March 2022.
- Meeting with USC on 16 March 2022.
- Meeting with TfNSW on 21 March 2022.

The following matters were raised by USC and have been addressed in **Section 6.8**:

- material tracking onto Kingstown Road and sealing of the quarry access road entry; and
- concerns regarding road safety and pavement impacts are to be addressed, including when pavements are saturated during wet weather.

The USC and TfNSW also provided additional information to support the assessment, including traffic count data, information on safety issues and potential mitigation, crash data and advice regarding appropriate assumptions for average annual growth for background traffic.

Whilst no Crown roads are contained within the Indicative Quarry Extraction Area, the internal access road passes across a Crown road adjacent to the quarry and this will remain the same for the expanded quarry. The Applicant has consulted with Crown Lands and has submitted the relevant applications to obtain authorisation for the continued maintenance of and access to the Crown road via a direct crossing.

5.2 Aboriginal community

The Aboriginal cultural heritage assessment (outlined in **Section 6.6**) was conducted in accordance with the relevant consultation guidelines and Code of Practice as discussed in **Section 6.6.1**. Consultation with the Aboriginal community was commensurate with the Project scope and requirements of the assessment. On behalf of the Applicant, OzArk Environment & Heritage engaged with Iwatta Aboriginal Corporation to conduct the field assessment on 30 March 2022. The Iwatta Aboriginal Corporation members and staff were content with the level of consultation during the assessment and recommended that no further Cultural Investigation would be required for the Project's disturbance area.

5.3 Surrounding landowners

The assessment process has considered the potential impacts of the Project at four of the nearest sensitive receivers. The sensitive receivers are located more than 2 km from the Project Site and are shown in **Figure 5-1**.

The residents of each property identified as a sensitive receiver were consulted individually via a letterbox drop during the preparation of this EIS. The letter provided a description of the Project and a summary of the key environmental assessments and mitigation measures, with an invitation to discuss further.

No response was received by any of the residents identified as a sensitive receiver. Potential impacts from the Project on sensitive receivers have been assessed in **Section 6**. Assessments of noise, blasting and vibration, air quality and visual amenity impacts determined identified sensitive receivers were unlikely to be impacted by the Project.

5.4 Lode resources

Two Exploration Licences (**EL**) which cover the Proposed Development Extent. To determine whether the Project is compatible with other land uses under section 2.17 of the Resources and Energy SEPP, Lode Resources Ltd, the holder of EL880 and EL9087, was contacted by email and provided with a Project summary and invitation to discuss further. No response was received however, a land use conflict assessment was undertaken in the preparation of this EIS (see **Section 6.9**) which concluded the Project would be compatible with exploration activities undertaken by Lode Resources noting exploration activities in relation to the Uralla Gold project to date have been focused in portions of these EL's north of Kingstown Road (Lode Resources, 2022).

Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Proposed Quarry Extension Areas
- Sensitive receivers
- Roads
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 5-1

Sensitive receivers

6. Assessment of impacts

6.1 Noise

6.1.1 Introduction

Muller Acoustic Consulting Pty Ltd conducted a Noise Impact Assessment for the Project, as presented in **Appendix D** (Muller Acoustic Consulting, 2022).

The Noise Impact Assessment was conducted in accordance with the following standards, guidelines, and policies:

- *Noise Policy for Industry* (**NPI**) (EPA, 2017);
- *Interim Construction Noise Guideline* (**ICNG**) (DECC, 2009);
- *NSW Road Noise Policy* (**RNP**) (DECCW, 2011);
- *Australian Standard* (**AS**) *2187.2-2006 – Explosives-Storage and Use Part 2: Use of Explosives;* and
- *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC, 1990).

6.1.2 Existing environment

6.1.2.1 Sensitive receivers

The Noise Impact Assessment considered the potential noise impacts at four sensitive receivers. The sensitive receivers are located more than 2 km from the Project Site, as shown in **Figure 5-1**.

6.1.2.2 Background noise levels

For low noise environments, such as rural environments, minimum assumed Rating Background Levels (**RBL**) can be adopted in lieu of completing background noise measurements and is considered the most conservative method for establishing noise criteria for a project. The Noise Impact Assessment found the RBL that adopted for the Noise Impact Assessment is the minimum assumed RBL of 35 A-weighted decibels (**dBA**) during the daytime period, being the relevant assessment period for the Project based on the proposed hours of operation.

6.1.3 Assessment criteria

6.1.3.1 Operational noise assessment criteria

The assessment of potential impacts of operational noise considered the intrusiveness noise level and the amenity noise levels in determining achievable noise requirements (**Appendix D**). The intrusiveness criteria require the energy average noise level over a 15-minute period (**$L_{Aeq(15\ min)}$**) to not exceed the RBL by more than 5 dBA. Amenity criteria are based on the energy average noise level over the entire day, evening or night period and can be converted to a Project amenity noise level (equivalent energy average noise level over a 15-minute period) for assessment purposes. The project noise trigger level (**PNTL**) provides a benchmark, that if exceeded, would indicate a potential noise impact has occurred and triggers a management response (EPA, 2017).

Table 6-1 presents the derivation of the PNTL which is defined as the lower (that is, the more stringent) value of the project intrusiveness noise level (**INL**) and project amenity noise level (**ANL**).

Table 6-1: Project noise trigger levels

Receiver type	Period	Adopted RBL[2] dB L_{A90}	Project INL dB $L_{Aeq(15min)}$	Project ANL dB $L_{Aeq(15min)}$[3]	PNTL dB $L_{Aeq(15min)}$
Residential (rural)	Day[1]	35	40	53	**40**

Source: Appendix D

1 Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays

2 Minimum RBLs adopted.

3 Includes a 3 dB adjustment to the recommended amenity period level of 50 dB $L_{Aeq(period)}$ to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

As the Project INL is the most stringent (i.e. less than the Project ANL), the Noise Impact Assessment adopted the PNTL as 40 dB $L_{Aeq(15min)}$ to which project-only noise levels would be assessed.

6.1.3.2 Road traffic noise assessment criteria

The RNP sets out noise criteria that provides for a degree of amenity appropriate for the land use and road category. In accordance with the RNP, the Noise Impact Assessment adopted the 'Freeway/arterial/sub-arterial road' category for inbound and outbound transport routes, consistent with the classification of the haulage route as a 'principal haulage route'. **Table 6-2** provides the road traffic noise assessment criteria for this road category relevant to the daytime period.

Table 6-2: Road traffic noise assessment criteria

Road category	Type of development	Assessment criteria dB(A)
		Day (7 am – 10 pm)
Freeway/arterial/ sub-arterial road	Existing residences affected by additional traffic on existing freeways/sub-arterial/roads generated by land use developments	60 dB(A) $L_{Aeq\ (15\ hr)}$

Source: Adapted from Appendix D

In addition to meeting the assessment criteria, any sensitive receiver that experiences a significant increase in total traffic noise levels of above +12 dB (external), due to additional Project vehicles, should be considered for mitigation.

6.1.4 Potential impacts

6.1.4.1 Construction noise assessment

Additional construction activities will not be required for the Project as it comprises a continuation of activities at the existing quarry. As a result, no further assessment of construction-related activities was undertaken.

6.1.4.2 Operational noise assessment

Modelling method and scenario

A computer model was developed to quantify Project noise emissions to sensitive receivers using DGMR (iNoise, version 2022) noise modelling software. The model incorporated a three-dimensional digital terrain map and utilised relevant noise source data, ground type, attenuation from barrier or buildings and atmosphere information to predict noise levels at the identified sensitive receivers.

Modifying factors to account for annoying noise characteristics were assessed, with no correction for low frequency noise, intermittent noise or noise tonality being required.

The following operational activities were included in the noise modelling scenario:

- Extraction on a campaign basis using a bulldozer or excavator to rip and push the weathered material into stockpiles.
- Material requiring further processing being direct loaded into a mobile crushing unit using a front-end loader.
- Material not requiring further processing being direct loaded into road trucks for transportation off site.

Machinery used at the quarry would include up to three bulldozers, five front end loaders, two excavators, one skid-steer loader and one forklift. Transport of the quarry material would typically be undertaken using truck and dog configurations and rigid configurations. Based on these methods, a single modelling scenario was adopted to represent worst-case quarry operations. The noise sources and noise emission levels are presented in Table 16 of the Noise Impact Assessment (**Appendix D**).

The modelled operational scenario considered the worst-case operating conditions based on the staffing numbers, assuming the simultaneous operation of plant at maximum capacity during the entirety of the assessment period.

Meteorology

Weather conditions have the ability to significantly affect noise emissions from industry sources. Wind has the potential to increase noise at sensitive receiver locations when it is at low velocities and travels from the direction of the noise source. Conditions that increase received noise levels include source to sensitive receiver winds and the presence of temperature inversions.

Meteorological data for the period of September 2019 to September 2021 was sourced from the Bureau of Meteorology (**BoM**) Automatic Weather Station (**AWS**) located at Armidale Airport (056238), approximately 24 km northeast of the Project Site, was assessed to determine prevailing conditions at the Project Site.

The frequency of occurrence analysis of seasonal wind data concluded that prevailing winds were not considered to be a noise enhancing feature and not applicable for detailed assessment. The relevant meteorological conditions adopted for operational noise modelling are summarised in **Table 6-3**.

Table 6-3: Modelled meteorological parameters for Project Site

Assessment condition	Temperature	Wind speed/ direction	Relative humidity	Stability class
Day - Calm	20°C	0.5 m/s all directions	60%	D

Source: Appendix D

Operating schedule

The proposed hours and related identified activities for the Project, outlined in **Table 6-4**, formed the basis of the noise modelling scenarios for the assessment.

Table 6-4: Proposed hours of operation

Activity	Monday to Saturday	Sunday/Public Holidays
Extraction operations	7 am to 6 pm	n/a
Processing operations	7 am to 6 pm	n/a
Loading and transport operations	7 am to 6 pm	n/a

Source: Appendix D

Operational Noise Level Predictions

Operational noise predictions for the Project included extraction, processing, product loading and transportation.

The Noise Impact Assessment (**Appendix D**) predicted noise levels at each sensitive receiver during calm meteorological conditions and are provided in **Table 6-5**. The resulting noise contour maps for the modelled operational scenario are presented in **Appendix D**.

Table 6-5: Predicted Operational Noise Levels

Receiver	Period	Noise predictions	PNTL
SR1	Day	<30	40
SR2	Day	<30	40
SR3	Day	<30	40
SR4	Day	<30	40

Source: Appendix D

Modelling results indicate that noise emissions from the Project satisfy the PNTL at all four sensitive receivers.

6.1.4.3 Traffic noise assessment

Extracted material would typically be transported from the quarry using truck and dog trailers with a maximum capacity of 34 tonnes (**t**). Smaller rigid trucks (14 t) and semi-tippers (26 t) would also be used on occasion. During operation of the quarry, the average number of truck movements is estimated to be 38 movements per day, with a maximum of 60 truck movements per day comprising 58 laden truck movements hauling material from the quarry and two heavy vehicle movements for maintenance servicing or refuelling.

Along the proposed Kingstown Road transport route, sensitive receivers are generally setback from Kingstown Road, with a minimum offset distance of approximately 30 m to receivers on the outskirts of Uralla, and approximately 15 m to the nearest receivers within the township of Uralla.

Predicted noise levels from Project related traffic was calculated with consideration of the highest expected operational road traffic volumes associated with the closest sensitive receivers along Kingstown Road (i.e. receivers 15 m from Kingstown Road / East Street) are presented in **Table 6-6**.

Table 6-6: Operational Road Traffic Noise Levels on Sensitive Receivers

Offset Distance (m)	Assessment Criteria dB $L_{Aeq(15hr)}$ [1]	Traffic Noise dB $L_{Aeq(15hr)}$		Total charge
		Existing	Future	
15	60	50.6	51.3	+0.7

Source: Appendix D

1 Day - 7am to 10pm.

The traffic noise contribution from the Project is predicted to remain below the relevant daytime period assessment criterion for the most effected receivers adjacent to the haul route.

6.1.5 Mitigation measures

Although noise levels are predicted to meet the relevant noise assessment criteria and no further mitigation measures are required, the Applicant would prepare an Environmental Management Plan (**EMP**) to proactively address any potential residual noise impacts.

6.2 Blasting and Vibration

6.2.1 Introduction

The Noise Impact Assessment (Muller Acoustic Consulting, 2022) includes an assessment on the potential impacts from blasting activities. The Noise Impact Assessment conducted an assessment of blasting impacts in accordance with the guidelines contained within *Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (Australian and New Zealand Environment Council [**ANZEC**], 1990).

6.2.2 Assessment criteria

Noise and vibration levels from blasting are assessable against criteria established within the ANZEC guidelines as detailed above. Blasting limits for air-blast overpressure and ground vibration are presented in **Table 6-7**.

Table 6-7: ANZEC guideline blasting limits

	Overpressure dB (Linear Peak)	Ground Vibration PPV (mm/s)
Recommended Maximum (95% of all blasts)	115	5
Level not to be exceeded	120	10
Long term goal for ground vibration	n/a	2

Source: Appendix D

6.2.3 Potential impacts

The Project may require small unconfined surface blasts on occasion when consolidated rock is encountered, anticipated to occur at an average rate of one blast every two years. Air-blast overpressure and ground vibration predictions have been calculated using the accepted equations from *AS2187.2-2006*, by adopting a maximum instantaneous charge of up to 3 kg for a small unconfined surface blast.

Air-blast overpressure and vibration predictions calculated to each sensitive receiver (**Figure 5-1**) are presented in **Table 6-8** and are below the relevant overpressure and ground vibration criteria for blasting.

Table 6-8: Calculated blasting emissions

Receiver	Distance to charge [1] (km)	Airblast overpressure (dBz Peak)	Ground vibration (mm/s)
SR1	2.5	114.2	<0.01
SR2	3.0	112.1	<0.01
SR3	3.5	110.6	<0.01
SR4	4.3	107.5	<0.01

Source: Appendix D

1 Denotes distance from centre of disturbance area to nearest receivers.

There is no significant infrastructure in the locality of the Project that would experience effects of vibration from blasting. The nearest public road to the Project to Kingstown Road, located approximately 950 m north of the site, is expected to experience ground vibration levels of up to 0.05 mm/s.

Blast effects resulting from the Project are predicted at the nearest sensitive receivers to be, at worst for overpressure up to 114 dBZ, and for vibration up to 0.01 mm/s. These levels are well below the regulatory criteria and considerably lower than other sources of overpressure that livestock are likely to be already subjected to such as lightning strikes.

6.2.4 Mitigation measures

It has been demonstrated that blast and vibration levels from the Project are predicted to meet the relevant blasting criteria, with no sensitive receivers, infrastructure or livestock being affected by occasional blasting undertaken as part of the Project.

Explosives for blasting would not be stored on site and minor quantities of explosives would be transported to the quarry for small unconfined surface blasts on an occasional basis only if consolidated rock is encountered.

6.3 Air

6.3.1 Introduction

Zephyr Environmental Pty Ltd conducted an Air Quality Assessment for the Project as presented in **Appendix E** (Zephyr Environmental, 2022). The Air Quality Assessment was conducted in accordance with the *Approved methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2016) (Approved Methods) and gives particular attention to potential dust impacts on nearby sensitive receivers due to the operation of the quarry and/or road haulage.

6.3.2 Existing environment

6.3.2.1 Sensitive receivers

The Air Quality Assessment considered the potential air quality impacts associated with particulate matter concentration and deposition levels at four sensitive receivers. The sensitive receivers are located more than 2 km from the Project Site, as shown in **Figure 5-1**.

6.3.2.2 Meteorology

Meteorological data over a six-year period from 2016 to 2021 sourced from the BoM AWS (056238) located at the Armidale Airport, approximately 24 km northeast of the Project, was assessed to determine the representative meteorological dataset for air quality modelling. Annual windroses were compiled from the dataset and are presented in **Figure 6-1**.

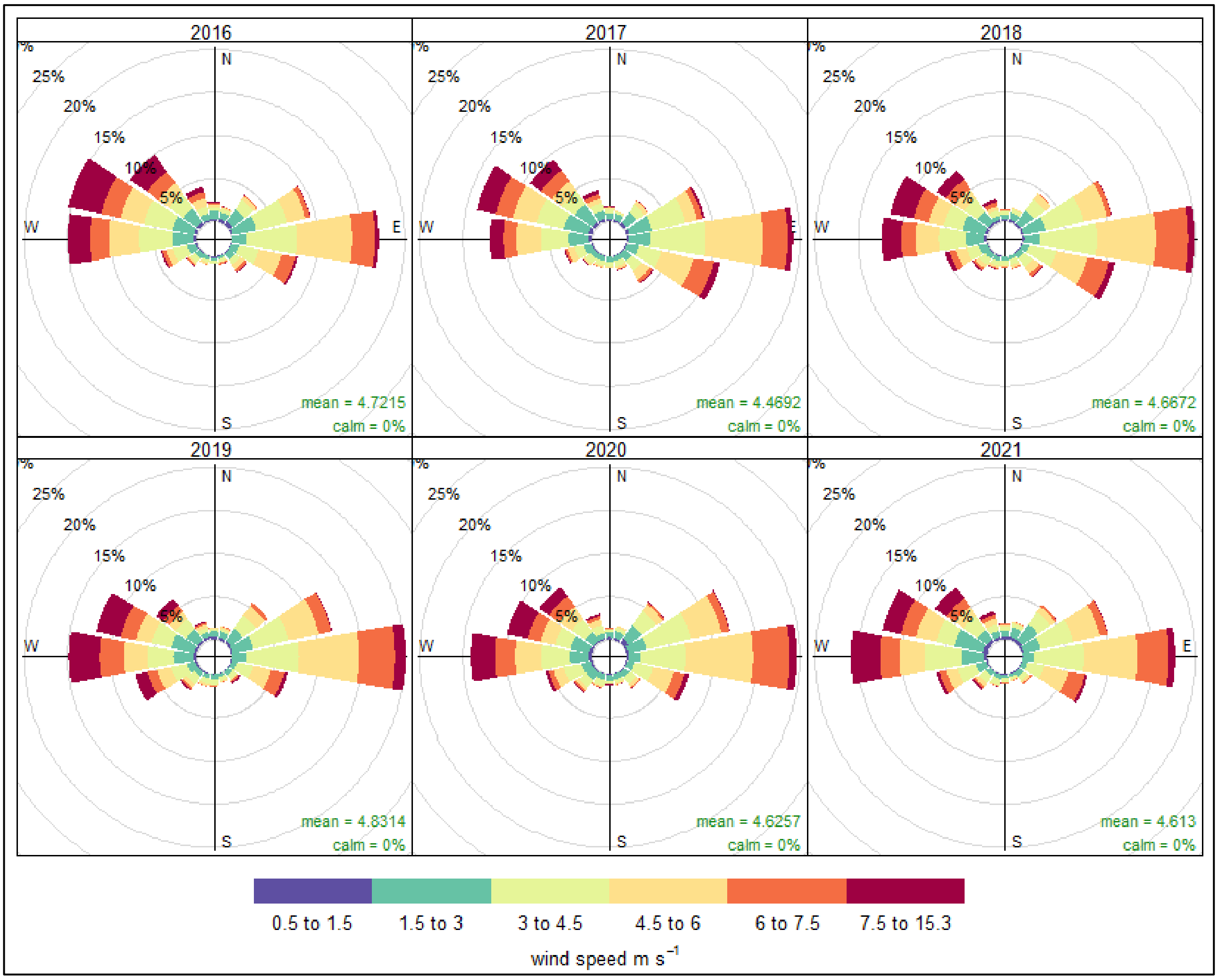


Figure 6-1: Annual windroses for 2016 to 2021 at Armidale AWS

The analysis shows that wind speed and direction are reasonably consistent from year to year, and that 2021 is a representative year.

Figure 6-2 presents the seasonal variations for wind in 2021. On an annual basis, winds are predominantly from the western and eastern quadrants, with stronger winds from the west. The stronger winds predominantly occur in winter and spring, while winds in summer are generally from the eastern quadrant. The highest hourly average wind speed for the year was 14.9 m/s, with an annual average of 4.6 m/s.

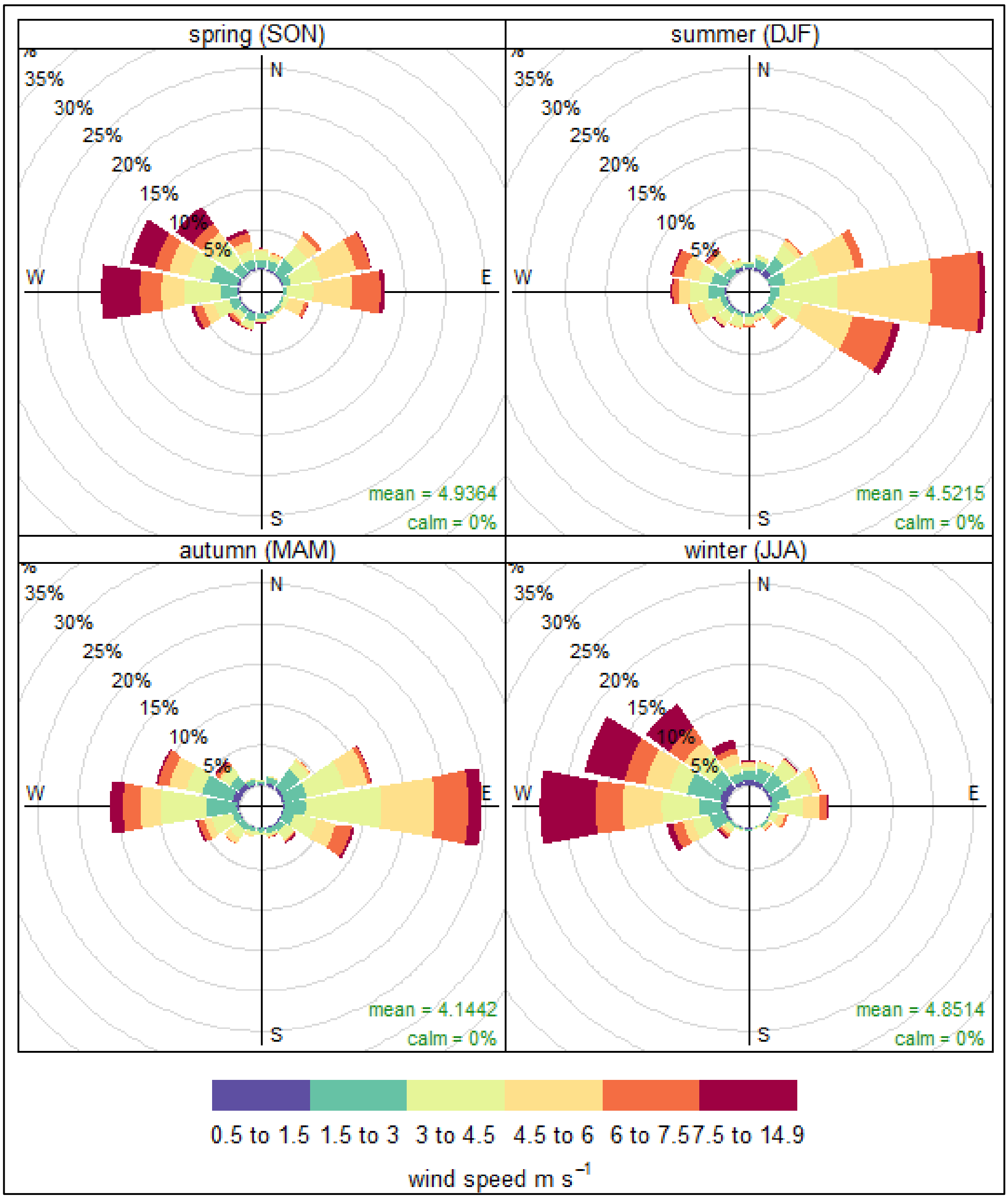


Figure 6-2: Seasonal windroses for 2021 Armidale AWS

6.3.2.3 Baseline air quality

Data on particulate matter (**PM**), defined as fine particles less than 10 micrometres (**PM_{10}**) and fine particles less than 2.5 micrometres (**$PM_{2.5}$**), has been collected at several regional monitoring stations as part of the DPE monitoring program across NSW. The Armidale monitoring station, being the closest station to the Project Site, has been used to represent the background concentrations for the Air Quality Assessment. The most recent complete year for assessment is 2021, noting 2019 and 2020 were impacted by severe bushfire events in the region and therefore do not present representative background conditions.

The annual average PM_{10} and $PM_{2.5}$ concentrations measured at Armidale in 2021 are 10.4 µg/m^3 and 7.2 µg/m^3 respectively. As this is the closest monitoring station to the Project Site, these concentrations were used to represent background concentrations in the Air Quality Assessment.

The 24-hour average $PM_{2.5}$ concentrations for Armidale are highest during the winter months, likely due to the impact from wood smoke emitted from domestic wood heaters. There were four days that recorded over the 25 µg/m^3 assessment criterion (**Section 6.3.3**) during 2021, and no days that recorded over the PM_{10} 50 µg/m^3 assessment criterion during 2021 (**Appendix E**).

As there is no monitoring data available for dust deposition, the Air Quality Assessment adopted a conservative consumption of 2 g/m^2/month.

Annual average PM and dust deposition concentrations used to represent background concentrations are summarised in **Table 6-9**.

Table 6-9: Annual average particulate matter and dust deposition background concentrations

Pollutant	Background level
PM_{10}	10.4 µg/m^3
$PM_{2.5}$	7.2 µg/m^3
Dust deposition	2 g/m^2/month

Source: Adapted from Appendix E

6.3.3 Assessment criteria

The Approved Methods specify air quality criteria relevant for assessing impacts from air pollution and are consistent with the revised *National Environment Protection Measure for Ambient Air Quality*. Airborne PM has the potential to cause nuisance dust effects when it deposits on surfaces. Larger particles do not tend to remain suspended in the atmosphere for long periods of time and will fall out relatively close to the source. Dust fallout can soil materials and generally degrade the aesthetic environment and is therefore assessed for nuisance or amenity impacts.

Table 6-10 details the criteria for PM_{10}, $PM_{2.5}$ and deposited dust relevant to the Project.

Table 6-10: NSW EPA impact assessment criteria for particulate matter and deposited dust

Pollutant	Averaging period	Criterion
PM_{10}	Annual	25 µg/m^3
	24-hour	50 µg/m^3
$PM_{2.5}$	Annual	8 µg/m^3
	24-hour	25 µg/m^3
Deposited dust (insoluble solids)	Annual (maximum increase)	2 g/m^2/month
	Annual (maximum total)	4 g/m^2/month

Source: Adapted from Appendix E

6.3.3.1 Protection of the Environment Operations Act (1997)

The statutory framework for managing air emissions in NSW is regulated under the POEO Act. The primary regulations for air quality made under the POEO Act are:

- *Protection of the Environment Operations (Clean Air) Regulation 2021.*
- *Protection of the Environment Operations (General) Regulation 2021.*

The Project will comply with the POEO regulations as follows:

- As a scheduled activity under the POEO regulations, the quarry will operate under an EPL issued by the NSW EPA and would be required to comply with requirements including emission limits.
- The Project will not feature significant odour-generating emission sources, and is therefore unlikely to generate odorous emissions.
- No large-scale open burning would be performed on-site.

6.3.4 Potential impacts

To assess the potential air quality impacts from the Project, a single 'worst case' operating scenario was adopted, with a daily production based on the maximum annual production rate of 120,000 m^3. To remain conservative, no regular dust controls have been included in the air emission estimates to enable worst-case predictions.

Estimates of particulate matter emissions have been made for key generating activities, being quantified for three size fractions (total suspended particles (**TSP**), PM_{10} and $PM_{2.5}$). Emission factors developed within NSW, and by the United States Environmental Protection Agency (US EPA,1985) have been applied to estimate the amount of dust produced by each proposed activity.

Information based on operational descriptions, access road distances, material volumes, operating hours and truck sizes has been used to develop the particulate matter inventory. Other conservative assumptions include:

- area of 9 ha exposed to wind erosion with no dust controls;
- internal access road is unsealed and no dust suppression on access road;
- maximum daily truck movements of 60 movements per day; and
- all material is crushed and stockpiled on site.

Table 6-11 summarises the quantities of TSP, PM_{10} and $PM_{2.5}$ estimated to be released by the Project. All activities have been assumed to occur between 7 am – 6 pm every day of the year. The exception to this is wind erosion which can occur at any hour of the day. Emission inventories for each particle size fraction are provided in the Air Quality Assessment Report (**Appendix E**).

Table 6-11: Estimated annual emissions for TSP, PM_{10} and $PM_{2.5}$ (kg/y)

Activity	TSP	PM_{10}	$PM_{2.5}$
Dozers ripping and pushing to crusher	20,886	5,047	2,193
Excavators loading crusher	882	417	63
Crushing on site	745	331	331
Loading product to stockpiles	882	417	63
Loading product to trucks	882	417	63
Hauling product off site	36,822	7,884	788
Wind erosion	7,884	3,942	591
Total	**68,984**	**18,456**	**4,093**

Source: Appendix E

The US EPA's model AERMOD, which includes AERMET for the preparation of meteorological input files, was used for the Air Quality Assessment. Terrain data was sourced from NASA's Shuttle Radar Topography Mission Data. The terrain dataset was then processed within AERMAP to create the necessary input files.

Predictions were made over a 10 km x 10 km grid at 200 m spacing, as well as at the four individual sensitive receivers shown in **Figure 5-1**. Background concentrations for annual average PM_{10} and $PM_{2.5}$ (from the Armidale monitoring station) and the background annual average dust deposition rates in **Section 6.3.3** were added to the modelled Project contributions to determine the predicted cumulative impacts.

Table 6-12 presents the predictions for each sensitive receiver showing the contributions of the Project and the cumulative concentration for the annual average PM_{10} and $PM_{2.5}$ concentrations and dust deposition rates. The results show that there are no sensitive receivers predicted to exceed the annual average PM_{10} and $PM_{2.5}$ EPA criterion of 25 µg/m^3 and 8 µg/m^3 respectively. The results also show there are no sensitive receivers predicted to exceed the annual average dust deposition EPA criterion, either incremental (2 g/m^2/month) or cumulative (4 g/m^2/month).

Table 6-12: Annual average PM_{10}, $PM_{2.5}$ and dust deposition for sensitive receivers

Sensitive receiver	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		Deposited dust (g/m²/month)	
	Annual Project	Annual cumulative	Annual Project	Annual cumulative	Annual Project	Annual cumulative
	Air Quality impact criteria (cumulative)					
	-	8 µg/m³	-	25 µg/m³	2 g/m²/month[a]	4 g/m²/month[b]
SR1	0.01	7.2	0.04	10.4	0.02	2.02
SR2	0.03	7.2	0.12	10.5	0.02	2.02
SR3	0.01	7.2	0.02	10.4	0.003	2.00
SR4	0.004	7.2	0.01	10.4	0.002	2.00

Source: Adapted from Appendix E

a Maximum increase due to the project.

b Maximum total level.

For maximum 24-hour average PM_{10} and $PM_{2.5}$, both the incremental (Project contribution) and cumulative predictions were analysed. Incremental concentrations are shown as contour plots (**Appendix E**) and represent maximum predictions at all receptors across the model domain. These contours do not represent a single worst-case day, but rather represent the potential worst case 24-hour average PM_{10} and $PM_{2.5}$ concentration that could be reached at any particular location across the entire modelling year, which may occur when operations associated with maximum throughput are combined with worst-case meteorological conditions.

Table 6-13 presents the PM_{10} and $PM_{2.5}$ results for all sensitive receivers from the Project alone. The maximum concentration is predicted to be 2.8 µg/m³ and 0.9 µg/m³ respectively, occurring at SR2.

Table 6-13: Maximum 24-hour average PM2.5 and PM10 concentrations for the Project alone at each sensitive receiver – maximum throughput operations

Sensitive receiver	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)
SR1	0.2	0.7
SR2	0.9	2.8
SR3	0.2	0.7
SR4	0.1	0.4

Source: Adapted from Appendix E

To estimate the cumulative 24-hour average PM_{10} and $PM_{2.5}$ concentrations at the most impacted sensitive receiver (SR2), the predicted concentration from the Project for each day of the year was combined with the corresponding background concentration for that day. Additional modelling was carried out for SR2 to determine the 24-hour average $PM_{2.5}$ and PM_{10} concentration for each day of the year. This was then added to the daily background concentrations presented in **Table 6-9**.

The cumulative 24-hour PM_{10} and $PM_{2.5}$ concentrations for each day at SR2 are presented in **Figure 6-3** and **Figure 6-4** respectively. As noted in **Section 6.3.3,** there are a number of occasions where the background $PM_{2.5}$ concentrations exceed the NSW EPA $PM_{2.5}$ 24-hour average criterion of 25 µg/m³ during 2021. However as shown in **Figure 6-3** and **Figure 6-4** respectively, the contributions from the Project are very minor at SR2 and do not result in any additional exceedances.

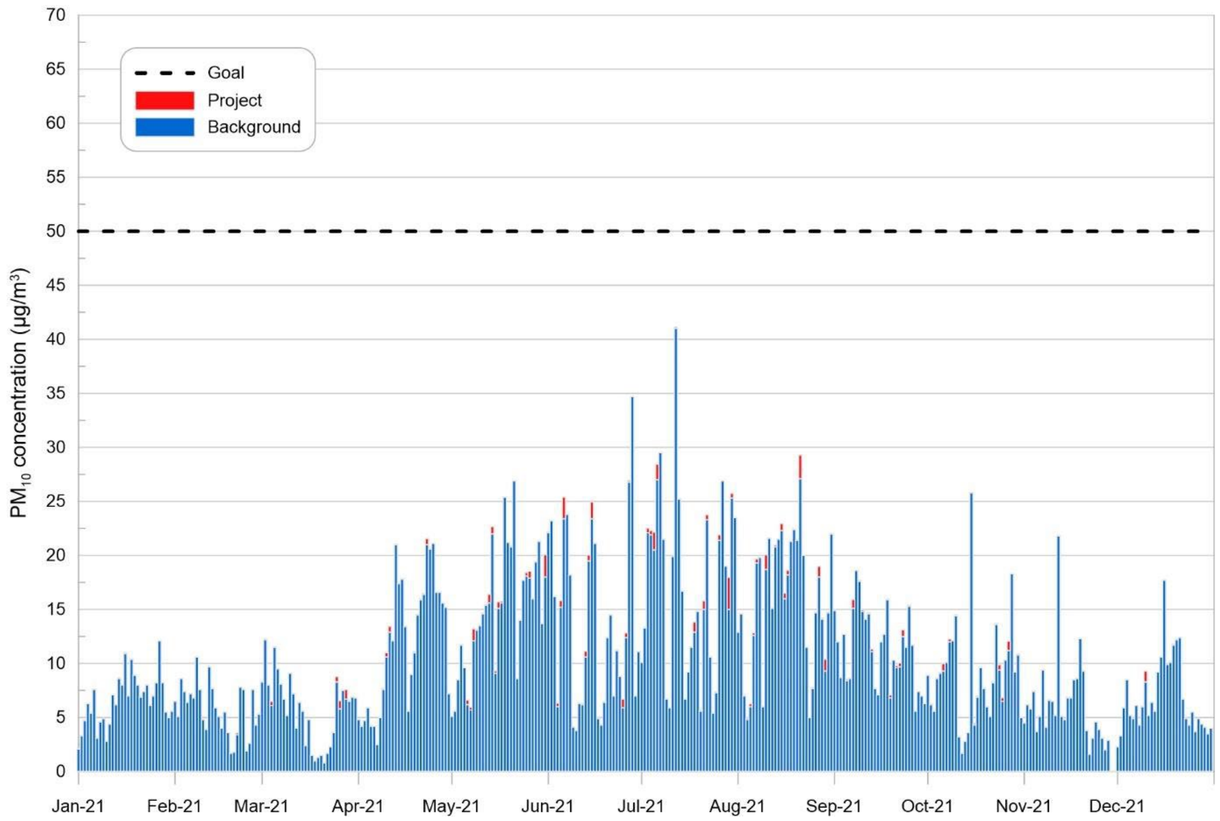


Figure 6-3: Predicted daily cumulative 24-hour average PM_{10} concentration at SR2

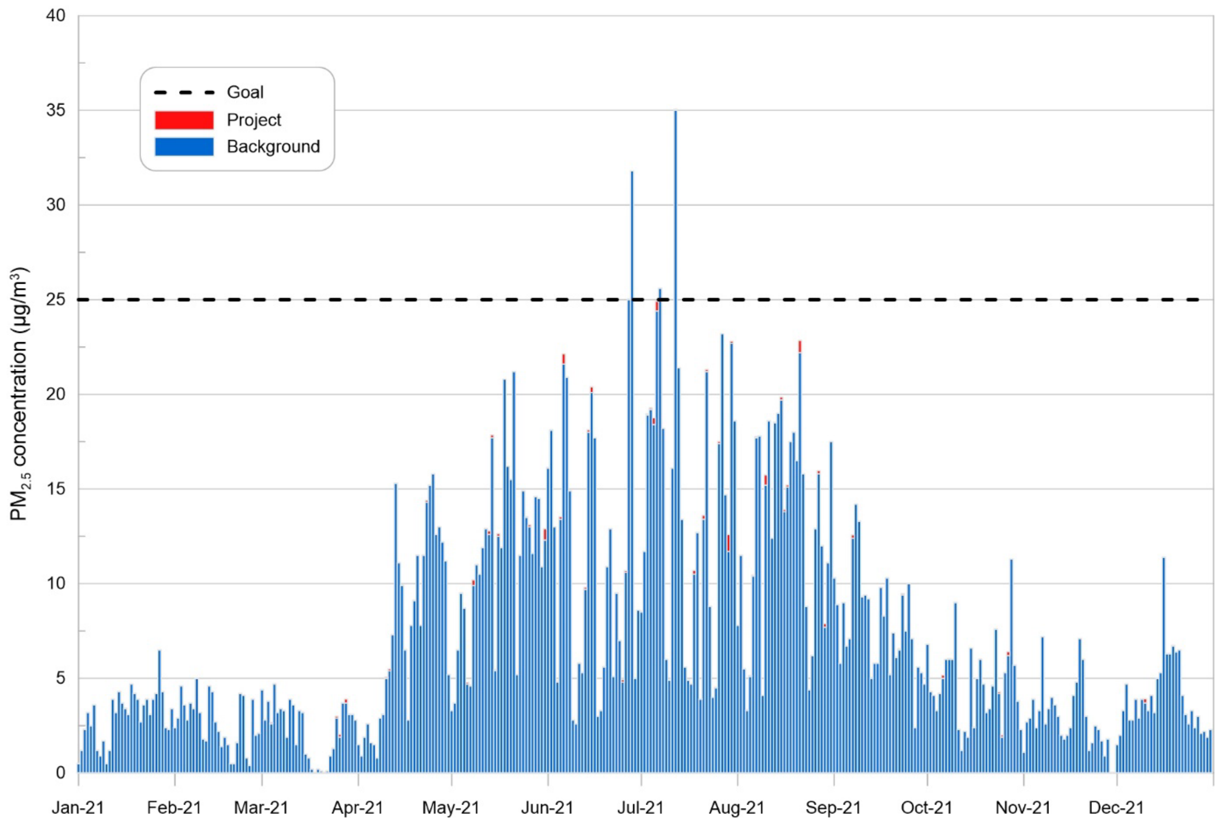


Figure 6-4: Predicted daily cumulative 24-hour average $PM_{2.5}$ concentration at SR2

6.3.4.1 Greenhouse Gas Assessment

The following scope of greenhouse gas emissions was assessed as being relevant to the Project:

- Scope 1 emissions – direct emissions generated at a facility, including fuel use. Direct emissions from the Project Site would be generated through the combustion of diesel fuel in trucks and machinery.
- Scope 2 emissions – indirect emissions associated with the purchase and consumption of electricity that is produced at another facility. Scope 2 emissions are not relevant as the Project will not require electricity as part of its operational activities.
- Scope 3 emissions – indirect emissions other than Scope 2 emissions that occur as a consequence of the activities of a facility but are generated from sources not owned or controlled by the facility. These include extraction and production of purchased materials, transportation of purchased fuels, use of sold products and use of fuels in employee transport.

The Applicant would minimise diesel fuel usage where practicable and improve the emissions from onsite equipment through scheduled equipment maintenance. Given the small scale of the operation, it is considered that the Project would generate a fraction of the NSW and National greenhouse gases emitted each year.

6.3.5 Mitigation measures

Although air quality is predicted to meet the relevant air quality assessment criteria and no further mitigation measures are required, the Applicant would prepare an EMP to proactively address any potential residual air quality impacts.

6.4 Water

The existing quarry has not intersected any groundwater and no groundwater is expected to be intersected by the Project. No groundwater licences are expected to be required under the *Water Management Act 2000*.

Groundwater Dependent Ecosystems **(GDEs)** include ecosystems which may rely on the surface expression of groundwater (including surface water ecosystems that may have a groundwater component) and ecosystems which may rely on the subsurface presence of groundwater (including vegetation ecosystems). A review of the Groundwater Dependent Ecosystems Atlas (BoM, 2022) indicates there is moderate potential for terrestrial GDEs to occur within and surrounding the Project Site in areas of intact vegetation. Given groundwater supplies have not been intersected to date and the Proposed Development Extent does not areas of intact vegetation, it is unlikely terrestrial GDEs would be impact by the Project.

Accordingly, further assessment of groundwater impacts of the Project has not been undertaken. Therefore, this section only assesses the surface water impacts and management aspects of the Project.

6.4.1 Introduction

WRM Water and Environment Pty Ltd (**WRM**) conducted a Surface Water Assessment for the Project as presented in **Appendix F** (WRM, 2022b). The Surface Water Assessment has been guided by the Project SEARs, including recommendations from the EPA and Water NSW.

The Surface Water Assessment considered water licensing requirements and other approvals required under the *Water Act 1912* and/or *Water Management Act 2000* and has also been guided by the requirements of the NSW Government's *Water Quality and River Flow Objectives* (NSW Government, 2006).

A separate Erosion and Sediment Control Plan for the Project has been prepared by WRM and is presented in **Appendix F** (WRM, 2022a). The Erosion and Sediment Control Plan has been guided by the requirements of the following guidelines:

- *Managing Urban Stormwater – Soils and Constructions, Volume 2E – Mines and Quarries* (Landcom, 2008); and
- *Best Practice Erosion and Sediment Control* (IECA, 2008).

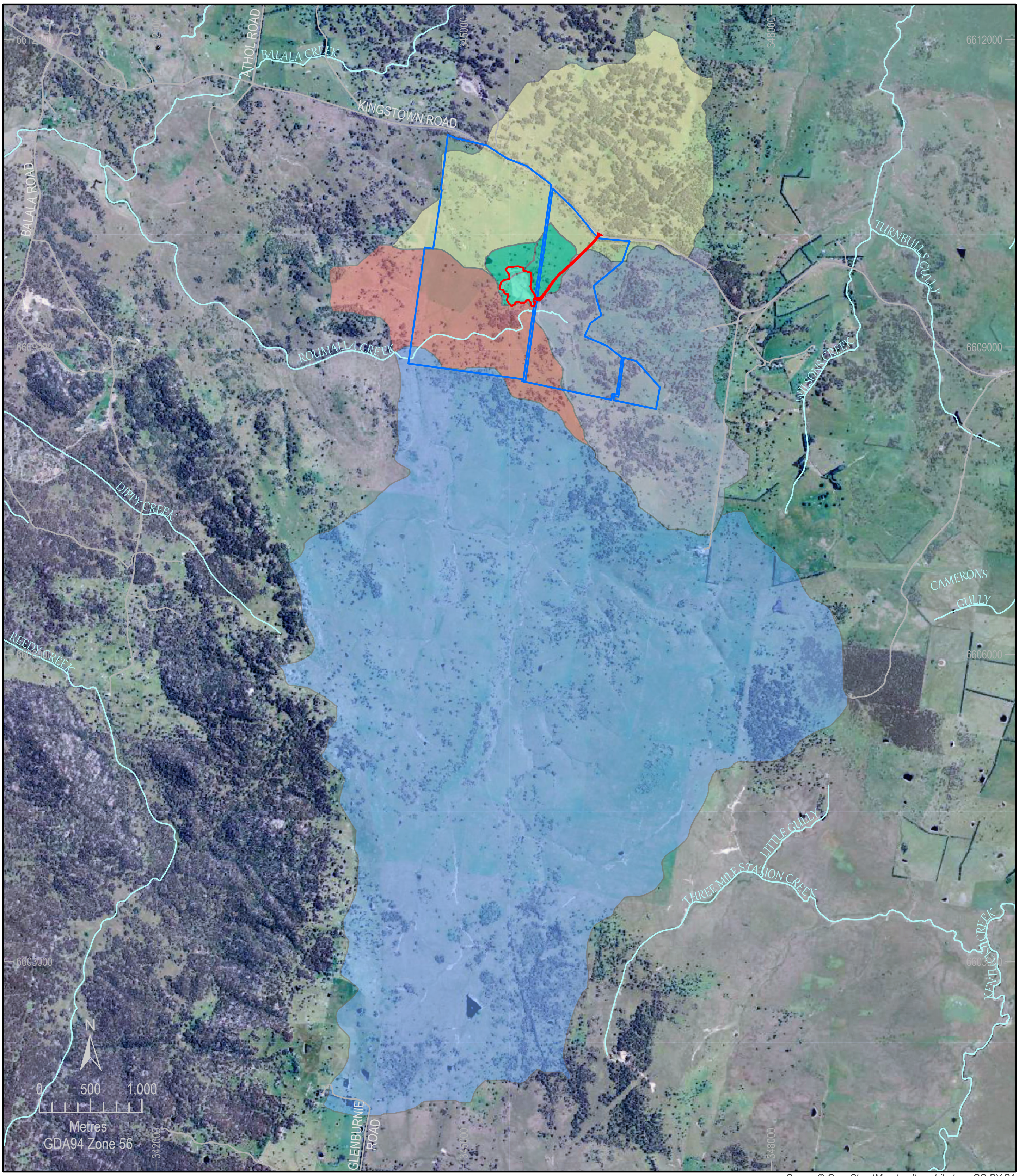
6.4.2 Existing environment

6.4.2.1 Regional hydrology

The Project is located within the Roumalla Creek Catchment. Roumalla Creek is a tributary of the Gwydir River, which is located in the upper reaches of the Murray-Darling basin. The Gwydir Reiver extends for over 480 km, with a catchment extending from the New England Tablelands in the Great Dividing Range, flowing through the tablelands and northwestern slopes of NSW. The valley broadens into an alluvial floodplain east of Moree where the river flows westward through extensive wetlands and swamps to the Barwon River. Major tributaries of the Gwydir River include Copes Creek, Moredun Creek, Georges Creek, Laura Creek and Horton River. The Gwydir River catchment is used extensively for agricultural activities, supporting dryland and irrigated agriculture and livestock production.

Roumalla Creek traverses the property in a southwestern direction immediately south of the Proposed Development Extent. As shown in **Figure 6-5**, Roumalla Creek has a catchment area of approximately 3.8 km^2 (380 ha) upstream of the Proposed Development Extent. The Roumalla Creek catchment to the western property boundary is approximately 29 km^2 (2,900 ha) which includes the catchment of the "Southern Tributary" of the creek. A "Northern Tributary" of Roumalla Creek flows in a southwesterly direction across the northern part of the Project Site. The Northern Tributary has a catchment area of 4.4 km^2 (440 ha) to the western boundary of the Project Site.

Roumalla Creek is located within a disturbed catchment, with large areas of the catchment being substantially cleared for grazing. The Roumalla Creek channel is characterised as having mostly grass cover, with some trees on the banks. The riparian zone has been degraded over time by removal or modification of native vegetation, uncontrolled livestock access and establishment of non-native species (**Figure 6-6**).



Source:© OpenStreetMap (and) contributors, CC-BY-SA

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Proposed Quarry Extension Areas
- Watercourse

Catchments

- Local catchment
- Roumalla Creek (1.9km^2)
- Roumalla Creek (3.8km^2)
- Northern Tributary (4.4 km^2)
- Southern Tributary (23.1 km^2)

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 6-5

Regional drainage characteristics

Figure 6-6: Roumalla Creek channel immediately south of the quarry

6.4.2.2 Local hydrology

The majority of surface water runoff from the existing quarry extraction area drains to an existing sediment pond at the southeastern corner of the quarry. This existing sediment pond has a catchment area of approximately 28.5 ha, with approximately 74% of the catchment consisting of undisturbed area to the northwest of the quarry. Some runoff from the northern parts of the existing quarry extraction area drains in a northwest direction to an existing farm dam, which has a catchment area of approximately 13.8 ha.

6.4.2.3 Topography and soil characteristics

The Project Site is located on gently undulating terrain which progresses in elevation from 930 m Australian height datum (**AHD**) in the southeast of the existing quarry extraction area to 960 m AHD in the northwest of the quarry. A natural ridgeline (saddle) runs along the northwestern edge of the quarry.

The geology of the Project Site consists mainly of interbedded cherts (generally formed from silica) and mudstone (generally formed from silt and clay) (USC, 2002). The soil classification within the Project Site is mapped as Kurosols which are described further in **Section 6.9.2**.

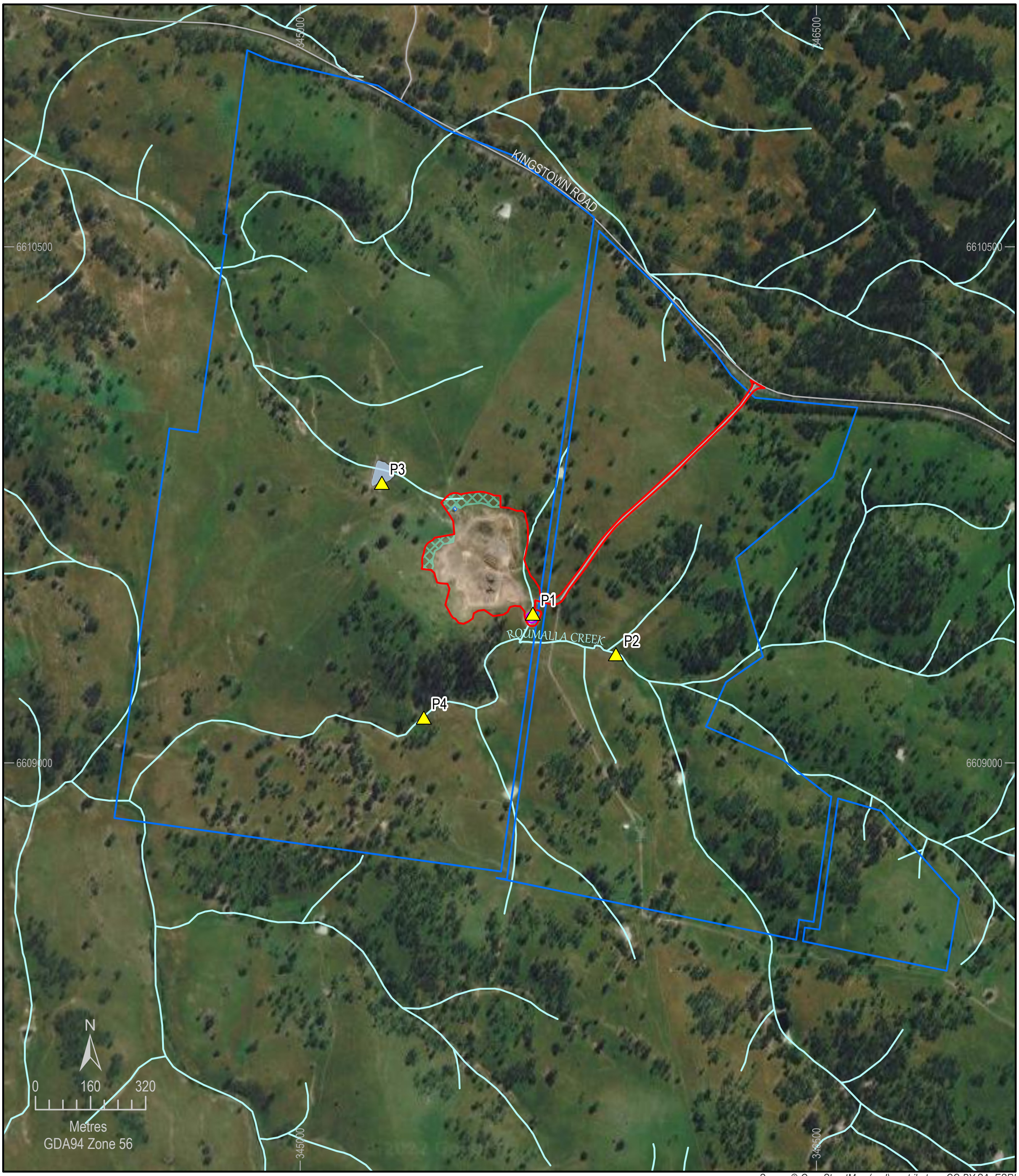
6.4.2.4 Surface water quality

The *Water Management Act 2000* provides a framework for identifying environmental values (**EV**) for a waterway and deciding water quality objectives (**WQO**) to protect or enhance the EV's. The EVs need to be protected from the effects of habitat alteration, waste release, contaminated runoff and altered flow to ensure healthy aquatic ecosystems and waterways that are safe for community use.

Roumalla Creek and its tributaries would be classified as a 'fresh' water source with EVs for protection including:

- aquatic ecosystem protection;
- stock watering;
- human consumption;
- primary, secondary and visual recreation; and
- drinking water.

Limited surface water monitoring has been undertaken in the vicinity of the existing quarry. Surface water sampling was undertaken at three locations (P1, P2 and P3) in the vicinity of the Project in May 2022 (**Figure 6-7**) with the results provided by the Surface Water Assessment in **Table 6-14**.For comparison, **Table 6-14** also shows the water quality threshold criteria for pH and total suspended solids (**TSS**) obtained from the *Australian and New Zealand guidelines for fresh and marine water quality* (ANZG, 2018) and are based on 95% trigger values which have been adopted as the water quality criteria for the Project.



Source:© OpenStreetMap (and) contributors, CC-BY-SA, ESRI

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Proposed Quarry Extension Areas
- Existing sediment pond
- Existing shelter structure
- Farm dam
- Surface water monitoring locations
- Roads
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 6-7

Existing/proposed surface water monitoring locations

Table 6-14: Surface water quality sampling results

Parameter	Units	P1 (sediment pond)	P2 (Roumalla Creek upstream)	P3 (farm dam)	Threshold criteria
Field results					
EC	µS/cm	181.4	286.5	59.4	30 – 350 [a]
pH	-	8.0	7.8	8.1	6.5 – 8.0
Laboratory results					
EC	µS/cm	260	430	79	30 – 350 [a]
pH	-	7.2	7.5	7.0	6.5 – 8.0
TSS	mg/L	550	22	14	50

Source: Appendix F

aNSW Government Gwydir River water quality objective for upland rivers

Water quality sampling results indicate the following:

- Water quality in P2 (Roumalla Creek upstream) and P3 (farm dam) are generally consistent. Electrical Conductivity (**EC**) and TSS in P2 are higher than at P3, which the Surface Water Assessment indicated could be due to evapo-concentration of water in the creek at P2. Overall, water quality in P2 and P3 is a reasonable representation of background water quality.
- Background water quality (at P2 and P3) is generally good, with EC, pH and TSS generally not exceeding the threshold criteria, with the exception of a marginal exceedance of field pH at P3 and laboratory EC as P2.
- Water quality in P1 (sediment pond) indicates that EC and pH do not exceed the threshold criteria and are similar to the background concentrations in P2 and P3. TSS in P1 exceeds the threshold criteria and background concentrations. However, the Surface Water Assessment indicated that a higher TSS concentration in P2 (Roumalla Creek upstream) could be expected when the creek is flowing or is in flood.

6.4.3 Potential impacts

6.4.3.1 Surface water management objectives

Land disturbance associated with operation of the quarry has the potential to adversely affect the quality of surface runoff in downstream receiving waters through increased sediment loads. In addition, runoff from active quarrying areas may contain increased concentrations of pollutants when compared to natural runoff.

The objectives of the proposed water management system for the Project include:

- Separation of runoff from areas unaffected by quarry operations (clean catchment water) and areas that are disturbed by quarry operations (sediment-laden catchment water).
- Understand, manage, and minimise the potential impact of discharges from the existing sediment pond.

6.4.3.2 Proposed water management infrastructure

The Project would involve the use of the existing sediment pond with proposed additional drainage and sediment control infrastructure.

The main components of water-related infrastructure would include:

- a “dirty water drain” that will capture sediment-laden runoff (sediment water) from disturbed areas of the quarry and convey it to the existing sediment pond; and
- a “clean water drain” that will flow parallel to the dirty water drain.

The clean water drain would capture clean water runoff from undisturbed areas that would otherwise drain to the sediment pond under existing conditions. Clean water runoff captured by the clean water drain would be discharged downstream of the existing sediment pond. The clean water drain would also capture from a small northeastern section of the Proposed Development Extent. However, this section of the quarry has been rehabilitated (grassed) and therefore, runoff from this area would have similar characteristics to runoff from undisturbed areas.

The proposed drains would reduce the catchment draining to the sediment pond by approximately 70% to approximately 9 ha. Additional culverts would also be required beneath the access road to convey the clean water runoff separately from the sediment water. The sizing of these proposed drains and culverts would be undertaken during detailed design.

6.4.3.3 Water balance modelling

A computer-based operational simulation model (**OPSIM**) was used to assess the potential quantity and quality of uncontrolled discharges from the existing sediment pond. The OPSIM model was also used to estimate the runoff yield from the Roumalla Creek catchment upstream of the Project Site, to assess the potential for the Roumalla Creek catchment runoff to dilute uncontrolled discharges from the sediment pond.

The inflow of water into the Project Site is through catchment runoff and direct rainfall. Potential rock processing would not involve washing. Therefore, the only outflow of water from the Project Site is through evaporation and uncontrolled discharges from the existing sediment pond.

With the proposed surface water infrastructure in place, the catchment reporting to the sediment pond would be reduced significantly. Water balance modelling has determined that there is a 50% chance that at least 7 megalitre (**ML**) of water would discharge from the sediment pond in any year, compared to a 50% chance that at least 17 ML of water would discharge under existing conditions.

6.4.3.4 Surface water discharge quality

The water balance model was also used to assess the potential impacts on surface water quality due to discharges from the sediment pond. The ratio between the volume of runoff from the Roumalla Creek catchment and the volume of uncontrolled discharge from the sediment pond were assessed using the water balance model to determine potential dilution ratios achieved downstream of the existing sediment pond. Zero routing was assumed in the Roumalla Creek catchment, which means that the runoff volume from Roumalla Creek on each day is assumed to mix with the coincident spill volume from the sediment pond, without delay.

The water quality data in **Table 6-14** shows that EC and pH in the sediment pond do not exceed the threshold criteria and are similar to the background concentration in Roumalla Creek. Therefore, the Project is not expected to have any adverse impacts on the concentrations of these water quality parameters in Roumalla Creek.

Total suspended solids in the sediment pond outflows appear to be elevated compared to background levels. However, the Surface Water Assessment indicated that a higher TSS concentration in the creek could be expected when the creek is flowing or is in flood.

Based on the predicted potential dilution ratios, there is an 80% chance that when the sediment pond spills, some dilution of sediment pond outflows by Roumalla Creek flows will occur. There is a 50% chance that when the sediment pond spills, contaminant concentrations in the sediment pond outflows would be diluted by a factor 33 by Roumalla Creek flows (**Appendix F**).

6.4.3.5 Changes in contributing catchment

The Project will increase the quarry extraction area by up to 0.99 ha. The increase in the quarry extraction area represents less than 0.3% of both the northern tributary catchment to the western property boundary and the Roumalla Creek catchment to the Project Site.

The Existing Development Extent does not have any in-ground pits that would capture surface runoff. This is assumed to remain the same following the proposed quarry extension. The loss of catchment flows in Roumalla Creek would be negligible and therefore, the potential impact on water quantity in Roumalla Creek due to the Project is considered negligible.

Runoff from the Indicative Quarry Extraction Area would drain-offsite through the existing sediment pond. The existing sediment pond is located on a mapped first order stream, which is considered a “minor stream” in accordance with the *Water Management (General) Regulation 2018*. In addition, the existing sediment pond’s primary function is to control erosion to prevent contamination of a water source. As such, it is considered an “excluded works” dam under Schedule 1 of the Regulation and does not require licensing.

6.4.4 Mitigation measures

The following mitigation measures to proactively control potential surface water quality impacts would be implemented and documented within an EMP:

- Design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond.
- Quarterly surface water quality monitoring for pH, EC, TSS and oil and grease would be undertaken at monitoring locations shown in **Figure 6-7** to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues.
- Development of an Erosion and Sediment Control Plan to identify measures to minimise soil erosion and transport of sediment off-site.

6.5 Biodiversity

6.5.1 Introduction

Stringybark Ecological conducted a Biodiversity Assessment for the Project as presented in **Appendix G** (Stringybark Ecological, 2022). The SEARs required a detailed assessment to be undertaken in accordance with sections 7.2 and 7.7 of the BC Act. The Applicant has sought to avoid, minimise and mitigate biodiversity impacts in the first instance as part of the Project design and has modified the originally proposed quarry extraction area (i.e. the Project Study Area as defined in **Section 2.4.3**) to preferentially disturb areas of vegetation in poorer condition. As a result, the Applicant is now proposing to clear 0.99 ha compared to the originally proposed 32 ha.

6.5.1.1 Biodiversity Conservation Act 2016

Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 4 of the EP&A Act. Sections 7.2(1)(a), 7.3 and 7.4 of the BC Act describe the assessment requirements and Biodiversity Offset Scheme (**BOS**) thresholds.

The BOS under the BC Act may be applicable to the development if any of the BOS thresholds are triggered. This would then require application of the Biodiversity Assessment Method (**BAM**) and a Biodiversity Development Assessment Report **(BDAR)** to be prepared by an accredited assessor. A requirement for a BDAR is triggered by any of the following:

- The development is likely to significantly affect threatened species or ecological communities or their habitats according to test of significance in section 7.3 of the BC Act.
- The development exceeds the threshold levels set out in Part 7 of the *Biodiversity Conservation Regulation 2017* (**BC Regulation**):
  - Area clearing threshold.
  - NSW Government Biodiversity Values Map (**BV Map**).
- The area is located within a declared Area of Outstanding Biodiversity Value.

Pursuant to the Uralla LEP, the minimum lot size for the Project is 400 ha meaning the native vegetation area clearing threshold under the BC Regulation is up to 1 ha. The proposed clearing of native vegetation within the Project Site would be a maximum of 0.99 ha. Therefore, the native vegetation clearing threshold is not triggered.

Additionally, the Project Site is not included on the BV Map. Therefore, this threshold was not triggered.

Threatened species and communities listed under the BC Act were identified as potentially being impacted by the Project. Assessments of Significance were undertaken for these matters (**Appendix G**) and concluded that a significant impact is not likely to result and therefore this threshold is not triggered.

The Biodiversity Assessment considered various design scenarios to determine whether the Project would trigger the BOS and assessed potential impacts to threatened species and ecological communities in accordance with the provisions of the BC Act and the Biodiversity and Conservation SEPP. The Project does not trigger the BOS and therefore, the Biodiversity Assessment has assessed potential impacts of the Project on biodiversity values in place of a BDAR.

The Biodiversity Assessment initially assessed the Project Study Area of 32 ha and the Alternative Project Study Area, also of 32 ha. However, the Project was reduced to 0.99 ha following field surveys and identification of a TEC. Assessment of potential impacts and mitigation measures presented in **Section 6.5.4** and **Section 6.5.5** consider the Proposed Quarry Extension Areas (0.99 ha).

6.5.1.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

In accordance with the Biodiversity and Conservation SEPP, Chapter 3 koala habitat protection 2020 applies to the Project Site as Uralla Shire is an LGA specified in Schedule 1 of the *State Environmental Planning Policy (Koala Habitat Projection) 2021* (repealed). An assessment in accordance with the Biodiversity and Conservation SEPP has been completed in **Section 6.5.4.4** below.

All other Chapters in the Biodiversity and Conservation SEPP do not apply to the Project.

6.5.1.3 Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* (**FM Act**) provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provisions for the management of threats to threatened species, populations, and ecological communities defined under the Act, as well as the protection of fish and fish habitat in general.

If a planned development or activity is likely to have any impact on a threatened species listed under the FM Act, a preliminary assessment of the potential impacts must be made (the 'Assessment of Significance'). If the impacts are likely to be significant, or if critical habitat is affected, a species impact statement must be prepared. In these cases, the Director-General of the Department of Primary Industries (**DPI**) must agree to the development approval and the Minister for Primary Industries may also need to be consulted. Searches of relevant databases and mapping have been undertaken in this EIS, separate to the Biodiversity Assessment, to identify threatened species and their habitat.

Key Fish Habitat (**KFH**) is not defined under the FM Act. However, the NSW DPI provides a policy definition for KFH to generally include all marine and estuarine habitats up to the highest astronomical tide level (that reached by 'king' tides) and most permanent and semipermanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank. KFH mapping has been reviewed in the preparation of this EIS.

Potential impacts of the Project on KFH, threatened species and populations, and their habitat, has been undertaken in **Section 6.5.4.5**, which is separate to the Biodiversity Assessment.

6.5.1.4 Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) sets out the requirements for the protection of Matters of National Environmental Significance (**MNES**), such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (among others).

Any actions that will or are likely to have a significant impact on an MNES require referral and approval from the Commonwealth Environment Minister. Significant impacts are defined by the Commonwealth guidelines and policies (DotE, 2013) for MNES.

The Biodiversity Assessment included an assessment of MNES relevant to the Project (**Appendix G**). The outcomes of the assessment are summarised in **Section 6.5**.

6.5.2 Data collection methodology

The Biodiversity Assessment included a desktop assessment and flora and fauna field surveys to identify the presence of vegetation communities and the likelihood of threatened species or ecological communities within and surrounding the Project Site. The field surveys were undertaken in March 2022 by a qualified ecologist (BAAS18049) to validate the information generated from the desktop assessment and to obtain any new information relevant to the Proposed Quarry Extraction Areas and surrounding Project Site.

6.5.2.1 Desktop assessment

The desktop assessment included searches of databases relevant to the Project Site and local area, including the:

- NSW BioNet database for records of threatened species and ecological communities listed in the BC Act within a 10 km x 10 km block centred on the Project Site.
- DCEEW Protected Matters Search Tool for MNES listed under the EPBC Act within a 10 km radius from the Project Site.

The likely occurrence of threatened species, populations and communities was then determined based on the records obtained through the desktop assessment.

In addition to the desktop assessment undertaken in the Biodiversity Assessment, the following desktop searches were conducted:

- KFH Mapping; and
- NSW DPI Freshwater threatened species distribution maps.

6.5.2.2 Field surveys

Flora surveys were conducted in March 2022 within the Project Study Area (i.e. initial 32 ha) in accordance with the BAM. Targeted surveys of the Project Site were also conducted to determine the presence of threatened species and communities identified during the desktop assessment.

Fauna surveys were conducted based on the results of the desktop assessment and/or the identification of suitable habitat. The surveys focused on the presence or likely presence of threatened fauna. Methods included terrestrial and aquatic habitat assessments, observational surveys using binoculars, listening for calls, camera traps and the identification of koalas using the Spot Assessment Technique (**SAT**). SAT surveys were also undertaken along the proposed haulage route on Kingstown Road.

Additional threatened species not identified during the desktop assessment were also recorded if suitable habitat was identified during the field survey, or the species was considered likely to be present.

Detailed survey methods are outlined in **Appendix G**.

6.5.3 Results

The NSW BioNet search was undertaken on 5 March 2022 and identified records of 14 threatened fauna species and one threatened flora species listed under the BC Act. A likelihood of occurrence table for species listed under the BC Act is provided in Appendix A of the Biodiversity Assessment.

Results from the DCEEW Protected Matters search and likelihood assessment are provided in the Biodiversity Assessment (**Appendix G**).

Based on the likelihood assessments (Appendix A and B of the Biodiversity Assessment), seven threatened fauna species and two threatened flora species were targeted in the field surveys to confirm habitat and presence. These species and their conservation status under the EPBC Act and the BC Act and habitat requirements are outlined in **Table 6-15**.

Table 6-15: Habitat requirements and legislative status of terrestrial species targeted for field survey

Species	BC Act Status	EPBC Act Status	Habitat requirement
Birds			
Diamond firetail (*Stagonopleura guttata*)	V	-	– Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. – Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. – Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. – Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (NSW OEH, 2017b)
Little lorikeet (*Glossopsitta pusilla)*	V	-	– Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. – Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. – Roosts in treetops, but requires hollows for nesting (NSW OEH, 2022).
Brown treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)	V	-	– This species is found in eucalypt woodlands, including Box-Gum Woodland, and dry open forests of the inland slopes and plains inland of the Great Dividing Range. It mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. – Hollows in standing dead or alive trees and tree stumps are essential for nesting (NSW OEH, 2017a).
Dusky woodswallow (*Artamus cyanopterus cyanopterus*)	V	-	– Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. – Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. – Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post (NSW OEH, 2017c).
Flame robin (*Petroica phoenicea*)	V	-	– Flame robin breeds in upland tall moist eucalypt forests and woodland, often on ridges and slopes. – Prefers clearings or areas with open understorey, however the groundlayer of breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense (NSW OEH, 2017d).
Mammals			
Koala (*Phascolarctos cinereus*)	E	E	Requires Eucalypts in vicinity.

Species	BC Act Status	EPBC Act Status	Habitat requirement
Reptiles			
Bell's turtle (*Wollumbinia belli*)	E	V	– Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. Occupied pools are most commonly less than 3 m deep with rocky or sandy bottoms and patches of vegetation. Nests are dug out in riverbanks of sand or loam. – Most typically uses narrow stretches of rivers 30 – 40 m wide. Most surrounding habitat has been converted to grazing land. – This species eats aquatic plants and terrestrial leaves that fall into the watercourse, supplemented by invertebrates and other small animals (NSW OEH, 2018).
Flora			
Bluegrass (*Dicanthium setosum*)	V	V	Occurs in grassy woodland or derived native grassland.
Austral toadflax (*Thesium australe*)	V	V	A hemiparasite usually associated with kangaroo grass (*Themeda triandra*) or snow grass (*Poa sieberiana*).

6.5.3.1 Landscape context

The Project Site is within the Bundarra Downs subregion of the New England Tablelands Bioregion and includes the Bundarra Valley (Brv) Mitchell Landscape (Mitchell, 2002). The landscape has been cleared extensively for agricultural purposes.

Two ephemeral drainage lines drain from the Project Site to the northwest into tributaries of Balala Creek, while the existing pit drains into a sediment dam, with overflow to Roumalla Creek to the south.

6.5.3.2 Vegetation communities

The Proposed Quarry Extension Areas and surrounds contain vegetation which has been modified by historical agricultural land use. Remnant patches of vegetation are located outside of the Proposed Quarry Extension Areas, with larger areas of native vegetation located to the south of the Project Site.

One PCT was identified within the Project Study Area, namely PCT 510, present as both intact vegetation and as Derived Native Grassland. Within the Proposed Quarry Extension Areas, the condition of the PCT 510 was assessed as being in 'poor' condition with no trees present.

6.5.3.3 Threatened flora

Results of the flora surveys did not identify any individuals of bluegrass or austral toadflax, or any other threatened flora species.

6.5.3.4 Threatened fauna and habitat

No threatened fauna species were recorded within the Project Study Area during the fauna surveys.

However, suitable foraging habitat was identified within the Project Study Area for the diamond firetail, with no suitable roosting, breeding or foraging habitat recoded within the Proposed Quarry Extension Areas.

No core or potential koala habitat was identified within the Project Study Area. However, evidence of koalas in the form of pock marks and scratches on trees was recorded along Kingstown Road between the quarry entrance and Uralla.

Suitable habitat for the Bell's turtle was not identified within the Project Study Area or immediately downstream of the Project Site. However, suitable habitat was identified at the confluence of Roumalla Creek and one of its tributaries approximately 1.9 km downstream from the sediment pond.

6.5.3.5 Aquatic species and habitat

Roumalla Creek and Balala Creek and their tributaries (3rd order and above) are mapped as KFH (**Figure 6-8**). However, no KFH is mapped within the Proposed Development Extent.

A review of the NSW DPI Freshwater threatened species distribution mapping identified indicative distributions of eel-tailed catfish (*Tandanas tandanas*) and southern purple-spotted gudgeon (*Mogurnda adspersa*) in Roumalla Creek more than 20 km downstream of the Project Site. Distribution mapping is based on modelled known and expected distributions, and the indicative distribution means there is a high probability that the species will occur in the stream segment. However, mapping does not indicate the entire species distribution. Aquatic species listing status and habitat requirements are outlined in **Table 6-16**.

Table 6-16: Habitat requirements and legislative status of aquatic species targeted for field survey

Species	FM Act Status	EPBC Act Status	Habitat requirement
Eel-tailed catfish (*Tandanas tandanas*)	E[1]	-	– The Eel tailed catfish is a non-migratory, benthic (bottom dwelling) species. It is relatively sedentary, and adults typically only move within a 5 km range. – They can be found in a diverse range of freshwater environments including rivers, creeks, lakes, billabongs and lagoons. They prefer clear, sluggish or still waters, but can also be found in flowing streams with turbid waters. Substrates range from mud to gravel and rock (NSW DPI, 2015).
Southern purple spotted gudgeon (*Mogurnda adspersa*)	E	-	– The species is a benthic species found in a variety of habitats such as rivers, creeks, and billabongs with slow-flowing or still waters or in streams with low turbidity. Cover in the form of aquatic vegetation, overhanging vegetation from riverbanks, leaf litter, rocks or snags are important for the species. – Most remnant populations in NSW occur in small to medium sized streams (NSW DPI, 2017).

1 Eel-tailed catfish in Murray-Darling Basin endangered population.

Field surveys included a habitat assessment of Roumalla Creek, which confirmed the creek is shallow and narrow with a steep gradient and degraded riparian zone for at least 1 km downstream of the Project Site.

A search of NSW BioNet records did not reveal any threatened aquatic species within the Project Site or in Roumalla Creek.

Field surveys included an assessment of habitat along Roumalla Creek for approximately 1 km downstream of the Project. Roumalla Creek is shallow and narrow with a relative steep gradient and degraded riparian zone which has been cleared for livestock production.

Source:© OpenStreetMap (and) contributors, CC-BY-SA, ESRI, NSW Department of Primary Industries

LEGEND

- Proposed Development Extent
- Proposed Quarry Extension Areas
- Key Fish Habitat
- Roads
- Named watercourses
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 6-8

Mapped Key Fish Habitat in proximity to the Project

6.5.3.6 Exotic species and priority weeds

A total of 18 exotic flora species were recorded within the Proposed Quarry Extraction Areas (BAM Plot 1), however none of the species are listed as Priority Weeds under the *Biosecurity Act 2105* for the Northern Tablelands. Two individuals of Paspalum (*Paspalum dilitatum*) were detected in BAM plot 1 which is located within the Proposed Quarry Extraction Areas. Paspalum is listed under Appendix 2 of the *Northern Tablelands Regional Strategic Weeds Management Plan 2017-2022* (LLS, 2017) as a regional species of concern and as a pasture species identified as a potential threat to native biodiversity in high conservation areas. Given the low cover (0.2%) recoded in BAM Plot 1, and the location of this plot within the Proposed Quarry Extraction Areas, this exotic species is unlikely to be high risk.

6.5.4 Potential impacts

6.5.4.1 Avoidance

To avoid areas of intact remnant vegetation in 'moderate' or 'good' condition, the Project has reduced the areas requiring disturbance by approximately 31 ha, as determined by vegetation integrity score **(VIS)** generated the BAM Calculator, located to the west, north and east of the Existing Development Extent. The Project instead targets areas of cleared land assessed as containing PCT 510 in poor condition.

In addition, the Project does not require works within the riparian corridor of Roumalla Creek or require works or activities in Roumalla Creek or Balala Creek that would involve dredging or reclamation, harm marine vegetation or obstruct the free passage of fish. Therefore, permits under sections 201, 205 or 219 of the FM Act are not required.

6.5.4.2 Vegetation communities

The Biodiversity Assessment determined PCT 510 to be consistent with the BC Act listed *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community*. While this TEC occurs within the Proposed Quarry Extension Areas and is designated as a "Serious and Irreversible Impact" (**SAII**) under the BC Act, the small area of impact (<0.99 ha) and consequent lack of significant impact on the TEC means the consent authority does not need to consider the SAII.

Within the Proposed Quarry Extension Areas, PCT 510 does not contain 12 or more non-grassy understorey species or 'important' species. Therefore, the community does not conform with the EPBC Act listed Critically Endangered Ecological Community (**CEEC**) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Therefore, the Project is not considered a controlled action and referral to the Commonwealth Minister is not required.

6.5.4.3 Threatened flora

Two threatened flora species were determined likely to occur within the Project Study Area based on records and knowledge of the region (**Table 6-17**). Field surveys were undertaken in autumn when both species would be detectable. Results of the surveys for these species are provided in **Table 6-17**.

Table 6-17: Justification for excluding species from further assessment under the EPBC Act and BC Act

Species	BC Act status	EPBC Act status	Habitat requirement	Field survey result
Bluegrass (*Dicanthium setosum*)	V	V	Occurs in grassy woodland or derived native grassland.	Suitable habitat identified within Proposed Quarry Extraction Areas however no individuals recorded in the BAM plot or targeted searches.
Austral toadflax (*Thesium austral*)	V	V	A hemiparasite usually associated with kangaroo grass (*Themeda triandra*) or snow grass (*Poa sieberiana*).	No individuals of austral toadflax or associated grasses were recorded in the BAM plot or targeted searches.

Source: Appendix G

Following the flora surveys, it was determined that further assessment would not be required for these species as suitable habitat was not present within the Proposed Quarry Extension Areas and the field surveys were conducted in autumn when detection is possible. Therefore, it is unlikely these species would be impacted by the Project.

6.5.4.4 Threatened fauna and habitat

Following field surveys and refinement of the Project design (see **Section 2.4.3**), the following species were excluded from further assessment as suitable habitat was not found within the Proposed Quarry Extension Areas:

- little lorikeet;
- brown treecreeper (eastern subspecies);
- dusky woodswallow; and
- flame robin.

A test of significance under the BC Act was not required for the diamond firetail as this species is unlikely to be impacted by the Project. No individuals were detected within the Project Study Area during the fauna surveys and the Project Site does not support suitable breeding habitat for this species. Additionally, there are no trees located within the Proposed Quarry Extension Areas. Therefore, the Project will not have a direct impact on threatened species breeding habitat and will not cause habitat fragmentation.

The Biodiversity Assessment included a test of significance for koala and Bell's turtle in accordance with the BC Act, and for EPBC Act listed species in accordance with the Significant Impact Guidelines (DotE, 2013) for the species listed in **Table 6-18**. The assessments are provided in full in the Biodiversity Assessment (**Appendix G**).

Table 6-18: Assessments of significance undertaken under the BC Act and EPBC Act

Species	Test of significance undertaken (Y/N)		Habitat requirements present in Proposed Quarry Extension Areas	Assessment summary
	BC Act	EPBC Act		
Mammals				
Koala	Y	Y	No habitat present, however the haulage route on Kingstown Road contains Eucalypt woodland within the road corridor.	– Clearing within the Proposed Quarry Extension Areas will not result in the destruction of potential or core koala habitat as there are no trees present. – SAT surveys and cameras did not detect any koalas within the Project Study Area. – Vehicle strikes from increased truck movements on Kingstown Road (a Prescribed Impact) may result from the Project. – Mitigation measures aimed at reducing the likelihood of vehicle strikes are provided in **Section 6.5.5**. **Outcome:** no significant impact.
Reptiles				
Bell's turtle	N[1]	Y	Bell's turtle requires streams with clean water and sandy beaches, with a preference for pools less than 3 m deep in river reaches 20 – 30 m with sandy banks. Within the Site boundary, Roumalla Creek is shallow and narrow with a relative steep gradient, and banks are degraded by livestock grazing and there is no shrub cover present.	– While suitable habitat was not identified in Roumalla Creek for at least 1 km downstream of the existing quarry, and the closest records of this species are 5 km downstream in Balala Creek, suitable habitat may be present at the confluence of Roumalla Creek and a tributary approximately 1.9 km downstream of the existing quarry. – There is potential for this habitat to be impacted by sediment entering Roumalla Creek from the Project. Mitigation measures aimed at preventing and reducing the amount of sediment entering Roumalla Creek are provided in **Section 6.4.4** and summarised in **Section 6.5.5**. **Outcome:** no significant impact.

Source: Adapted from Appendix G

1 Summary assessment only as habitat was not identified within the Proposed Quarry Extension Areas

Pursuant to clause 3.3 of the Biodiversity Conservation SEPP, the *State Environmental Planning Policy (Koala Habitat Protection) 2021* applies to RU2 land within the Uralla LGA. Part 3.2 sets out the land to which the part applies and the steps that must be considered by a council before they may grant consent to a development application for consent to carry out development on land to which Part 3.2 applies.

Part 3.2 is applicable to the site as it is within the Uralla LGA, is larger than 1 ha and is in relation to which a development application has been made. Potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. An assessment in accordance with Part 3.2 has been undertaken for the Project (**Table 6-19**).

Table 6-19: Assessment in accordance with Part 3.2 of the Biodiversity and Conservation SPP.

Step	Assessment	Outcome
Step 1 – Is the land potential koala habitat?	No koala feed trees listed in Schedule 1 of the Biodiversity and Conservation SEPP were identified within the site.	– Council is not prevented from granting consent for the development application and no further consideration of the steps in Part 3.2 or requirements of the SEPP in relation to koala habitat is required. – No further steps apply, therefore further assessment is not required.

Source: Adapted from Appendix G

6.5.4.5 Aquatic species and habitat

Threatened aquatic species and their habitat have not been identified within the Proposed Quarry Extension Areas or immediately downstream of the Project. The indicative distribution of the southern purple-spotted gudgeon and ell-tailed catfish is more than 20 km downstream of the Project in Roumalla Creek.

Given the lack of habitat features required by the southern purple-spotted gudgeon and ell-tailed catfish, further assessment in the form of an assessment of significance in accordance with the FM Act have not been undertaken for these species as both species are unlikely to be present or directly impacted by the Project. Furthermore, given the distance to the mapped species distribution downstream, it is unlikely that the Project will have any indirect impacts on these species, noting additional surface water infrastructure is proposed to reduce the amount and likelihood of the existing sediment pond overflowing into Roumalla Creek (see **Section 6.4**).

The Project would not require any works within Roumalla Creek or its riparian zone. Therefore, the Project does not involve any key threatening processes under the FM Act that pose threats to native fish.

6.5.4.6 Exotic flora species and priority weeds

The Project will involve topsoil stripping within the Proposed Quarry Extension Areas, which may result in the spread of weed propagules into new areas via machinery dispersal. However, it is noted that weed cover is low (<10%) and that these direct impacts would be operating within an environment with high levels of existing disturbance and as such is unlikely to contribute significantly to the spread of weeds off the Proposed Development Extent to adjacent areas.

6.5.5 Mitigation measures

The Biodiversity Assessment identified mitigation measures to minimise the potential environmental impacts of the Project on koalas (**Table 6-20**). Additional mitigation measures for the protection of flora and fauna, biodiversity values are also provided in **Table 6-20**. The Applicant would prepare an EMP to proactively address the mitigation measures listed in **Table 6-20** and to manage any potential residual biodiversity impacts.

Table 6-20: Biodiversity mitigation measures

Impact type	Reasons	Mitigation measure
General	General works mitigation measures.	– Ensure all staff are aware of the biodiversity values of the site.
Terrestrial biodiversity values	Damage to vegetation that is not proposed to be cleared.	– Disturbance area boundary and no-go zones to be demarcated prior to disturbance. – Works must be stopped if any previously undiscovered threatened species or populations are discovered during disturbance. An assessment of the impact and any required approvals must be obtained.
Native fauna, including koala	Vehicle strike.	– Quarry truck speeds would be limited to 80 km/h between the quarry entrance and the 50 km/h zone at Uralla, with a koala warning sign at the exit gate. – Education for drivers about watching for and avoiding native fauna would be included in site induction and daily/weekly safety briefings.
Aquatic biodiversity values	Sediment entering Roumalla Creek.	– An Erosion and Sediment Control Plan has been prepared and would be implemented as part of the Project. – Surface water monitoring would be undertaken on a quarterly basis.
Priority weeds	Spread of priority weeds to and from the Proposed Quarry Extension Areas.	– Weed management would be undertaken prior to disturbance of uncleared land to reduce the spread of weeds to other areas within the Proposed Quarry Extension Areas.

Source: Adapted from Appendix G

6.6 Aboriginal cultural heritage

6.6.1 Introduction

OzArk Environment & Heritage conducted an Archaeological Technical Report (**ATR**) for the Project as presented in **Appendix H** (OzArk, 2022a). The assessment covered the original Project Study Area within the Project Site and therefore assessed an area larger the Proposed Development Extent for the Project.

The ATR was guided by the specifications set out in the following documents:

- *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice; DECCW 2010; Requirements 1–9).
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (the Guide; OEH 2011; Section 2).

The ATR has sought to identify and record Aboriginal cultural values, objects, or places, assess the archaeological potential of the Project Study Area and formulate management recommendations based on the results of the background research, field survey and a significance assessment.

6.6.2 Existing environment

6.6.2.1 Landscape context

The Project Study Area is bounded by low hills to the north, east and south; all of which contain first order drainage channels. Most of these drainages converge in the west of the existing quarry and then flow to the west and north where they join with Balala Creek which eventually flows into the greater Murray-Darling catchment. A small portion of landforms at the south of the existing quarry (mostly within the existing quarry) is within the Roumalla Creek catchment that is located to the south of the Project Study Area.

The topography of the Project Study Area is comprised of low to medium height hills, with the highest hill being situated in the southeast of the Project Study Area where the existing quarry is located. The hills have a general western aspect and are covered by many minor drainage channels which would be generally dry, but due to heavy rain in the period immediate leading up to the survey, were mostly flowing at the time of inspection.

The Project Study Area is situated within a geological landscape of Devonian-Carboniferous sedimentary rocks. The local lithology is characterised by sedimentary rocks including quartz-rich pebbly sandstone and conglomerate units deposited in fluvial systems, and also siltstone, mudstone and sandstone with lithic fragments. Also present in high density within the Project Study Area were numerous exposures of basalt, although no granite was identified. Inspection of the periphery of the Quarry identified a subsurface matrix of fine black soils with a high concentration of layered sedimentary siltstone unsuitable for manufacture of stone tools. The basalt rocks identified throughout the Project Study Area were also of poor integrity and considered not suitable for use as a lithic resource by the traditional Aboriginal occupants of the area.

Historical land use of the area is pastoral with the entire Project Study Area showing evidence of historical clearing. The south-eastern extent of the Project Study Area currently comprises a working quarry. At the time of survey the ground surface had been subject to heavy rainfall in the previous month and an unusually wet summer immediately prior to that. This has resulted in the drainage channels all being full and extremely dense foliage (mainly high grasses) covering over 95% of the Project Study Area.

6.6.2.2 Aboriginal peoples use of the Project Study Area

No evidence regarding the past use of the lands within the Project Study Area is available. The entire New England area is an understudied part of NSW, from the perspective of Aboriginal cultural heritage management, and no archaeological or cultural reports were identified that specifically covered the landforms within the Project Study Area.

Given that the topography of the Project Study Area mostly comprises hill slopes and steep drainage lines, it is considered unlikely that Aboriginal people would have utilised any of the land for activities such as camping. Although a significant amount of basalt was identified throughout the Project Study Area, it was neither of sufficient quality nor density at any specific location to likely represent a significant raw material source for the local Aboriginal people.

6.6.2.3 Database searches

An AHIMS database search was conducted within a 5 km radius, centred on and including the Project Study Area. The search was conducted between eastings: 341550–350049 and northings: 6604632–6614926 (GDA Zone 56). One registered site, a rock shelter with art (AHIMS 20-6-0010), was identified approximately 3 km west of the Project Study Area (**Figure 6-9**).

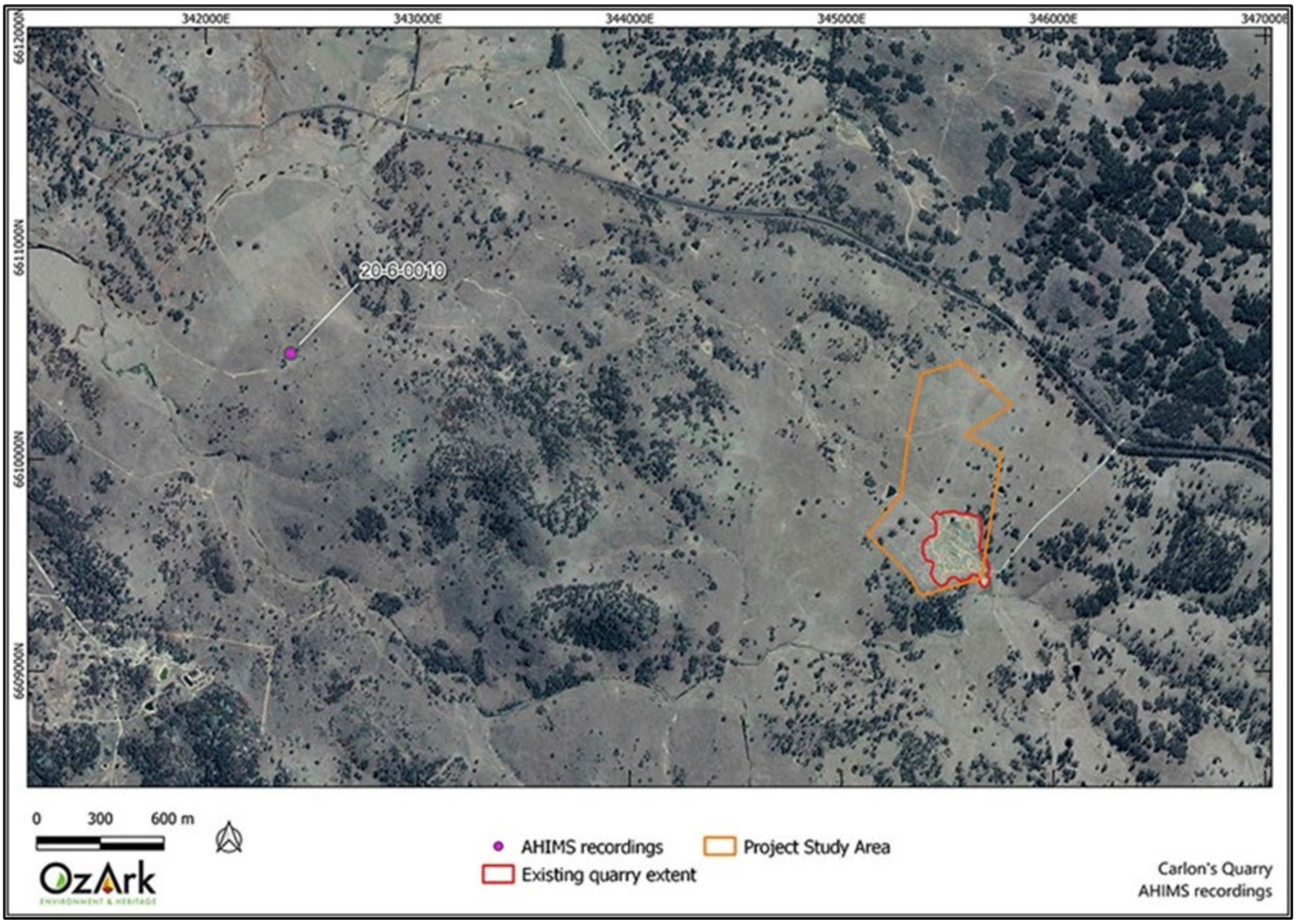


Figure 6-9: Location of previously recorded AHIMS site in relation to the Project Study Area

Database searches of the Uralla LEP, Commonwealth Heritage Listings and National Native Title Claims were also conducted. identified no Aboriginal places or sites listed over the Project Study Area.

6.6.3 Assessment methodology and results

6.6.3.1 Predictive modelling

Utilising data that has been collected both regionally and locally, broad statements regarding archaeological sites that have the potential to occur within the Project Study Area can be made.

These predictions are:

- Aboriginal sites appear to be most prominent on crest and ridge landforms. Sites are relatively common on slope landforms where there is the presence of outcropping bedrock, particularly silcrete bedrock. Other sites on slopes occur within a secondary context.
- Sites are also identified on flat landforms in relation to water. All orders of watercourses have a higher potential to record archaeological sites.
- The predominant site type in the region are stone artefact sites.
- All site types have the potential to be present, with relatively high numbers of grinding groove sites, quarries, scarred trees, and ceremonial sites identified in the area.
- The predominant material utilised for artefact manufacture is silcrete. A relatively large number of artefacts in the region are also manufactured from chert, and there is the potential for artefact manufactured from volcanics to be present.

6.6.3.2 Field survey

The field assessment was undertaken by OzArk on 30 March 2022 for the identification of Aboriginal heritage within the Project Study Area and Alternative Study Area.

The Project Study Area was reviewed by desktop analysis prior to attending the field. Three primary survey units were identified as being present:

- SU1: Elevated undulating, sometimes with gentle–moderate slopes. Approximately 51% of Project Study Area.
- SU2: Hill slopes: hillslopes – mostly southern aspect. Approximately 28% of Project Study Area.
- SU3: Hill crests: level elevated – hillcrests or benches. Approximately 4% of Project Study Area.

A single linear survey route was used to provide adequate sampling of the three survey units and of the Project Study Area to confidently characterise the likelihood and presence of any Aboriginal objects.

Field surveys identified one possible scarred tree (CQST1) on a hill crest in the northern boundary of the Project Study Area within SU3, but outside of the Proposed Development Extent (**Figure 6-10** and **Figure 6-11**). The condition of the tree is very poor – dead with significant rot and numerous fallen limbs. The extent of overgrowth conceals any evidence as the exact original nature of the scarring event.

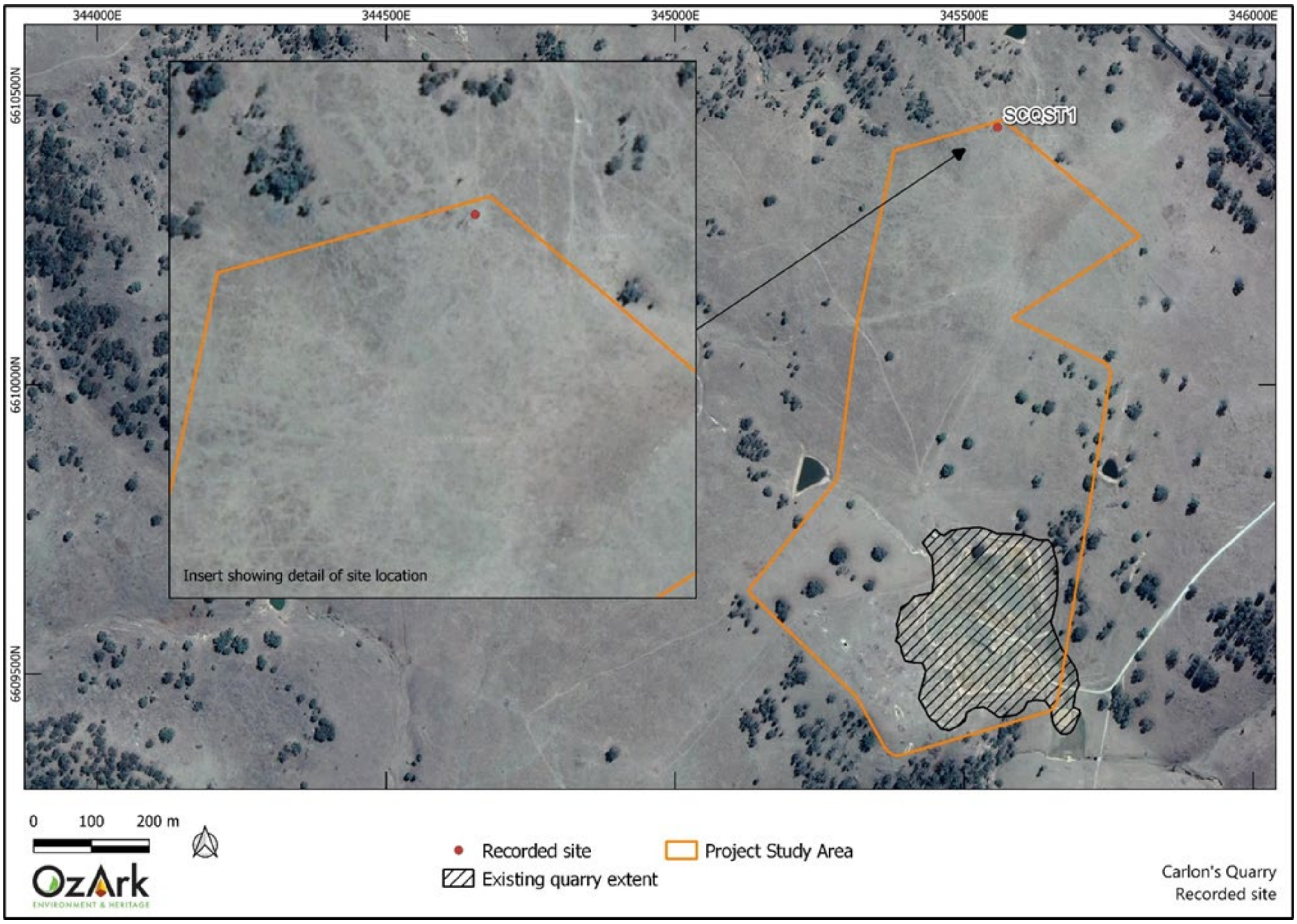


Figure 6-10: Location of possible Scarred Tree CQST1

(a) View west with CQST1 in foreground (b) Detail of CQST1

Figure 6-11: View of possible Scarred Tree CQST1

Figure 6-11 shows a single elongated scar on the northern side of the trunk. The scar is almost completely overgrown with only a relatively thin slit showing of what would likely have once been a much wider and longer scar. The heavy regrowth made it difficult to determine the exact shape, and thus likely purpose of, any bark that had been removed, but also made categorical determination of the scar as anthropogenic in nature impossible.

6.6.3.3 Assessed significance of scarred tree

The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) notes that cultural significance is comprised of an assessment of social values, scientific values, aesthetic values, and historic values. An assessment of significance was undertaken for site CQST1 in accordance with the Guide and is presented in **Table 6-21**.

Table 6-21: Assessment of significance results for CQST1(20-6-0081)

Value	Assessment	Assessed value
Social or cultural	Aboriginal scarred trees are considered rare as far as regional representation goes. Their numbers have been significantly affected since contact through land management (clearing) practices and natural attrition. Natural attrition results from two main sources. The first is that, as traditional subsistence activities lessened because of cultural dispossession, less scarred trees have been created within the landscape. This factor coupled with the nature of trees having a limited mortality has resulted in Aboriginal scarred trees being poorly represented within the landscape. Based on this understanding it is considered that all Aboriginal scarred trees, regardless of their state of preservation or other factors, are considered as being of high social/cultural value, not only to the local Aboriginal population but also from a broader cultural perspective.	Moderate to High

Value	Assessment	Assessed value
Archaeological / scientific	All Aboriginal scarred trees are of relatively high scientific value; however, the scientific value of any specific scarred tree is largely dependent on its integrity. Although the possible scarred tree identified during the survey has scientific value based on its location within the landscape, the nature of the scarring activity and the tree species, its specific scientific value is reduced considerably due to its very poor state of preservation, its isolation through clearing, and its lack of context with other cultural objects or values. The perspective of representativeness is perhaps the most important scientific aspect of this tree. Its advance state of deterioration and ground disturbance in the immediate vicinity significantly reduce its scientific value as a specific object in its own right.	Low
Aesthetic	The aesthetic value of the tree is highly compromised due to its advanced state of deterioration, both rot and major loss of branches since dying, and is further compromised by the isolated location of the tree in the landscape as a result of historic land use practices.	Low
Historic	The site has no known association with a known person or historical event and therefore has no historic value.	Nil

Source: Adapted from Appendix H

The ATR determined the Project Study Area to hold low cultural or archaeological significance. The scientific value of the scarred tree is considered to have low-moderate potential to provide further information on the traditional Aboriginal use of the New England Tablelands region. The remainder of the Project Study Area has very low scientific value as it is confined to areas away from optimal occupation locations such as along reliable water sources or landforms which provide shelter.

6.6.4 Potential impacts

The ATR concluded that there is a low likelihood that the Project will adversely impact Aboriginal cultural heritage values.

The possible scarred tree is located approximately 660 m from the Proposed Development Extent and will not be impacted by the Project. Mitigation measures outlined in **Section 6.6.5** are sufficient to manage activities that have the potential to result in reduced local and regional Aboriginal heritage values. An Aboriginal Heritage Impact Permit (**AHIP**) under section 90 of the *National Parks and Wildlife Act 1974* is not required.

6.6.5 Mitigation measures

The two primary objectives when managing impacts to Aboriginal cultural heritage values are:

- Impacts to significant Aboriginal objects and places should always be avoided wherever possible.
- Where impacts to Aboriginal objects and places cannot be avoided, proposals should be amended to reduce the extent and severity of impacts to significant Aboriginal objects and places using reasonable and feasible measures.

The following mitigation measures concerning Aboriginal cultural values within the Project Study Area would be implemented and documented within an EMP:

- The scarred tree (registered as AHIMS 20-6-0081) would be clearly fenced and demarcated to protect it from any inadvertent harm. A 5 m buffer around the tree would be sufficient. The site would be marked on any applicable site plans so that its position is known.
- Extraction activities would be confined to within the Indicative Quarry Extraction Area to eliminate the risk of harm to Aboriginal objects and places in adjacent landforms. Should the parameters of the Proposed Development Extent go beyond the Project Study Area, further archaeological assessment may be required.
- If during works Aboriginal artefacts or skeletal material are identified, all work will cease and the procedures in the *Aboriginal Heritage: Unanticipated Finds Protocol* would be followed (**Appendix H**).

- Inductions for work crews would include cultural heritage awareness to ensure recognition of Aboriginal cultural heritage values and are aware of the legislative protection of Aboriginal objects and places under the NPW Act and the contents of the *Aboriginal Heritage: Unanticipated Finds Protocol* (**Appendix H**).

6.7 Historic heritage

6.7.1 Introduction

OzArk conducted an assessment of historic heritage values for the Project as presented in **Appendix I** (OzArk, 2022b).

The assessment involved desktop searches of relevant historic heritage registers, databases, and lists, including the:

- National Heritage List and Commonwealth Heritage List;
- NSW State Heritage Register; and
- Uralla LEP.

Historic relics, buildings, structures and features are protected under the NSW *Heritage Act 1977* (Heritage Act). The Heritage Act defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts of State or Local significance. Identified heritage items are listed in Schdeule 5 of the Uralla LEP or listed on the State Heritage Register, or by an active Interim Heritage Order.

6.7.2 Existing environment

The desktop searches undertaken identified several historic heritage items (**Table 6-22**) located in the region. **Figure 6-12** illustrates the proximity of the items to the Project.

Table 6-22: Historic heritage items within vicinity of the Project

Item name	Item ID	Status	Item location	Distance from Project Site
World Heritage List and National Heritage List (Uralla LGA)				
Gondwana Rainforests of Australia	105135 (World) 105704 (National)	Word heritage National significance	Oxley Wild Rivers National Park (part)	31.5 km east
Commonwealth Heritage List (within 30 km)				
Armidale Post Office[1,2]	105493	National, state and local significance	Armidale	-
Hunter River Lancers Training Depot	105656	National	Armidale	-
NSW State Heritage Register (within 15 km)				
New England Brass and Iron Lace Foundry	01455	State significance	Uralla	10.8 km east
Uralla Railway Station Group[3]	01275	State and local significance	Uralla	11 km east
McCrossin's Mill Precinct[3]	00161	State and local significance	Uralla	10 km east

Item name	Item ID	Status	Item location	Distance from Project Site
The Captain Thunderbolt Sites: – Blanch's Royal Oak Inn – Thunderbolt's Death Site – Thunderbolt's Rock – Thunderbolt's Grave	01889	State significance	Uralla	9 km east and southeast
Uralla LEP (within 10 km)				
Balala Station Homestead	I03	Local significance	Balala	4 km west
Rocky River Goldmining Precinct	C02	Conservation zone	Rocky River	7 km east
Wallaby Rocks, Lower Wallaby Rocks and Great Falls	I41	Significant item with natural heritage values	Uralla	8 km east

1 Also listed in the NSW State Heritage Register

2 Also listed in the *Armidale Dumaresq Local Environmental Plan 2012*

3 Also listed in the Uralla LEP.

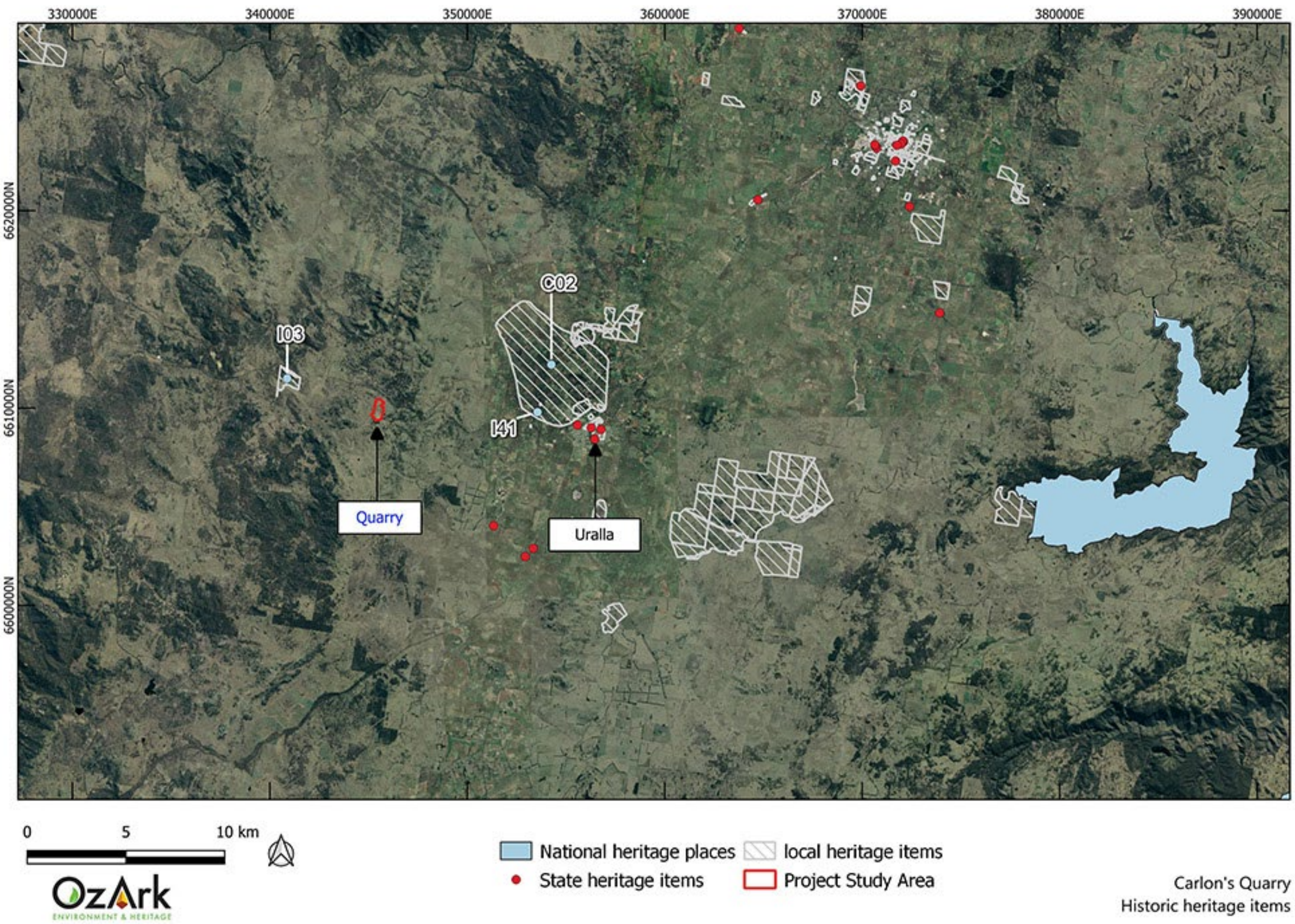


Figure 6-12: Location of listed heritage items in relation to the Project

The field survey conducted as part of the assessment of Aboriginal cultural values (**Section 6.6** and **Appendix I**) also included a component to identify historic heritage within the Project Study Area. No items of historic heritage were recorded during the survey.

6.7.3 Potential impacts

All identified registered historic heritage items are located more than 4 km from the Proposed Development Extent (**Figure 6-12**). Therefore, the Project would not directly or indirectly impact historic heritage items.

6.7.4 Mitigation measures

There are no direct or indirect impacts to historic heritage predicted. Accordingly, specific mitigation measures have not proposed. The Applicant would prepare an EMP to document the procedures to be followed if historic heritage is encountered.

6.8 Traffic and transport

6.8.1 Introduction

Constructive Solutions Pty Ltd conducted a Traffic Impact Assessment for the Project as presented in **Appendix J** (Constructive Solutions, 2022).

The Traffic Impact Assessment was conducted in accordance with the NSW Roads and Traffic Authority's (**RTA**) (now TfNSW) *Guide to Traffic Generating Developments (2002)* and *Austroads Road Design Guide (*RTA, 2021). The Traffic Impact Assessment, prepared by Constructive Solutions (Austroads, 2022), addresses the requirements of the SEARs and the requirements nominated by TfNSW and the Uralla Shire Council.

6.8.2 Existing environment

6.8.2.1 Roads

The quarry access road from the Kingstown Road to the quarry is a private unsealed all weather gravel road that traverses gently undulating country. Although not designed to a specific standard, the access road is relatively straight with good forward sight distance, with the exception of the crest near the Kingstown Road intersection. Whilst no Crown roads are contained within the Indicative Quarry Extraction Area, the access road traverses a Crown road located adjacent to the quarry. This will remain the same under the Proposed Development Extent. The Applicant consulted with Crown Lands (**Section 5.1.1**) and has submitted the relevant applications to obtain authorisation for the continued maintenance of and access to the Crown road via a direct crossing. There are no fire trails within proximity of the quarry access road.

Kingstown Road is a local road providing a link from Uralla to the village of Kingstown and the locality, Retreat. Its primary function is to provide access to these regions which are associated with agricultural activities, primarily grazing. There are smaller rural residential holdings within the vicinity of Uralla, between the quarry access road and the town boundary. A sand quarry is in operation approximately 22 km west of Uralla at 2076 Kingstown Road to meet the demand for quarry products in the broader region.

Laden trucks transporting gravel material from Carlon's Quarry turn right from the quarry access road onto Kingstown Road and travel 10.3 km to the New England Highway. A very small percentage of the materials are transported west on Kingstown Road, which is primarily associated with meeting Uralla Shire Council's demand for road pavement materials.

The road in sections has inherent safety issues associated with its alignment, lack of forward sight distance, road width, steep unprotected batters and hazards within the clear zone. These aspects are not uncommon throughout the rural road network within the USC and surrounds. The pavement is inherently of an average to poor standard with the exception of some rehabilitated sections. Intersecting roads include Queen Street, Quartz Gully Road, Wallaby Rocks Lane, Panhandle Road and Devoncourt Road.

The speed limit travelling west along Kingstown Road changes abruptly from 50 km/h to 100 km/h just west of Queen Street. The following aspects are encountered in a high-speed environment:

- Uralla Cemetery;
- concealed accesses;
- crests and tight radius curves, which in certain circumstances is coupled with steep grades; and
- limited forward sight distance and SISD.

There is currently one bus utilising Kingstown Road. The school bus commences its pick-up route just west of the quarry access road intersection at approximately 8:30 am, and ceases at approximately 8:45 am at the New England Highway during the morning run. The afternoon run turns onto Kingstown Road at 3:35 pm and travels past the quarry intersection at approximately 3:50 pm.

At the New England Highway, at least 80% of the traffic turn left travelling and return on the same route. The remainder turn right travelling south. The New England Highway, within the town boundary, has a single lane in either direction with associated turn treatments at numerous intersections.

6.8.2.2 Intersections

The quarry access road, heads to the south off Kingstown Road, and consists of gravel to the intersection with Kingstown Road which consists of bitumen, approaching on a downhill grade. The sight distance in either direction along Kingstown Road is considered adequate in both directions based on the safe intersection sight distance (**SISD**) for a 100 km/hr speed zone as per the Austroads Guides of 248 m. There are no controls at the intersection (**Figure 6-13**).

Figure 6-13: Carlon's Quarry access road intersection looking east

Kingstown Road (also known as East Street between Queen Street and the New England Highway) forms a four-way intersection at their junction with the New England Highway (**Figure 6-14**). Both of the right turn manoeuvres from the New England Highway have channelised right turn lanes. The left turn manoeuvres onto and off the Kingstown Road are directly from the travel lane.

Figure 6-14: Kingstown Road (East Street) intersection with the New England Highway

On the day of the inspection haulage vehicles associated with the quarry were observed making all relevant turn manoeuvres other than proceeding straight. With the exception of the right turn out of the Kingstown Road, the dimensional capacity appears adequate. When making the right turn out into the southbound lane of the New England Highway the haulage vehicle had to traverse over the channelised right turn lane. It was also noted that the haulage vehicles had a tendency to swing wide when turning left onto the Kingstown Road when vehicles were parked on the southern side of the Kingstown Road.

6.8.2.3 Traffic volumes

The current traffic volumes have been estimated based on the information provided by TfNSW and USC. The count for the New England Highway was presumed based on the two available counts. Counts for two locations along Kingstown Road were also provided. The existing traffic volumes are summarised in **Table 6-23**.

Table 6-23: Traffic volumes

Road	Site	Existing traffic		
		LV	HV	Total
New England Highway	Hill Street#	8,093		8,093
	South of Bendemeer (2021)	2,966	837 (22%)	3,803
	Kingstown Road (assumed)	5000	1,200 (19.5%)	6,200
Kingstown Road	800 m from Queen Street (July 21)	456	51 (10%)	507
	Wallaby Rocks Bridge (July 21)	342	56 (14%)	398
	Wallaby Rocks Bridge (August 21)	221	30 (12%)	251
	West of Carlon's Pit (August 21)	201	10 (5%)	211

Source: Appendix J

Notes: There were no counts on the New England Highway within the proximity of the Kingstown Road intersection. A count has been assumed for the purpose of this assessment based on the two available counts, of which the Hill Street site is believed to be distorted by its position within the main street of Uralla.

2011 survey available on TfNSW website. No split in LV and HV.

6.8.2.4 Accident data

A summary of recent crash data was provided by TfNSW. The details are provided in **Table 6-24**.

Table 6-24: Summarised crash data

Road	Description	Year	Fatal	Injury
Kingstown Road	Westbound vehicle off carriageway near Wallaby Rock Lane. Daytime overcast and dry.	2018	1	0
	Westbound vehicles off carriageway approximately 400m east of Wallaby Rocks Lane. Daytime overcast and wet.	2018	0	1

Source: Appendix J

Whilst there is limited data to form any conclusions, both incidents occurred in close proximity to each other. It should be noted that both accidents are unrelated to the existing quarry operations.

6.8.3 Assessment of impacts

Forecast traffic volumes have been calculated for Kingstown Road. The following assumptions have been made in relation to vehicle movements associated with Carlon's Quarry:

- A maximum quarry production rate at 120,000 m^3 per annum (216,000 tonnes per annum), maximum average daily truck movements are anticipated to be 29 laden trips (or 58 movements) per day.
- An average annual quarry production rate 80,000 m^3 per annum (144,000 tonnes per annum), average daily truck movements are anticipated to be 19 laden trips (or 38 movements) per day.
- Light vehicle movements, associated with the quarry contractors average 4 per day as a result of the two contractors originating from Uralla.
- Other miscellaneous traffic result from the following activities:
    - Fuel deliveries 1 per week
    - Maintenance vehicles 1 per week
    - Other (light vehicles) 2 per week

6.8.3.1 Safety issues

A number of inherent safety issues associated with the Project road network were identified through in the Traffic Impact Assessment (**Appendix J**), including:

- The swept path for right turning vehicles out into the southbound lane of the New England Highway was impaired by the extent of the channelised right turn lane (refer **Figure 6-14**).
- Articulated heavy vehicles turning left onto Kingstown Road from the New England Highway were swinging wide over the centre of the side road to avoid parked vehicles on the southern side of the road adjacent to the service station.
- Various aspects encountered along Kingstown Road, including:
    - the Uralla Cemetery;
    - concealed accesses;
    - crests and tight radius curves, which in certain circumstances coupled with steep grades; and
    - limited forward sight distance and safe intersection sight distance (for accesses and intersecting roads).

6.8.3.2 Traffic volumes

Expected light vehicle daily traffic volumes range from 0 to 8 movements and expected heavy vehicle daily traffic volumes range from 0 to 60 movements (inclusive of laden movements and minor traffic associated with maintenance and refuelling). Heavy vehicle movements assume that maximum annual production would be achieved over 250 days of haulage, at a uniform rate, utilising rigid (20%) truck and dog (75%) and semi tipper (5%) configurations (**Appendix J**).

The current and 10-year forecast combined traffic volumes are shown in **Table 6-25** and **Table 6-26**, respectively with the presumed existing quarry activity during 2021 subtracted from the actual traffic volume counts. The traffic volumes for the proposed quarry operations are based on maximum production to reflect the worst-case scenario.

Table 6-25: Quarry operation, estimated current traffic and combined traffic volumes at maximum production

Road	Existing traffic (less quarry traffic)		Maximum quarry traffic levels		Combined traffic		Quarry contribution to total traffic (%)	Quarry contribution to heavy vehicle traffic (%)
	LV	HV	LV	HV	LV	HV		
Kingstown Road#	336	40	8	60	344	100	15%	60%
New England Highway (North)	4995	1187	6	47	5002	1235	1%	4%
New England Highway (South)	4999	1197	2	12	5000	1209	0%	1%

Source: Appendix J

Kingstown Road data is taken from the Wallaby Rocks count site using the highest count undertaken in 2021. Estimates for Kingstown Road to the west of the quarry entrance are not shown as the traffic generated to/from this direction is considered negligible.

Table 6-26: Quarry operation, forecast traffic (Year 2032) and combined traffic volumes at maximum production

Road	Existing traffic (less quarry traffic) #		Maximum quarry traffic levels		Combined traffic		Quarry contribution to total traffic (%)	Quarry contribution to heavy vehicle traffic (%)
	LV	HV	LV	HV	LV	HV		
Kingstown Road#	410	49	8	60	418	109	13%	55%
New England Highway (North)	6089	1447	6	47	6096	1495	1%	3%
New England Highway (South)	6094	1459	2	12	6095	1471	0%	1%

Source: Appendix J

2% average annual growth rate applied in accordance with USC advice.

The percentage contribution to heavy vehicle movements as a result of the Project is significant for Kingstown Road but negligible on the New England Highway. The heavy vehicle movements will require mitigation however, is well within the acceptable volumes for a two-way two lane sealed rural road.

6.8.3.3 Intersection performance

The current quarry intersection was determined to be insufficient to cater for the increase in heavy vehicle movements and may not have suitable dimensional capacity to avoid any conflict between opposing vehicles. Gravel has tracked over Kingstown Road and there are potholes developing within the travel lanes (**Figure 6-13**).

The New England Highway intersection is considered suitable for the increase in vehicle movements as the impact (from an 'intersection performance' perspective) is considered negligible, therefore SIDRA analysis has not been undertaken. The quarry's output would be constrained to its ability to dispatch trucks, assumed to be 10 heavy vehicles every hour, limiting the potential number of heavy vehicles through the intersection in any hour to a total of 20 movements.

The New England Highway intersection is considered suitable for the increase in vehicle movements. The increase in turning traffic is not anticipated to affect traffic interaction performance as the majority of vehicles will turn left into the northbound lane and return via the channelised right turn lane (southbound).

6.8.4 Mitigation measures

Amendments to haulage frequencies and payloads associated with the Project are achievable with the proposed amendments to the existing road network and implementation of applicable mitigation measures as summarised in **Table 6-27**. The Applicant will document these measures within an EMP.

As discussed in **Section 4.3**, a section 138 application (under the *Roads Act 1993*) would be separately made to obtain consent from the appropriate roads authority in respect of the proposed works to be carried out in, on or over a public road.

Table 6-27: Summary of traffic mitigation measures

Aspect	Mitigation measure
Kingstown Road / New England Highway intersection	The Applicant would consult with and request USC /TfNSW review the swept path right turn out heading southbound and implement outcomes that minimise conflict.
Extension 50 km/h speed limit, implementation of 80 km/h speed limit along Kingstown Road	– The Applicant would consult with and request USC /TfNSW consider the extension of the 50 km/h speed zone and implement an 80 km/h speed zone to reflect the road environment and its inherent safety issues. – In the absence of a regulatory 80 km/h speed limit being introduced, a self-imposed 80 km/h speed limit would be implemented (outside of the 50 km/h section).
Quarry access road intersection	The quarry access road intersection would be upgraded to include appropriate turn treatments with associated controls including: – Seal to extend at least to the existing cattle grid. – Heavy duty wearing course over the primary section of the roadway would be considered to improve the durability of the pavement and its susceptibility to failure.
School bus run	– Communicate to truck drivers on a regular basis the location of the current school bus stop locations. – Install UHF radio in school bus and haulage vehicles and set to the same channel (if acceptable to the School Bus Proprietor).
Drivers and haulage vehicles	Develop a Driver's Code of Conduct to encompass: – Known hazards. – Vehicle checking and maintenance procedures. – School bus routes and pick up/drop off locations. – Self-imposed speed limit of 80 km/h on Kingstown Road. – Chain of responsibility requirements relating to fatigue.
Pedestrian and cyclist activity	– Implement a self-imposed speed limit of 40 km/h adjacent to the Uralla Cemetery during a funeral service. – Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary.

Aspect	Mitigation measure
Road maintenance	– Payment of the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads). – Haulage would be ceased where rain events exceed 20 mm for at least a 24-hour period to reduce impacts on pavement.

Source: Adapted from Appendix J

Additional measures that are considered to be beyond the scope of the Applicant have been identified that would further improve the overall safety on Kingstown Road. These measures are the responsibility of and would be undertaken by the relevant roads authority and include the following:

- Maintenance of the road and localised shoulder widening[2], using funding from Section 7.11 contributions.
- Removal of vegetation that obscures sight distance, particularly in close proximity to accesses and intersections.
- Delineation should be improved by installing a centreline and preferably edge lines (including glass beads).
- Guideposts should be reinstated and Chevron alignment marker signage installed around substandard curves.
- Install intersection controls and provide advanced warning of intersections along the Kingstown Road.
- Sign post school bus routes and where possible current pick up and drop off locations.
- Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary.

6.9 Land resources

6.9.1 Introduction

In accordance with the requirements of the SEARs, this section includes a baseline assessment of current land use, soils, and land capability associated with the Project Site.

Potential impacts on agricultural land, and exploration activities in proximity to the Project are considered to ensure the compatibility of the development with the existing agricultural land use on, and adjacent to the Project Site both during operation and after decommissioning.

6.9.2 Existing environment

The Project Site is located within an undulating landscape, where elevation ranges between 930 m and 978 m AHD. The Project Site has been historically cleared and grazed for sheep and cattle production with a number of stock dams developed. A considerable portion of the Project Site has been historically cultivated for improved pasture.

Surrounding land uses include:

- agriculture;
- mineral exploration; and
- sand quarrying.

6.9.2.1 Land use

The Project Site and surrounding land is zoned RU2 Rural Landscape under the provisions of the Uralla LEP. Extractive industries are permissible in the RU2 Zone with development consent. Under the provisions of the Uralla LEP, the objectives of this zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To maintain the rural landscape character of the land.
- To provide for a range of compatible land uses, including extensive agriculture.

[2] Localised shoulder widening should be undertaken where there is substandard width for two heavy vehicles to pass without leaving the roadway.

6.9.2.2 Geology

The Project Site lies within the New England Orogen and is located on Sandon Beds consisting of low grade, regionally metamorphosed lithic wacke, paraconglomerate, siltstone, mudstone, minor chert, jasper, and spilite of Carboniferous (382.7 million years (Ma) to 323.2 Ma) (NSW Government, 2022). Surrounding the Project Site, the Sandon Beds are intruded by various Permian and Triassic igneous rocks (NSW Government, 2022).

6.9.2.3 Soils

The soil classification within the Project Site is mapped as Kurosols. Kurosols have a strong texture contrast between the topsoil (A horizon) and the strongly acidic subsoil (B horizons) which may or not be sodic. Many of these soils have unusual subsoil chemical characteristics such as high magnesium, sodium and aluminium and due to high acidity (pH<5.5) have low agricultural potential and chemical fertility (Isbell and the National Committee on Soil and Terrain, 2021).

The NSW inherent soil fertility map (DPIE, 2021a) identifies soils within the Project Site as having moderate fertility (2) which would generally support grazing only.

6.9.2.4 Land and Soil Capability

Land capability classes aim to classify land according to its inherent ability and protection from erosion and other forms of land degradation. The classification of any land is based on biophysical features which determine the limitations and hazards of that land. The main hazards and limitations include water erosion, wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils, rockiness, and mass movement. The eight-class system recognises four types of land uses with land capability decreasing from Class 1 to Class 8 (OEH, 2012):

- Class 1 – 3: land suitable for cultivation;
- Class 4 – 5: land suitable for grazing and restricted cultivation;
- Class 6: land suitable for grazing; and
- Class 7 – 8: land not suitable for agricultural production.

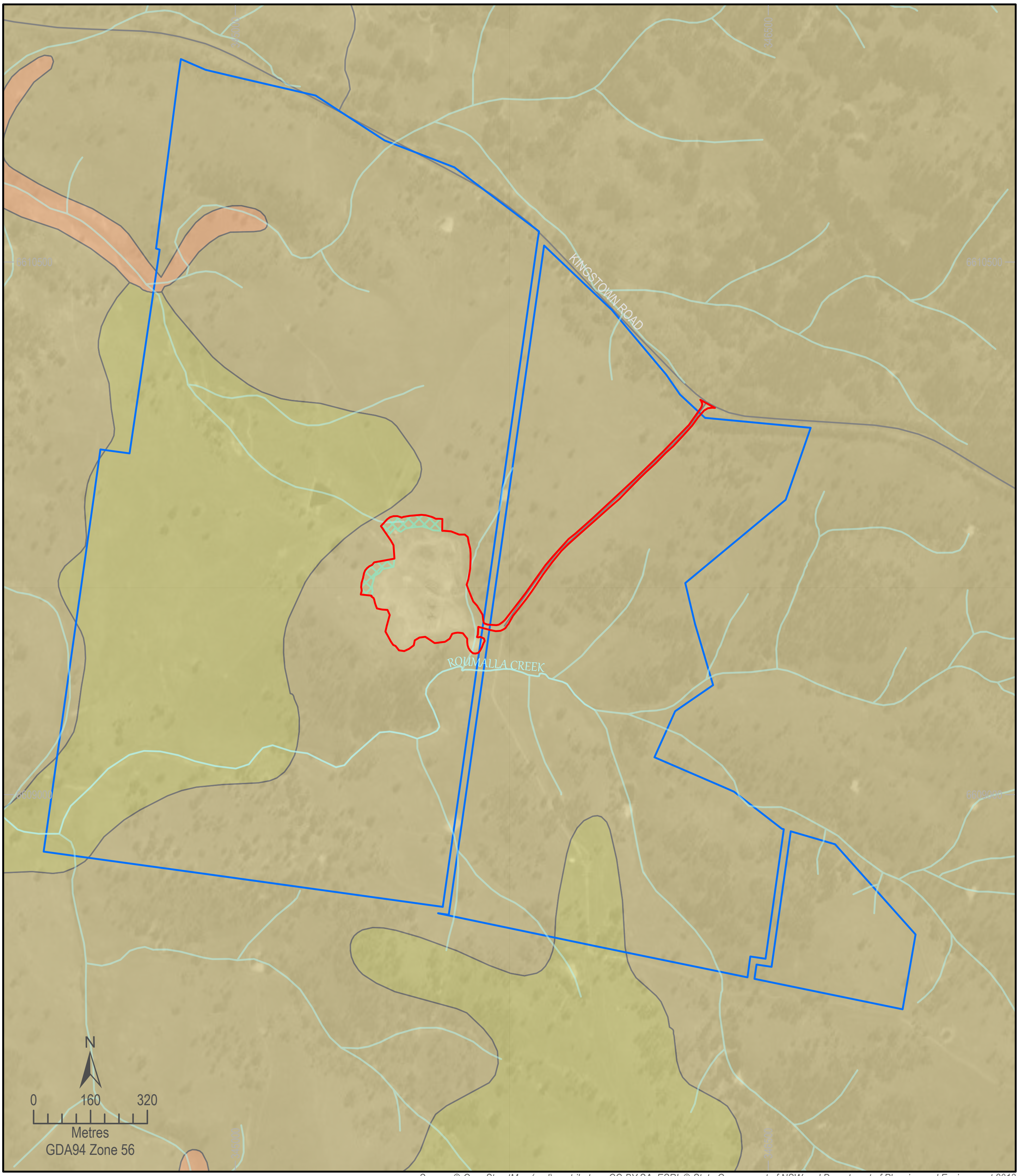
Land and soil capability (**LSC)** mapping corresponds to each soil landscape, based on the most limiting factor. The majority of the Site has moderate to severe limitations (Class 4 and Class 5) for more intensive use other than grazing, but remains suitable for a variety of land uses if careful management to prevent long-term degradation is implemented. A small section of lower capability land (Class 6) is located along an unnamed drainage line in the north portion of the Site and under the scheme is land restricted to low impact land uses. Within the Proposed Development Extent, all land is mapped as Class 4 (**Figure 6-15**).

The hazards and their associated LSC class for land within the Proposed Development Extent is show in **Table 6-28**. Soil acidification, water erosion and shallow soils/rockiness are the most limiting factors within the Proposed Development Extension.

Table 6-28: Land and soil classification

Hazard	LSC within Proposed Development Extent
Soil acidification	4
Water erosion	4
Soil structure decline	3
Wind erosion	3
Shallow soils / Rockiness	4
Salinity	1
Mass movement	1
Water-logging	2
LSC Class	**4**
Capability	**Moderate**

Source: Land and Soil Capability Mapping for NSW (DPIE, 2021b)



Source: © OpenStreetMap (and) contributors, CC-BY-SA, ESRI, © State Government of NSW and Department of Planning and Environment 2013

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Proposed Quarry Extension Areas
- Roads
- Watercourses

LSC

- 4 - Moderate to severe limitations
- 5 - Severe limitations
- 6 - Very severe limitations

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 6-15

LSC classes in the Proposed Development Extent and surrounds

6.9.2.5 Biophysical Strategic Agricultural Land

The Project Area contains land suitable for grazing but does not contain any Biophysical Strategic Agricultural Land (**BSAL**). The closest mapped BSAL is approximately 22 km to the northeast of the Project.

6.9.2.6 Contaminated Land

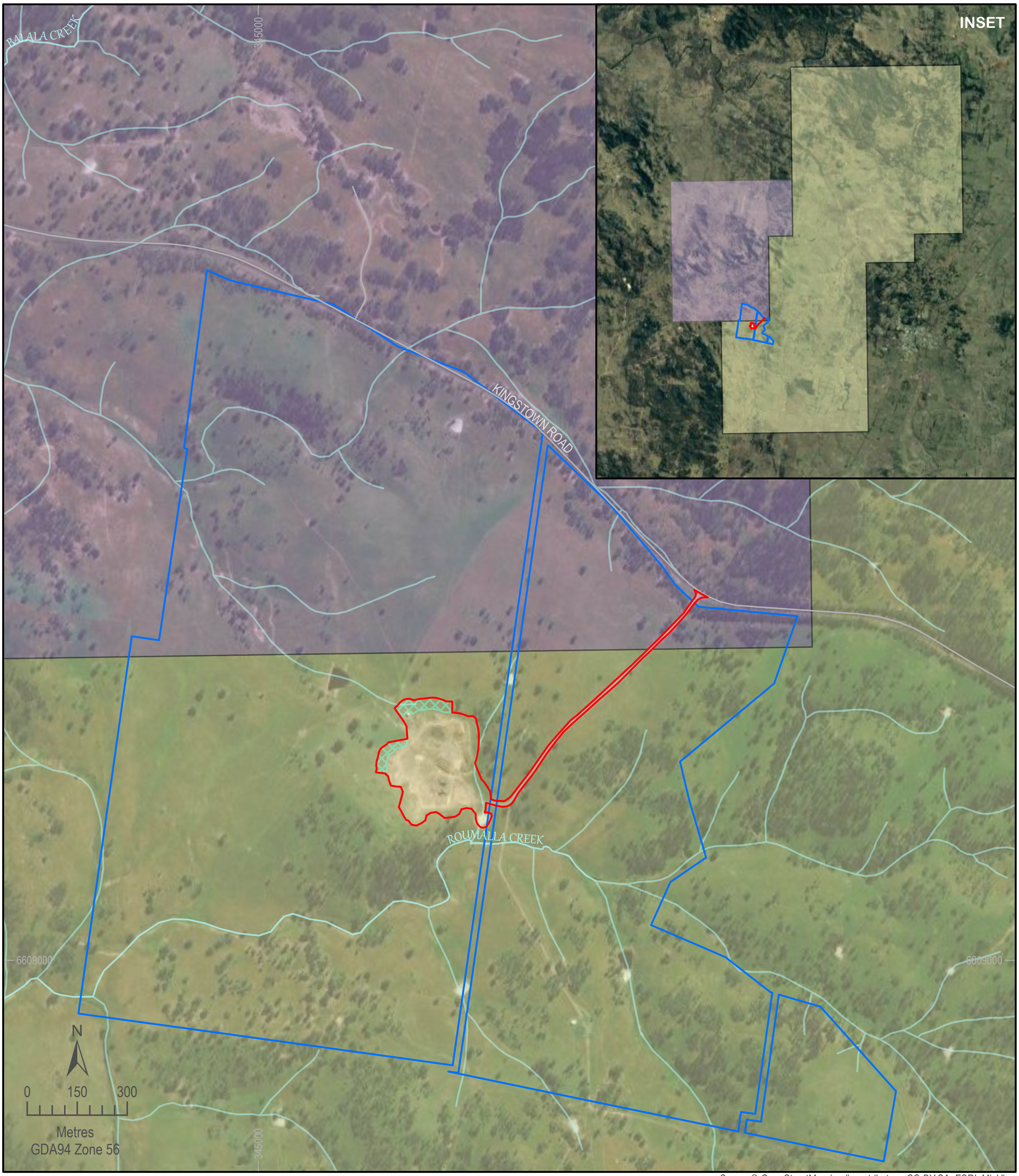
A review of the EPA Contaminated Land Record and the List of NSW contaminated sites under section 58 and section 60 of the *Contaminated Land Management Act 1997* (CLM Act), respectively was conducted. There are no registered contaminated land sites within or surrounding the Project site.

A review of premises currently regulated by an EPL under the POEO Act and premises that are no longer required to be licensed under the POEO Act did not identify any identified premises within or surrounding the Project Site.

The Project Site has a history of agricultural land use. Agricultural sites may contain buried rubbish including contaminants such as pesticides which could be encountered during excavation. During site visits, there were no indications of potential sources of contamination identified.

6.9.2.7 Exploration

Lode Resources Pty Ltd holds two EL's (EL8980 and EL9087) that extend over the Project Site (**Figure 6-16**). The Proposed Disturbance Area would be entirely confined to EL8980 which allows the holder to undertake exploration activities associated with Group 1 (metallic metals) as defined under the *Mining Regulation 2016*.



Source:© OpenStreetMap (and) contributors, CC-BY-SA, ESRI, MinView

LEGEND

- Lot 3 / DP834359 boundary
- Proposed Development Extent
- Proposed Quarry Extension Areas
- EL8980
- EL9087
- Roads
- Watercourses

ONWARD CONSULTING

CARLON'S QUARRY EXPANSION PROJECT

FIGURE 6-16

Current exploration leases in the Project Site and immediate surrounds

6.9.3 Potential impacts

6.9.3.1 Land use conflicts

Extractive industries are permitted with development consent in the RU2 Zone and whilst agricultural activities would be excluded from the Proposed Development Extent for the life of the Project, The Proposed Development Extent accounts for only very small portion of the Project Site, and more broadly the RU2 Zone within the Uralla LGA. Furthermore, the Proposed Disturbance Area would be rehabilitated to agricultural use upon closure. The Project is consistent with the objectives of this land use zone.

The holder of EL8980 and EL9087, Lode Resources, was contacted with an invitation to discuss the Project and its compatibility with exploration activities. The holder did not respond, however exploration activities in relation to the Uralla Gold project to date have been focused in portions of these EL's north of Kingstown Road (Lode Resources, 2022). Therefore, it is unlikely the Project would preclude exploration activities at the Project site in line with EL8980 and EL9087 or any potential extraction of mineral resources should these be found at the site and approval to extract is granted. It has been established that the Project can coexist with the interests of EL8980 and EL9087 as such would be consistent with section 2.17 of the Resources and Energy SEPP.

The Project would involve the continuation and extension of quarrying activities. To date, there has been no major impacts to existing agricultural activities from quarry operations. A Land Use Conflict Risk Assessment ([**LUCRA**]; NSW DPI, 2011) has been undertaken to identify and assess the potential for land use conflict between the Project and neighbouring properties. There are four key steps to undertaking a LUCRA:

- gather information about proposed land use change and associated activities;
- evaluate the risk level of each activity;
- identify risk reduction management strategies; and
- record LUCRA result (presented in this EIS).

The LUCRA for the Project is contained in full in **Appendix K**.

Potential conflicts identified in the LUCRA are outlined in **Table 6-32**. The evaluation of risk levels for each potential conflict uses a risk ranking matrix to rank the identified potential land use conflicts. The risk ranking matrix (**Table 6-29**) assesses the environmental, public health and amenity impacts according to the:

- probability of occurrence; and
- consequence of the impact.

The risk ranking matrix yields a risk ranking from 25 (high) to 1 (low). It covers each combination of five levels of 'probability' (a letter A to E as defined in **Table 6-30**) and 5 levels of 'consequence', (a number 1 to 5 as defined in **Table 6-31**) to identify the risk ranking of each impact. For example, an activity with a 'probability' of D and a 'consequence' of 3 yields a risk rank of 9.

Table 6-29: Risk ranking matrix (LUCRA Guide)

Risk matrix		Probability				
		A	B	C	D	E
Consequence	1	25	24	22	19	15
	2	23	21	18	14	10
	3	20	17	13	9	6
	4	16	12	8	5	3
	5	11	7	4	2	1

Table 6-30: Measure of probability (LUCRA Guide)

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

Table 6-31: Measure of consequence (LUCRA Guide)

Level	Descriptor	Description
1	Severe	– Severe and/or permanent damage to the environment – Irreversible – Severe impact on the community – Neighbours are in prolonged dispute and legal action involved
2	Major	– Serious and/or long-term impact to the environment – Long-term management implications – Serious impact on the community – Neighbours are in serious dispute
3	Moderate	– Moderate and/or medium-term impact to the environment and community – Some ongoing management implications – Neighbour disputes occur
4	Minor	– Minor and/or short-term impact to the environment and community – Can be effectively managed as part of normal operations – Infrequent disputes between neighbours
5	Negligible	– Very minor impact to the environment and community – Can be effectively managed as part of normal operations – Neighbour disputes unlikely

The risk ranking for each identified potential conflict, assuming no mitigation measures are implemented, is also provided in **Table 6-29**. From the risk ranking, priority is given to those potential conflicts with high risk, as identified by a score greater than 11, which require risk reduction management strategies.

The process of risk reduction aims to identify management strategies that affect the probability of an event occurring, such as the implementation of certain procedures, new technology or scientific controls that might lower the risk probability values. The objective of risk reduction controls is to lower the risk ranking score to 10 or below.

Mitigation measures determined in this EIS relevant to the identified potential conflicts are provided in **Table 6-32**. Mitigation measures aim to reduce the probability of an event occurring, but in some instances also lower negative consequences of the event. The revised risk rating for each identified potential conflict if mitigation measures are implemented, is below 10 and considered low risk.

Table 6-32: LUCRA results

Step 1 Identified potential conflict	Step 2 Unmitigated risk rating[1]	Step 3 Risk reduction management strategy	Revised risk rating
Generation of dust affecting human health, animal health and viability of grazing activities.	4	Revegetation of disturbed areas as soon as practicable to minimise exposed areas.	2
Erosion of land and sediment run off into adjacent waterways entering neighbouring properties, particularly during rain events that alters the topography of that land and requires works to be carried out that would rectify the issue. This may affect livestock drinking water quality downstream.	12	Preparation and implementation of an Erosion and Sediment Control Plan in accordance with the *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2E Mines and Quarries* (DECC, 2008). At a minimum, the ESCP would include the following provisions: – install erosion and sedimentation control measures prior to disturbance – ensure vehicles, plant and equipment leave the Premises in a clean condition to minimise mobilisation of sediment onto adjacent roads – soil handling and stockpiling procedures – stabilise and rehabilitate disturbed areas as soon as practicable. The following mitigation measures to proactively control potential surface water quality impacts would be implemented and documented within an EMP: – Design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond. – Quarterly surface water quality monitoring for pH, EC, TSS and oil and grease would be undertaken at monitoring locations shown in **Figure 6-7** to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues. – Development of an Erosion and Sediment Control Plan to identify measures to minimise soil erosion and transport of sediment off-site.	8
The Project is not compatible with exploration activities and potential future extraction activities.	6	The holder of EL8980 and EL9087 was contacted during the preparation of this EIS. Whilst a response was not received, it is noted that the holder is aware of the quarry's existence and their current area of interest does not overlie the Project. Therefore, the Project is not expected to prevent the continuation of exploration activities. Where any changes to the Project are proposed, the holder would be contacted during the approvals process. Additional mitigation measures are not proposed.	3

Step 1 Identified potential conflict	Step 2 Unmitigated risk rating[1]	Step 3 Risk reduction management strategy	Revised risk rating
Degradation of Kingstown Road as a result of increased heavy vehicle movements leading to a decline in road pavements conditions that may cause damage to, or pose a safety risk, to other vehicles.	17	Maintenance of the road would be the responsibility of and undertaken by USC. In return, the Applicant would pay the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads). Haulage would be ceased where rain events exceed 20 mm for at least a 24-hour period to reduce impacts on pavement.	5
Increased heavy vehicle movements on Kingstown Road resulting in road safety issues, including other vehicles and livestock (when grazing permitted in road corridor)	13	Measures to mitigate the traffic impacts would be implemented and documented within an EMP. Consult and request USC / TfNSW review swept path right turn out heading southbound and implement outcomes that minimise conflict. Consult and request USC / TfNSW consider the extension of the 50 km/h speed zone and implement an 80 km/h speed zone to reflect the road environment and its inherent safety issues. In the absence of a regulatory 80 km/h speed limit being introduced a self-imposed speed limit would be implemented for the Kingstown Road (outside of the 50 km/h section). Quarry intersection to be upgraded to include appropriate turn treatments with associated controls. Seal to extend at least to the existing cattle grid. Heavy duty wearing course over the primary section of the roadway is recommended to improve the durability of the pavement and its susceptibility to failure. Communicate to drivers on a regular basis the location of the current school bus stop locations. Install UHF in school bus and operate haulage vehicles on same channel (if acceptable to the School Bus Proprietor). Develop a Driver's Code of Conduct to encompass known hazards, vehicle checking and maintenance procedures, school bus routes and pick up/drop off locations, self-imposed speed limit of 80 km/h on Kingstown Road and chain of responsibility requirements relating to fatigue. Implement a self-imposed speed limit of 40 km/h adjacent to the cemetery when funerals are undertaken. Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary. Payment of the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads). Haulage would be ceased where rain events exceed 20 mm for at least a 24-hour period to reduce impacts on pavement.	9

1 Pink cells identify high priority risks (score greater than 11).

6.9.3.2 Soils

Kurosols subsoils are sodic soils that are prone to dispersion due to sodium weakening bonds between soil particles and therefore pose a high erosion risk. The high exchangeable aluminium content may counterbalance the deleterious effect of sodium (via dispersion) on soil physical properties. However, some soils do not behave this way in practice (Isbell and the National Committee on Soil and Terrain 2021).

The Project will potentially impact soil resources from the temporary and permanent losses of land associated with quarrying. Activities likely to have an impact on soil physical and chemical properties and the post quarrying land use include:

- excavation of soil to access the gravel resource;
- temporary to long-term stockpiling of soils;
- soil compaction from machinery;
- soil contamination from refuelling and machinery maintenance activities; and
- soil loss through wind and water erosion.

These activities have the potential to reduce the overall land and soil capability as well as reduce the quality of agricultural land within the Proposed Quarry Extension Areas.

6.9.3.3 Land and Soil Capability

Excluding the retained walls of the extraction area, implementation of the proposed soil management and rehabilitation methods would provide for the establishment of the LSC Classes equivalent to those of the pre-quarry environment (see **Section 6.9.2**).

The three objective LSC Classes in respect to the final landform are provided in **Table 6-33**.

Table 6-33: Objective LSC Classes of the final landform

Objectives LSC Class	Primary Domain	Reason
LSC Class 4	Stockpiling areas on Kurosols	These areas would be reformed to the pre-disturbance landform. Subsoil and topsoil would be reapplied with applications of fertiliser with the objective of returning land to its pre-disturbance land use for livestock grazing.
LSC Class 5	Final void floor	This area will have limitations due to poor drainage, permeability and water holding capacity. Possible shading from highwall may result in reduced vegetation growth.
	Stockpiling areas on Kursools (natric)	These areas would be reformed to the pre-disturbance landform. Subsoil and topsoil would be reapplied with applications of fertiliser with the objective of returning land to its pre-disturbance land use for livestock grazing.
LSC Class 8	Extraction area walls	Will not be capable of sustaining agricultural activities due to steep slope and lack of soil.

Further details of the final landform are outlined in **Section 6.14**.

6.9.3.4 Soil contamination

Topsoil stripping and extraction have the potential to expose buried rubbish (if present).

Chapter 14 of the Uralla DCP requires the Council to consider whether the land is (or might be) contaminated and if it is to ensure that appropriate investigatory and/or remedial action is undertaken prior to consent being issued. The onus is on the developer of the land to take the necessary steps to determine whether the land is actually or potentially contaminated prior to lodgement of an application and consider whether any of the land uses identified in Table 14.1 of the DCP have been undertaken on that land. Agricultural activities and extractive industries are listed in Table 14.1.

The Project will not change the current land use, except by temporarily converting agricultural land to an extractive industry. Therefore, risks to human health are not expected to be exacerbated by the temporary land use change.

Pursuant to section 4.6 of the Resilience and Hazards SEPP there is no reason to consider that land utilised by the Project would likely be contaminated.

6.9.4 Mitigation measures

6.9.4.1 Land use conflicts

Land use conflicts would be managed by the mitigation measures outlined in **Section 6.9.3.1**.

6.9.4.2 Soils

Erosion and sediment control measures would be consistent with the practices described in *Managing Urban Stormwater: Soils and Construction – Volume 2E Mines and Quarries* (DECC, 2008).

Within the Proposed Quarry Extension Areas, where soil stripping is required, the following measures to conserve soil resources would be implemented and documented within an EMP:

- Measures detailed within the Erosion and Sediment Control Plan (provided in the Surface Water Assessment – **Appendix F**) would be implemented.
- Topsoil would be stripped at a nominal depth of 100 mm, unless determined otherwise via site validation.
- Prior to stripping topsoil, operators would be made aware of the stripping depths and identify suitable areas for stockpiling and direct placement (if available).
- Separation of topsoil and subsoil during stripping and stockpiling.
- Optimisation of topsoil and useable subsoil recovery during stripping operations.
- Disturbance areas would be stripped progressively to reduce erosion and sediment generation and reduce the extent of stockpiles.
- Where practicable, topsoil would be preferentially applied directly on a prepared rehabilitation area. If rehabilitation areas are not available, topsoil would be stockpiled at appropriate locations (see below).

The following mitigation measures will apply to stockpiled topsoil:

- topsoil would be stockpiled in low mounds;
- placement of stockpiles outside of areas prone to flooding and at least 40 m from any watercourse;
- isolation of stockpiles from upslope runoff by construction of diversion embankments;
- vegetating stockpiles and bunds with grass species (where retained for more than 120 days);
- overland flow onto or across stockpile sites would be kept to a minimum, as practicable; and
- installation of erosion and sediment control measures prior to disturbance.

6.9.4.3 Soil contamination

The Project Site has previously been used for agricultural activities, namely livestock grazing and existing extractive activities. Whilst the occurrence of pre-existing soil contamination is not expected, should evidence of contamination be encountered (e.g. buried waste or discolouration of the soil), the Applicant will seek further advice from the NSW EPA and Uralla Shire Council before continuing disturbance of the suspected contamination.

Any soil contamination as a result of the Project is likely to be restricted to spills or leaks from fuel or other hydrocarbon products.

In the event that a hydrocarbon spill occurs, the following mitigation measures would be implemented:

- Source Control: isolate the source of spill or leak and stop the leak either by maintenance or using the spill kit.
- Recovery: recover as much as possible at the source by pumping free hydrocarbon from the surface and excavating hydrocarbon-contaminated materials.
- Disposal: contaminated materials would be removed from site immediately by transporting to a licensed waste facility or would be stockpiled on site undercover and on an impermeable surface e.g. a high-density polyethylene sheet, where it will then be transported to a licensed waste facility as soon as practicable.

6.9.4.4 Land and Soil Capability

Land and soil capability would be maintained through the implementation of soil conservation measures outlined under **Section 6.9.4.2** and the creation of the final landform described in **Section 6.14**.

6.10 Waste

6.10.1 Introduction

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) promotes waste recovery including consideration of waste resources against a hierarchy in the following order:

1. avoidance and reduction of waste;
2. re-use of waste;
3. recycling, processing or reprocessing waste;
4. recovery of energy; and
5. disposal.

Adoption of these principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development (**ESD**).

6.10.2 Sources of waste

Quarrying involves the stripping and emplacement of topsoil and overburden, extraction, processing (as required) and stockpiling of the product prior to loading and transportation. The primary wastes generated at the quarry may include:

- excavated material (topsoil and overburden);
- general domestic waste (putrescible and non-putrescible);
- used oils and grease;
- tyres and batteries; or
- stormwater runoff from the Indicative Quarry Extraction Area.

The extractable resource at the Project lies immediately beneath the topsoil, therefore very little overburden is generated by current operations. Any rock material extracted that is not suitable for sale and despatch is temporarily stockpiled for use in final profiling and rehabilitation activities.

Apart from excavated material, no waste is disposed at site and all waste is segregated for off-site recycling or disposal at a licensed waste facility.

6.10.3 Potential impacts

6.10.3.1 Predicted waste sources and quantity

The Project would not create additional waste streams or change the types of waste generated by the existing operations. Non-production wastes are expected to be generated in small volumes and as there is no dedicated workshop or amenities. Operators and drivers would collect and remove waste as it is generated. The potential non-production waste types likely to be generated by the Project are summarised in **Table 6-34**.

Table 6-34: Predicted sources and quantity of waste

Waste classification	Waste type	Quantity	Current final use or removal
General solid waste (putrescible and non-putrescible)	Domestic waste	100 kg / year	Collected and removed as generated. Wastes are transported to an appropriately licenced facility for disposal or recycling (where recycling options are available).
Liquid waste	Stormwater runoff	–	Stormwater would be managed as outlined in **Section 6.4.4**.
Hazardous waste	Hydrocarbons – oils, greases	700 L / year	Collected and removed as generated. Wastes are transported to an appropriately licenced facility for disposal or recycling (where recycling options are available).
	Chemical/hydrocarbon containers	80 kg / year	
	Batteries	50 kg / year	
Special waste	Waste tyres	800 kg / year	Collected and removed as generated. Wastes are transported to an appropriately licenced facility for disposal or recycling (where recycling options are available).

6.10.3.2 Virgin Excavated Natural Material

Whilst the extractable resource is close to the surface, virgin excavated natural material would be generated during extraction activities, including topsoil and gravel that is assessed as unsuitable for market. Scalped crusher material (crusher dust) and oversize material would also be generated as a result of occasional rock processing operations.

These excavated materials would be temporarily stockpiled within the Proposed Development Extent prior to placement over the final floor of the Indicative Extraction Area as part of final profiling and rehabilitation activities for the final landform, as outlined in **Section 6.14**. The crusher dust may be retained in stockpiles for longer periods and blended with stripped and stockpiled soil to improve the nutrient concentration and water retention of the soil material used in rehabilitation.

6.10.4 Mitigation measures

To meet the requirements for waste management under the POEO Act, POEO (Waste) Regulation, and the *Waste Avoidance and Resource Recovery Act 2001 (NSW)* **(WARR Act),** the Applicant would implement waste management measures according to the following hierarchy:

1. Reduce waste production.
2. Recover resources (including reuse, recycling treatment and energy recovery).
3. Dispose of waste appropriately.

Waste would be classified in accordance with the NSW EPA *Waste Classification Guidelines – Part 1: classifying waste* (EPA, 2014) and *Addendum* (EPA, 2016). Waste that cannot be recovered would be disposed of lawfully at a licensed waste facility.

Wastes generated on site would be managed in accordance with current practice (**Table 6-34**). The Applicant would prepare an EMP to proactively address any potential residual waste impacts.

6.11 Hazards

6.11.1 Introduction

In accordance with the requirements of the SEARs, this section outlines an assessment of potential hazards and risks associated with the Project, including bushfire risk and the transport, storage, handling and use of hazardous and dangerous goods, and other identified public safety risks. Management measures to manage these risks are also outlined. This chapter also considered if the Project is a potentially hazardous or offensive development under the Resilience and Hazards SEPP.

6.11.2 Bushfire

The NSW Rural Fire Service bushfire prone land tool was used to determine if the Project Site is within a designated bushfire prone area.

The areas of the Project Site to be disturbed for the Project have been cleared of large trees and shrubs and is now dominated by native/exotic grasslands. Remnant areas of open woodland are located to the south and northeast of the Project Site, however the majority of the surrounding land has been cleared for agricultural use. There are no intact native vegetation stands associated with the Project.

The Project will not involve the construction of additional buildings or structures that would require bushfire risk management, and there are no habitable buildings within 2.5 km of the Project Site. Therefore, the Project will not alter the current bushfire risk of the existing quarry.

The Project Site could be susceptible to grass fires in hot, dry and windy conditions. The majority of activities would be undertaken in areas with adequate clearance to combustible vegetation and potential ignition sources. Control measures to manage potential bushfire risks are provided in **Table 6-35**.

Table 6-35: Bushfire potential ignition sources and control measures

Activity	Potential ignition source	Control measures
Refuelling	Sparks caused by machinery, vehicles or other equipment igniting spilled fuel or dry grass	– Refuelling activities would be carried out within the cleared area of the Proposed Development Extent. – Engines in all vehicles would be turned off during refuelling. – Fire extinguishers would be fitted and maintained in all mobile equipment.
Equipment maintenance	Hot works, including welding, soldering and cutting	Maintenance activities would be carried out within the cleared area of the Proposed Development Extent.
General activities	Rubbish e.g. glass, metal	– Good housekeeping would be maintained. – Fire extinguishers would be fitted and maintained in all mobile equipment.

The following measures to mitigate the risk of bushfire impacts would be implemented and documented within an EMP:

- control measures to prevent or mitigate ignition of fire (as presented in **Table 6-35**);
- maintenance of the existing internal access road to enable adequate access and egress for quarry and emergency service personnel;
- emergency management and evacuation arrangements; and
- operational protocols during total fire bans.

6.11.3 Hazardous substances and dangerous goods

The Resilience and Hazards SEPP presents a systematic approach for the assessment of proposals for potentially hazardous and offensive industry or storage, and applies to any proposals which fall under the definition of 'potentially hazardous industry' or 'potentially offensive industry.'

The DPE provides a checklist and a risk screening procedure in the "Applying SEPP 33" guideline to help determine whether a development proposal falls within the definition of potentially hazardous industry. The screening procedure considers the type and quantity of dangerous goods associated with the proposal and, whether the quantities would represent a potential hazard. The Resilience and Hazards SEPP defines potentially hazardous industry as a development which poses a significant risk in relation to the locality to human health, life, property or to the biophysical environment, if it were to operate without employing any control measures.

The Project will involve handling of potentially hazardous materials during machinery, and plant maintenance and refuelling (i.e. diesel fuel, greases and oils). However, with the exception of fire extinguishers stored on machinery, no hazardous materials would be stored on site. Emergency spill response equipment would be made available for use in the event of potential spillage of hazardous materials used on site for maintenance and refuelling activities.

Minor quantities of diesel fuel, greases and oils may be temporarily stored in small self bunded tanks designed and constructed in accordance with the relevant Australian Standards. Based on diesel fuel, greases and oils not being permanently stored on site, the quantities are less than the 'Applying SEPP 33' screening test minimum quantity of 5 tonne for a Class 3 Package Group III hazardous material. Therefore, the Project does not classify under the definition of a potentially hazardous industry.

Carbon dioxide fire extinguishers are classed as Class 2.2 Non-flammable, non toxic gas which are excluded from the "Applying SEPP 33" risk screening test.

Explosives for blasting (Class 1.1 explosives) would not be stored on site and minor quantities of explosives would be transported to the quarry for small unconfined surface blasts on an occasional basis if consolidated rock is encountered. It is anticipated that surface blasting would occur at an average of one blast every two years. The transport and delivery of Class 1.1 explosives would be undertaken by a licensed contractor, in accordance with all relevant standards and legislation.

Potentially polluting discharges, including noise emissions, vibration, air pollutants and water pollutants have been assessed in this EIS (**Sections 6.1, 6.2, 6.3** and **6.4** respectively). When all measures to reduced impacts have been employed, these discharges would not have a significant adverse impact in the locality or on the existing or likely future development on other land and therefore the Project is not considered to classify under the definition of an offensive industry.

6.11.4 Other public safety risks

In order to reduce the risk of unauthorised access and warn the general public of the hazardous nature of the Project Site, a locked gate would be maintained at the entry to the Project Site with signs erected at the entry point, and where necessary, along the premises boundary. Signage would be regularly inspected to ensure it is maintained in a legible condition and has not been damaged or removed.

Public safety risks associated with increased truck movements along Kingstown Road would be managed by implementation of the following management measures, consistent with **Section 6.8.4**:

- Upgrade the intersection of the quarry access road/Kingstown Road, including a seal to extend at least to the cattle grid to prevent material tracking onto the Kingstown Road.
- Develop and implement a Drivers' Code of Conduct to encompass known hazards, vehicle checking and maintenance procedures, school bus routes and pick up/drop off locations, self-imposed speed limit of 80 km/h on Kingstown Road and chain of responsibility requirements relating to fatigue.
- Communicate on a regular basis the location of the current school bus stop locations and install a UHF in the school bus and operate haulage vehicles on same channel (if acceptable to the School Bus Proprietor).

All measures would be documented within an EMP.

6.12 Visual

6.12.1 Introduction

In accordance with the SEARs, this section assesses the likely visual impacts from the Project on private landowners and key vantage points in the public domain (i.e. Kingstown Road). The assessment describes the existing visual amenity of the local setting, assesses the potential impacts of the Project from private and public domains and provides mitigation measures to reduce impacts.

6.12.2 Existing environment

The local setting is dominated by cleared agricultural land interspersed by remnant vegetation on lower capability land and along road corridors and major waterways. Notable built features within the landscape include Kingstown Road and other local roads (including the quarry access road), local homesteads and ancillary infrastructure.

The extent of the existing quarry is generally screened from the public domain by local topography and vegetation. Kingstown Road to the north has some views of the existing quarry, however vehicles on these roads have only transient views, largely obscured by vegetation within the road reserve, topography, distance and motion effects. **Figure 6-17** and **Figure 6-18** show the location and visual representation of the existing quarry (red arrow indicates location of the Project Site).

Figure 6-17: View from Kingstown Road looking ESE towards the Project Site.

Figure 6-18: View from the Project entrance at Kingstown Road looking SWW towards the Project.

6.12.3 Potential impacts

The visual assessment considered the Proposed Development Extent and its location to both the public domain and private sensitive receivers.

The Project will have limited visibility from the public domain, including Kingstown Road, due to the high visual absorption resulting from the undulating nature of the surrounding landscape and remnant vegetation corridors. Furthermore, the Project will not involve the felling of trees that would depreciate the landscape absorption effect.

The Project will also involve a change in hours of operation from 7.30 am to 5 pm weekdays to 7am to 6 pm Monday to Saturday. The Project will generally only operate in daylight hours, except for the tail end of shifts in autumn and winter. Impacts from lighting are not anticipated. If lights are used at the tail end of shifts, the distance from the identified sensitive receivers and screening from terrain and vegetation would mean lighting is unlikely to cause an adverse impact.

The increased hours of operation will result in vehicle headlights on the access road between 5 pm and 6 pm in autumn and winter, however impacts would be negligible due to terrain, vegetation and distance between the haul route and identified sensitive receivers.

6.12.4 Mitigation measures

The Project would be progressively rehabilitated in accordance with the Rehabilitation Plan (**Section 6.14**) which will provide a final landform consistent with the surrounding land use.

Measures to mitigate the risk of visual impacts would be implemented and documented within an EMP, including limiting activities outside of daylight hours to vehicle movements to and from the Project where possible. Where tail end of shifts or emergency works require lighting, lighting would be directed away from sensitive receivers.

6.13 Social and economic

6.13.1 Introduction

Potential socio-economic impacts of the Project have been considered with respect to the Uralla LGA and wider New England region. The current profile of these regions has been utilised for the assessment, along with relevant community plans and impacts.

6.13.2 Existing environment

The existing quarry has been supplying high quality gravel material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure in the region. The quarry provides employment of two casual contractors to run the operations and indirect employment for truck drivers associated with product transport.

6.13.2.1 Socio-economic profile

The Uralla LGA has a population of 5,971, comprising of 48.3% males and 51.7% females (ABS, 2021). Aboriginal and Torres Strait Islander people make up approximately 9.5% of the population. Population growth rates for the Uralla LGA between the 2006, 2011, 2016 and 2021 census dates were, -0.31%, -0.16%, +3.1%, and -1.27% respectively. The main industries of employment include agriculture, education and training, healthcare and social assistance, and retail. The unemployment rate is approximately 5.2%, less than the national unemployment rate of 5.7% (ABS, 2016).

The population of the broader New England North West region is expected to grow modestly over the next 20 years from 188,350 in 2016 to a predicted 202,150 in 2036 (DPE, 2017). Armidale is a service area for the New England Tablelands and includes the University of New England, educational facilities, transport facilities, sporting and recreational facilities, hospitals, and services for the tourism industry.

6.13.2.2 Significance of the resource

The Manilla 1:25,000 map sheet indicates that the surface geology of the quarry is characterised by sedimentary rocks of Devonian and Carboniferous age (MinView, 2020), with the quarry itself containing interbedded cherts and mudstone (USC, 2002). No exploration drilling or geophysical survey has been undertaken to enable mapping and resource estimation for Carlon's Quarry.

The Project seeks to recover a maximum of 120,000 m^3 of gravel from the existing quarry per annum. The gravel is suitable for gravel re-sheeting, gravel roads and as a select sub-grade for road construction. The Project would support the development and maintenance of public roads as well as roads and infrastructure for major renewable energy projects either currently under construction or proposed within the Uralla LGA and surrounding LGAs.

6.13.3 Potential impacts

6.13.3.1 Adverse impacts

The Project is an extension to the existing quarry. Due to the limited scale of the extension, the potential adverse impacts to the local economy, environment and community are expected to be limited and would be further managed by the mitigation measures outlined in **Section 6.13.4**.

The Project would result in a significant increase in contribution to heavy vehicle traffic on Kingstown Road. However, with the implementation of traffic mitigations measures outlined in **Section 6.8** (including payment of the Section 7.11 contribution towards the road maintenance within USC), the heavy vehicle movements are well within the acceptable volumes for a two-way two land sealed rural road.

6.13.3.2 Beneficial/positive impacts

The Project would provide ongoing employment for two contractors during the operational life of the quarry. While not directly employed by the Applicant, the Project would provide additional work for truck drivers associated with material transport. The Project would contribute approximately $250,000 per year in wages and associated benefits to contractors which would be largely spent within the Uralla LGA and surrounding region, representing a positive impact on economic activities within the Uralla LGA.

The Project would contribute to State and Local developments through the supply of gravel materials required for the construction of internal access tracks and pads associated with renewal energy projects within the New England Renewable Energy Zone. The Project would also benefit the local and surrounding community through the supply of competitively priced and conveniently located rock products to local markets for aggregates, road base and general fill. The Project would therefore provide longer-term indirect economic, social and environmental benefits provided by the projects that it will enable.

The Project also incorporates a progressive rehabilitation plan. The proposed final land use would be a combination of grazing and passive biodiversity conservation which is compatible with the surrounding land uses and will ensure that the Project Site would be used productively and continue to provide employment opportunities following its use as an extractive industry site.

6.13.4 Mitigation measures

The potential for socio economic impacts is limited. In addition to the mitigation measures relating to noise, vibration, air quality, traffic and transport, and visual amenity, the following management measures are proposed to ensure the Project-related socio-economic benefits are maximised and adverse impacts minimised:

- give preference to engaging new contractors or employees, where practicable, to candidates from surrounding communities over candidates with equivalent qualifications and experience from elsewhere; and
- give preference, where practicable and cost-competitive, to suppliers of equipment, services or consumables located within the surrounding communities.

These management measures would be documented within an EMP for the Project.

6.14 Rehabilitation

6.14.1 Introduction

While the Applicant anticipates that a further application for approval to extract gravel may be made, the following section outlines the decommissioning and rehabilitation activities proposed upon completion of operations with the assumption that a further application is not made. This section also provides a description of the proposed final landform and land uses which consider the surrounding land uses and landscape.

6.14.2 Final landform

Due to the nature of quarry operations, there would be a lack of overburden available for backfilling. Therefore, the final landform would consist of a void with a sump to retain drainage.

The proposed final landform of the Project will involve:

- decommissioning and removal of site infrastructure;
- retention of a final void surrounded by a safety bund vegetated with native tree, shrub and grass species;
- ripping and remediation of hardstand surfaces surrounding the final void and top dressed with soil and seeded with pasture species;
- retaining the sediment pond, where appropriate, and other drainage infrastructure including the proposed contour bank to divert overland flow from the void; and
- retention of the quarry access road to allow access for ongoing agricultural activities.

6.14.3 Final land use

Existing surrounding land uses include agriculturally based industries (predominantly livestock grazing) and rural dwellings. Intact native vegetation stands are also present within the Project Site and surrounding lands.

The final land use proposed for the Project would be low intensity grazing, primarily within the stockpiling, infrastructure, and ancillary activity areas, with remaining areas (including the final void) designated for passive biodiversity conservation.

Therefore, the proposed final land use would be a combination of grazing and passive biodiversity conservation which is compatible with the surrounding land uses and will ensure that the Project Site would be used productively and continue to provide economic opportunities following its use as an extractive industry site.

The final land uses are consistent with the objectives of the Uralla LEP RU2 land use zone (section 6.15.3).

6.14.4 Final land use and rehabilitation objectives

With reference to the Uralla LEP RU2 land zone objectives, the following final land use objectives would been adopted for the Project:

- To produce a safe and stable final landform that provides grazing land for ongoing extensive agricultural activities.
- To minimise disruption to existing drainage patterns, achieve a stable and functional drainage system on the rehabilitated disturbance area and prevent any detrimental impacts on water quantity and quality.
- To maintain the rural landscape character of the land by minimising the environmental impact of all site earthworks associated with environmental controls and rehabilitation activities.

6.14.5 Rehabilitation phases and measures

Where practicable, rehabilitation activities would be undertaken progressively throughout the life of the Project.

6.14.5.1 Infrastructure decommissioning and removal

It is anticipated the existing shelter structure would be retained to support ongoing extensive agricultural activities. However, if not required for ongoing use, the existing shelter structure would be removed for re-use or disposal at a licensed waste facility. Concrete footings would be broken up and removed.

Hydrocarbons, fuels and explosives will not be stored on site, therefore an inspection for potential contamination from ongoing storage is not required.

The quarry access road would be retained for accessing future agricultural activities associated with the Project Site. If determined by the Applicant to no longer be required, the access road would be excavated and materials either sold or returned to the Proposed Development Extent for placement in the final void.

6.14.5.2 Landform establishment

Upon completion of extractive activities, a geotechnical review of the Proposed Development Extent would be undertaken to confirm if the final void and proposed landform is safe and stable.

The final quarry floor would be ripped to assist in the keying of soil to be respread over the area, and profiling works undertaken to ensure all water drains to a single location in the final void to promote water storage.

Available overburden or excess subsoil would be used to create undulations on the surface landform. Disturbed areas within the Indicative Quarry Extraction Area would be reshaped to appropriate grades and the final landform would be free draining with a topography that integrates with the surrounding landscape.

6.14.5.3 Growth media development and ecosystem establishment

The profiled landform would be covered with the stockpiled topsoil or, when minimum disturbance has occurred, such as the stockpiled areas, the surface would be ripped or sacrificed. Topsoil depth would be dependent on the quantity salvaged from existing operations and the Proposed Quarry Extraction Areas. For the purposes of returning the site to extensive agricultural land use, the topsoil depth should be 100 mm to 200 mm. If salvaged topsoil resources are insufficient, additional topsoil would be imported to site.

In areas where the intended final land use is extensive agriculture (grazing), pasture establishment will use species consistent with surrounding lands. A suitable fertiliser would be added to assist with identified soil nutrient deficiencies. In areas identified for passive biodiversity conservation, native trees, shrubs, and grasses would be used which are comparable to existing vegetation communities within the Project Site.

7. Project justification

7.1 Introduction

The SEARs for the Project require the EIS to outline why the development should be approved, taking into consideration:

- alternatives;
- the suitability of the site;
- the biophysical, economic, and social impacts of the Project, having regard to the principles of ecologically sustainable development; and
- whether the Project is consistent with the objects of the EP&A Act.

This section outlines the strategic need and justification for the Project.

7.2 Project alternatives

Section 2.4 outlines the analysis of feasible alternatives to the proposed development, including the consequences of not carrying out the development.

If the Project was not to proceed, the existing quarry would not be expanded and would operate at a reduced capacity, with an associated reduction in the operational life of the quarry. The opportunity to secure access to a long-term, local supply of cost-efficient gravel material for the construction market in the New England region would be foregone and could potentially impact the growth of the renewable energy sector within the region.

The alternative to extending the existing quarry would mean demand would be met by other existing quarries, or from newly developed quarries. Whilst gravel resources are available in the New England region, it is not always feasible to extract sufficient resources to meet the significant increase in demand given the quantity of available resources present, and the environmental and financial constraints associated with developing new resources.

The Project seeks to extend an existing operating quarry, with the Proposed Quarry Extension Areas refined to mitigate the potential biodiversity impacts of the Project. Continuation of existing quarry operations is likely to result in improved environmental outcomes compared to the development of a new greenfield site.

The benefits of proceeding with the Project are considered to outweigh the predicted impacts on the environment that would result if the Project were approved.

7.3 Objects of the Environmental Planning and Assessment Act 1979

(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 Project will enable the responsible development of a regionally significant resource that promotes the social and economic welfare of the community and a better environment in the following ways:

- The Project comprises a regionally significant gravel resource to provide a local source of gravel to meet an increase in demand for gravel material in the New England region for State significant development projects, including large renewable energy developments.
- The Project would support the planned future growth of the region and maintain local supply of quarry materials close to markets.
- The Project would benefit the local and surrounding community through the supply of competitively priced, conveniently located rock products to local markets for aggregates, road base and general fill.
- The Project would provide direct and indirect employment opportunities for the local community.
- The mitigation measures outlined in **Appendix C** have been based on detailed environmental assessments conducted by technical specialists and in consultation with the community to ensure the potential adverse environmental and social impacts would be appropriately avoided, mitigated, or compensated.

- The progressive rehabilitation and final land use plan outlined in **Section 6.14** will ensure the Project would be used productively following its use as an extractive industry site.

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

Section 193 of the EP&A Regulation sets out and defines the principles of ESD as:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity and ecological integrity; and
- improved valuation, pricing and incentive mechanisms.

Each of these principles has been considered and are presented in **Table 7-1**.

Table 7-1: Consistency of the Project with the principles of ESD

Principle	Definition	Consistency of the Project
Precautionary principle	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In applying the precautionary principle, public and private decisions should be guided by: – careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and – an assessment of the risk-weighted consequences of various options.	The environmental impacts of the Project have been assessed using appropriate specialists where required, and involved the use of computer modelling, scientific research, analysis and interpretation. These processes have allowed prediction of impacts with a reasonable degree of certainty. The nature of environment, the impact predictions contain a degree of variability and uncertainty which has required adoption of a conservative approach by predicting the worst-case scenario. Serious and irreversible damage to the environment are not predicted as a result of the Project due to the modified nature of the area, the small disturbance footprint (0.99 ha) and limited indirect impacts. Residual risks would be minimised by implementation of mitigation measures. As a precautionary measure, monitoring would be undertaken, if required, to reduce the effect of uncertainty.
Inter-generational equity	The present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The Project is consistent with inter-generational equity principles in that it will support the development of public roads as well as tracks and infrastructure for a major renewable energy project currently under construction in the Uralla LGA. Further major renewable energy projects are proposed within the New England Renewable Energy Zone. It is expected that the Project would provide gravel for these developments also. Through expert assessment and associated monitoring and safeguard measures that would be implemented, the Project will mitigate any short-term or long-term environmental impacts.

Principle	Definition	Consistency of the Project
Conservation of biological diversity and maintenance of ecological integrity	The conservation of biological diversity and ecological integrity should be a fundamental consideration	The Project would require clearing up to 0.99 ha of native vegetation. The proposed clearing has been assessed in **Section 6.5** and includes a hierarchy to manage impacts. Given the environmental context, significant impacts to any threatened species, populations or ecological communities or their habitats are considered unlikely to result from the Project. Areas of higher conservation value have been avoided during evolution of the Proposed Development Extent, and where clearing will occur on land of lower conservation value there would be managed by the implementation of mitigation measures.
Improved valuation and pricing of environmental resources	Environmental factors should be included in the valuation of assets and services, such as: – polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance, or abatement, and – the users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and – established environmental goals should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	The Project optimises the valuation and pricing of the gravel resource, with minimal impact, by maximising its efficient extraction at the existing quarry. It also recognises and supports the growing renewable energy market in the Uralla LGAs and surrounding LGAs. Results from related expert assessments anticipate that the Project will not produce result in pollution or adverse environmental effects.

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

Section 2 provides an overview of the strategic context for the Project. The Project is complementary to the intended final land use and will:

- provide ongoing direct and indirect employment opportunities for the local community; and
- provide a local supply of cost-efficient gravel close to markets, reducing the cost of development for construction and infrastructure projects in the region.

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

A preliminary biodiversity assessment was completed which informed the amended layout for the Proposed Development Extent. The *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* TEC was surveyed in the Project Site and the project design was refined to mitigate impacts on this community, reducing the Indicative Quarry Extraction Area from a maximum of 32 ha to 8 ha and impacting areas of the TEC assessed in poor condition only.

Additionally, the biodiversity assessment recommended mitigation measures to avoid or mitigate biodiversity impacts. These measures are presented in **Appendix C** and discussed in **Section 6.5.**

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

The additional disturbance associated with the Project would be less than one hectare. The Aboriginal cultural heritage (**Section 6.6**) and historic heritage (**Section 6.7**) assessments concluded that there would be no adverse impacts due to the absence of Aboriginal cultural heritage and historic heritage items near the Proposed Development Extent.

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

Section 5 outlines the community and stakeholder engagement process undertaken throughout the environmental impact assessment. The Applicant engaged in the following consultation with the community and key stakeholders:

- Letterbox drop-off to surrounding landowners that may be affected by the Project.
- Consultation with the Iwatta Aboriginal Consultation during the preparation of the Aboriginal heritage assessment in accordance with the relevant Code of Practice and Guidelines.
- Email correspondence with Lode Resources who hold exploration licences overlapping the Proposal site.
- Consultation with State and local government authorities.

Section 5 demonstrates that community and stakeholder engagement provided input into the matters assessed in the EIS and the final project description for the quarry expansion.

Following lodgement, the DA and EIS would be exhibited for a period of 28 days, providing a formal opportunity for stakeholder participation and input into the Project.

7.4 Matters for consideration – EP&A Act

This section assesses the assesses the application against the relevant matters for consideration outlined in Section 4.15 of the EP&A Act.

7.4.1 Environmental planning instruments

The following environmental planning instruments are relevant to the development application for the Project:

- The *Uralla Local Environmental Plan 2012;*
- *State Environmental Planning Policy (Resources and Energy) 2021;*
- *State Environmental Planning Policy (Resilience and Hazards) 2021; and*
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021.*

The Statutory Compliance Table in **Appendix B** outlines the relevant regulatory requirements of each environmental planning instrument and identifies where these have been addressed in the EIS.

The objectives of the Uralla Local Environmental Plan 2012 are addressed in **Section 7.4.1.1**.

7.4.1.1 Uralla Local Environmental Plan 2012

The Project Site is zoned RU2 Rural Landscape under the Uralla LEP. Extractive industries are permitted with consent in the RU2 Zone. The objectives of the RU2 zone include:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- to maintain the rural landscape character of the land; and
- to provide for a range of compatible land uses, including extensive agriculture.

Extractive industries are permitted with development consent in the RU2 Zone and whilst agricultural activities would be excluded from the Proposed Development Extent for the life of the Project, The Proposed Development Extent accounts for only very small portion of the Project Site, and more broadly the RU2 Zone within the Uralla LGA. Furthermore, the Proposed Disturbance Area would be rehabilitated to agricultural use and passive biodiversity conservation upon closure. The Project is consistent with the objectives of this land use zone.

7.4.2 Proposed environmental planning instrument

There is no proposed environmental planning instrument relevant to the Project.

7.4.3 Development control plan

The aim of the Uralla DCP 2021 is to support the planning controls outlined in the Uralla LEP 2012.

Table 7-2 summarises the Project's compliance with the relevant sections of the DCP applicable to the Project.

Table 7-2: Uralla Shire Council Development Control Plan assessment

Development controls	Comment
Chapter 4.3 Biodiversity	Complies. A Biodiversity Assessment was undertaken to review the Project against the relevant provisions of State and Commonwealth legislation. Field surveys were undertaken by a qualified ecologist (BAM Assessor Accreditation No. BAAS18049) to validate the information generated in the database searches and obtain any new information relevant to the Proposal Site. The Biodiversity Assessment also confirmed that no core or potential koala habitat was identified within the Project Study Area. The Biodiversity Assessment is outlined in **Section 6.5**.
Chapter 4.4 Bushfire Management	Complies. The Project Site is within a designated bushfire prone area. The Project will not involve construction of additional buildings or structures that would require bushfire risk management, and there are no habitable buildings within 2.5 km of the Project Site. Therefore, the Project will not alter the current bushfire risk of the existing quarry. Assessment of bushfire risk and measures to mitigate the risk of bushfire impacts is outlined in **Section 6.11.2**.
Chapter 4.5 Access to Rural Properties – General	Complies. The Project would provide safe, convenient and readily maintainable assess from a dedicated public road. The intersection of the quarry access road with Kingstown Road would be upgraded to include appropriate turn treatments with a sealed approach to the cattle grid and gate.
Chapter 13.11 Integrated, Designated Development and other Categories of Development	Complies. The Project is classified as designated and integrated development under the EP&A Act and is required to be advertised and publicly exhibited.
Chapter 14 Contaminated Land	Complies. Pursuant to section 4.6 of the Resilience and Hazards SEPP there is no reason to consider that land to be utilised by the Project would likely be contaminated. Assessment of contamination risk is outlined in **Section 6.9.3.4**.

7.4.4 Any planning agreement of draft planning agreement

There is no planning agreement that has been entered into under section 7.4 of the EP&A Act, nor is there any draft planning agreement that the Applicant is offering to enter.

7.4.5 The regulations

There is no matter prescribed by the EP&A Regulation for the purpose of the section 4.15(1)(a)(iv) of the EP&A Act that are relevant to the evaluation of the Project.

7.4.6 Likely impacts

7.4.6.1 Biophysical impacts

The EIS process adopted the mitigation hierarchy approach to avoid impacts, minimise impacts and after that to compensate for potential biophysical impacts. Modifications to the project description were informed by the input of environmental specialists and the community. Where it was not practicable to avoid impacts through amendments to the Project design, mitigation measures were identified to manage residual impacts.

The Biodiversity Assessment (**Appendix G**) provides a detailed assessment of the Project's biodiversity impacts. The Proposed Quarry Extension Areas were refined to mitigate impacts on threatened ecological communities, reducing the Indicative Quarry Extraction Area from a maximum of 32 ha to 8 ha. The Biodiversity Assessment informed the amended layout for the Project. These amendments included:

- maximum size of the Indicative Quarry Extraction Area has been reduced from 32 ha to 8 ha; and
- maximum production rate has been reduced from 150,000 m^3 per annum (or approximately 270,000 tonnes per annum) to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum).

These amendments contain the Project's direct biodiversity impacts to less than one hectare of additional disturbance. The assessment of the revised Project design concluded that the Project is not likely to result in a significant impact on biodiversity values and will not require the provision of biodiversity offsets for the Project.

The water assessment (**Appendix F**) provides a detailed assessment of the Project's surface water impacts. Additional water management infrastructure is proposed for the Project to improve the management of surface water runoff from the site. A dirty / clean water drainage system would be designed and constructed to capture sediment water from disturbed areas of the quarry and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond, thus reducing the catchment draining to the sediment pond by approximately 70% to approximately 9 ha. The Erosion and Sediment Control Plan would be implemented to identify measures to minimise soil erosion and transport of sediment off-site and would be incorporated in the design of the dirty water / clean water drain to be installed as part of the Project.

The noise assessment (**Appendix D**) and air quality assessment (**Appendix E**) concluded that the Project can comply with the relevant noise and air quality impact assessment criteria.

The environmental mitigation measures proposed in **Section 6** have been summarised in **Appendix C**. These measures are based on assessments conducted in accordance with various government guidelines, policies, and plans. These measures would be implemented following approval of the Project to avoid and mitigate biophysical impacts where reasonable and feasible.

7.4.6.2 Social impacts

The Project's positive social impacts, both direct and indirect include:

- Employment of two casual contractors to run the operations and indirect employment for truck drivers associated with product transport.
- Amendments to the existing road network and implementation of appropriate mitigation measures to improve road safety, particularly along the Kingstown Road.

7.4.6.3 Economic impacts

The Project's positive economic impacts, both direct and indirect include:

- A regionally significant gravel resource to provide a local source of gravel to meet an increase in demand for gravel material the New England region for State significant development projects, including large renewable energy developments. The Project would support the planned future growth of the region and maintain local supply of quarry materials close to markets.
- Benefit the local and surrounding community through the supply of competitively priced, conveniently located, rock products to local markets for aggregates, road base and general fill.
- Employment of two casual contractors to run the operations and indirect employment for truck drivers associated with product transport. The Project would contribute approximately $250,000 per year in wages and associated

benefits to contractors which would be largely spent within the Uralla LGA and surrounding region, representing a positive impact on economic activities within the Uralla LGA.

7.4.7 Suitability of the site

The Project Site is located in a rural landscape in an area dominated by rural based industries. The Project Site is considered suitable for the Project for the following reasons:

- The Project Site contains extensive gravel resources and is located within proximity to markets for these resources.
- The Project Site has been used for gravel extraction since original approval was granted in 2002.
- The Project Site is located within a Rural Landscape zone and the development is consistent with the objectives of the zone and permissible with consent.
- The Proposed Quarry Extension Areas consists of cleared land not used for low intensity grazing, limiting the potential ecological impacts of further disturbance.
- The Project is compatible with surrounding land uses and can co-exist with these existing uses.
- Topography and vegetation provide some visual shielding from the surrounding area.
- Suitable safe access to the New England Highway is provided from the site with the proposed amendments to the existing road network and implementation of applicable mitigation measures as summarised in **Section 6.8.4**.

7.4.8 Any submissions made

Public consultation is expected to be carried out by the consent authority on the submitted development application and accompanying documentation during the 28-day public exhibition period for the development consent application. Any submissions received as a result would be considered by the Northern Regional Planning Panel in its assessment of the application against applicable plans and policies.

7.4.9 Public interest

The Project will deliver the following benefits that are in the public interest.

7.4.9.1 Employment

The Project would provide ongoing employment for two casual contractors to run the operations and indirect employment for truck drivers associated with product transport. The Project would contribute approximately $250,000 per year in wages and associated benefits to contractors which would be largely spent within the Uralla LGA and surrounding region, representing a positive impact on economic activities within the Uralla LGA.

7.4.9.2 Reduce the cost of construction and infrastructure projects

An increase in demand for gravel material in the New England region is being driven by the renewable energy industry, via the gazettal of the New England Renewable Energy Zone which predicted to produce in the order of 8 gigawatts of renewable electricity by 2030. This scale of development will require significant gravel material for upgrading local and State roads, development of internal access tracks, and foundations for wind turbines and other supporting infrastructure.

The Project is located in close proximity to existing approved and future proposed renewable energy projects. Therefore, the Project will support the planned future growth of the region and maintain a local supply of cost-efficient quarry materials close to markets, resulting in transportation cost savings for large scale renewable projects and road infrastructure projects.

7.4.9.3 Adverse impacts are managed

Section 2.4 details the comprehensive process the Project underwent to avoid adverse impacts where reasonable and feasible. The environmental impact assessment process adopted the mitigation hierarchy approach to avoid impacts, minimise impacts and after that to compensate for potential impacts. Modifications to the project description were informed by the input of environmental specialists and the community. These included:

- maximum size of the Indicative Quarry Extraction Area has been reduced from 32 ha to 8 ha; and

- maximum production rate has been reduced from 150,000 m^3 per annum (or approximately 270,000 tonnes per annum) to 120,000 m^3 per annum (or approximately 216,000 tonnes per annum).

The environmental mitigation measures proposed in **Section 6** have been compiled in **Appendix C**. These measures are based on assessments conducted in accordance with various government guidelines, policies, and plans. These measures would be implemented following approval of the Project.

7.4.9.4 Rehabilitation and final land use of the Project Site

The Project proposes a progressive rehabilitation and final land use plan. The proposed final land use of grazing and passive biodiversity conservation is compatible with the surrounding land uses and the objectives of the RU2 land use zone.

8. References

Austroads. (2021). *Guide to Road Design.* Retrieved from: http://austroads.com.au/safety-and-design/road-design/guide-to-road-design

Bureau of Meteorology (BoM). (2022). *Groundwater Dependent Ecosystems Atlas*. Retrieved from http://www.bom.gov.au/water/groundwater/gde/map.shtml

Constructive Solutions. (2022). *Carlon's Quarry Expansion – Traffic Impact Assessment.* Constructive Solutions.

Department of the Environment (DotE). (2013). *Matters of National Significance: Significance impact guidelines 1.1.* Department of the Environment.

Engage Environmental Services. (2022). *Surface Water Monitoring – Carlon's Quarry 1033 Kingstown Road, Balala, NSW.* Engage Environmental Services.

Isbell, R. F. and the National Committee on Soil and Terrain. (2021). *The Australian Soil Classification (*3rd ed.). CSIRO Publishing, Melbourne.

Landcom. (2004). *Managing Urban Stormwater: Soils and Construction – Volume 1* (4th edition) *(Blue Book).* New South Wales Government.

Local Land Services (LLS). (2017). *Northern Tablelands Regional Strategic Weeds Management Plan 2017-2022*. Local Land Services.

Lode Resources Ltd. (2022). *Projects.* Retrieved from: https://loderesources.com/lode-resources-projects

McKenzie, N., Jacquier, D., Isbell, R. and Brown, K. (2004). *Australian soils and landscapes*. CSIRO Publishing, Collingwood.

Muller Acoustic Consulting Pty Ltd. (2022). *Noise Impact Assessment – Carlon's Quarry Expansion Project.* Muller Acoustic Consulting Ptd Ltd.

NSW Department of Environment & Climate Change (DECC). (2002). *Descriptions for NSW (Mitchell) Landscapes Version 2 (2002).* Department of Environment & Climate Change, Sydney.

NSW Department of Environment & Climate Change (DECC). (2008). *Managing Urban Stormwater: Soils and Construction Volume – 2E Mines and Quarries*. Department of Environment & Climate Change, Sydney.

NSW Department of Planning & Environment (DPE). (2017). *New England North West Regional Plan 2036*. Department of Planning & Environment, Sydney.

NSW Department of Planning, Industry and Environment (DPIE). (2021a). *Estimated Inherent Soil Fertility of NSW Version 4.5*. NSW Department of Planning, Industry and Environment, Parramatta.

NSW Department of Planning, Industry and Environment (DPIE). (2021b). *Land and Soil Capability Mapping for NSW. Version 4.5*. NSW Department of Planning, Industry and Environment, Parramatta.

NSW Department of Primary Industries (DPI). (2015). *Eel-Tailed Catfish population in the Murray-Darling Basin, Tandanus tandanus.* NSW Department of Primary Industries.

NSW Department of Primary Industries (DPI). (2011). *Land Use Conflict Risk Assessment Guide: Primefact 1134.* NSW Department of primary Industries.

NSW Department of Primary Industries (DPI). (2017). *Southern Purple Spotted Gudgeon – Mogurnda adspersa.* NSW Department of Primary Industries.

NSW Environment Protection Authority (EPA). (2014). *Waste Classification Guidelines Part 1: Classifying Waste*. EPA, Sydney.

NSW Environment Protection Authority (EPA). (2016). *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste*. EPA, Sydney.

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

NSW Government. (2022). *MinView – Manilla 1:25,000 map sheet. Retrieved from: https://minview.geoscience.nsw.gov.au*

NSW Office of Environment & Heritage (OEH). (2011). *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2012). *The land and soil capability assessment scheme – second approximation*. NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2017a). *Threatened species – Brown Treecreeper (eastern subspecies) (profile).* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2017b). *Threatened species – Diamond Firetail (profile).* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2017c). *Threatened species – Dusky Woodswallow (profile).* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2017d). *Threatened species – Flame Robin (profile).* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2018). *Threatened species – Western Sawshelled Turtle, Bell's Turtle (profile).* NSW Office of Environment and Heritage, Sydney.

NSW Office of Environment & Heritage (OEH). (2022). *Threatened species – Little Lorikeet (profile).* NSW Office of Environment and Heritage, Sydney.

Onward Consulting. (2021). *Request for Secretary Environmental Assessment Requirements.* Onward Consulting, Armidale.

OzArk Environment & Heritage. (2022a). *Archaeological Technical Report: Carlon's Quarry - Kingstown Road, Uralla.* OzArk Environment & Heritage.

OzArk Environment & Heritage. (2022b) *Carlon's Quarry: Historic Heritage Assessment.* OzArk Environment & Heritage.

Roads and Traffic Authority (RTA). (2002). *Guide to Traffic Generating Developments.* Roads and Traffic Authority, NSW. Roads and Traffic Authority.

Stringybark Ecological Pty Ltd. (2022). *Biodiversity assessment: Carlon's Quarry - Kingstown Rd, Balala, NSW.* Stringybark Ecological Pty Ltd.

US Environmental Protection Authority (US EPA). (1985). *Compilation of Air Pollutant Emission Factors* (4th ed). US EPA, North Carolina.

Uralla Shire Council (USC). (2002). *Statement of Environment Effects for the operation of a gravel pit. Lot 3 DP 834359, West of Uralla, owned by Mr M Carlon, in the Shire of Uralla.* Uralla Shire Council.

WRM Water & Environment Pty Ltd. (2022a). *Carlon's Quarry Expansion Project – Erosion and Sediment Control Plan.* WRM Water & Environment Pty Ltd, Spring Hill.

WRM Water & Environment Pty Ltd. (2022b). *Carlon's Quarry Expansion Project – Surface Water Assessment.* WRM Water & Environment Pty Ltd, Spring Hill.

Zephyr Environmental. (2022). *Carlon's Quarry Expansion Project: Air Quality Assessment.* Zephyr Environmental.

9. Abbreviations and glossary

9.1 Terms

Term	Definition
Alternative Study Area	High-level constraints identified vegetation zones of 'moderate' and 'good' condition within the listed Threatened Ecological Community *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community.* The Alternate Study Area investigated an area with vegetation zones in a 'poor' condition state up to approximately 32 ha (consistent with the Project Study Area).
Applicant	Blendee Partnership.
Core koala habitat	An area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.
Day period	For road noise assessments, the day period is from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.
Evening period	The period from 6pm to 10pm.
Existing Development Extent	The current extent of surface development.
Indicative Quarry Extraction Area	Indicative area in which extraction activities (including gravel excavation, topsoil storage and rehabilitation activities) is proposed, located wholly within the Proposed Development Extent.
L_{A90}	Sound level exceeded 90% of the sampling time.
L_{Aeq}	The 'equal energy' average noise levels, and is used in some instances for the assessment of traffic noise effects or the risk of hearing impairment due to noise exposures.
Night period	The remaining periods left after the day and evening periods (10pm to 7am)
$PM_{2.5}$	Particulate matter less than 2.5 µm in aerodynamic equivalent diameter.
PM_{10}	Particulate matter less than 10 µm in aerodynamic equivalent diameter.
Potential koala habitat	Areas of native vegetation where trees of the types listed in Schedule 1 of the Biodiversity and Conservation SEPP constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
Project Site	Lot 3 of DP 834359 on which the existing quarry operations are located.
Project Study Area	The originally proposed quarry extraction area of 32 ha (as described in the Scoping Report).
Proposed Quarry Extension Areas	Additional disturbance areas (comprising 0.99 ha) created by clearing and excavation, located wholly within the Proposed Development Extent.
Proposed Development Extent	The proposed extent of surface development, which forms the basis of this environmental impact assessment.
Windroses	A graphical tool used which summarised the occurrence of winds at a location, showing their strength, direction and frequency.

9.2 Abbreviations

Abbreviation	Definition
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ANL	Amenity noise level
ANZEC	Australian and New Zealand Environment Council

Abbreviation	Definition
AS	Australian Standard
ATR	Archaeological Technical Report
AWS	Automatic Weather Station
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	*Biodiversity Conservation Regulation 2017* (NSW)
BDAR	Biodiversity Development Assessment Report
BoM	Bureau of Meteorology
BOS	Biodiversity Offsets Scheme
BV Map	NSW Government Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
DA	Development Application
dBA	A-weighted decibel
DCP	Development Control Plan
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment (now Department of Planning and Environment)
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EL	Exploration Licence
EMP	Environmental Management Plan
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021* (NSW)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cth)
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
EV	Environmental Values
FM Act	*Fisheries Management Act 1994* (NSW)
GW	Gigawatt
ha	Hectare
ICNG	Interim Construction Noise Guideline
INL	Intrusiveness noise level
KFH	Key Fish Habitat
LEP	Local Environment Plan
LGA	Local Government Area
LSC	Land and soil classification
LSPS	Local Strategic Planning Statement
LUCRA	Land Use Conflict Risk Assessment

Abbreviation	Definition
ML	Megalitre
MNES	Matters of National Environmental Significance
NEPM	National Environment Protection Measure
NIA	Noise Impact Assessment
NML	Noise management level
NPI	Noise Policy for Industry
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
OPSIM	Operational Simulation Model
PCT	Plant Community Type
PM	Particulate Matter
PNTL	Project Noise Trigger Level
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
RBL	Rating background noise level
REZ	Renewable Energy Zone
RNP	NSW Road Noise Policy
Roads Act	Roads Act 1993
RTA	NSW Roads and Traffic Authority (now TfNSW)
SAII	Serious and Irreversible Impact
SAT	Spot Assessment Technique
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SRLUP	Strategic Regional Land Use Plan 2036
t	Tonne
TEC	Threatened Ecological Community
TfNSW	Transport of NSW
TSP	Total Suspended Particles
TSS	Total Suspended Solids
USC	Uralla Shire Council
VIS	Vegetation Integrity Score
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)
WM Act	*Water Management Act 2000* (NSW)
WQO	Water Quality Objectives
WRM	WRM Water and Environment Pty Ltd

Appendix A Secretary Environmental Assessment Requirements

Table A-1 SEARs (EAR 1622) issued 3 December 2022

Issue Category	Requirement	Document reference
	The Environmental Impact Statement (EIS) for the development must comply with the requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.[1]	
	In particular, the EIS must include:	
	• an executive summary;	Summary
	• a comprehensive description of the development, including:	
	– a detailed site description and history of any previous quarrying on the site, including a current survey plan;	Section 2 Figure 1-2
	– identification of the resource, including the amount, type, composition;	Section 1.4
	– the layout of the proposed works and components (including any existing infrastructure that would be used for the development);	Section 3.2 Figure 3-1
	– an assessment of the potential impacts of the development, as well as any cumulative impacts, including the measures that would be used to minimise, manage or offset these impacts;	Section 6
	– a detailed rehabilitation plan for the site;	Section 6.14
	– any likely interactions between the development and any existing/approved developments and land uses in the area, paying particular attention to potential land use conflicts with nearby residential development;	Section 6.9
	– a list of any other approvals that must be obtained before the development may commence;	Section 4.5
	– the permissibility of the development, including identification of the land use zoning of the site;	Section 4.2
	– identification of sensitive receivers likely to be affected by the development using clear maps/plans, including key landform areas, such as conservation areas and waterways;	Section 5.3 Figure 5-1
	• a conclusion justifying why the development should be approved, taking into consideration:	
	– alternatives;	Section 7.2
	– the suitability of the site;	Section 7.4.7
	– the biophysical, economic and social impacts of the project, having regard to the principles of ecologically sustainable development; and	Section 7.4.6
	– whether the project is consistent with the objects of the *Environmental Planning and Assessment Act 1979*; and	Section 7.3
	• a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.	Page 14
	[1] The *Environmental Planning and Assessment Regulation 2000* was repealed by the *Environmental Planning and Assessment Regulation 2021.* This EIS complies with the requirements of Part 8, Division 5 of the *Environmental Planning and Assessment Regulation 2021.*	
Consultation	In preparing the EIS for the development, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers and any surrounding landowners that may be impacted by the development.	Section 5

Issue Category	Requirement	Document reference
	The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.	Section 5
Key Issues	The EIS must assess the potential impacts of the proposal at all stages of the development, including the establishment, operation and decommissioning of the development. The EIS must address the following specific issues:	
	• **Noise –** including a quantitative assessment of potential: – construction and operational noise and off-site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline*, *NSW Noise Policy for Industry* and *NSW Road Noise Policy* respectively; – reasonable and feasible mitigation measures to minimise noise emissions; and – monitoring and management measures.	Section 6.1
	• **Blasting and vibration –** – proposed hours, frequency, methods and impacts; and – an assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZECC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features;	Section 6.2
	• **Air –** including: – an assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2016). The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage;	Section 6.3
	• **Water –** including: – a detailed site water balance and an assessment of any water licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo; – an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives; and – a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts;	Section 6.4
	• **Biodiversity –** including: – accurate predictions of any vegetation clearing on site; – a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the *Biodiversity Conservation Act 2016*; and	Section 6.5

Issue Category	Requirement	Document reference
	– a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.	
	• **Heritage –** including:	
	– an assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage; and	Section 6.6
	– identification of Historic heritage in the vicinity of the development and an assessment of the likelihood and significance of impacts on heritage items, having regard to the relevant policies and guidelines listed in Attachment 1;	Section 6.7
	• **Traffic & Transport –** including:	Section 6.8
	– accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;	
	– an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;	
	– a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;	
	– evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and	
	– a description of access roads, specifically in relation to nearby Crown roads and fire trails;	
	• **Land Resources –** including an assessment of:	Section 6.9
	– potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate); and	
	– an assessment of activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts;	
	• **Waste –** including estimates of the quantity and nature of the waste streams that would be generated or received by the development and any measures that would be implemented to minimise, manage or dispose of these waste streams;	Section 6.10
	• **Hazards –** including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks and the transport, storage, handling and use of any hazardous or dangerous goods;	Section 6.11
	• **Visual –** including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, including with respect to any new landforms;	Section 6.12
	• **Social & Economic –** an assessment of the likely social and economic impacts of the development, including consideration of both the significance of the resource and the costs and benefits of the project; and	Section 6.13

Issue Category	Requirement	Document reference
	• **Rehabilitation –** including: – a detailed description of the proposed rehabilitation measures that would be undertaken throughout the development and during quarry closure; – a detailed rehabilitation strategy, including justification for the proposed final landform and consideration of the objectives of any relevant strategic land use plans or policies; and – potential impacts on landforms (topography), paying particular attention to the long-term geotechnical stability of any new landforms (such as overburden dumps, bunds etc); and	Section 6.14
Environmental Planning Instruments	The EIS must take into account all relevant State Government environmental planning instruments, guidelines, policies, and plans. While not exhaustive, Attachment 1 contains a list of some of the environmental planning instruments, guidelines, policies and plans that may be relevant to the environmental assessment of this development. During the preparation of the EIS you must also consult the Department's EIS Guideline –Extractive Industries – Quarries. This guideline is available at http://www.planning.nsw.gov.au/~/media/Files/DPE/Guidelines/extractive-industriesquarries-eis-guideline-1996-10.ashx.	Section 4 Section 6
	In addition, the EIS must assess the development against the *Uralla Local Environmental Plan 2012* and any relevant development control plans/strategies.	Section 7.4.1.1 Section 7.4.3

Table A-2: Summary of key issues raised by agencies

Agency	Issued raised	Section in EIS
NSW EPA	**Environmental impacts of the project**	
	– The EIS must address the requirements of Section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) by determining the extent of each impact and providing sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL). – Impacts related to the following environmental issues need to be assessed, quantified and reported on:	Section 6 Section 7
	• **Air Issues, including odour:** air quality including dust and odour generation from the operation on the surrounding landscape and/or community;	Section 6.3
	• **Noise and vibration impacts** associated with blasting, and operational noise particularly machinery and plant movements;	Section 6.1 Section 6.2
	• **Waste** including hazardous materials and radiation. Consideration needs to be given to disposal options for general waste, sanitary waste as well as hazardous materials and radiation, where relevant.	Section 6.10
	• **Water and Soils** including site water balance and sediment and erosion controls during construction and operation phases.	Section 6.4
	The Environmental Impact Statement (EIS) should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned.	
	Licensing requirements	

Agency	Issued raised	Section in EIS
	– The development is a scheduled activity under the Protection of the Environment Operations Act 1997 (POEO Act) and will therefore require an Environment Protection Licence (EPL) if approval is granted. – Should project approval be granted, the proponent will need to make an application to the EPA for its EPL for the proposed facility prior to undertaking any on site works. Additional information is available through the EPA Guide to Licensing document (www.epa.nsw.gov.au/licensing/licenceguide.htm).	Section 4.4
	Specific issues – air	
	– The EIS must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the Protection of the Environment Operations (POEO) Act (1997) and the POEO (Clean Air) Regulation (2002). Particular consideration should be given to section 129 of the POEO Act concerning control of "offensive odour".	Section 6.3
	– The EIS must include an air quality impact assessment (AQIA). The AQIA must be carried out in accordance with the document, Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016), available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/approved-methods-for-modelling-and-assessmentof-air-pollutants-in-nsw-160666.pdf	Section 6.3 and Appendix E
	– The EIS must detail emission control techniques/practices that would be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, POEO (Clean Air) Regulation and associated air quality limits or guideline criteria.	Section 6.3
	Specific issues – noise and vibration	
	The EIS must assess the following noise and vibration aspects of the proposed development	
	– Construction noise associated with the proposed development should be assessed using the Interim Construction Noise Guideline (DECC, 2009). These are available at: https://www.environment.nsw.gov.au/resources/noise/09265cng.pdf	N/A – no construction activities relevant
	– Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the Assessing Vibration: a technical guideline (DEC, 2006). These are available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/vibrationguide0643.pdf	Section 6.2
	– If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990).These are available at: https://www.environment.nsw.gov.au/resources/noise/anzecblasting.pdf	Section 6.2
	– Operational noise from all industrial activities (including private haul roads and private railway lines) to be undertaken on the premises should be assessed using the guidelines contained in the NSW Noise Policy for Industry (EPA, 2017). https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)	Section 6.1
	– Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the NSW Road Noise Policy and associated application notes (EPA, 2011). https://www.epa.nsw.gov.au/your-environment/noise/transport-noise	Section 6.1
	Specific issues – waste, chemicals and hazardous materials and radiation	

Agency	Issued raised	Section in EIS
	– The EIS must assess all aspects of waste generation, management and disposal associated with the proposed development.	Section 6.10
	– The EIS must demonstrate compliance with all regulatory requirements outlined in the POEO Act and associated waste regulations.	
	– The EIS must identify, characterise and classify the following in accordance with the EPA's Waste Classification Guidelines (2014) and associated addendums: (i) all waste that would be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste; (ii) all waste that is proposed to be disposed of to an offsite location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.	
	Note: The EPA's Waste Classification Guidelines (2014) and associated addendums are available at: https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste	
	– The EIS must outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on-site.	Section 6.4.4
	– The EIS must demonstrate that appropriate spill containment would be provided for storage, filling and loading of all fuels and other chemicals to be used on site, in accordance with the relevant Australian Standard.	Section 6.11.3
	Specific issues – water	
	– The EIS must demonstrate how the proposed development will meet the requirements of section 120 of the POEO Act.	Section 6.4
	– The EIS must include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	Section 6.4
	– If the proposed development intends to discharge waters to the environment, the EIS must demonstrate how the discharge(s) would be managed in terms of water quantity, quality and frequency of discharge and include an impact assessment of the discharge on the receiving environment. This should include: • Description of the proposal including position of any intakes and discharges, volumes, water quality and frequency of all water discharges. • Description of the receiving waters including upstream and downstream water quality as well as any other water users. • Demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.	
	– The EIS must refer to Water Quality Objectives for the receiving waters and indicators and associated trigger values or criteria for the identified environmental values of the receiving environment. This information should be sourced from the ANZECC (2018) Guidelines for Fresh and Marine Water Quality, available at: https://www.waterquality.gov.au/anz-guidelines	Section 6.4.2.4
	– The EIS must describe how stormwater would be managed in all phases of the project, including details of how stormwater and runoff would be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).	Section 6.4

Agency	Issued raised	Section in EIS
	– The EIS must describe any water quality monitoring programs to be carried out at the project site. Water quality monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004) which is available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/approvedmethods-water.pdf	Section 6.4.4
DPIE – Crown Lands	The Department will need to be referenced, prior to any use or occupation of any Crown roads or land, during the assessment phase. It is recommended that the proponent contact Crown Lands as early as possible to discuss and initiate the processes required to authorise the use of and/or access to the Crown road. Application will need to be made to close and purchase the Crown road required for access to the development/proposal.	Section 5.1.2
DPIE – Natural Resources Access Regulator	Based on the information provided, this is not a matter for NRAR to comment on in terms of requirements under water legislation and policy. This is because it does not require a licence/lease under the *Mining* Act *1992*, a Controlled Activity Approval under the *Water Management Act 2000* and/or the proponent is not a public authority such as a Council.	N/A
Water NSW	Using the objects and principles of the WM Act, applicants must ensure EIS demonstrates (where relevant) how their proposal will minimise or mitigate impacts on the following matters: – water sources, floodplains and dependent ecosystems (including groundwater dependent ecosystems and wetlands, swamps, bogs, depressions and perennial streams) which should be protected and restored where possible. – habitats, animals and plants that benefit from water – water quality including sediment and dissolved oxygen, its beneficial use classification and impacts – groundwater pollution, contamination and disposal, including short and long term protection measures – acidity, waterlogging, or salinity (including dryland salinity where relevant) – cumulative impacts associated with other approvals, and impacts on existing groundwater users – geographical and other features of indigenous, major cultural, heritage or spiritual significance (natural or built) – soil erosion and compaction (impact of final landform on groundwater regime) – vegetation clearing (include dimensions of area and details of native species to be cleared) – contamination of soils, sediment control, contamination of water and other relevant sites – geomorphic instability – including inducing landslip or subsidence; and – Impacts on other users. The full description of the development and existing environment should also include: – The location and description of all surface and groundwater on the site – The location and description of all existing or proposed water quality control infrastructure, not limited to clean and dirty water diversions, sediment basins and retention basins – The location and description of all water monitoring locations/points (surface and ground waters) The EIS should also include identification of:	Section 6.4 *Note – section 6.4 assesses the surface water management aspects of the Project, as groundwater is not expected to be encountered.* Section 6.4 *Note – section 6.4 assesses the surface water management*

Agency	Issued raised	Section in EIS
	– Any potential impacts on downstream environments and downstream users, and measures to mitigate and manage those impacts – Any impacts associated with changes in the quantity or quality of flow to nearby watercourses – Estimated water usage for quarrying process and infiltration of wash-water into groundwater – Sediment and Erosion Control plans to avoid loose excavated material stored on-site from flowing into the watercourses, including risk management measures for protection of the watercourses and dams onsite, from any pollution incidents – Details of earthworks requirements, associated diversion drainage works on-site and mitigation measures for the protection of surface water and groundwater – Risks, risk mitigation and monitoring measures associated with: • infiltration of wastewater – from works associated wash water generated onsite - into the groundwater.	*aspects of the Project, as groundwater is not expected to be encountered.*
USC	No additional requirements requested to those provided in a draft version of the SEARs.	N/A

Appendix B Statutory compliance table

Table B-1 Statutory compliance conditions relevant to this EIS Statutory requirement

Statutory compliance conditions	Relevant section in EIS
Environmental Planning and Assessment Act 1979	
Section 1.3 Objects of the Act	
(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,	Section 7.3
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Section 7.3
(c) to promote the orderly and economic use and development of land,	Section 7.3
(d) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats	Section 7.3
(e) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Section 7.3
(f) to provide increased opportunity for community participation in environmental planning and assessment.	Section 7.3
Section 4.15 Evaluation	
(1) ***Matters for consideration – general*** *In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application –*	
(a) the provisions of -	Section 7.4.1
(i) any environmental planning instrument, and	
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and	Section 7.4.2
(iii) any development control plan, and	Section 7.4.3
(iii) (a) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and	Section 7.4.4
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),	Section 7.4.5
that apply to the land to which the development application relates,	
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	Section 7.4.6
(c) the suitability of the site for the development,	Section 7.4.7
(d) any submissions made in accordance with this Act or the regulations,	Section 7.4.8
(e) the public interest.	Section 7.4.9
Uralla Local Environmental Plan 2012	
Part 2 Permitted or prohibited development **Land Use Table** **Zone RU2 Rural Landscape**	
1 Objectives of zone – To encourage sustainable primary industry production by maintaining and enhancing the natural resource base. – To maintain the rural landscape character of the land.	Section 7.4.1.1

Statutory compliance conditions	Relevant section in EIS
– To provide for a range of compatible land uses, including extensive agriculture.	
Part 5 Miscellaneous provisions **Section 5.10 Heritage Conservation** (4) ***Effect of proposed development on heritage significance*** *The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subclause applies regardless of whether a heritage management document is prepared under subclause (5) or a heritage conservation management plan is submitted under subclause (6).*	Appendix I Section 6.7
Part 6 Additional local provisions **Section 6.1 Earthworks** *(3) Before granting development consent for earthworks, the consent authority must consider the following matters –*	
(a) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality,	Section 6.4
(b) the effect of the proposed development on the likely future use or redevelopment of the land,	Section 6.9
(c) the quality of the fill or the soil to be excavated, or both,	Section 6.9
(d) the effect of the proposed development on the existing and likely amenity of adjoining properties,	Section 6
(e) the source of any fill material and the destination of any excavated material,	Section 3.3
(f) the likelihood of disturbing relics,	Section 6.6 Section 6.7
(g) the proximity to and potential for adverse impacts on any watercourse, drinking water catchment or environmentally sensitive area,	Section 6.4 Section 6.5
(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Appendix C
State Environmental Planning Policy (Resources and Energy) 2021	
Section 2.17 Compatibility of proposed mine, petroleum production or extractive industry with other land uses *Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must -* *(a) consider -* *(i) the existing uses and approved uses of land in the vicinity of the development, and* *(ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and* *(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and* *(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a)(i) and (ii), and* *(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).*	Section 5 and Section 6.9
Section 2.18 Consideration of voluntary land acquisition and mitigation policy	

Statutory compliance conditions	Relevant section in EIS
(1) In this section **voluntary land acquisition and mitigation policy** means the Voluntary Land Acquisition and Mitigation Policy approved by the Minister and published in the Gazette on the date on which State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment (Air and Noise Impacts) 2018 is published on the NSW legislation website. (2) Before determining an application for consent for State significant development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider any applicable provisions of the voluntary land acquisition and mitigation policy and, in particular - (a) any applicable provisions of the policy for the mitigation or avoidance of noise or particulate matter impacts outside the land on which the development is to be carried out, and (b) any applicable provisions of the policy relating to the developer making an offer to acquire land affected by those impacts. (3) To avoid doubt, the obligations of a consent authority under this section extend to any application to modify a development consent for State significant development for the purposes of mining, petroleum production or extractive industry. (4) This section extends to applications made, but not determined, before the commencement of this section.	Not applicable as the Project is not State significant development
Section 2.19 Compatibility of proposed development with mining, petroleum production or extractive industry	
(1) This section applies to an application for consent for development on land that is, immediately before the application is determined—	
(a) in the vicinity of an existing mine, petroleum production facility or extractive industry, or	Section 2.3
(b) identified on a map (being a map that is approved and signed by the Minister and copies of which are deposited in the head office of the Department and publicly available on the Department's website) as being the location of State or regionally significant resources of minerals, petroleum or extractive materials, or ***Note:*** *At the commencement of this Chapter, no land was identified as referred to in paragraph (b).*	Not applicable as per note to this clause
(c) identified by an environmental planning instrument as being the location of significant resources of minerals, petroleum or extractive materials. ***Note:*** *Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995) is an example of an environmental planning instrument that identifies land as containing significant deposits of extractive materials.*	Not applicable
(2) Before determining an application to which this section applies, the consent authority must -	Section 6.9
(a) consider - (i) the existing uses and approved uses of land in the vicinity of the development, and (ii) whether or not the development is likely to have a significant impact on current or future extraction or recovery of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of, those resources), and (iii) any ways in which the development may be incompatible with any of those existing or approved uses or that current or future extraction or recovery, and (b) evaluate and compare the respective public benefits of the development and the uses, extraction and recovery referred to in paragraph (a)(i) and (ii), and (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).	Section 7.4.9
Section 2.20 Natural resource management and environmental management	

Statutory compliance conditions	Relevant section in EIS
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following—	Appendix C Appendix F Appendix G Section 6.4 Section 6.5
(a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,	
(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,	
(c) that greenhouse gas emissions are minimised to the greatest extent practicable.	Section 6.3.4.1
(2) Without limiting subsection (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.	Section 6.3.4.1
Section 2.21 Resource recovery	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.	Section 3
(2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.	
(3) The consent authority may refuse to grant consent to development if it is not satisfied that the development would be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.	
Section 2.22 Transport	
(1) Before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following -	Appendix J Section 6.8
(a) require that some or all of the transport of materials in connection with the development is not to be by public road,	
(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,	
(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.	
Section 2.23 Rehabilitation	
(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that would be affected by the development.	Section 6.14
(2) In particular, the consent authority must consider whether conditions of the consent should -	
(a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or	
(b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or	

Statutory compliance conditions	Relevant section in EIS
(c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under clause 3 of Schedule 6 to the Act and the Contaminated Land Management Act 1997), or (d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.	
State Environmental Planning Policy (Resilience and Hazards) 2021	
Section 3.2 Definitions of "potentially hazardous industry" and "potentially offensive industry" In this Chapter – ***potentially hazardous industry*** means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality – (a) to human health, life or property, or (b) to the biophysical environment, and includes a hazardous industry and a hazardous storage establishment. ***potentially offensive industry*** means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.	Section 6.11
Section 4.6 Contamination and remediation to be considered in determining development application (1) A consent authority must not consent to the carrying out of any development on land unless – *(a)* it has considered whether the land is contaminated	Section 6.9
State Environmental Planning Policy (Biodiversity and Conservation) 2021	
Part 3.2 Development control of koala habitats ***Section 3.5 Land to which this Part applies*** This Part applies to land – *(a) that is land to which this Chapter applies, and* *(b) that is land in relation to which a development application has been made, and* *(c) that, whether or not the development application applies to the whole, or only part, of the land –* *(i) has an area of more than 1 hectare, or* *(ii) has, together with adjoining land in the same ownership, an area of more than 1 hectare.* **Section 3.6 Step 1 – Is the land potential koala habitat?** (1) Before a council may grant consent to a development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat. (2) The council may be satisfied as to whether or not land is a potential koala habitat only on information obtained by it, or by the applicant, from a person who is qualified and experienced in tree identification. (3) If the council is satisfied –	Section 6.5

Statutory compliance conditions	Relevant section in EIS
(a) *that the land is not a potential koala habitat, it is not prevented, because of this Chapter, from granting consent to the development application, or* (b) *that the land is a potential koala habitat, it must comply with section 3.7.*	

Appendix C Mitigation measures

Mitigation measures

The EIS process adopted the mitigation hierarchy approach to avoid impacts, minimise impacts and after that to compensate for potential biophysical impacts. Modifications to the project description were informed by the input of environmental specialists and the community. These modifications are described in **Section 2.4.3** of the EIS.

Where it was not practicable to avoid impacts through amendments to the Project design, mitigation measures were identified to manage residual impacts. The following table summarises the proposed environmental mitigation measures for the Project.

Table C-1 Mitigation measures

Reference	Mitigation measure
1. Noise, blasting and vibration	
1.1	Measures to mitigate the noise, blasting and vibration impacts would be implemented and documented within an EMP.
2. Air quality	
2.1	Measures to mitigate the air quality impacts would be implemented and documented within an EMP.
3. Water	
3.1	Measures to mitigate the water impacts would be implemented and documented within an EMP.
3.2	Design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond.
3.3	Develop a surface water monitoring program to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues.
3.4	Develop an Erosion and Sediment Control Plan to minimise soil erosion and transport of sediment off-site.
4. Biodiversity	
4.1	Ensure all staff are aware of environmental values of the site.
4.2	Disturbance area boundary and no-go areas to be demarcated prior to disturbance
4.3	Works must be stopped if any previously undiscovered threatened species or populations are discovered during disturbance. An assessment of the impact and any required approvals must be obtained.
4.4	Quarry truck speeds would be limited to 80 km/h between the quarry entrance and the 50 km/h zone at Uralla, with a koala warning sign at the exit gate.
4.5	Education for drivers about watching for and avoiding koalas would be included in site induction and daily/weekly safety briefings.
4.6	An erosion and sediment control plan has been prepared and would be implemented as part of the Project.
4.7	Surface water monitoring would be undertaken on a quarterly basis.
4.8	Weed management should be undertaken prior to disturbance of uncleared land to reduce the spread of weeds to other areas within the Proposed Disturbance Area.
5. Aboriginal cultural heritage	
5.1	Mitigation measures concerning Aboriginal cultural values would be implemented and documented within an EMP.
5.2	Aboriginal scarred tree site CQST1 (20-6-0081) would be clearly fenced and demarcated with a 5 m buffer around the tree, to protect it from any inadvertent harm.
5.3	Aboriginal scarred tree site CQST1 (20-6-0081) would be marked on any applicable site plans so that its position is known.

Reference	Mitigation measure
5.4	Extraction activities would be confined to within the Indicative Quarry Extraction Area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
5.5	If during works, Aboriginal artefacts or skeletal material are identified, all work will cease and the procedures in the *Aboriginal Heritage: Unanticipated Finds Protocol* (**Appendix H**) would be followed.
5.6	Inductions for work crews would include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the *Aboriginal Heritage: Unanticipated Finds Protocol* (**Appendix H**).
6. Historic heritage	
6.1	Procedures to be followed if historic heritage objects are encountered would be implemented and document within an EMP.
7. Traffic and transport	
7.1	Measures to mitigate the traffic impacts would be implemented and documented within an EMP.
7.2	Consult and request USC / TfNSW review swept path right turn out heading southbound and implement outcomes that minimise conflict.
7.3	Consult and request USC / TfNSW consider the extension of the 50 km/h speed zone and implement an 80 km/h speed zone to reflect the road environment and its inherent safety issues.
7.4	In the absence of a regulatory 80 km/h speed limit being introduced a self-imposed speed limit would be implemented for the Kingstown Road (outside of the 50 km/h section).
7.5	Upgrade the intersection of the quarry access road/Kingstown Road, including a seal to extend at least to the cattle grid to prevent material tracking onto the Kingstown Road.
7.6	Communicate to drivers on a regular basis the location of the current school bus stop locations.
7.7	Install a UHF in the school bus and operate haulage vehicles on same channel (if acceptable to the School Bus Proprietor).
7.8	Develop a Driver's Code of Conduct to encompass known hazards, vehicle checking and maintenance procedures, school bus routes and pick up/drop off locations, self-imposed speed limit of 80 km/h on Kingstown Road and chain of responsibility requirements relating to fatigue.
7.9	Implement a self-imposed speed limit of 40km/h adjacent to the cemetery when funerals are undertaken.
7.10	Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary.
7.11	Payment of the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads).
7.12	Cease haulage where rain events exceed 20 mm for at least a 24-hour period to reduce impacts on pavement.
8. Land resources	
8.1	Measures to mitigate the soil resources impacts would be implemented and documented within an EMP.
8.2	Revegetation of disturbed areas as soon as practicable to minimise exposed areas.
8.3	Develop an Erosion and Sediment Control Plan to minimise soil erosion and transport of sediment off-site.
8.4	Design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond.
8.5	Develop a surface water monitoring program to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues.

Reference	Mitigation measure
8.6	Where any changes to the Project are proposed, the holder of EL8980 and EL9087 would be contacted during the approvals process to reassess compatibility of extraction and exploration activities.
8.7	Whilst the occurrence of pre-existing soil contamination is not expected, should evidence of contamination be encountered during excavation e.g. buried waste or discolouration of the soil, the Applicant will seek further advice from the NSW EPA and Uralla Shire Council before continuing excavation of the suspected contamination.
8.8	The EMP will include a strategy to be implemented in the event of a hydrocarbon
9. Waste	
9.1	Measures to mitigate the waste impacts would be implemented and documented within an EMP.
10. Hazards	
10.1	Measures to mitigate the risk of bushfire impacts and other hazards would be implemented and documented within an EMP.
10.2	Refuelling activities would be carried out within the cleared area of the Proposed Development Extent.
10.3	Engines in all vehicles would be turned off during refuelling.
10.4	Fire extinguishers would be fitted and maintained in all mobile equipment.
10.5	Maintenance activities would be carried out within the cleared area of the Proposed Development Extent.
10.6	Good housekeeping would be maintained.
10.8	Emergency spill response equipment would be available on site for use in the event of potential spillage of hazardous materials brought to site for maintenance and refuelling activities.
10.9	Explosives for blasting would not be stored on site and minor quantities of explosives would be transported to the quarry for small unconfined surface blasts on an occasional basis only if consolidated rock is encountered.
10.10	The transport and delivery of Class 1.1 explosives would be undertaken by a licensed contractor, in accordance with all relevant standards and legislation.
10.11	Maintain a locked gate at the premises entry with signs erected at the entry point, and where necessary, along the premises boundary.
10.12	Regularly inspect signage to ensure it is maintained in a legible condition and has not been damaged or removed.
11. Visual	
11.1	Limit activities outside of daylight hours to vehicle movements to and from the Project where possible. Where tail end of shifts or emergency works require lighting, lighting would be directed away from sensitive receivers.
12. Social and economic	
12.1	Measures to mitigate the social and economic impacts would be implemented and documented within an EMP.
12.2	Give preference to engaging new contractors or employees, where practicable, to candidates from surrounding communities over candidates with equivalent qualifications and experience from elsewhere.
12.3	Give preference, where practicable and cost-competitive, to suppliers of equipment, services or consumables located within the surrounding communities.
13. Rehabilitation	
13.1	Rehabilitation objectives and completion criteria would be implemented and documented within an EMP.

Appendix D Noise Assessment

Noise Impact Assessment

Carlon's Quarry Expansion Project

Prepared for: Onward Consulting Pty Ltd
August 2022
MAC221518-01RP1V3

Muller Acoustic Consulting

Noise Impact Assessment

Carlon's Quarry Expansion Project

Prepared for: Onward Consulting Pty Ltd
1/195-197 Beardy Street
Armidale NSW 2350

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC221518-01RP1V3	5 August 2022	Dale Redwood		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Onward Consulting Pty Ltd (Onward) on behalf of Blendee Partnership (the 'Applicant') to prepare a Noise Impact Assessment (NIA) for the proposed expansion of Carlon's Quarry, Balala, NSW (the 'quarry').

The NIA is provided to accompany the Environmental Impact Statement (EIS) being prepared to assess the proposed extension of the quarry. The NIA has been undertaken in accordance with the following policies and guidelines:

- NSW Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017;
- NSW Department of Environment and Climate Change (DECC), Interim Construction Noise Guideline (ICNG), 2009;
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011;
- Australian Standard AS2187.2-2006 (AS2187.2) – Explosives-Storage and Use Part 2: Use of Explosives; and
- Australian and New Zealand Environment Council (ANZEC), 1990, Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration.

A glossary of terms, definitions and abbreviations used in this report is provided in Appendix A.

1.1 Project Background

Carlon's Quarry is an existing approved gravel quarry operated by Blendee Partnership, located at 1033 Kingstown Road, Balala, (Lot 3 DP 834359), approximately 10 kilometres (km) west of Uralla in northern NSW (see **Figure 1**).

The existing quarry received development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act) for the Carlon's Quarry Expansion Project (the 'Project'). This NIA has been prepared to accompany the development application for the Project, with reference to the Secretary's Environmental Assessment Requirements (SEARs).

1.2 Project Overview

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m^3) to a maximum 120,000m^3 per annum with an approximate average of 80,000m^3 per annum. The Project involves a minor extension to the north and west of the existing quarry and will require the operation of additional mobile equipment.

Under existing operations, rock material is extracted through mechanical excavation methods. The rock material is generally friable and breaks apart when excavated, which requires none, or very little material processing. Machinery used at the quarry has historically included two front end loaders, three bulldozers, one excavator, one forklift and one bobcat.

Transport of the quarry material is typically undertaken using trucks with dog trailers, with occasional B-Double vehicles. Access to the quarry is via a private all weather gravel track from Kingstown Road, which is a local rural road used predominantly by local graziers.

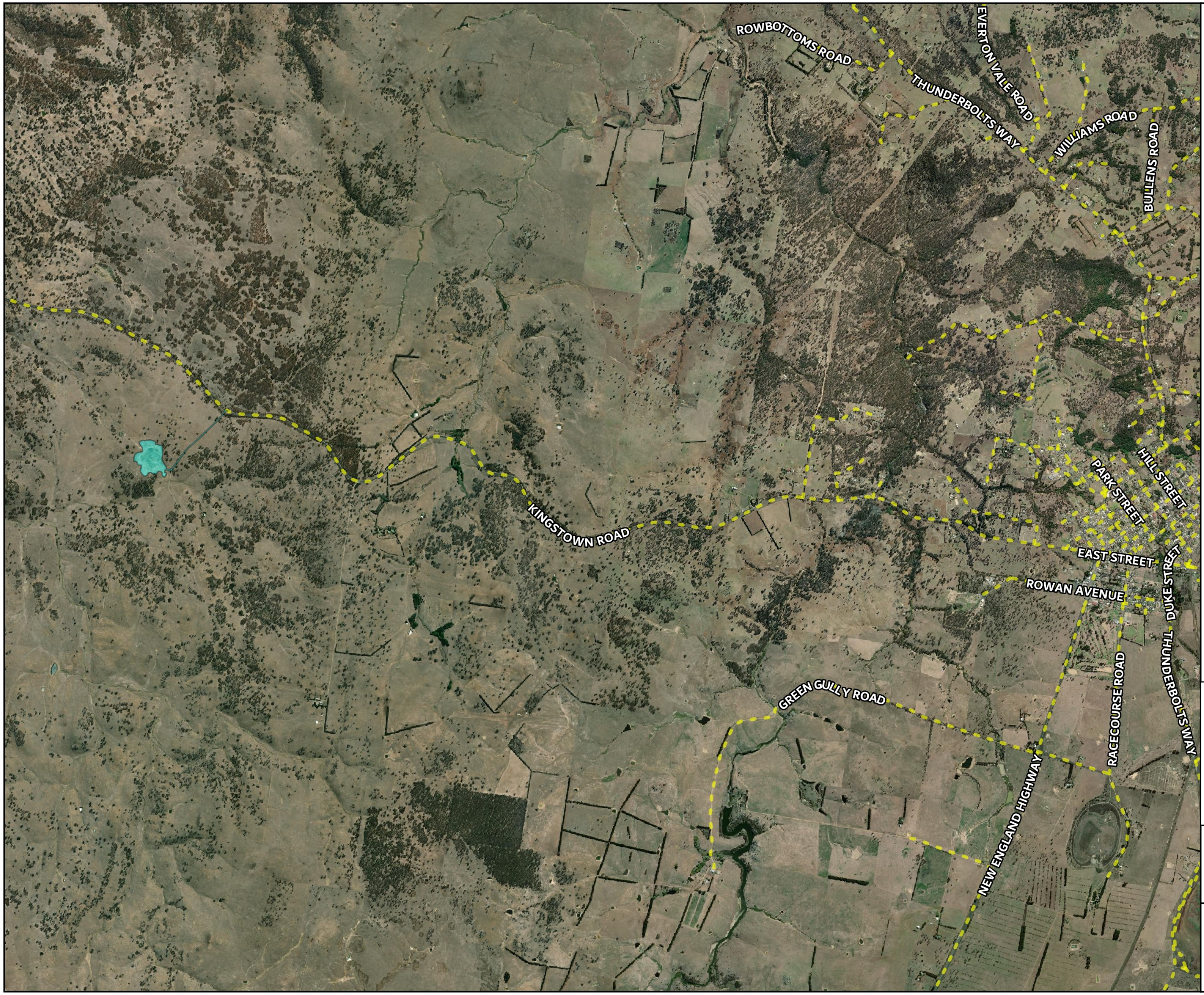
It is expected that machinery used to operate the quarry would be similar to the existing fleet, however, it is proposed that an additional three front end loaders, one excavator, and a skid-steer loader may also be used. Material processing is expected to remain similar with the current operations, whereby rock material typically breaks apart when excavated. Occasional use of a mobile crushing plant is expected to be undertaken where more cohesive rock is encountered. Additionally, explosives may be required on occasion (i.e. on average, one blast every two years) to break apart consolidated rock. There would not be any rock drilling during blasting campaigns.

FIGURE 1

Locality Plan

MAC221518-01

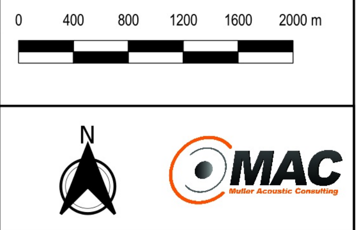
Carlon's Quarry



KEY

Project Site

Road Network



1.3 Hours of Operation

Table 1 presents the proposed operating hours for the quarry. The proposed hours and combination of activities for the quarry have formed the basis of the noise modelling scenarios for this assessment. Operations would typically be undertaken on a campaign basis.

Table 1 Proposed Hours for Quarry Operation

Activity	Monday to Saturday	Sunday / Public Holidays
Extraction operations	7am to 6pm	n/a
Processing operations	7am to 6pm	n/a
Loading and Transportation Operations	7am to 6pm	n/a

1.4 Potentially Sensitive Receivers

From review of aerial imagery and associated project information, the following potentially sensitive receivers have been identified. Receivers in the locality are primarily rural / residential, and are located more than 2km from the proposed project. **Table 2** presents a summary of receiver identification, address and MGA(56) coordinates. The location of the receivers are presented visually in **Figure 2**.

Table 2 Receiver Locations

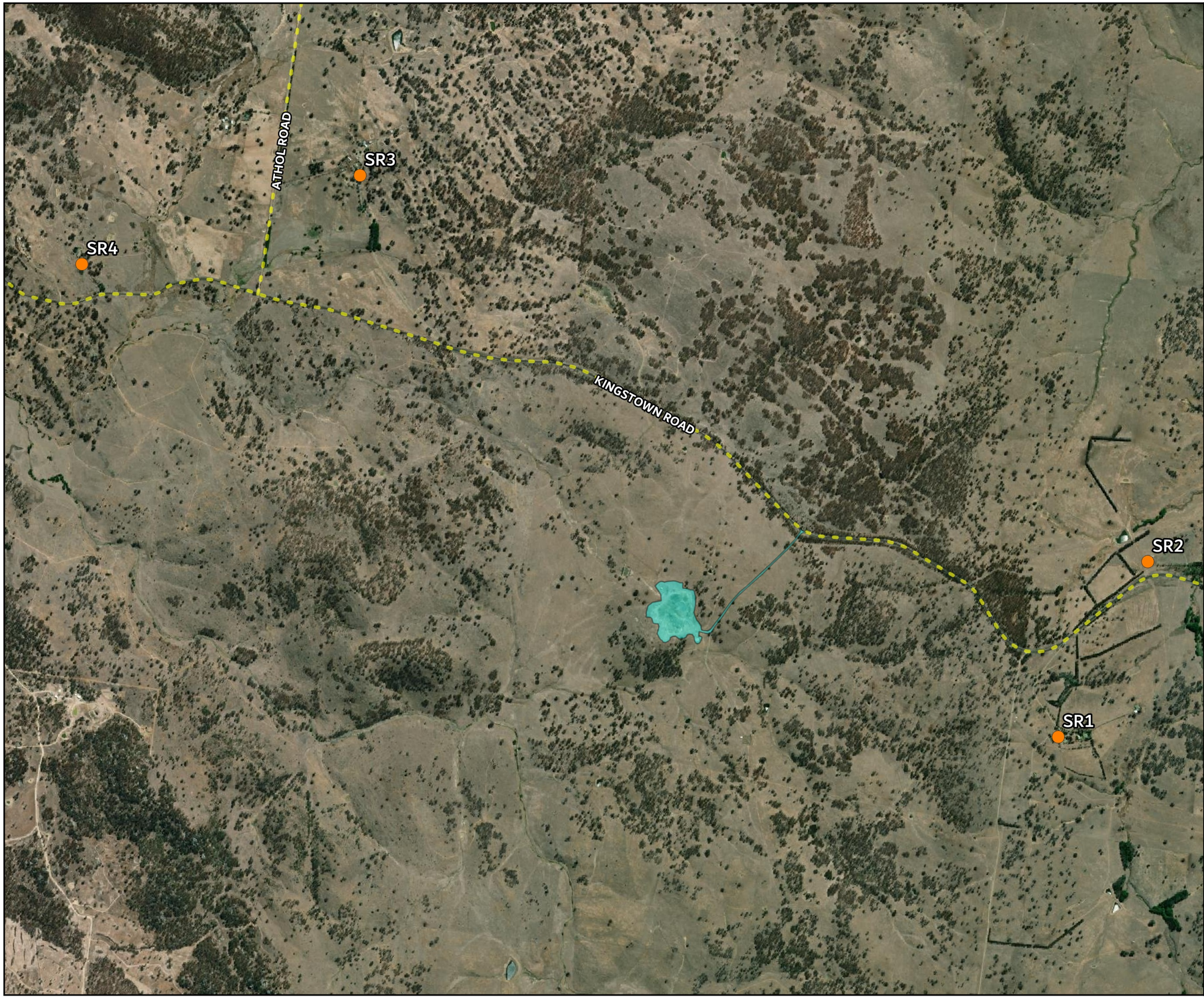
Receivers	Address	MGA56 Coordinates	
		Easting	Northing
SR1	750 Kingstown Road	347921	6608817
SR2	639 Kingstown Road	348479	6609908
SR3	1294 Kingstown Road	343571	6612313
SR4	1538 Kingstown Road	341838	6611760

FIGURE 2

Receiver Map

MAC221518-01

Carlon's Quarry



KEY

Project Site

Receivers

Road Network

0 300 600 900 1200 m

N

MAC

Muller Acoustic Consulting

1.5 Coverage of Secretary's Environmental Assessment Requirements

The key issues to be addressed, as part of this NIA are outlined in the Secretary's Environmental Assessment Requirements (EAR 1622) which are reproduced in **Table 3**.

Table 3 Coverage of SEARs and Other Government Agency Requirements

Noise Assessment Requirement	Reference
Coverage of Secretary's Environmental Assessment Requirements (EAR 1622 - 3/12/2021)	
▪ Including a quantitative assessment of potential:	
– Construction and operational noise and off-site transport impacts of the development in accordance with the Interim Construction Noise Guideline, NSW Noise Policy for Industry and NSW Road Noise Policy respectively;	Section 4.1 Section 5.1 Section 5.2
– Reasonable and feasible mitigation measures to minimise noise emissions; and	Section 6
– Monitoring and management measures.	Section 6
▪ Blasting and Vibration	
– Proposed hours, frequency, methods and impacts; and	Section 1.1 Section 2.4
– An assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZECC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features.	Section 5.3
Coverage of Issues Identified by Other Government Agencies	
EPA (8/11/2021)	
▪ Noise and vibration – proximity to sensitive receptors and impacts of any sources associated with the project, including operational noise and blasting.	Section 5.1 Section 5.2 Section 5.3

2 Noise Policy and Guidelines

The following section summarises relevant policy and guidelines pertinent to undertaking a noise impact assessment for this type of project.

2.1 Interim Construction Noise Guideline

The assessment and management of noise from construction work is completed with reference to the Interim Construction Noise Guideline (ICNG). The ICNG is specifically aimed at managing noise from construction work regulated by the EPA and is used to assist in setting statutory conditions in licences or other regulatory instruments.

The ICNG sets out procedures to identify and address the impacts of construction noise on residences and other sensitive land uses.

2.1.1 Standard Hours for Construction

Table 4 summarises the ICNG recommended standard hours for construction works.

Table 4 Recommended Standard Hours for Construction

Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

2.1.2 Out of Hours Construction

Works conducted outside of recommended standard hours are considered out of hours work (OOH). The ICNG suggests that any request to vary the hours of construction activities as identified above shall be:

- considered on a case by case basis or activity-specific basis;
- accompanied by details of the nature and need for activities to be undertaken during the varied construction hours; and
- accompanied by written evidence that activities undertaken during the varied construction hours are strongly justified; appropriate consultation with potentially affected receivers and notification of the relevant regulatory authorities has occurred; and all practicable and reasonable mitigation measures will be put in place.

2.1.3 Construction Noise Management Levels

Table 5 reproduces the ICNG management levels for residential receivers. The construction noise management levels are the sum of the management level and relevant rating background level (RBL) for each specific assessment period.

Table 5 Noise Management Levels

Time of Day	Management Level $LA_{eq,15min}$[1]	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB.	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA.	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours.	Noise affected RBL + 5dB.	A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2.

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

2.2 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.

2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.

3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

2.2.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

2.2.2 Project Intrusiveness Noise Level (PINL)

The PINL ($L_{Aeq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI and can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. These result in minimum intrusiveness noise levels as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

2.2.3 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: "*to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows*":

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Furthermore, where the PANL is applicable and can be satisfied, the assessment of cumulative industrial noise is not required.

The recommended amenity noise levels as per Table 2.2 of the NPI are reproduced in **Table 6**.

Table 6 Amenity Criteria			
Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward - internal - external	 All All	 Noisiest 1-hour Noisiest 1-hour	 35 50
Place of worship - internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

2.3 Road Noise Policy

The road traffic noise criteria are provided in the Department of Environment, Climate Change and Water NSW (DECCW), Road Noise Policy (RNP), 2011. The policy sets out noise criteria that provide for a degree of amenity appropriate for the land use and road category.

For some industries such as mines and extractive industries, that are not served by arterial roads, a principal haulage route may be identified. The RNP indicates that where local authorities identify a 'principal haulage route', the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads.

2.4 ANZEC Blasting Guidelines

Noise and vibration levels from blasting are assessable against criteria established in the Australian and New Zealand Environment Council (ANZEC) – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration. The blasting limits are generally consistent with the guideline levels contained within AS2187:2006 Part 2 – Explosives - Storage and Usage – Part 2. Where compliance is achieved, the risk of human annoyance is minimised.

Furthermore, for damage induced vibration, German Standard DIN 4150 - Part 3: 1999 provides the strictest guideline levels of vibration velocity for evaluating the effects of vibration in structures. Blasting and vibration induced damage criteria relevant to this assessment are presented in detail in Section 3.4.

The guidelines recommend that blasting should generally be permitted during the hours of 9am to 5pm Monday to Saturday only. Blasting should not occur on Sundays or Public Holidays. Furthermore, blasting should generally take place no more than once per day.

This page has been intentionally left blank

3 Assessment Criteria

The following sections summarise the relevant noise and blasting criteria for this type of project.

3.1 Construction Noise Management Levels

Noise Management Levels (NMLs) for standard construction hours and out of hours periods are summarised in **Table 7**.

Table 7 Construction Noise Management Levels

Location	Assessment Period	RBL dBA	NML dB $L_{Aeq(15min)}$
All Residential Receivers	Standard Hours	35	45 (RBL+10dBA)
	OOH	30	35 (RBL+5dBA)

Note: See Table 5 for Recommended Construction Hours.

3.2 Operational Noise Management Levels

3.2.1 Project Intrusiveness Noise Levels

Due to the rural nature of the locality, the PINLs for the quarry have been determined based on the minimum RBL+5dBA. The PINLs for the Project are presented in **Table 8**.

Table 8 Intrusiveness Noise Levels

Receiver Type	Period[1]	Adopted RBL[2] dB L_{A90}	PINL dB $L_{Aeq(15min)}$
Residential	Day	35	40

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

Note 2: Minimum RBLs adopted.

3.2.2 Project Amenity Noise Levels

The PANLs for residential receivers potentially affected by the Project are presented in **Table 9**.

Table 9 Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	Recommended ANL dB $L_{Aeq(period)}$[2]	PANL dB $L_{Aeq(15min)}$[3]
Residential	Rural	Day	50	53

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

Note 2: Recommended amenity noise levels as per Table 2.2 of the NPI.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

3.2.3 Project Noise Trigger Levels

The PNTLs are the lower of either the PINL or the PANL. **Table 10** presents the derivation of the PNTL in accordance with the methodologies outlined in the NPI.

Table 10 Project Noise Trigger Levels

Receiver Type	Period[1]	RBL	PINL dB $L_{Aeq(15min)}$	PANL dB $L_{Aeq(15min)}$	PNTL dB $L_{Aeq(15min)}$
Residential	Day	35	40	53	**40**

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

3.3 Road Traffic Noise Criteria

In accordance with the RNP, this assessment has adopted the 'Freeway/arterial/sub-arterial road' category for the designated inbound and outbound transport routes, consistent with the classification of the haulage route as a 'principal haulage route'. **Table 11** reproduces the road traffic noise assessment criteria relevant for this road type.

Table 11 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road category	Type of Project/development	Assessment Criteria - dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial road	Existing residences affected by additional traffic on existing freeways/sub-arterial/roads generated by land use developments	60dB(A) $L_{Aeq(15hr)}$	55dB(A) $L_{Aeq(9hr)}$

Note: For road noise assessments, the day period is from 7am to 10pm (ie there is no evening assessment period as there is with operational noise). Night is from 10pm to 7am.

Additionally, the RNP states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2dB, which is generally accepted as the threshold of perceptibility to a change in noise level.

3.3.1 Relative Increase Criteria

In addition to meeting the assessment criteria, any significant increase in total traffic noise at receivers must be considered. Receivers experiencing increases in total traffic noise levels above those presented in **Table 12** due to the addition of project vehicles on Kingstown Road should be considered for mitigation.

Table 12 Increase Criteria for Residential Land Uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase, dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{Aeq(15hr)}$ +12dB (external)	Existing traffic $L_{Aeq(9hr)}$ +12dB (external)

3.4 ANZEC Guideline Blasting Limits

The ANZEC blasting limits for air-blast overpressure and ground vibration are presented in **Table 13**.

Table 13 ANZEC Guideline Blasting Limits

	Overpressure dB (Linear Peak)	Ground Vibration PPV (mm/s)
Recommended Maximum (95% of all blasts)	115	5
Level not to be exceeded	120	10
Long term goal for ground vibration	N/A	2

This page has been intentionally left blank

4 Noise Assessment Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2022) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation' including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

4.1 Construction Noise Modelling Parameters

MAC understands that the expansion of the quarry would involve the continuation and intensification of activities at the site and would not require additional construction activities. Hence, no further assessment of construction activities is required.

4.2 Operational Noise Modelling Parameters

The model incorporated three-dimensional digitised ground contours for the quarry and surrounding area, as derived from proposed Project plans superimposed onto the surrounding land base topography. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

4.2.1 Meteorological Analysis

Noise emissions from industry can be significantly affected by prevailing weather conditions. Wind has the potential to increase noise at a receiver when it is at low velocities and travels from the direction of the noise source. As the strength of the wind increases, the noise produced by the wind will mask the audibility of most industrial sources.

Meteorological conditions that enhance received noise levels include source to receiver winds and the presence of temperature inversions. To account for potential enhancements, the NPI specifies that the source to the receiver wind component speeds up to 3m/s for 30% or more of the time in any seasonal period (i.e. day, evening or night), is considered to be a feature wind and predictions must incorporate these conditions.

To determine the prevailing conditions for the Quarry, weather data during the period September 2019 to September 2021 was obtained from the Bureau of Meteorology's (BOM) Armidale Airport (ID:056238) Automatic Weather Station located approximately 24km northeast of the quarry site. The data was analysed using the EPA's Noise Enhancement Wind Analysis (NEWA) program in order to determine the frequency of occurrence of winds of speeds up to 3m/s in each season.

Table 14 summarises the results of the wind analysis and includes the dominant wind direction and percentage occurrence during each season for each assessment period. The results of the detailed analysis of meteorological data are presented in Appendix B.

Table 14 Seasonal Frequency of Occurrence Wind Speed Intervals

Season	Period	Wind Direction ±(45°)	% Wind Speeds (m/s) 0.5 to 3 m/s
Summer	Day	ENE, WSW	6
	Evening	NE, WNW	8
	Night	NE	13
Autumn	Day	WSW, WNW	8
	Evening	WNW	16
	Night	NE	23
Winter	Day	WSW, WNW	9
	Evening	WNW	17
	Night	NE	20
Spring	Day	SW, WSW, W, WNW	6
	Evening	WNW	15
	Night	NE, NW	15

Based on the results of this analysis, prevailing winds are not applicable for the assessment. The relevant meteorological conditions adopted are summarised in **Table 15**.

Table 15 Modelled Site Specific Meteorological Parameters

Assessment Condition	Temperature	Wind Speed / Direction	Relative Humidity	Stability Class
Day - Calm	20°C	0.5m/s all directions	60%	D

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

4.2.2 Operational Noise Modelling Scenario and Sound Power Levels

The following methods would be used to extract weathered material:

- Extraction would be undertaken on a campaign basis using a bulldozer or excavator to rip and push the weathered material into stockpiles;
- Material requiring further processing would be direct loaded into a mobile crushing unit using a front-end loader; and
- Material not requiring further processing would be direct loaded into road trucks for transportation off site.

Based on the proposed extraction methods, one (1) modelling scenario has been adopted to represent the worst-case Quarry operations. Mobile plant noise emission data used in modelling for this assessment were obtained from the manufacturer specifications or the MAC noise database. The noise emission levels used in modelling are summarised in **Table 16**.

Table 16 Single Octave Equipment Sound Power Levels, dB LAeq(15min) *(re10^{-12}W)*

Noise Source/Item	Octave Band Centre Frequency, Hz								Total, dBA
	63	125	250	500	1000	2000	4000	8000	
Mobile Equipment									
Bulldozer (Komatsu D85)	86	95	99	107	103	102	100	90	110
Loader (Komatsu WA250PZ or similar) (x3)	77	87	93	98	98	98	90	82	104
Truck & Dog (34t) (15/hr)	92	96	98	102	103	101	94	89	108
Rigid Truck (14t) (4/hr)	89	88	94	96	101	97	91	82	104
Semi Tipper (26t) (1/hr)	92	98	93	92	96	100	95	88	105
Mobile Crushing Unit[1]	88	96	103	106	106	104	100	93	111

Note 1: Occasional use of Mobile Crushing Unit only.

4.2.3 Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying ‘modifying factors’ corrections to account for annoying noise characteristics such as low frequency, tonality, intermittent noise or noise of short duration. An assessment of annoying characteristics has been undertaken for the project, and is provided in **Appendix C**. It is noted that due to the nature of the quarry operations, intermittent noise is not considered to be a feature of the site and has not been assessed.

The analysis of low-frequency noise found that modelled noise levels from all sources exceeded the screening test of C-A weighted noise levels greater or equal to 15dB. Therefore, further analysis was undertaken to determine whether noise levels exceeded the threshold in any octave band. The results of the assessment indicated that Z weighted noise levels remained below the relevant thresholds for all octave bands. Hence, no correction for low-frequency noise is applied.

An assessment of tonality was undertaken to identify dominant tones associated with the quarry. The tonal noise correction applies when the level of an octave band exceeds the level of the adjacent band on either side by at least 5dB. The results of the tonality assessment demonstrates that the quarry operations do not result in dominant tones. Hence, no correction for tonality is applied.

4.3 Road Noise Assessment Methodology

Predicted noise levels from project related traffic at the nearest receiver (15m from Kingstown Road / East Street) has been calculated using the United States Department of Transport, Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Low Volume Calculation Tool.

MAC understands that extracted material would typically be transported from the quarry using truck and dog trailers with a maximum capacity of 34t. Smaller rigid trucks (14t) and semi-tippers (26t) would also be used on occasion. During operation of the quarry the average number of truck movements would be 38 movements per day, with a maximum of 60 truck movements per day comprising 58 laden truck movements mauling material from the quarry and two (2) heavy vehicle movements for maintenance servicing or refuelling. Under the existing operations, the maximum number of truck movements is approximately 50 movements per day.

Upon departing the quarry site, it is assumed that all laden trucks would turn right from the Quarry Access Road (negligible traffic is assumed to turn left from the Quarry Access Road) and travel along Kingstown Road towards Uralla, before turning on to the New England Highway. Residential receivers along the proposed transport route are generally setback from Kingstown Road, with a minimum offset distance of approximately 30m to receivers on the outskirts of Uralla, and approximately 15m to the nearest receivers within the township of Uralla.

4.4 Blasting and Vibration Assessment Methodology

MAC understands that the rock material generally breaks apart when excavated, however, small unconfined surface blasts may be required in occasion when consolidated rock is encountered. It is anticipated that surface blasting would occur at an average rate of one blast every two years.

4.4.1 Air-Blast Overpressure

Calculation of overpressure has been completed using the following AS2187.2 equation:

$$\mathrm{P} = K_a \left(\frac{R}{(Q^{1/3})}\right)^a$$

Where:

P = Pressure, in kilopascals;

Q = Effective explosives charge mass, in kilograms (MIC);

R = Distance from charge, in metres;

K_a = Site constant of 516 was adopted for an unconfined surface blast; and

a = Site exponent, a value of -1.45 was adopted.

The conversion of 'P' to unweighted decibels (dBZ) is completed using the following formula:

$$\mathrm{SPL} = 10\ x \log\left(\frac{P}{P_0}\right)^2$$

4.4.2 Ground-Borne Vibration

Preliminary estimations for vibration have been completed using the following AS2187.2 equation:

$$\mathrm{V} = K_g \left(\frac{R}{(Q^{1/2})}\right)^{-B}$$

Where:

V = ground vibration as vector peak particle velocity, in mm/s;

R = distance between charge and point of measurement, in m;

Q = maximum instantaneous charge (effective charge mass per delay), in kg;

K_g = a constant related to site and rock properties for estimation purposes, a value of 1140 was adopted as per AS2187.2 to predict the 50% chance of exceedance in "average conditions"; and

B = a constant related to site and rock properties for estimation purposes, a value of 1.6 was adopted.

5 Noise Modelling Results and Discussion

5.1 Operational Noise Results

Quarry operations for noise prediction included extraction, processing, product loading and transportation. The predicted noise levels at each receiver during calm meteorological conditions are provided in **Table 17**. The noise contour maps for the quarry operations are provided in **Figure 3**.

The results of the noise modelling show that noise emissions from the quarry satisfy the PNTL at all residential receivers. The modelled operational scenario considered the worst-case operating conditions based on the staffing numbers, assuming the simultaneous operation of plant at maximum capacity during the entirety of the assessment period.

Table 17 Predicted Operational Noise Levels

Receiver	Period	Noise Predictions dB $L_{Aeq(15min)}$	PNTL	Compliant
SR1	Day	<30	40	✓
SR2	Day	<30	40	✓
SR3	Day	<30	40	✓
SR4	Day	<30	40	✓

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.

5.2 Traffic Noise Results

The results of the traffic noise calculations for the highest expected operational road traffic volumes are presented in **Table 18** for the closest residential receivers to Kingstown Road. The traffic noise contribution from the quarry is predicted to remain below the relevant day period assessment criterion for the potentially most affected residential receivers adjacent to the haul route.

Table 18 Operational Road Traffic Noise Levels – Residential Receivers

Offset Distance (m)	Assessment Criteria[1]	Traffic Noise dB $L_{Aeq(15hr)}$		
		Existing Traffic Noise	Future Traffic Noise	Total Change
15	60 dB $L_{Aeq(15hr)}$	50.6	51.3	+0.7

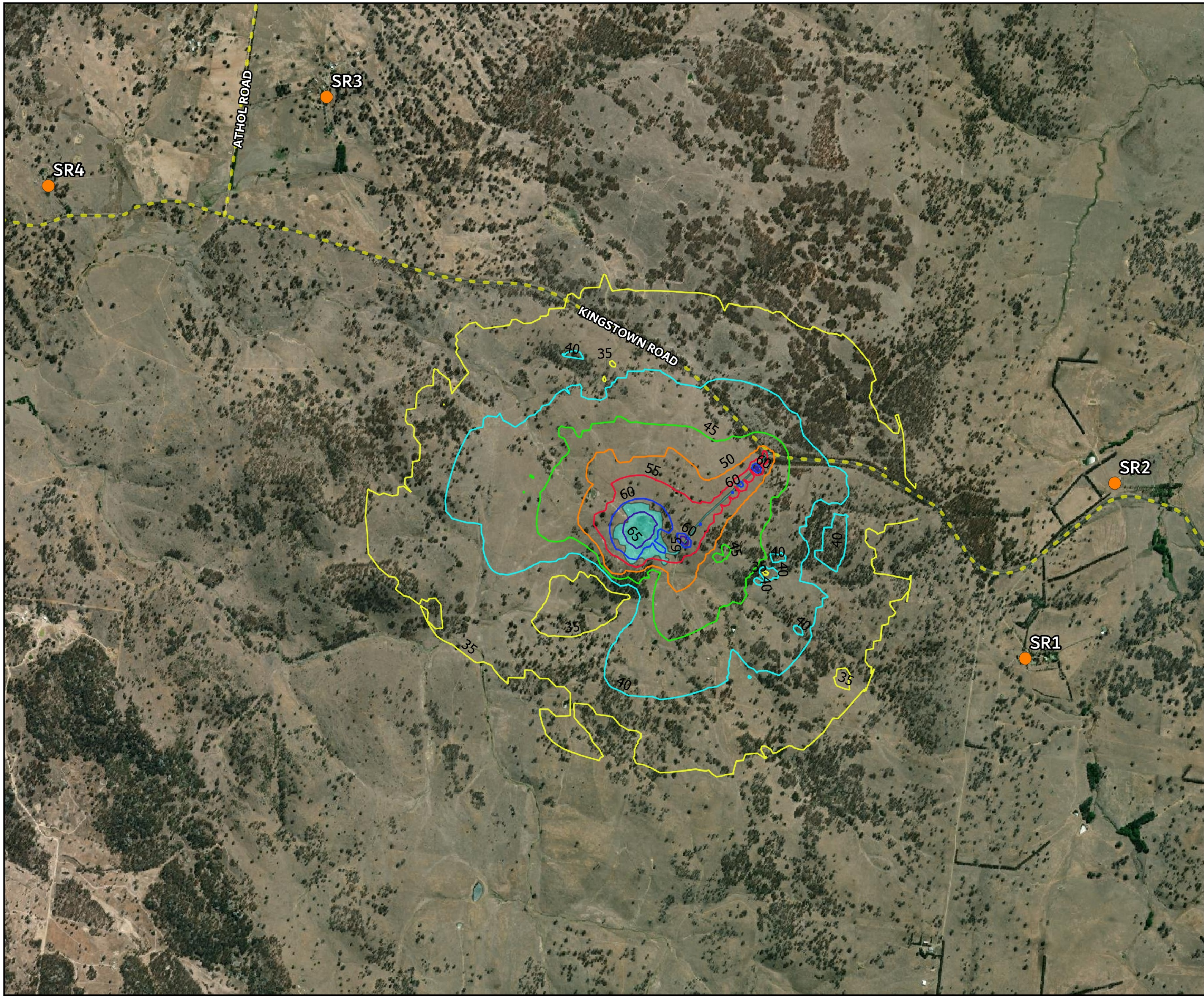
Note 1: Day 7am to 10pm.

FIGURE 3

Operational Noise Contours

MAC221518-01

Carlon's Quarry



KEY

Project Site

Receivers

Road Network

LAeq(15min) Noise Contours

35 dB

40 dB

45 dB

50 dB

55 dB

60 dB

65 dB

0 300 600 900 1200 m

N

MAC Muller Acoustic Consulting

5.3 Blasting Results

Blast overpressure and vibration have been calculated to each assessed receiver for the quarry adopting an MIC of up to 3kg for a small unconfined surface blast. Calculated levels for overpressure and vibration have been compared to the relevant ANZEC criteria and are presented in **Table 19**.

Results identify unconfined blasts of MICs up to 3kgs would satisfy relevant ANZEC overpressure and ground vibration criteria. Notwithstanding, where blasts are confined using a clay capping or similar, the overpressure levels are anticipated to be up to 14dBZ lower than the unconfined blast overpressure level.

Table 19 Blasting Emissions

Receiver ID	Distance to Charge[1]	Airblast Overpressure	Ground Vibration
	km	dBZ Peak	mm/s
SR1	2.5	114.2	<0.01
SR2	3.0	112.1	<0.01
SR3	3.5	110.6	<0.01
SR4	4.3	107.5	<0.01

Note 1: Denotes distance from centre of disturbance area to nearest receivers

5.3.1 Effects of Vibration on Infrastructure from Blasting

There is no significant infrastructure in the locality of the quarry. The nearest public road is Kingstown Road approximately 950m to the north of the quarry site, where ground vibration levels of up to 0.05mm/s are predicted to be experienced.

5.3.2 Effects of Blasting on Animals and Livestock

Blast effects resulting from the quarry are predicted at the nearest sensitive receivers to be, at worst for overpressure up to 114dBZ, and for vibration up to 0.01mm/s. These levels are well below the regulatory criteria and considerably lower than other sources of overpressure that livestock are likely to be already subjected to such as lightning strikes which are typically between 120dBZ and 130dBZ[2].

[2] Equine Health Impact Statement – Drayton South Coal Project (2015)

This page has been intentionally left blank

6 Noise Monitoring and Management

Although it is demonstrated that noise levels are predicted to meet the relevant PNTLs and no further mitigation measures are required, to proactively address any potential residual noise impacts, the Applicant would prepare an Environmental Management Plan (EMP), incorporating feasible and reasonable noise mitigation measures, for the ongoing management of the relevant environmental issues at the quarry.

This page has been intentionally left blank

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has conducted a NIA of potential impacts associated with the proposed expansion of Carlon's Quarry, Balala, NSW. The assessment has quantified potential operational noise emissions pertaining to extraction, processing and dispatch of quarry products via road trucks, road traffic noise on Kingstown Road, and air-blast overpressure and ground vibration from small unconfined blasts.

The results of the NIA demonstrate that operational noise levels comply with the relevant NPI criteria for all assessment periods at the most affected sensitive receiver locations. Additionally, the NIA demonstrates that the road noise criteria as specified in the RNP will be satisfied at the nearest potentially affected receivers for worst case operational road traffic.

Airblast overpressure and vibration levels are also predicted to meet the criteria at all assessed receivers for unconfined blast up to 3kg MIC.

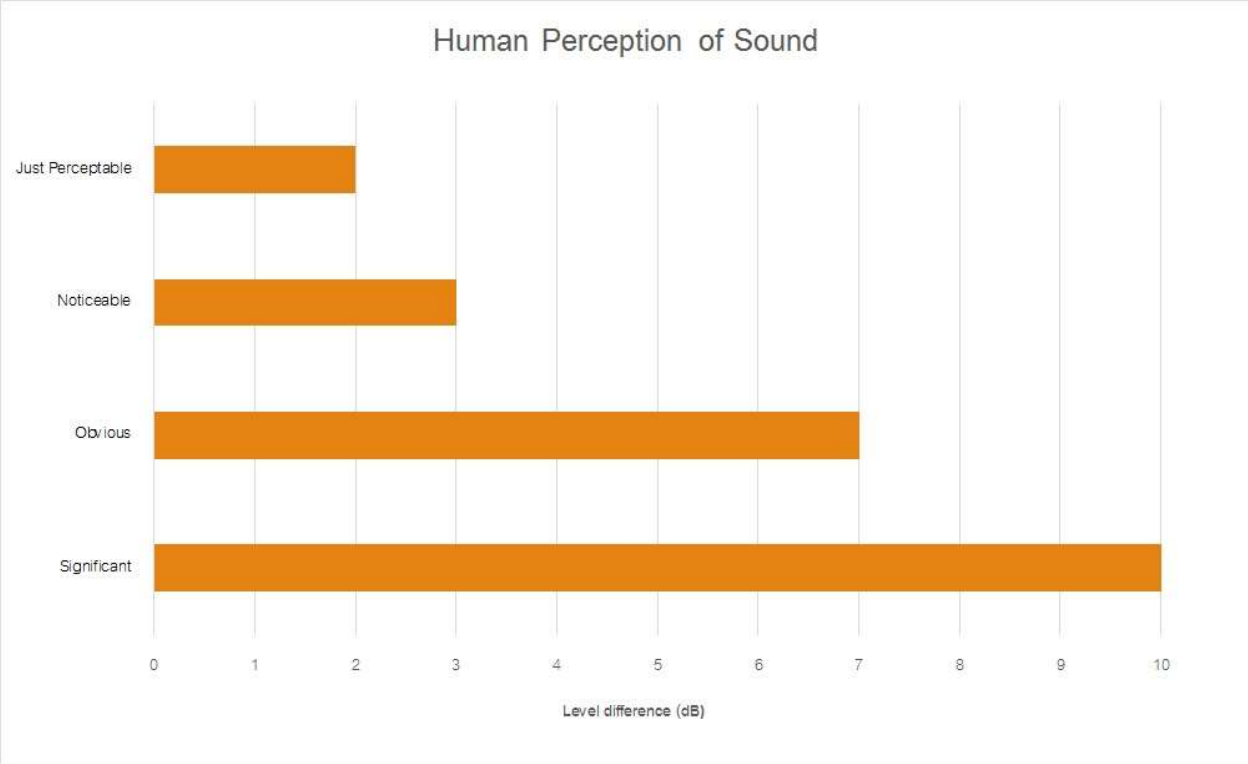
This page has been intentionally left blank

Appendix A – Glossary of Terms

Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA_{90} statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear. In some cases the overall change in noise level is described in dB rather than dB(A), or dB(Z) which relates to the weighted scale.
dB(Z)	Linear Z-weighted decibels.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA_{10}	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA_{90}	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LA_{eq}	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LA_{max}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Figure A1 – Human Perception of Sound



This page has been intentionally left blank

Appendix B – NEWA Analysed Meteorology

Table B1 NEWA Analysed Daytime Meteorological Conditions, Armidale Airport AWS NSW					
Direction ± 45º	Season	Day Percentage Occurrence %	Direction	Season	Day Percentage Occurrence %
0	Summer	2	180	Summer	3
0	Autumn	3	180	Autumn	4
0	Winter	3	180	Winter	3
0	Spring	2	180	Spring	5
22.5	Summer	3	202.5	Summer	4
22.5	Autumn	4	202.5	Autumn	4
22.5	Winter	4	202.5	Winter	4
22.5	Spring	3	202.5	Spring	5
45	Summer	5	225	Summer	5
45	Autumn	7	225	Autumn	8
45	Winter	5	225	Winter	8
45	Spring	4	225	Spring	6
67.5	Summer	6	247.5	Summer	6
67.5	Autumn	7	247.5	Autumn	8
67.5	Winter	5	247.5	Winter	9
67.5	Spring	4	247.5	Spring	6
90	Summer	5	270	Summer	5
90	Autumn	6	270	Autumn	7
90	Winter	5	270	Winter	8
90	Spring	4	270	Spring	6
112.5	Summer	5	292.5	Summer	5
112.5	Autumn	6	292.5	Autumn	8
112.5	Winter	5	292.5	Winter	9
112.5	Spring	5	292.5	Spring	6
135	Summer	5	315	Summer	5
135	Autumn	6	315	Autumn	7
135	Winter	4	315	Winter	8
135	Spring	5	315	Spring	5
157.5	Summer	2	337.5	Summer	3
157.5	Autumn	3	337.5	Autumn	3
157.5	Winter	2	337.5	Winter	4
157.5	Spring	3	337.5	Spring	3

Table B2 NEWA Analysed Evening Meteorological Conditions, Armidale Airport AWS NSW					
Direction ± 45°	Season	Evening Percentage Occurrence %	Direction	Season	Evening Percentage Occurrence %
0	Summer	5	180	Summer	3
0	Autumn	5	180	Autumn	6
0	Winter	8	180	Winter	4
0	Spring	6	180	Spring	5
22.5	Summer	6	202.5	Summer	3
22.5	Autumn	7	202.5	Autumn	6
22.5	Winter	9	202.5	Winter	5
22.5	Spring	6	202.5	Spring	7
45	Summer	8	225	Summer	5
45	Autumn	15	225	Autumn	11
45	Winter	12	225	Winter	11
45	Spring	7	225	Spring	11
67.5	Summer	7	247.5	Summer	7
67.5	Autumn	13	247.5	Autumn	13
67.5	Winter	9	247.5	Winter	14
67.5	Spring	6	247.5	Spring	13
90	Summer	5	270	Summer	7
90	Autumn	10	270	Autumn	15
90	Winter	7	270	Winter	15
90	Spring	5	270	Spring	14
112.5	Summer	6	292.5	Summer	8
112.5	Autumn	13	292.5	Autumn	16
112.5	Winter	9	292.5	Winter	17
112.5	Spring	6	292.5	Spring	15
135	Summer	6	315	Summer	7
135	Autumn	13	315	Autumn	15
135	Winter	7	315	Winter	14
135	Spring	6	315	Spring	12
157.5	Summer	2	337.5	Summer	6
157.5	Autumn	5	337.5	Autumn	8
157.5	Winter	3	337.5	Winter	9
157.5	Spring	3	337.5	Spring	7

Table B3 NEWA Analysed Night time Meteorological Conditions, Armidale Airport AWS NSW					
Direction ± 45º	Season	Night Percentage Occurrence %	Direction	Season	Night Percentage Occurrence %
0	Summer	5	180	Summer	2
0	Autumn	5	180	Autumn	2
0	Winter	8	180	Winter	2
0	Spring	7	180	Spring	3
22.5	Summer	8	202.5	Summer	2
22.5	Autumn	11	202.5	Autumn	2
22.5	Winter	14	202.5	Winter	2
22.5	Spring	11	202.5	Spring	4
45	Summer	13	225	Summer	6
45	Autumn	23	225	Autumn	6
45	Winter	20	225	Winter	6
45	Spring	15	225	Spring	8
67.5	Summer	12	247.5	Summer	9
67.5	Autumn	20	247.5	Autumn	10
67.5	Winter	17	247.5	Winter	10
67.5	Spring	13	247.5	Spring	12
90	Summer	10	270	Summer	9
90	Autumn	17	270	Autumn	12
90	Winter	14	270	Winter	13
90	Spring	11	270	Spring	14
112.5	Summer	9	292.5	Summer	10
112.5	Autumn	16	292.5	Autumn	12
112.5	Winter	13	292.5	Winter	14
112.5	Spring	11	292.5	Spring	14
135	Summer	8	315	Summer	10
135	Autumn	12	315	Autumn	13
135	Winter	7	315	Winter	14
135	Spring	7	315	Spring	15
157.5	Summer	1	337.5	Summer	6
157.5	Autumn	2	337.5	Autumn	6
157.5	Winter	1	337.5	Winter	10
157.5	Spring	2	337.5	Spring	9

Appendix C – Annoying Characteristics Assessment

C1 Requirements to Address Annoying Characteristics

Fact Sheet C of the NPI provides guidelines for applying 'modifying factors' adjustments to account for annoying noise characteristics such as low frequency, tonality, intermittent noise, irregular or noise of short duration.

C1.1 Low Frequency Noise

In accordance with Table C1 of the NPI, the low-frequency noise correction applies when the C minus A level is 15dB or more, and:

- Where any of the one-third octave noise levels in Table C2 (reproduced in **Table C-1**) are exceeded by up to and including 5dB and cannot be mitigated, a 2dBA positive adjustment to the measured/predicted A-weighted levels applies for the evening/night period; or
- Where any of the one-third octave noise levels in Table C2 are exceeded by more than 5dB and cannot be mitigated, a 5dBA positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dBA positive adjustment applies for the daytime period.

Table C-1 One-third octave low-frequency noise thresholds (from Table C2 of NPI)

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Noise predictions have been completed to determine the applicability of low frequency modifying factors. The modelled C-A noise levels for the nearest residential receivers to the quarry (R1, R2, R3 and R4) are provided in **Table C-2**.

It is noted that 1/1 octave data has been adopted for the assessment as 1/3 octave data for the project is unavailable. Additionally, results should be considered worst case for the site as concurrent operation of all plant and equipment was assessed. It is also noted that the assessment of low frequency noise by calculation is indicative as the inclusion of one third octaves and frequencies below 63Hz are not 100% compliant with the scope of ISO9613.

Table C-2 Modelled C weighted and A Weighted Single Octave Band Levels, dB LAeq(15min)									
Receiver ID	Octave Band Centre Frequency, Hz								Total
	Weighting	63	125	250	500	1000	2000	4000	
SR1	A	15.0	19.5	18.4	23.1	19.7	8.3	-38.2	26.9
	C	40.4	35.4	27.0	26.3	19.7	6.9	-40.0	41.9
Difference (C-A), dB									14.9
SR2	A	13.3	17.7	16.3	20.4	16.3	3.6	-45.0	24.4
	C	38.7	33.6	24.9	23.6	16.3	2.2	-46.8	40.2
Difference (C-A), dB									15.7
SR3	A	12.7	16.4	14.5	17.9	13.5	-1.7	-62.8	22.4
	C	38.1	32.3	23.1	21.1	13.5	-3.1	-64.6	39.3
Difference (C-A), dB									16.8
SR4	A	9.4	13.5	10.7	12.6	5.9	-13.2	-89.5	18.2
	C	34.8	29.4	19.3	15.8	5.9	-14.6	-91.3	36.0
Difference (C-A), dB									17.8

Analysis of the noise modelling identifies that with the inclusion of all noise sources, low frequency noise exceeds the screening test difference of C-A=15dB at receiver locations except the nearest residential receiver (SR1). Further analysis was therefore undertaken to determine whether any of the 1/3 octave noise levels in Table C2 of the NPI (**Table 1**) are exceeded for Receivers SR2 to SR4. It is noted that where data was only available as 1/1 octave, levels in each 1/1 band were divided equally into each 1/3 octave band.

The results of the analysis of low-frequency noise thresholds found that received levels do not exceed the thresholds in **Table C-1** by more than 5dB for day period operations at any of the receiver locations. Hence, the low-frequency correction is not applied to received noise levels for this assessment.

C1.2 Tonality

In addition to low frequency noise, a review of modifying factors for tonality have been completed. In accordance with Table C1 of the NPI, a correction for tonal noise applies when the level of 1/3 octave band exceeds the level of the adjacent band on both sides by:

- 5dB or more if the centre frequency of the band containing the tone is in the range 500-10,000Hz;
- 8dB or more if the centre frequency of the band containing the tone is in the range 16-400Hz; or
- 15dB or more if the centre frequency of the band containing the tone is in the range 25-125Hz.

MAC notes that the assessment should be completed with 1/3 octave data, however, only 1/1 octave data was available for the project. **Table C-3**, presents the results of the 1/1 octave data tonality noise test for the project.

The results of the analysis indicate that there are no dominant tones associated with the project. Hence, a correction for tonality is not required.

Table C-3 Modelled Z weighted Single Octave Band Levels, dB $LA_{eq(15min)}$

Receiver ID	Octave Band Centre Frequency, Hz								Total
	Weighting	63	125	250	500	1000[1]	2000[1]	4000[1]	
SR1	Z	41.2	35.6	27.0	26.3	19.7	7.1	-39.2	42.5
SR2	Z	39.5	33.8	24.9	23.6	16.3	2.4	-46.0	40.8
SR3	Z	38.9	32.5	23.1	21.1	13.5	-2.9	-63.8	39.9
SR4	Z	35.6	29.6	19.3	15.8	5.9	-14.4	-90.5	36.7

Note 1: For octave data for 1kHz and greater, the key difference between the octave bands is associated with atmospheric attenuation and ground absorption and noise mitigation measures (such as partial enclosures of sources, rather than a dominant tonal component from the source at these frequencies.)

Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting

Appendix E Air Quality Assessment

Carlon’s Quarry Expansion Project

Air Quality Assessment

Project Number.: 0038

Date: 5 August 2022

Document details	
Document title	Carlon's Quarry Expansion Project
Document subtitle	Air Quality Assessment
Project No.	0038
Date	5 August 2022
Version	Draft
Author	Jane Barnett
Client Name	Onward Consulting

Document history

Version	Date	Author	Reviewed by	Comments
D01	18.05.2022	Jane Barnett	Damon Roddis	Draft for client review
D02	23.05.2022	Jane Barnett	Damon Roddis	Final draft
F01	25.05.2022	Jane Barnett	Damon Roddis	Final
F02	05.08.2022	Jane Barnett	Damon Roddis	Final updated

Jane Barnett
Principal – Air Quality

Zephyr Environmental Pty Ltd
PO Box 41
Rozelle NSW 2039

CONTENTS

List of Tables

List of Figures

1 INTRODUCTION

Blendee Partnership is proposing to increase the size and production rate of their existing Carlon's Quarry to provide material for the development of road and infrastructure, due to the increasing demand from large scale renewable energy projects in the New England region.

Onward Consulting (on behalf of Blendee) has commissioned Zephyr Environmental (Zephyr) to prepare the air quality assessment for this proposed development. The assessment was prepared in accordance with the NSW EPA "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (Approved Methods) (EPA, 2016).

2 PROJECT DESCRIPTION

Carlon's Quarry is an existing approved gravel quarry operated by Blendee Partnership, located on the Kingstown Road approximately 10 kilometres (km) west of Uralla in northern NSW.

The existing quarry received development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW Environment Planning and Assessment Act 1979 (EP&A Act) for the Carlon's Quarry Expansion Project (the Project). This air quality impact assessment has been prepared to accompany the development application for the Project, with reference to the air quality components of the Secretary's Environmental Assessment Requirements (SEARs).

Carlon's Quarry is operated using machinery such as bulldozers, front end loaders and excavators. There has been no permanent infrastructure developed as part of the quarry.

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m^3) to a maximum 120,000 m^3 per annum with an approximate average of 80,000 m^3 per annum. The Project involves a minor extension to the north and west of the existing quarry and will require the operation of additional mobile equipment.

The nearest sensitive receptors are more than 2 km from the proposed works, as shown in Figure 2-1.

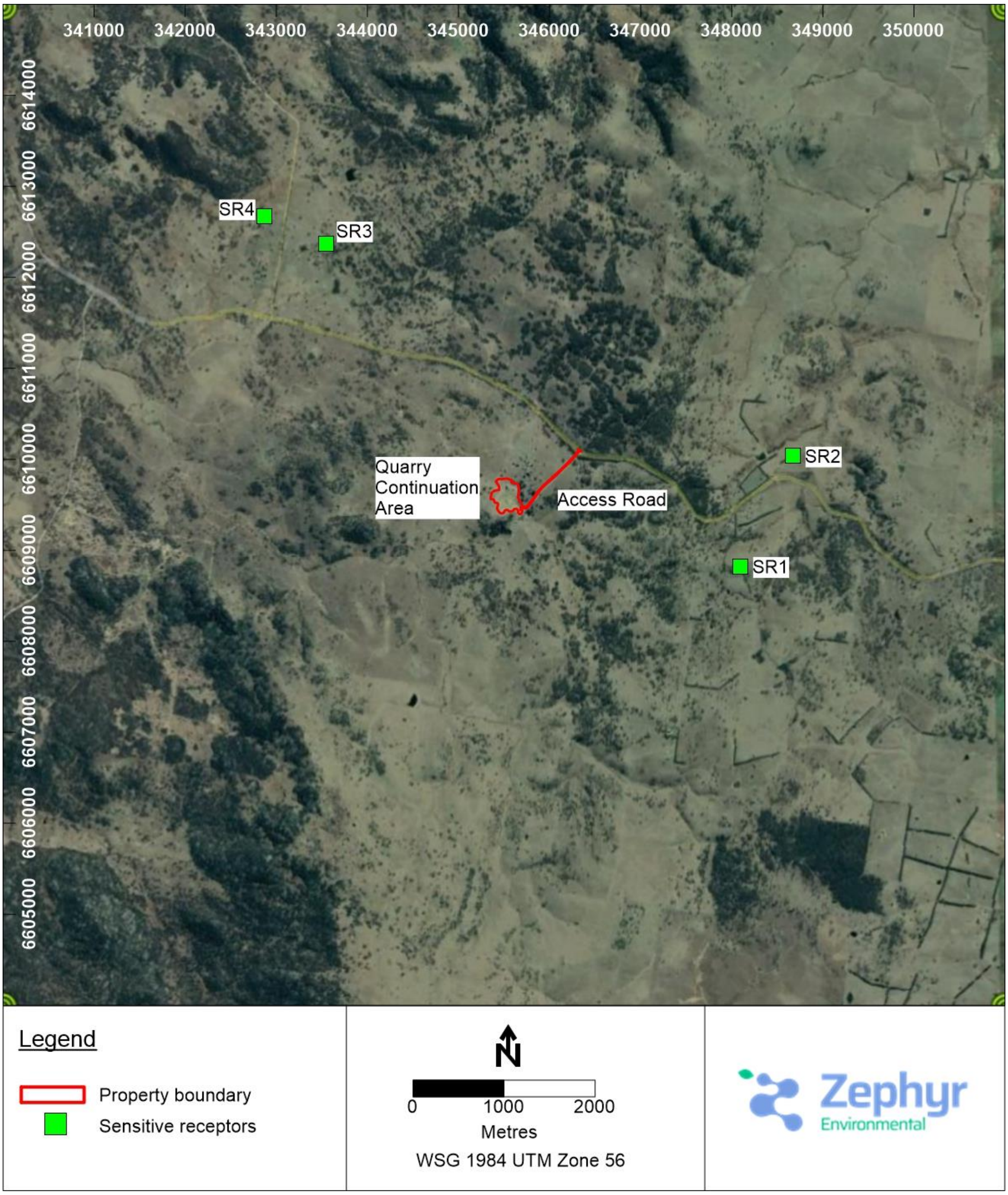


Figure 2-1: Project location relative to Sensitive Receptors (SR)

3 REGULATORY REQUIREMENTS

3.1 Secretary's Environmental Assessment Requirements (SEARs)

The SEARs for the project were issued on 3 December 2021. The SEARs related to air quality are provided in Table 3-1.

Table 3-1: SEARs requirements – air quality

Requirement	Report section
An assessment of the likely air quality impacts of the development in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016)*. The assessment is to give particular attention to potential dust impacts on any nearby private receivers due to construction activities, the operation of the quarry and/or road haulage	Section 8

3.2 NSW Environment Protection Authority

The NSW EPA has also provided some requirements for the air quality impact assessment. These are replicated in Table 1.3 below.

Table 3-2: NSW EPA requirements – air quality

Requirement	Report section
The assessment must demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act (1997)* and the *POEO (Clean Air) Regulation (2002)*. Particular consideration should be given to section 129 of the POEO Act concerning control of "offensive odour".	Section 4.1
The AQIA must be carried out in accordance with the document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016)*.	Section 8
The assessment must detail emission control techniques/practices that will be employed at the site and identify how the proposed control techniques/practices will meet the requirements of the POEO Act, *POEO (Clean Air) Regulation* and associated air quality limits or guideline criteria	Section 7

4 AIR QUALITY ASSESSMENT CRITERIA

The Approved Methods specifies air quality criteria relevant for assessing impacts from air pollution (EPA, 2016). These criteria are health-based and for PM_{10} and $PM_{2.5}$ are consistent with the revised National Environment Protection Measure for Ambient Air Quality (referred to as the Ambient Air-NEPM). Table 4-1 presents the air quality criteria for concentrations of particulate matter (PM) that that are relevant to this study.

Table 4-1: NSW EPA impact assessment criteria for PM_{10} and $PM_{2.5}$

Pollutant	Averaging period	Criterion
PM_{10}	Annual	25 µg/m^3
	24-hour	50 µg/m^3
$PM_{2.5}$	Annual	8 µg/m^3
	24-hour	25 µg/m^3

Airborne PM also has the potential to cause nuisance dust effects when it deposits on surfaces. Larger particles do not tend to remain suspended in the atmosphere for long periods of time and will fall out relatively close to the source. Dust fallout can soil materials and generally degrade the aesthetic environment and is therefore assessed for nuisance or amenity impacts. Table 4-2 shows the maximum acceptable increase in deposited dust levels over the existing dust levels and the maximum total deposited dust level. These criteria for deposited dust levels are set to protect against nuisance impacts (EPA, 2016).

Table 4-2: NSW EPA impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase (due to the project)	Maximum total level (cumulative)
Deposited dust (insoluble solids)	Annual	2 g/m^2/month	4 g/m^2/month

4.1 Protection of the Environment Operations Act (1997)

The statutory framework for managing air emissions in NSW is provided in the Protection of the Environment Operations Act 1997 (POEO Act). The primary regulations for air quality made under the POEO Act are:

- Protection of the Environment Operations (Clean Air) Regulation 2010
- Protection of the Environment Operations (General) Regulation 2009

The Project will comply with the POEO regulations as follows:

- as a scheduled activity under the POEO regulations, the quarry will operate under an Environment Protection Licence (EPL) issued by the NSW EPA and will be required to comply with requirements including emission limits, monitoring and pollution reduction programmes (PRPs)
- the quarry will not feature significant odour-generating emission sources and is, therefore, unlikely to generate odorous emissions
- no large-scale open burning will be performed on-site

5 LOCAL METEOROLOGY

The closest meteorological station to the Project Site is the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) located at Armidale Airport, approximately 20 km to the northeast of the Project.

A representative meteorological dataset was chosen by analysing the most recent six years' worth of data from the Armidale Airport AWS. Annual windroses were compiled for six years from 2016 to 2021 and are presented in Figure 5-1. This analysis shows that wind speed and direction are reasonably consistent from year to year, and that 2021 is a representative year.

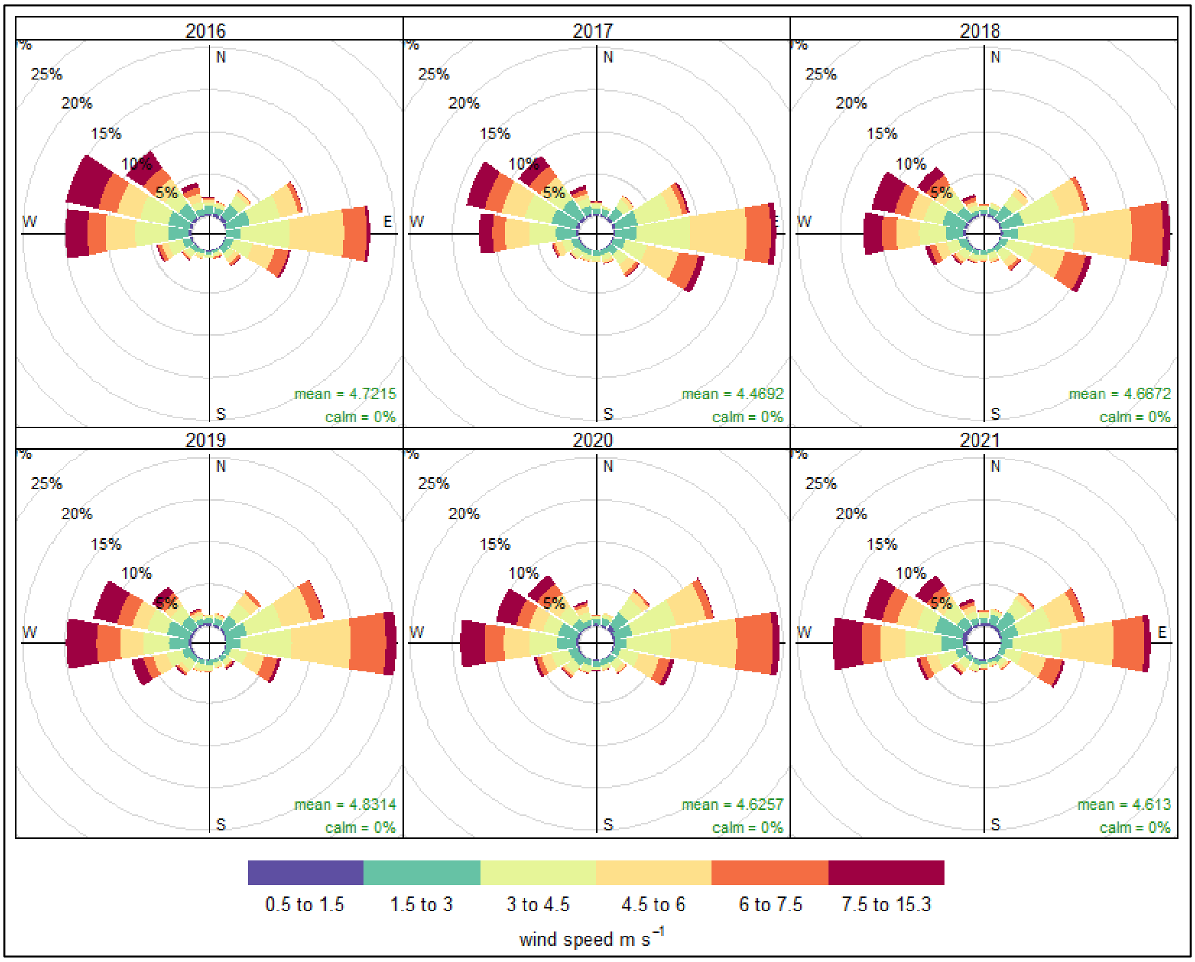


Figure 5-1: Annual windroses for 2016 – 2021 at the Armidale Airport AWS

Figure 5-2 presents the seasonal variations for 2021. The patterns as they vary from month to month are also shown in Figure 5-3.

On an annual basis, winds are predominantly from the western and eastern quadrants, with stronger winds from the west. The majority of these stronger winds occur in winter and into spring, which is shown clearly in the seasonal and monthly windroses. Winds in summer are generally from the eastern quadrant. The highest hourly average wind speed for the year was 14.9 m/s, with an annual average of 4.6 m/s.

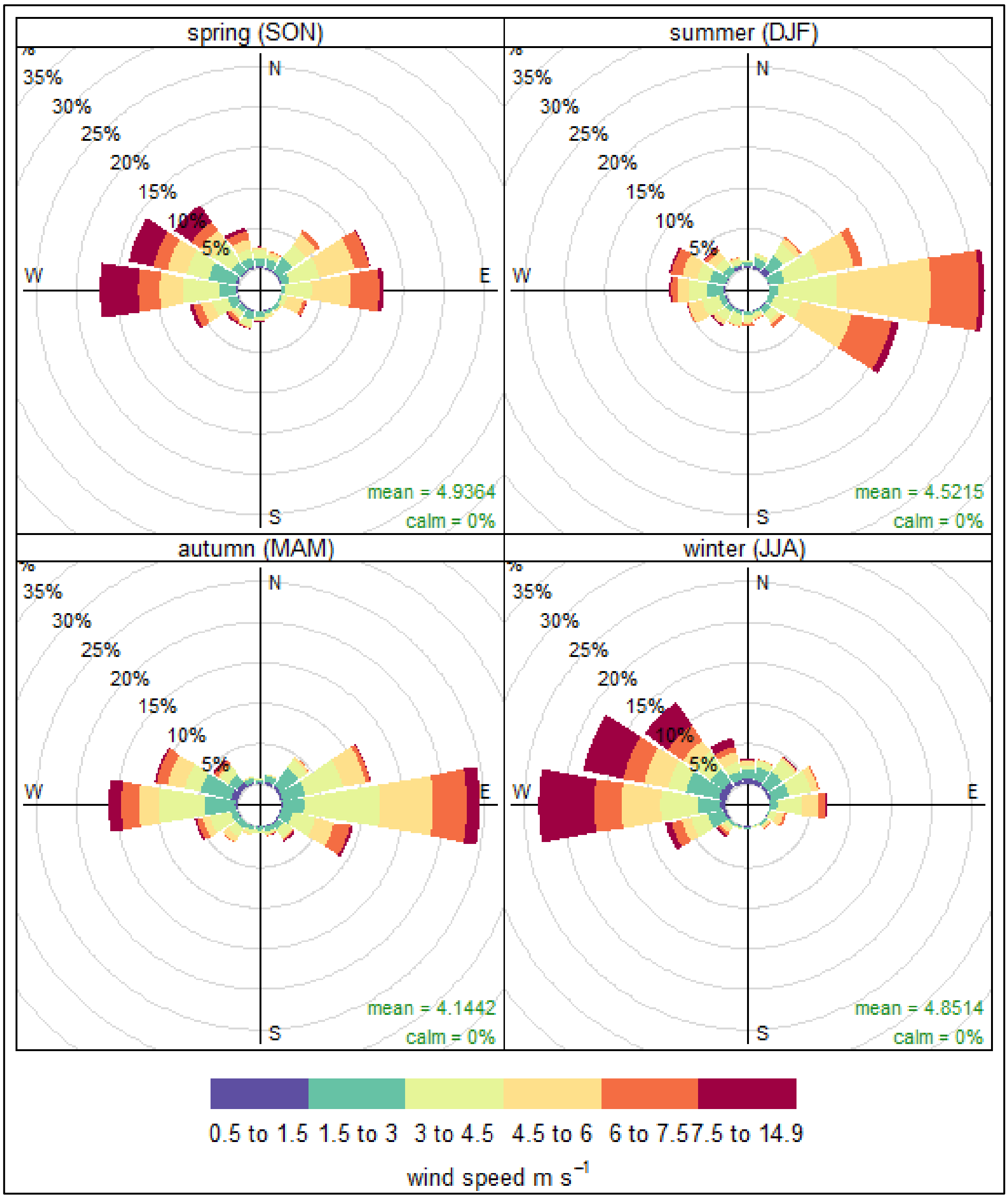


Figure 5-2: Seasonal windroses for Armidale AWS – 2021

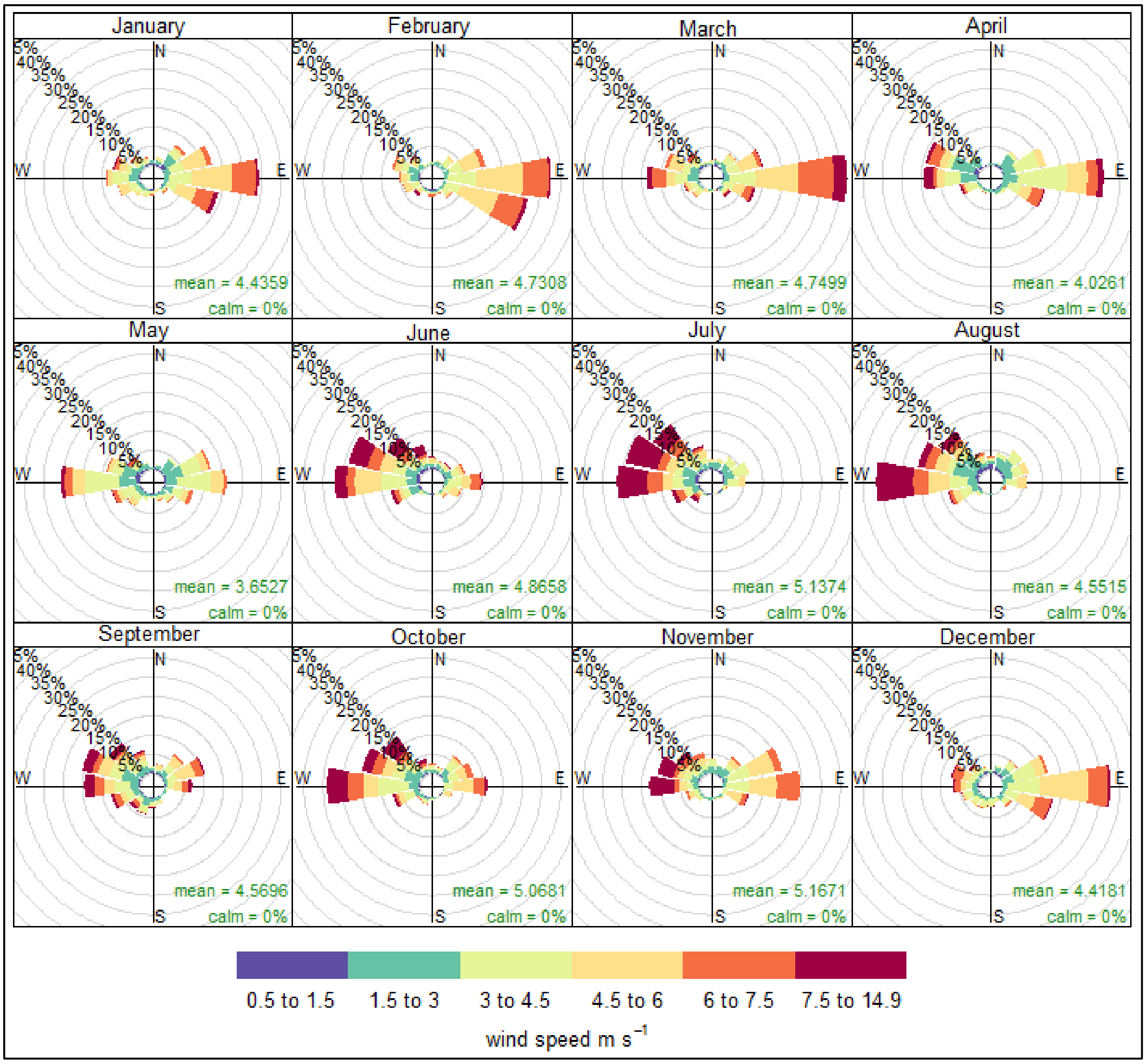


Figure 5-3: Monthly windroses for Armidale AWS – 2021

6 BASELINE AIR QUALITY

6.1 Monitoring data

Air quality criteria refer to cumulative air quality concentrations which include existing and proposed sources. To fully assess impacts against all the relevant air quality criteria (detailed in Section 4) it is necessary to have information on existing PM concentrations and deposition levels in the vicinity of the site.

6.1.1 PM_{10} and $PM_{2.5}$

PM_{10} and $PM_{2.5}$ data have been collected at a number of rural sites as part of the Department of Planning and Environment (DPE) monitoring program across NSW. The most representative of these sites include Armidale, Tamworth, Gunnedah and Narrabri, with Armidale being the closest. This site was commissioned in April 2018 and measures both PM_{10} and $PM_{2.5}$. The most recent complete year is 2021, which will be used to estimate background concentrations. 2019 and 2020 were impacted by the severe bushfire events experienced in those years and does therefore not present representative background conditions. 2018 is not a complete year and so does not enable the contemporaneous assessment of cumulative 24-hour average concentrations. The measured concentrations at each of these four sites is presented in Appendix A.

Table 6-1 presents the annual average PM_{10} and $PM_{2.5}$ concentrations at each of these sites in 2021. With the exception of Narrabri, the concentrations are relatively similar. As Armidale is closest to the project area, these concentrations (shaded) will be used to represent background concentrations for the assessment.

Table 6-1: Measured annual average PM_{10} and $PM_{2.5}$ concentrations at DPE sites

DPE monitoring station	PM_{10}	$PM_{2.5}$
Armidale	10.4	7.2
Tamworth	12.7	5.1
Gunnedah	11.2	6.6
Narrabri	7.0	3.1

The 24-hour average PM_{10} and $PM_{2.5}$ concentrations for these sites are presented in Figure 6-1 and Figure 6-2, respectively. $PM_{2.5}$ concentrations for Armidale are highest during the winter months, likely due to the impact from wood smoke emitted from domestic wood heaters. There were four days that recorded over the 25 µg/m^3 assessment criterion during 2021. There were no days that recorded over the PM_{10} 50 µg/m^3 assessment criterion during 2021.

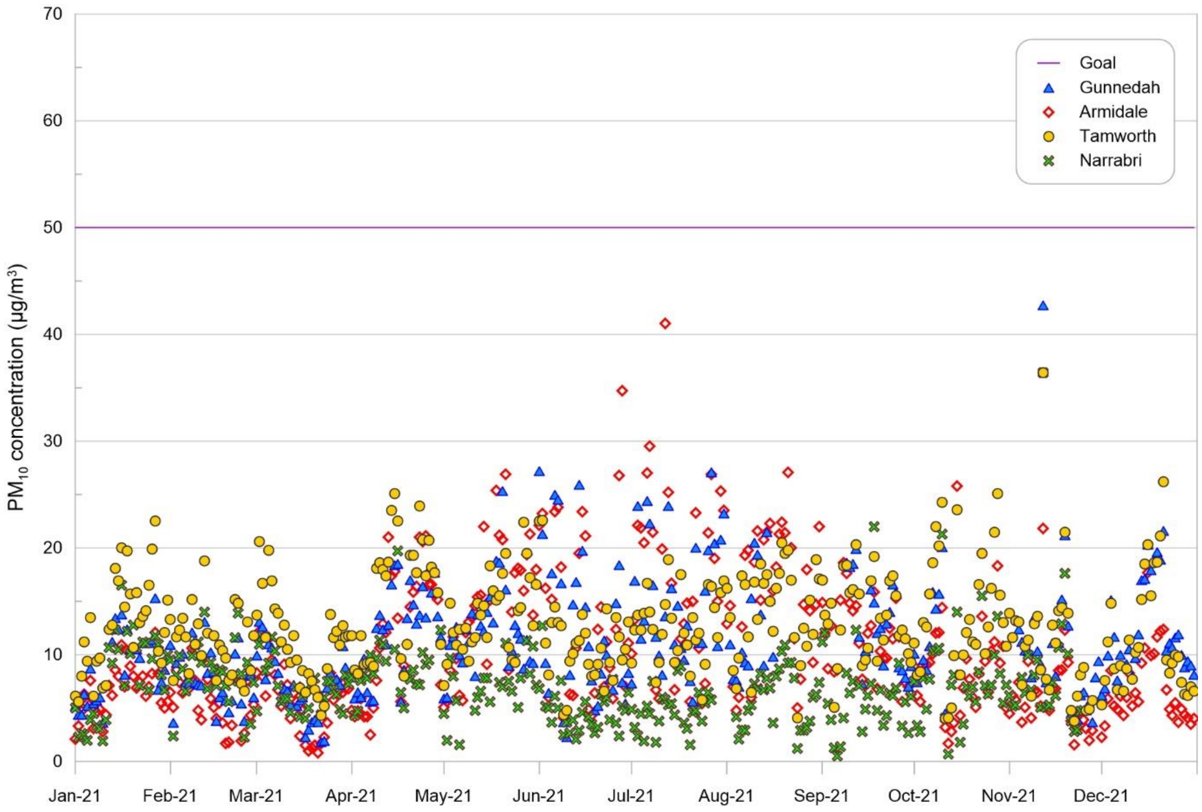


Figure 6-1: 24-hour PM_{10} concentrations at DPE sites for 2021

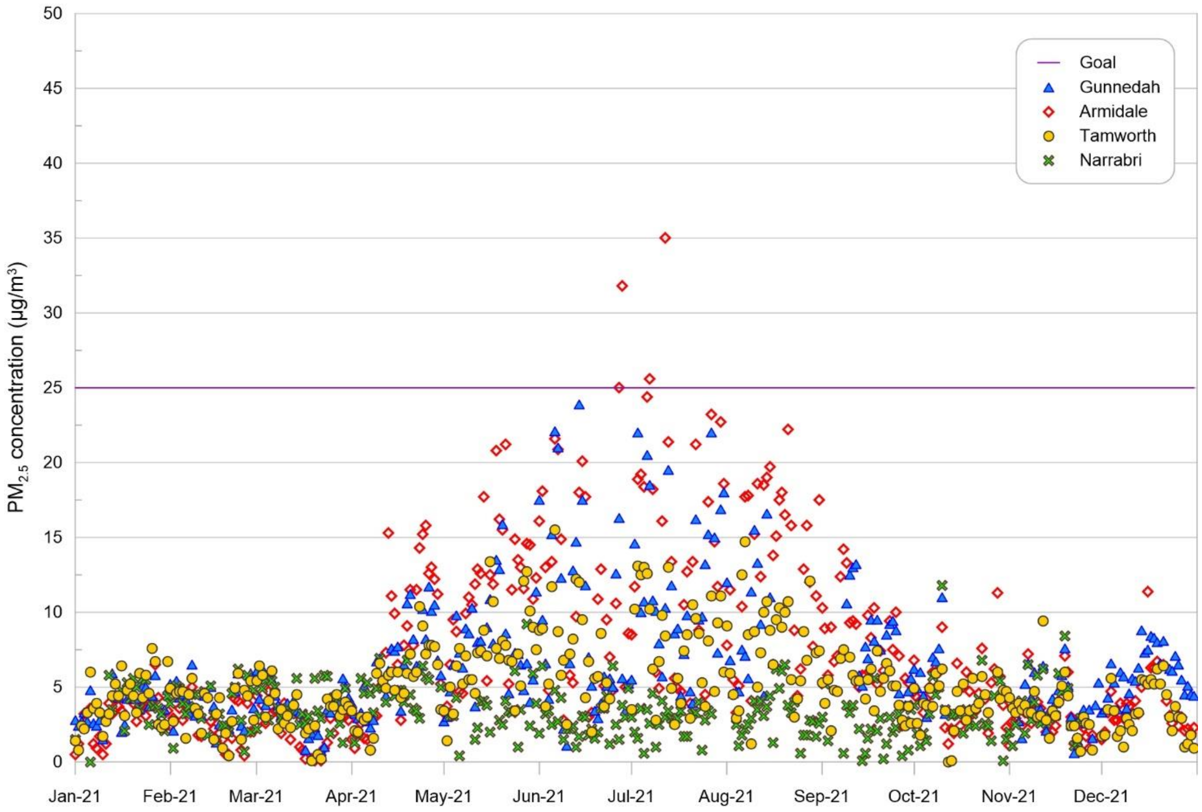


Figure 6-2: 24-hour $PM_{2.5}$ concentrations at DPE sites for 2021

6.1.2 Dust deposition

There are no monitoring data available for dust deposition so a conservative assumption of 2 g/m^2/month has been adopted.

7 EMISSIONS TO AIR

A single operating scenario has been assessed. This scenario represents a worst-case as it incorporates the maximum annual production rate of 120,000 m^3 and assumes high rates of daily production to achieve this over the year. In addition, to remain conservative, no regular dust controls have been included in the emission estimates to enable worst-case predictions.

7.1 Project operations

Estimates of PM emissions have been made for the key dust generating activities, and quantified for the three size fractions (TSP, PM_{10} and $PM_{2.5}$). Emission factors developed within NSW, and by the United States Environmental Protection Agency (US EPA, 1985), have been applied to estimate the amount of dust produced by each proposed activity.

Estimates of emissions for each source were developed on an hourly time step taking into account the activities that would take place at that location. Dust generating activities are represented by a series of volume sources situated according to the location of activities for the modelled scenario. The locations of these sources, as they are represented in the model, are indicated in Figure 7-1.

The information used for developing the PM inventory has been based on the operational descriptions, access road distances, material volumes, operating hours and truck sizes. The maximum annual production rate of 120,000 m^3 has been assumed to ensure a conservative assessment. Other conservative assumptions include:

- Area of 9 ha exposed to wind erosion with no dust control
- The access road is unsealed and no dust suppression on access road
- Maximum daily truck movements (60 movements per day)
- All material is crushed and stockpiled on site

Table 7-1 summarises the quantities of TSP, PM_{10} and $PM_{2.5}$ estimated to be released by the Project. All activities have been assumed to occur between 7am – 6pm every day of the year. The exception to this is wind erosion which can occur at any hour of the day. Emissions inventories for each particle size fraction are provided in Appendix B.

Table 7-1: Estimated annual emissions for TSP, PM_{10} and $PM_{2.5}$ (kg/y)

Activity	TSP	PM_{10}	$PM_{2.5}$
Dozers ripping and pushing to crusher	20,886	5,047	2,193
Excavators loading crusher	882	417	63
Crushing on site	745	331	331
Loading product to stockpiles	882	417	63
Loading product to trucks	882	417	63
Hauling product off site	36,822	7,884	788
Wind erosion	7,884	3,942	591
Total	**68,984**	**18,456**	**4,093**

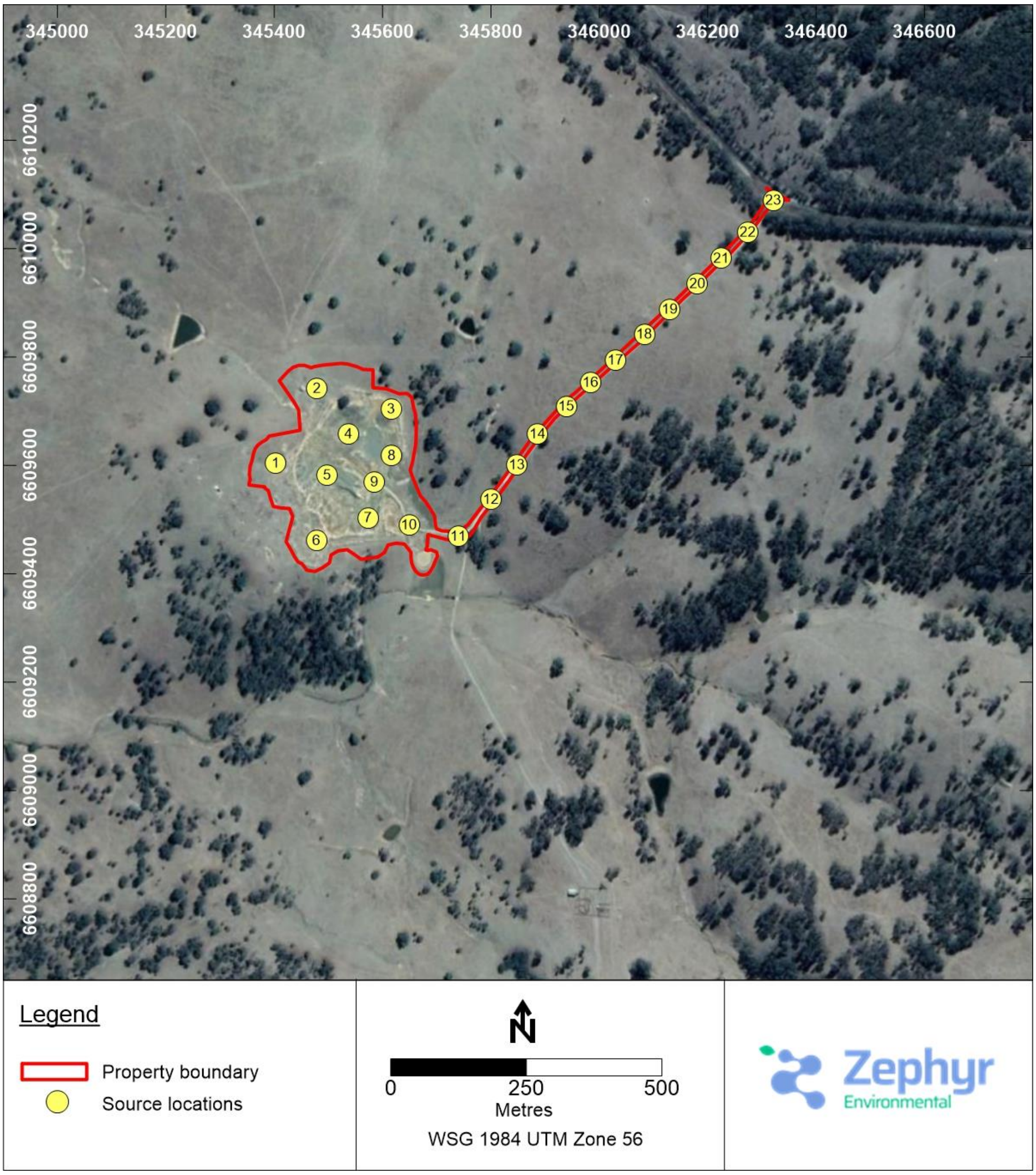


Figure 7-1: Locations of modelled volume sources

8 IMPACT ASSESSMENT

The US EPA's model AERMOD was used for this assessment, as this is considered to be the most suitable model for the source types, proximity of the sensitive receivers and local topography. AERMOD is accepted by the NSW EPA and used widely in Australia.

The AERMOD system includes AERMET, used for the preparation of meteorological input files and AERMAP, used for the preparation of terrain data. Terrain data was sourced from NASA's Shuttle Radar Topography Mission (SRTM) Data (3 arc second (~90m) resolution). This terrain dataset was then processed within AERMAP to create the necessary input files. Surface data, including cloud cover was sourced from the Armidale Airport AWS, as described in Section 5.

Predictions were made over a 10 km x 10 km grid at 200 m spacing, as well as at the four individual sensitive receptors. The gridded receptors were used to produce the contour plots presented in Sections 8.1, 8.2 and 8.3. The background concentrations for annual average PM_{10}, $PM_{2.5}$ (Section 6.1.1), and the background annual average dust deposition rates (Section 6.1.2), were added to the modelled Project contributions to determine the predicted cumulative impacts.

For maximum 24-hour average PM_{10} and $PM_{2.5}$, both the incremental (Project contribution) and cumulative predictions are presented in Sections 8.4 and 8.5. Incremental concentrations are shown as contour plots and represent maximum predictions at all receptors across the model domain. To estimate the cumulative 24-hour average PM_{10} and $PM_{2.5}$ concentrations at the most impacted sensitive receptor (SR2), the predicted concentration from the Project for each day was combined with the corresponding background concentration for that day.

8.1 Annual average PM_{10}

Figure 8-1 presents the predicted cumulative annual average PM_{10} concentrations due to the Project, including background, under maximum throughput conditions. In addition, Table 8-1 presents the predictions for each sensitive receiver showing the contributions for the project and background, as well as the cumulative concentration.

These results show that there are no sensitive receivers predicted to exceed the annual average PM_{10} EPA criterion of 25 µg/m^3.

Table 8-1: Annual average PM_{10} concentrations (µg/m^3)

Sensitive receiver	Project	Background	Total
SR1	0.04	10.4	10.4
SR2	0.12	10.4	10.5
SR3	0.02	10.4	10.4
SR4	0.01	10.4	10.4

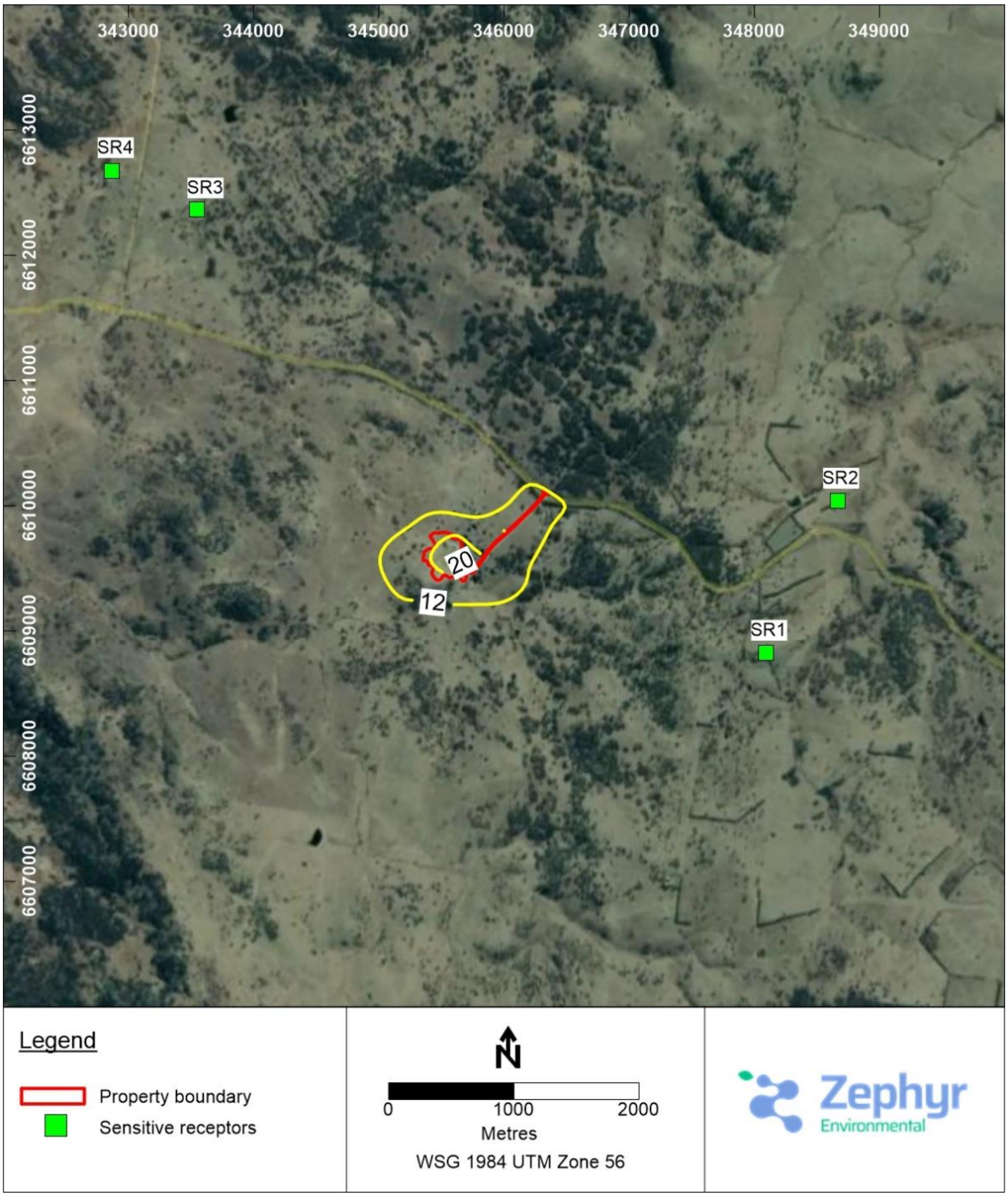


Figure 8-1: Predicted annual average PM_{10} concentrations due to the Project including background ($\mu g/m^3$)

8.2 Annual average $PM_{2.5}$

Figure 8-2 presents the predicted cumulative annual average $PM_{2.5}$ concentrations due to the Project, including background, under maximum throughput conditions. In addition, Table 8-2 presents the predictions for each sensitive receiver, showing the contributions for the project and background, as well as the cumulative concentration.

These results show that there are no sensitive receivers predicted to exceed the annual average $PM_{2.5}$ EPA criterion of 8 µg/m³.

Table 8-2: Annual average $PM_{2.5}$ concentrations (µg/m³)

Sensitive receiver	Project	Background	Total
SR1	0.01	7.2	7.2
SR2	0.03	7.2	7.2
SR3	0.01	7.2	7.2
SR4	0.004	7.2	7.2

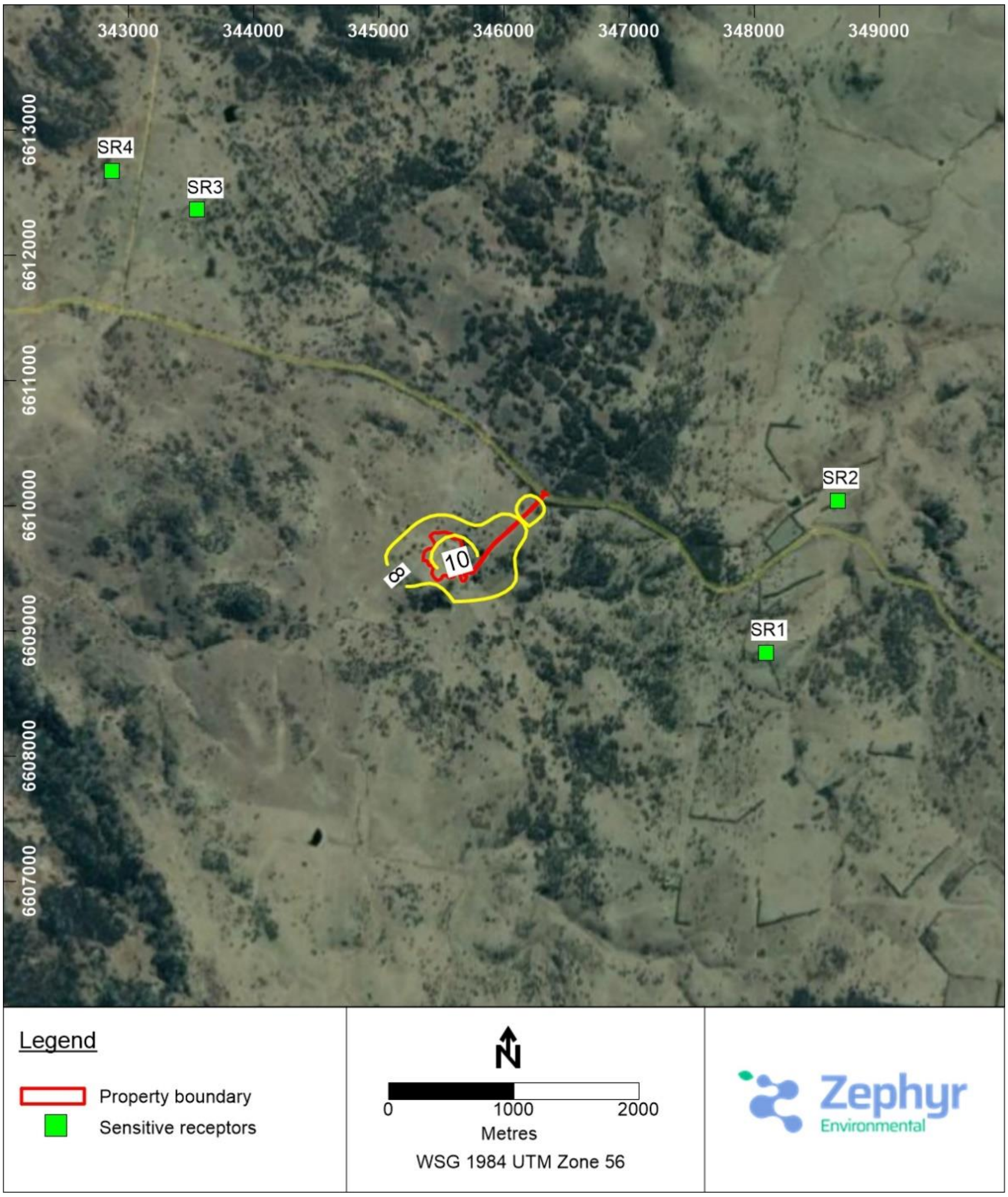


Figure 8-2: Predicted annual average $PM_{2.5}$ concentrations due to the Project including background (µg/m^3)

8.3 Annual average dust deposition

Figure 8-3 presents the predicted annual average dust deposition rates for the Project only, that is, the incremental increase, under maximum throughput conditions. Figure 8-4 presents the predicted cumulative annual average dust deposition rates due to the Project, including background. In addition, Table 8-3 presents the predictions for each sensitive receiver showing the contributions for the project and background as well as cumulative deposition rates.

These results show that there are no sensitive receivers predicted to exceed the annual average dust deposition EPA criterion, either incremental (2 g/m^2/month) or cumulative (4 g/m^2/month).

Table 8-3: Annual average dust deposition (g/m^2/month)

Sensitive receiver	Project	Background	Total
SR1	0.02	2	2.02
SR2	0.02	2	2.02
SR3	0.003	2	2.00
SR4	0.002	2	2.00

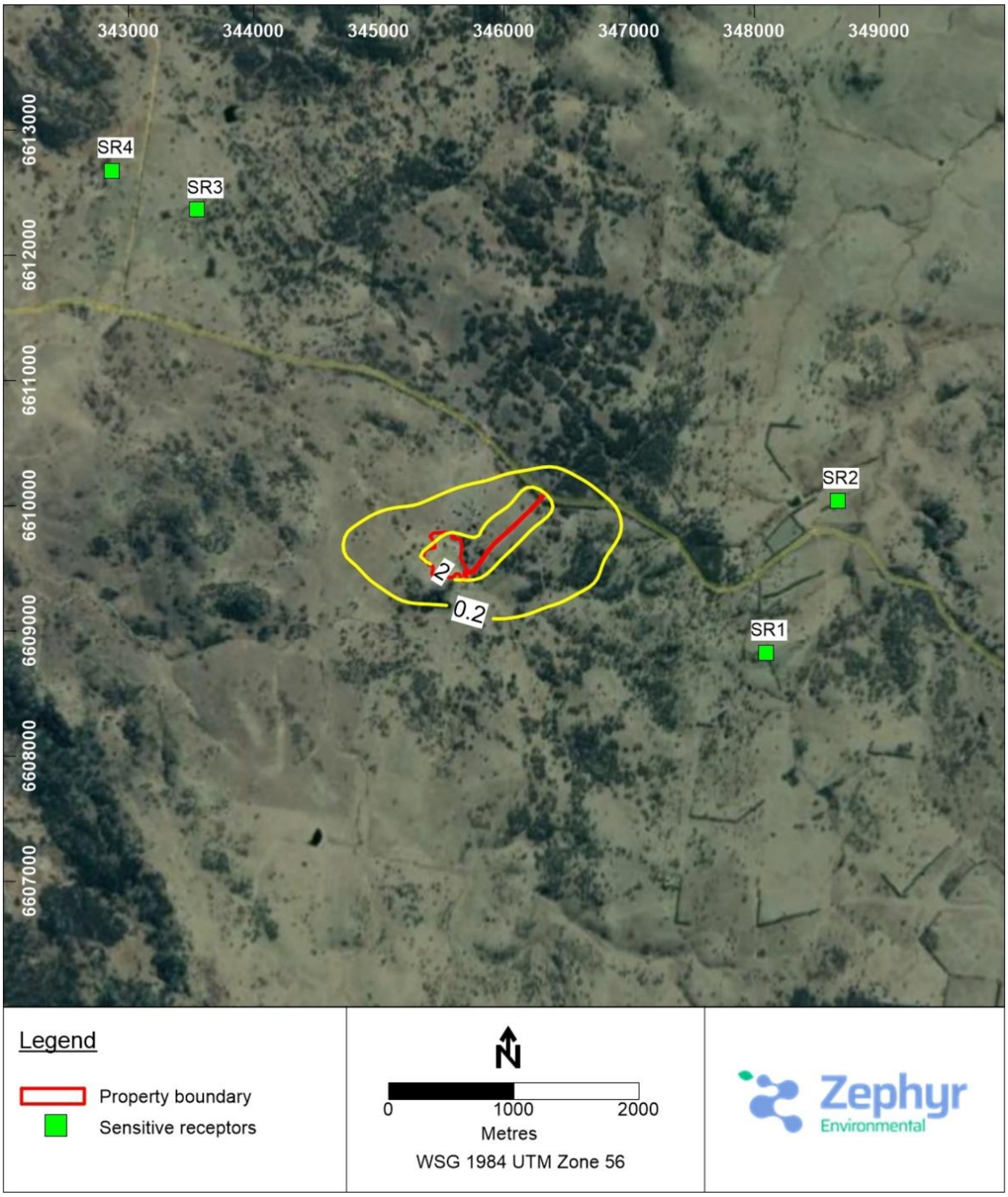


Figure 8-3: Predicted annual average dust deposition rates due to the Project (g/m^2/month)

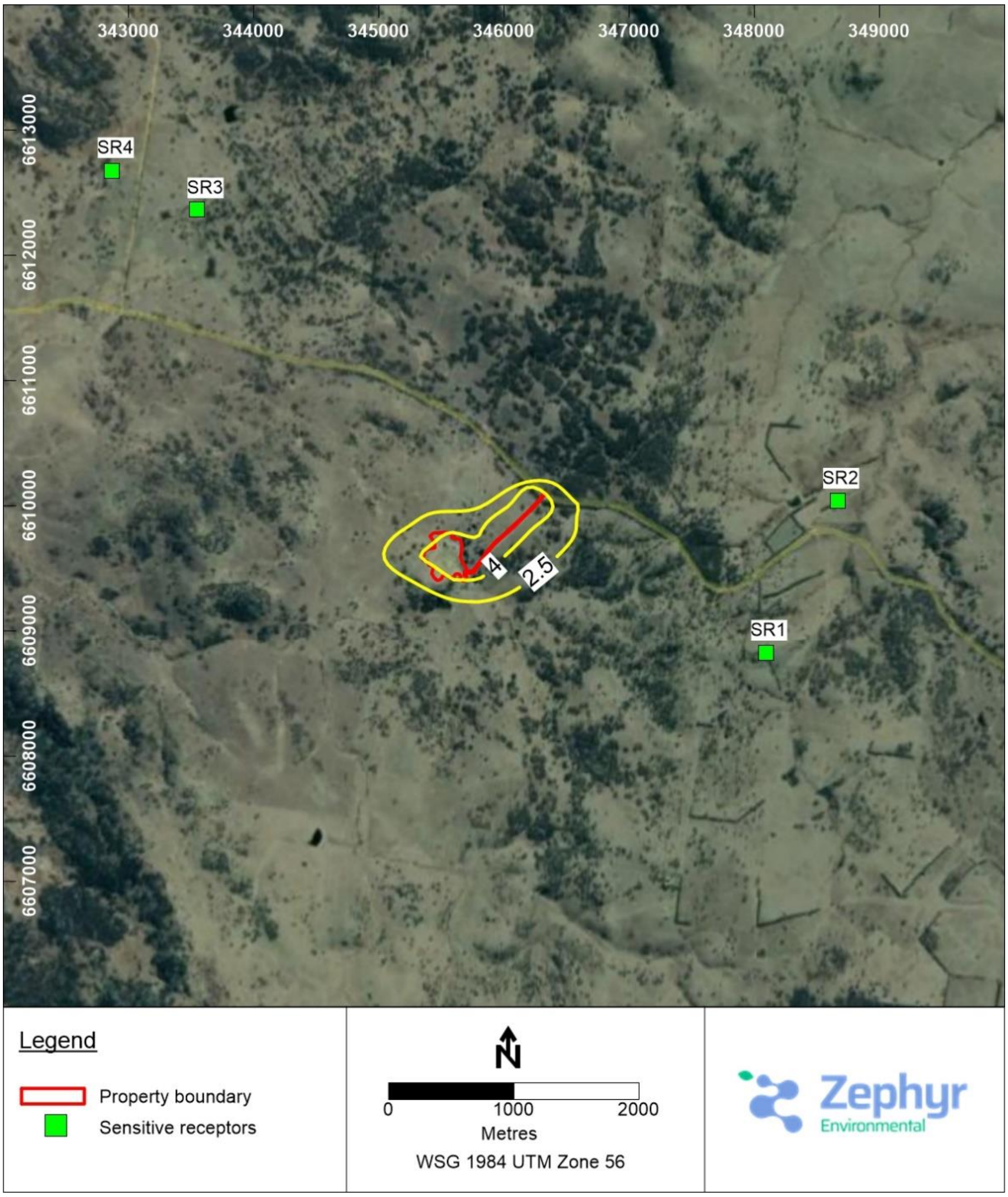


Figure 8-4: Predicted annual average dust deposition rates due to the Project including background (g/m^2/month)

8.4 24-hour average PM_{10}

Figure 8-5 presents the predicted maximum 24-hour average PM_{10} concentrations from the Project. These contours do not represent a single worst-case day, but rather represent the potential worst case 24-hour average PM_{10} concentration that could be reached at any particular location across the entire modelling year. It is not suggested that this will occur every day, but that these predictions may occur when the proposed operations associated with maximum throughput are combined with worst-case meteorological conditions.

Table 8-4 presents these PM_{10} results for all sensitive receivers for the Project alone. The maximum concentration is predicted to be 2.8 µg/m^3, occurring at SR2.

Additional modelling was carried out for SR2 to determine the 24-hour average PM_{10} concentration for each day of the year. This was then added to the daily background PM_{10} concentrations presented in Section 6.1.1. The cumulative 24-hour PM_{10} concentrations for each day are presented in Figure 8-6.

Table 8-4: Maximum 24-hour average PM_{10} concentration from the Project alone at each sensitive receptor – maximum throughput operations (µg/m^3)

Sensitive receiver	Maximum 24-hour average
SR1	0.7
SR2	2.8
SR3	0.7
SR4	0.4

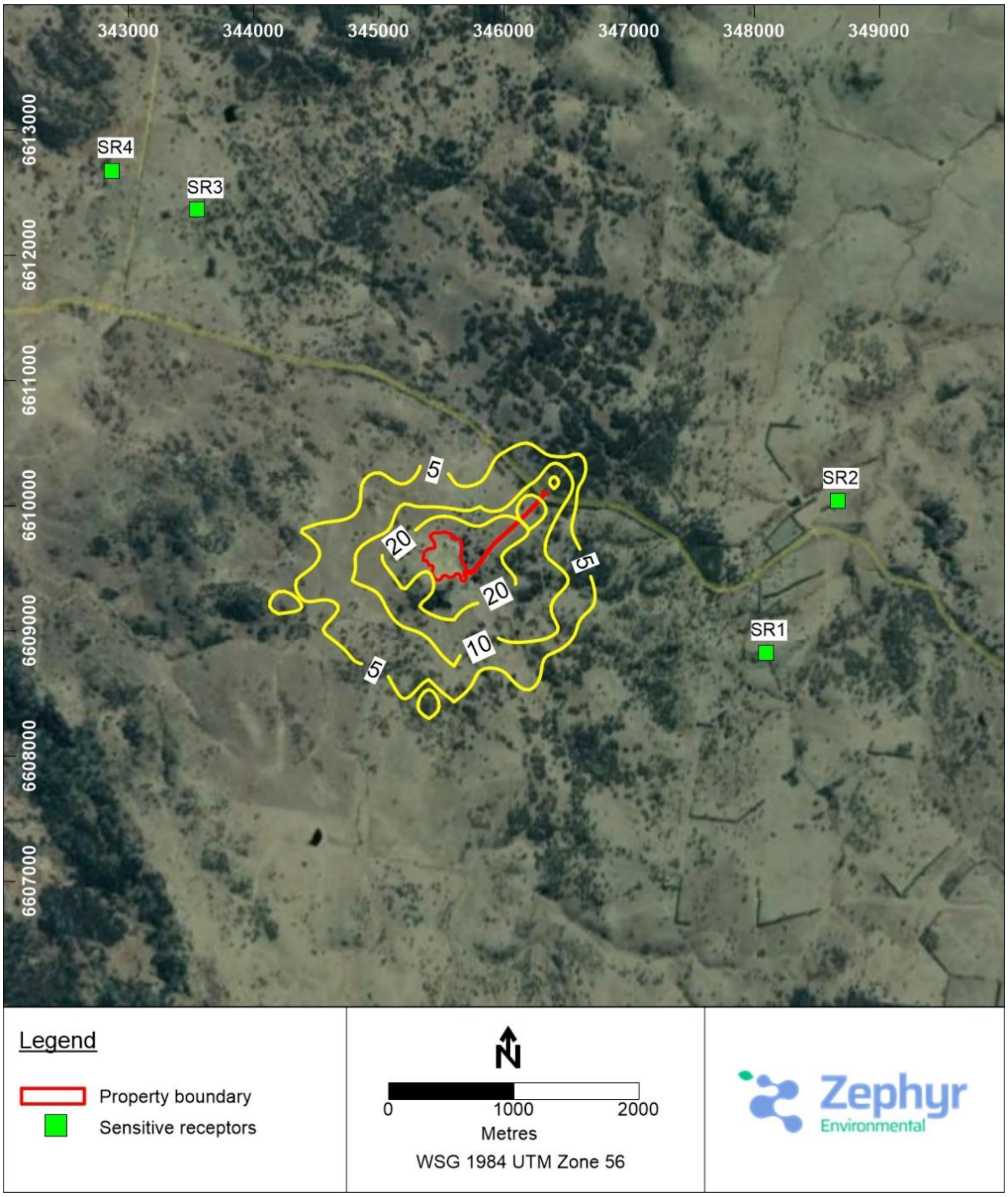


Figure 8-5: Maximum 24-hour average PM_{10} concentration from the Project ($\mu g/m^3$)

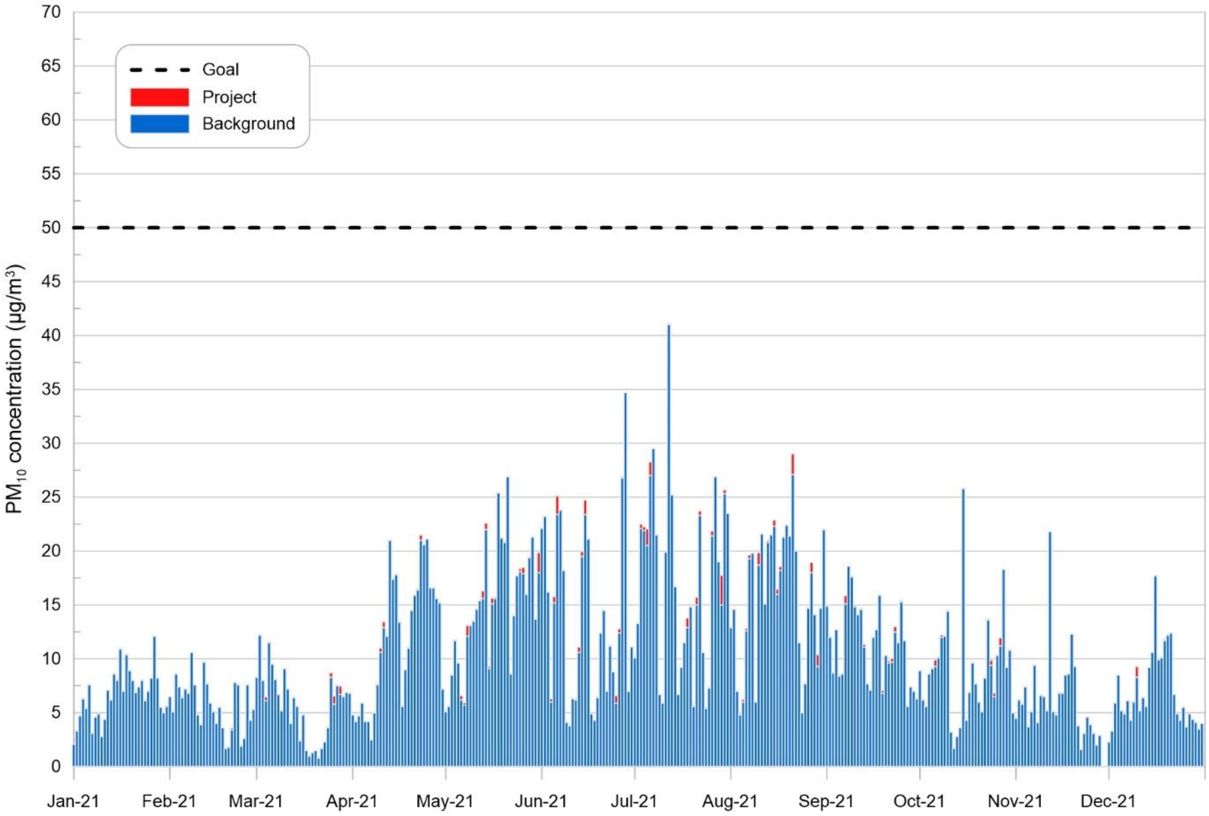


Figure 8-6: Predicted daily cumulative 24-hour average PM_{10} concentration at SR2 ($\mu g/m^3$)

8.5 24-hour average $PM_{2.5}$

Figure 8-7 presents the predicted maximum 24-hour average $PM_{2.5}$ concentrations from the Project. These contours do not represent a single worst-case day, but rather represent the potential worst case 24-hour average $PM_{2.5}$ concentration that could be reached at any particular location across the entire modelling year. It is not suggested that this will occur every day, but that these predictions may occur when the proposed operations associated with maximum throughput are combined with worst-case meteorological conditions.

Table 8-5 presents these $PM_{2.5}$ results for all sensitive receivers for the Project alone. The maximum concentration is predicted to be 0.9 µg/m³, occurring at SR2.

Additional modelling was carried out for SR2 to determine the 24-hour average $PM_{2.5}$ concentration for each day of the year. This was then added to the daily background $PM_{2.5}$ concentrations presented in Section 6.1.1. The cumulative 24-hour $PM_{2.5}$ concentrations for each day are presented in Figure 8-8. As noted in Section 6.1.1, there were a number of occasions where the background $PM_{2.5}$ concentrations exceeded the 24-hour average criterion of 25 µg/m³ during 2021. However, as shown in Figure 8-8, the contributions from the project are very minor at SR2 and do not result in any additional exceedances.

Table 8-5: Maximum 24-hour average $PM_{2.5}$ concentration from the Project alone at each sensitive receptor – maximum throughput operations (µg/m³)

Sensitive receiver	Maximum 24-hour average
SR1	0.2
SR2	0.9
SR3	0.2
SR4	0.1

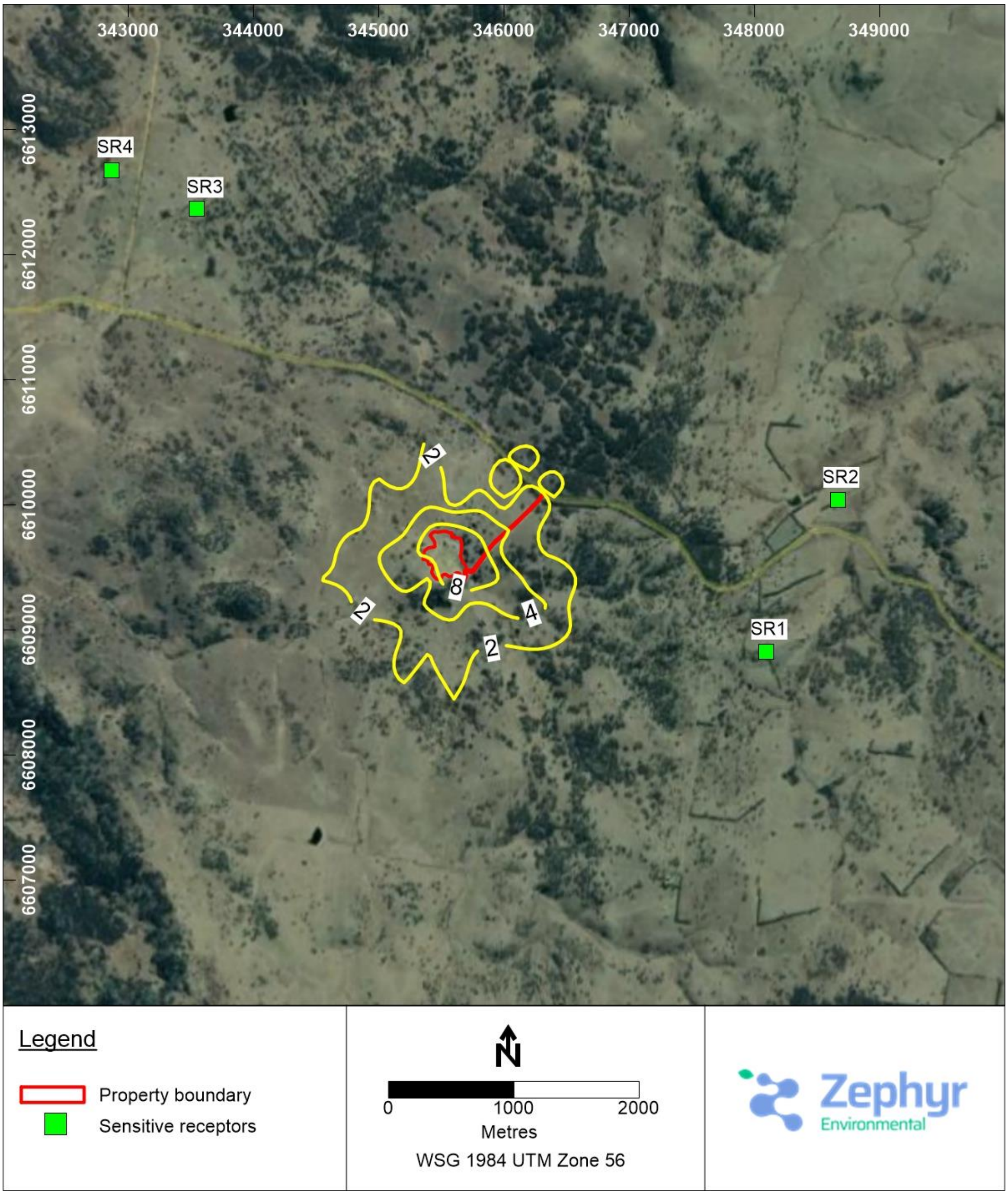


Figure 8-7: Maximum 24-hour average $PM_{2.5}$ concentration from the Project ($\mu g/m^3$)

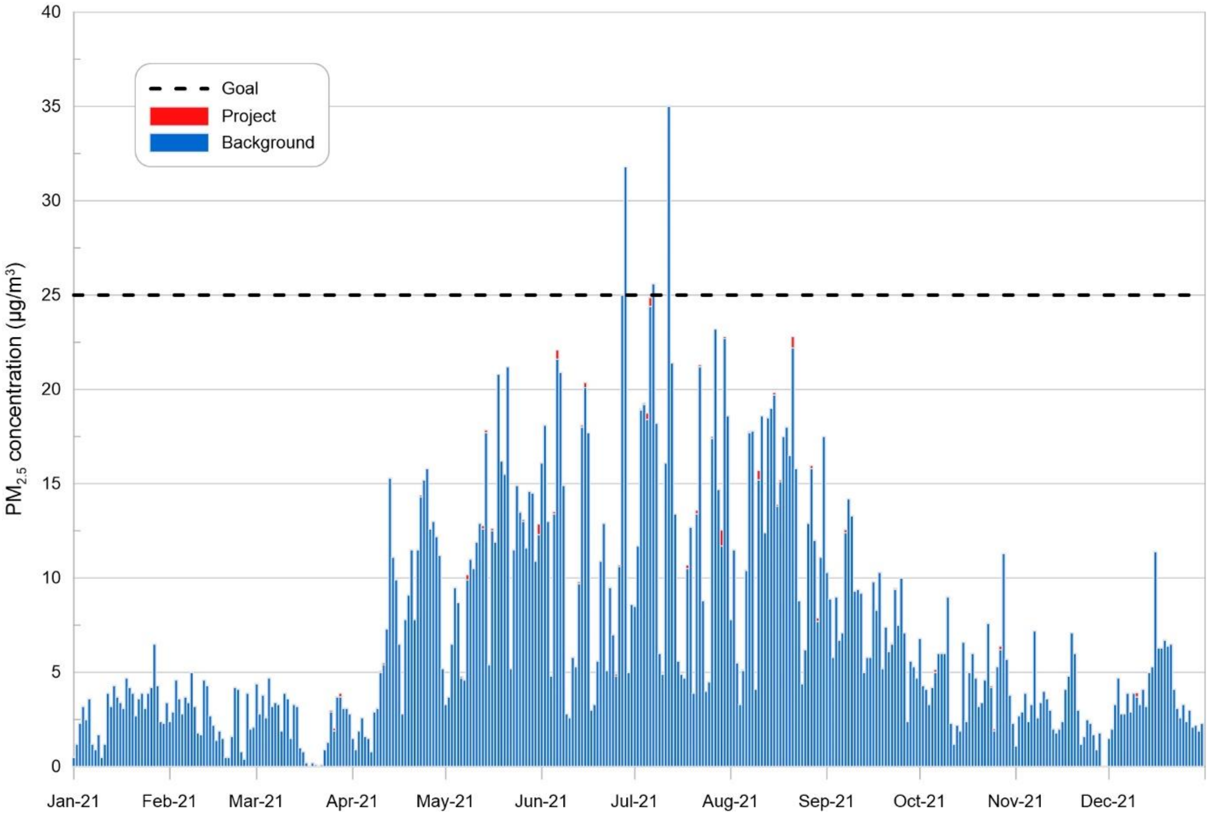


Figure 8-8: Predicted daily cumulative 24-hour average $PM_{2.5}$ concentration at SR2 (µg/m^3)

9 CONCLUSIONS

Zephyr has completed an air quality assessment for the proposed Carlon's Quarry Expansion Project located west of Uralla, NSW.

The dispersion modelling accounts for the local meteorology and terrain information and used PM emission estimates to predict the air quality impacts for maximum daily operations.

The results of the dispersion modelling indicate that the predicted annual average PM_{10} and $PM_{2.5}$ and dust deposition at the closest sensitive receivers are all predicted to comply with the NSW EPA air quality criteria.

The cumulative 24-hour assessment showed that there were no sensitive receivers predicted to experience maximum 24-hour cumulative PM_{10} and $PM_{2.5}$ concentrations above the NSW EPA air quality criteria. Therefore, no exceedances of the NSW EPA air quality criteria are predicted as a result of the Project.

10 REFERENCES

EPA (2016) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales. NSW Environment Protection Authority – August 2005, minor revisions November 2016.

US EPA (1985) Compilation of Air Pollutant Emission Factors, AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

Appendix A

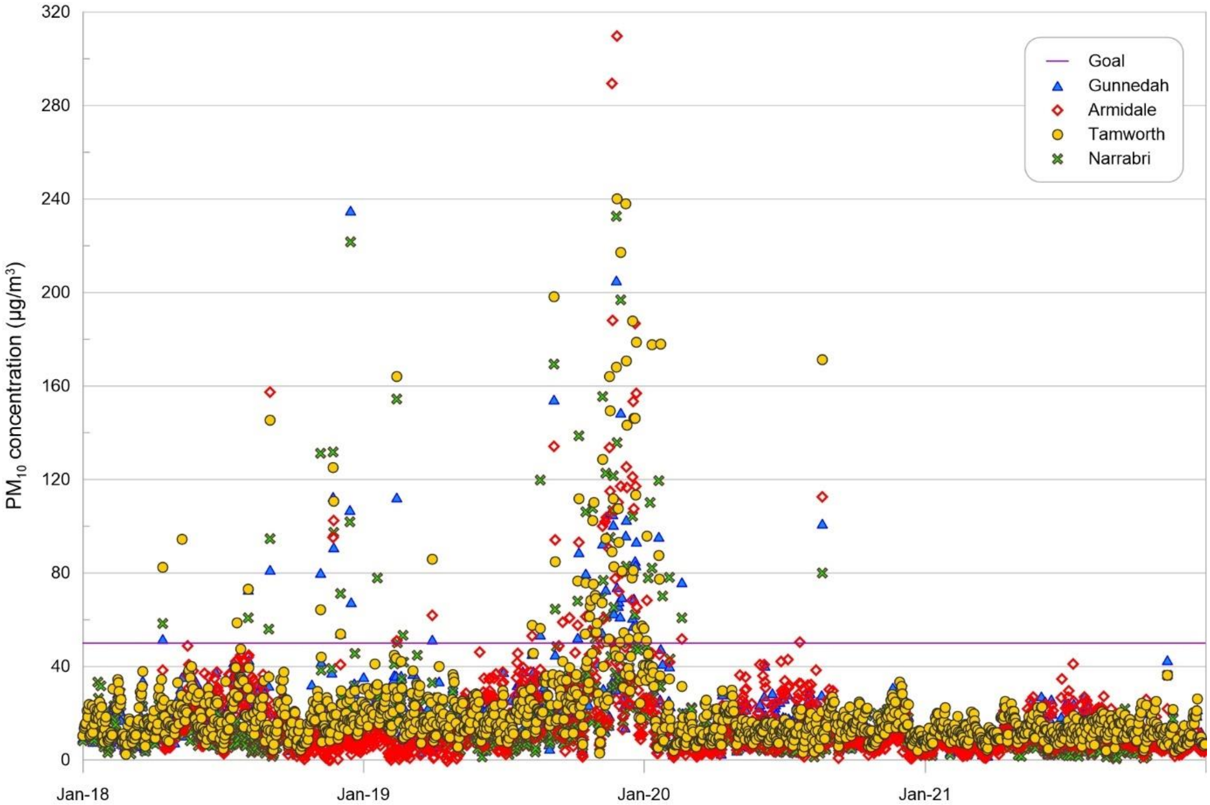


Figure A-1: 24-hour PM_{10} concentrations at DPE sites for 2018 – 2021

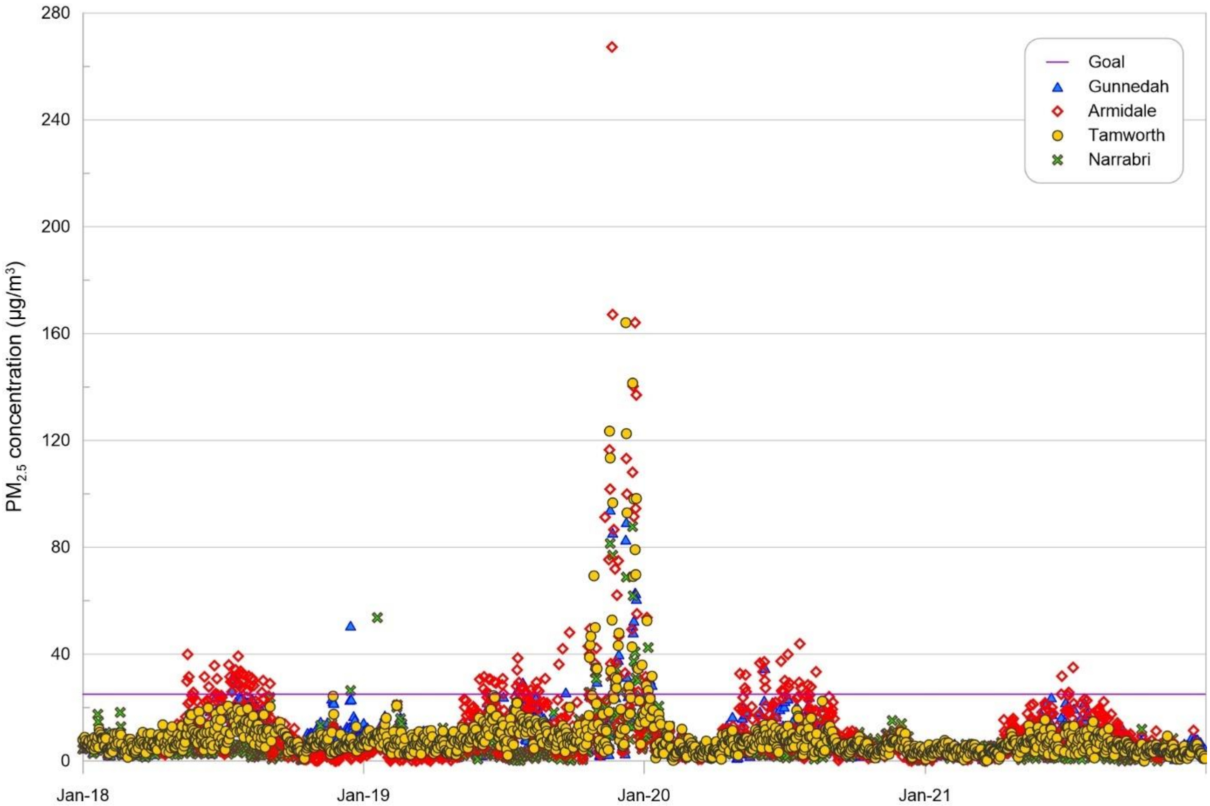


Figure A-2: 24-hour $PM_{2.5}$ concentrations at DPE sites for 2018 – 2021

Appendix B

Emissions estimates for each particle size

Emission calculations

Activity	Annual emissions (kg/y) TSP	Annual emissions (kg/y) PM10	Annual emissions (kg/y) PM2.5	Control (%)	Intensity	Units	TSP Factor	TSP Units	PM10 Factor	PM10 Units	PM2.5 Factor	PM2.5 Units
Dozers ripping and pushing to crusher	20,886	5,047	2,193	0	1,248	h/y	16.7	kg/h	4.044	kg/h	1.76	kg/h
Excavators loading crusher	882	417	63	0	276,000	t/y	0.003197	kg/t	0.001512	kg/t	0.000229	kg/t
Crushing	745	331	331	0	276,000	t/y	0.0027	kg/t	0.0012	kg/t	0.0012	kg/t
Loading to stockpiles	882	417	63	0	276,000	t/y	0.003197	kg/t	0.001512	kg/t	0.000229	kg/t
Loading product to trucks	882	417	63	0	276,000	t/y	0.003197	kg/t	0.001512	kg/t	0.000229	kg/t
Hauling product off site	36,822	7,884	788	0	276,000	t/y	0.13341	kg/t	0.02856	kg/t	0.00286	kg/t
Wind erosion	7,884	3,942	591	0	9.0	ha	876.0	kg/ha/y	438.0	kg/ha/y	65.7	kg/ha/y

Activity	Variables: Area (m2)	(ws/2.2)^1.3	Moisture (%)	Drop distance (m)	kg/VKT (TSP)	kg/VKT (PM10)	kg/VKT (PM2.5)	payload (t)	GVM (t)	km/trip	Silt (%)	Speed (km/h)	h/year	Silt loading (g/m2)
Dozers ripping and pushing to crusher	-		2	-	-	-	-	-	-	-	10	-	-	-
Excavators loading crusher	-	2.7	2	-	-	-	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loading to stockpiles	-	2.7	2	-	-	-	-	-	-	-	-	-	-	-
Loading product to trucks	-	2.7	2	-	-	-	-	-	-	-	-	-	-	-
Hauling product off site	-	-	-	-	0.910	0.195	0.019	15	17.5	2.2	2	-	-	-
Wind erosion	-	-	-	-	-	-	-	-	-	-	-	-	-	-

There were no site-specific parameters available for moisture and silt content so conservative assumptions were made regarding these. A low moisture content of 2% was assumed for the quarried material and a high silt content of 10% for material being ripped. A standard 2% silt was assumed for the unsealed access road.

Appendix F Water Assessment

Carlon's Quarry Expansion Project

Surface Water Assessment

Blendee Partnership c/o Onward Consulting

1846-01-B2, 18 August 2022

Report Title	Carlon's Quarry Expansion Project, Surface Water Assessment
Client	Blendee Partnership c/o Onward Consulting
Report Number	1846-01-B2

Revision Number	Report Date	Report Author	Reviewer
0	3 August 2022	AN	MGB
1	12 August 2022	AN	MGB
2	18 August 2022	AN	MGB

For and on behalf of WRM Water & Environment Pty Ltd
Level 9, 135 Wickham Tce, Spring Hill
PO Box 10703 Brisbane Adelaide St Qld 4000
Tel 07 3225 0200

Ardianto Notodirdjo

Senior Engineer

Contents

List of Figures

List of Tables

1 Introduction

1.1 BACKGROUND

Carlon's Quarry is an existing approved gravel quarry operated by Blendee Partnership, located on Kingstown Road approximately 10 kilometres (km) west of Uralla in northern NSW (see Figure 1.1).

The existing quarry received development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW Environment Planning and Assessment Act 1979 (EP&A Act) for the Carlon's Quarry Expansion Project (the Project). This surface water assessment has been prepared to accompany the development application for the Project, with reference to the water components of the Secretary's Environmental Assessment Requirements (SEARs).

Carlon's Quarry is operated using machinery such as bulldozers, front end loaders and excavators. There has been no permanent infrastructure developed as part of the quarry.

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m^3) to a maximum 120,000 m^3 per annum with an approximate average of 80,000 m^3. The Project involves a minor extension to the north and west of the existing quarry (see Figure 1.2) and will require the operation of additional mobile equipment.

1.2 PURPOSE OF REPORT

This surface water assessment report describes the potential impacts of the Project on the surface water environment and the proposed surface water management strategy to mitigate these impacts. This report should be read in conjunction with the Erosion and Sediment Control Plan (WRM, 2022) which was prepared as a separate document.

1.3 REPORT STRUCTURE

This report is structured as follows:

- Section 2 described the regulatory framework for the Project including the water components of the SEARs;
- Section 3 describes the existing surface water environment surrounding the Project;
- Section 4 describes the proposed surface water management system including the management objectives and proposed infrastructure;
- Section 5 provides a discussion of the potential surface water impacts of the Project and the proposed management measures;
- Section 6 presents a summary of findings for the surface water assessment; and
- Section 7 presents the references used in this report.

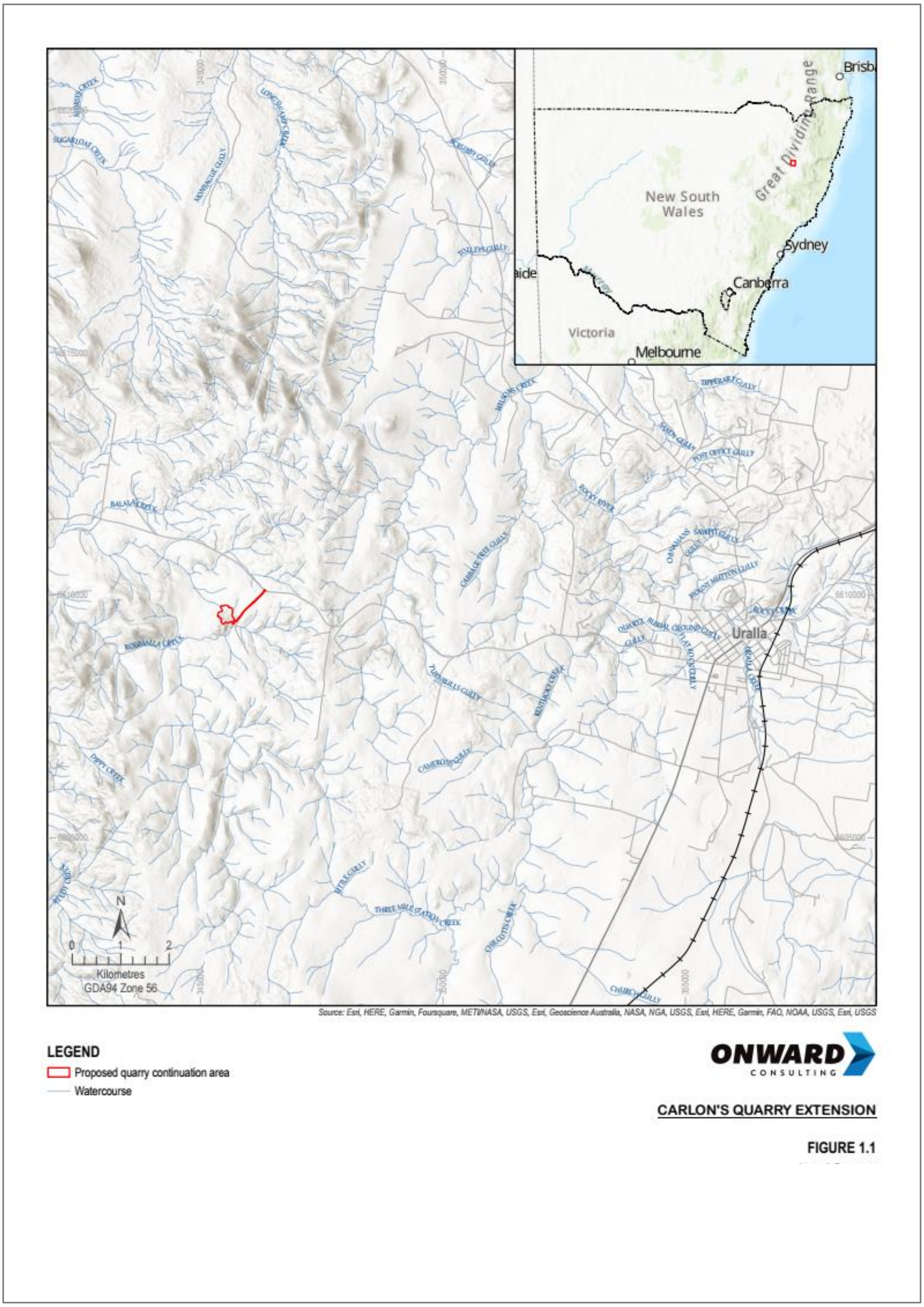


Figure 1.1 – Regional locality

Figure 1.2 – Existing quarry extent and proposed quarry expansion area

2 Environmental assessment requirements

2.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The Project SEARs were received on 3 December 2021 (EAR 1622). Table 2.1 shows the specific issues relevant to surface water that are required to be addressed by the Project SEARs, and the sections of this report in which these issues are addressed.

2.2 SPECIFIC AGENCY REQUIREMENTS

Table 2.1 also shows the specific agency environmental assessment requirements from the NSW EPA and WaterNSW, and the sections of this report in which these requirements are addressed.

Table 2.1 – The Project SEARS relevant to surface water

Environmental assessment requirements	Section in report
Specific issue in the Project SEAR (surface water only)	
a detailed site water balance and an assessment of any water licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000 , including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant Water Sharing Plan or water source embargo.	Section 5
an assessment of potential impacts on the quality and quantity of existing surface and ground water resources, including a detailed assessment of proposed water discharge quantities and quality against receiving water quality and flow objectives.	Section 5
a detailed description of the proposed water management system, water monitoring program and other measures to mitigate surface and groundwater impacts.	Section 4 and Section 5
Specific agency requirement (NSW EPA)	
The EIS must demonstrate how the proposed development will meet the requirements of section 120 of the POEO Act.	Section 5
The EIS must include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	Section 5
If the proposed development intends to discharge waters to the environment, the EIS must demonstrate how the discharge(s) will be managed in terms of water quantity, quality and frequency of discharge and include an impact assessment of the discharge on the receiving environment.	Section 5
The EIS must refer to Water Quality Objectives for the receiving waters and indicators and associated trigger values or criteria for the identified environmental values of the receiving environment. This information should be sourced from the ANZECC (2018) Guidelines for Fresh and Marine Water Quality.	Section 3

Environmental assessment requirements	Section in report
The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).	An Erosion and Sediment Control Plan (ESCP) is provided as a separate report.
The EIS must describe any water quality monitoring programs to be carried out at the project site. Water quality monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	Section 5
Specific agency requirement (WaterNSW)	
Water NSW recommends that as a minimum the EIS address the identification, assessment and management of potential impacts on surface water and groundwater resources arising from the proposed development.	Section 5

3 Existing surface water environment

3.1 REGIONAL DRAINAGE CHARACTERISTICS

Figure 3.1 shows the regional drainage features in the vicinity of the Project. The Project is located within the Roumalla Creek catchment. Roumalla Creek is a tributary of the Gwydir River, which is located in the upper reaches of the Murray-Darling basin.

Carlon's Quarry is located on private grazing land (Lot 3 on DP834359) (see Figure 1.2 and Figure 3.2), referred to in this report as the property. Roumalla Creek flows through the property in a southwesterly direction immediately south of the quarry.

Roumalla Creek has a catchment area of about 3.8 km^2 (380 hectares [ha]) upstream of the quarry. The Roumalla Creek catchment to the western property boundary is about 29 km^2 (2,900 ha) which include the catchment of the "Southern Tributary" of the creek. A "Northern Tributary" of Roumalla Creek flows in a southwesterly direction across the northern part of the property. The Northern Tributary has a catchment area of 4.4 km^2 (440 ha) to the western property boundary.

3.2 LOCAL DRAINAGE

Figure 3.2 shows the local drainage characteristics in the vicinity of the Project. Figure 3.4 to Figure 3.6 show photographs of existing drainage features within and in the vicinity of the Project site.

Most of the surface runoff from the quarry itself drains to an existing sediment pond at the southeastern corner of the quarry. This existing sediment pond has a catchment area of approximately 28.5 ha, with about 74% of the catchment consisting of undisturbed areas to the northwest of the quarry.

Some runoff from the northern parts of the existing quarry disturbance area drains northwest to an existing farm dam. The existing farm dam to the northwest of the quarry has a catchment area of approximately 13.8 ha.

Large areas of the Roumalla Creek catchment have been substantially cleared for grazing. The Roumalla Creek channel is characterised as having mostly grass cover, with some trees on the banks.

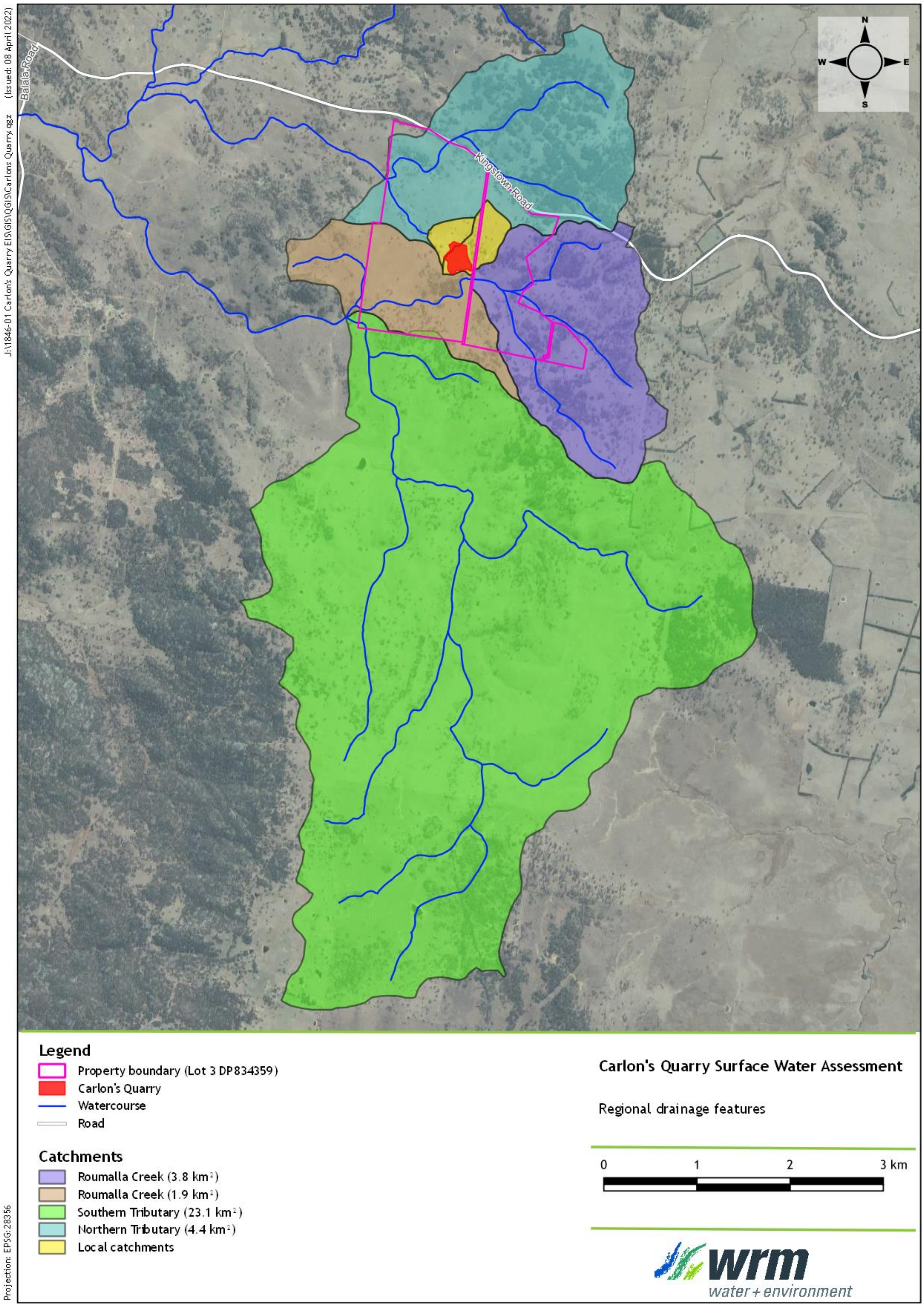
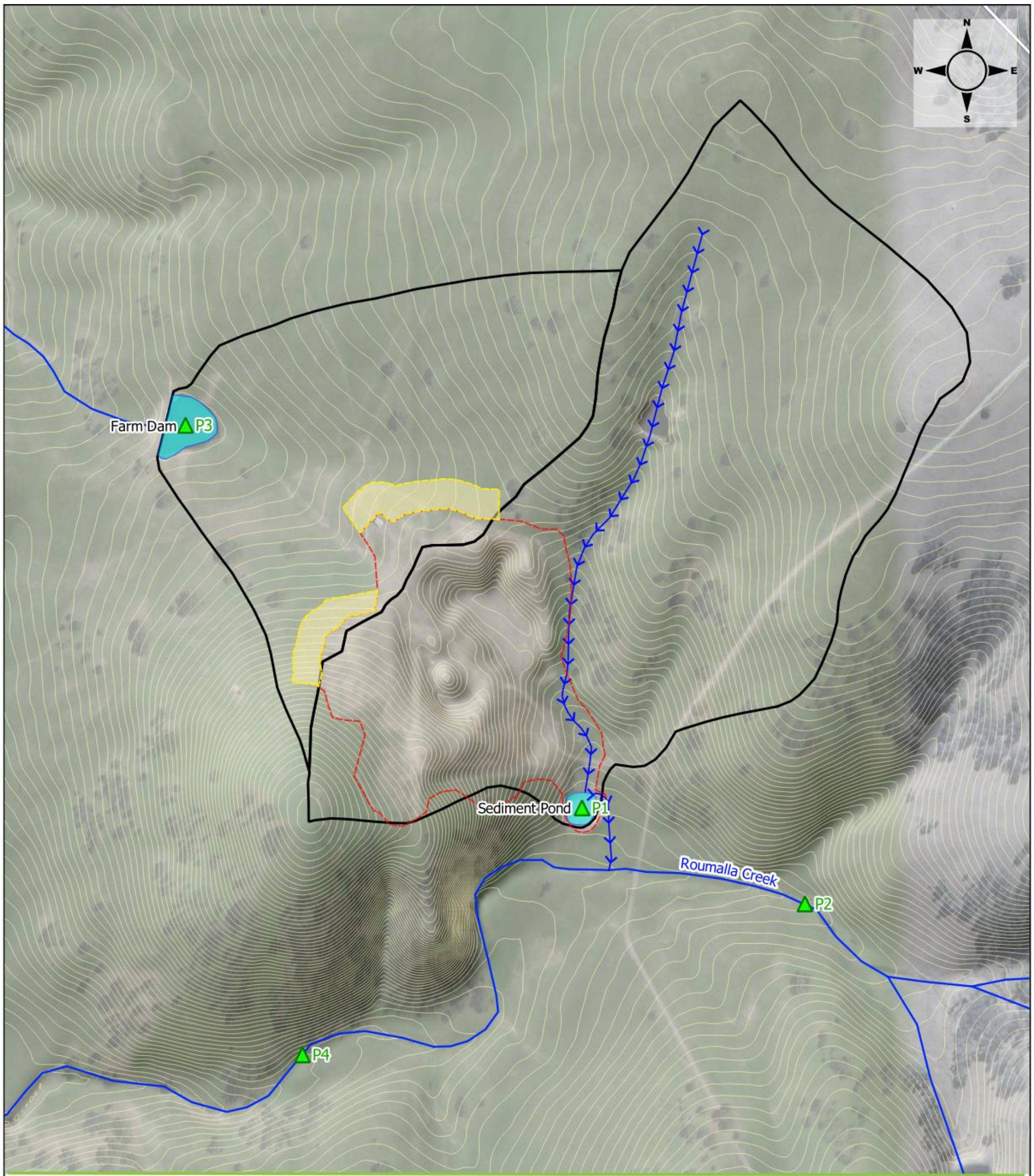


Figure 3.1 – Regional drainage characteristics



Legend

- Existing quarry extent
- Proposed quarry expansion area
- Road
- 1 m interval ground contour
- Watercourse
- Overland flow path
- Water storage
- Local catchment boundary
- Surface water monitoring location

Carlon's Quarry Surface Water Assessment

Local drainage features

0 100 200 300 m

wrm water + environment

Projection: EPSG:28356

Figure 3.2 – Local drainage characteristics

Figure 3.3 – The existing Carlon’s Gravel Pit (looking north)

Figure 3.4 – The existing sediment pond (looking east)

Figure 3.5 – The existing farm dam (looking west)

Figure 3.6 – Standing water in the Roumalla Creek channel immediately south of the quarry

3.3 WATER QUALITY

Engage Environmental Services Pty Ltd (Engage) undertook surface water sampling at the following three locations in the vicinity of the Project (see Figure 3.2 for their locations):

- Point 1 (P1): located at the existing sediment pond to the southeast of the quarry, surface runoff reporting to this location would be affected by quarry operations;
- Point 2 (P2): located in Roumalla Creek upstream of the quarry, surface runoff reporting to this location is not affected by quarry operations; and
- Point 3 (P3): located at the existing farm dam to the northwest of the quarry, most of the surface runoff reporting to this location is from undisturbed areas, but runoff from a small area of the quarry also reports to this dam (see Figure 3.2).

The surface water sampling methodology and results are provided in the surface water monitoring report prepared by Engage (Engage, 2022), which was supplied to WRM for use in this surface water assessment. Table 3.1 shows a summary of the water quality sampling results obtained from Engage (2022) for electrical conductivity (EC), pH and total suspended solids (TSS). Note that only a single sample was taken at the three locations described above.

For comparison, Table 3.1 also shows the water quality threshold criteria for pH and TSS obtained from the Australian and New Zealand guidelines for fresh and marine water quality (ANZG, 2018), based on 95% trigger values and National Environment Protection. These have been adopted as the water quality threshold criteria for the Project.

The water quality sampling results indicate the following:

- Water quality in P2 (Roumalla Creek) and P3 (farm dam) are generally consistent. EC and TSS in P2 are higher than those in P3, which is possibly due to evapo-concentration effects if the creek was not flowing at the time of sampling. Overall, water quality in P2 and P3 is a reasonable representation of background water quality.
- Background water quality (in P2 and P3) is generally good, with EC, pH and TSS generally not exceeding the threshold criteria, with the exception of marginal exceedance of field pH at P3 and laboratory EC at P2.
- Water quality in P1 (the sediment pond) indicate that EC and pH do not exceed the threshold criteria or are similar to the background concentrations in P2 and P3. TSS in P1 significantly exceed the threshold criteria and background concentrations. However, it is likely that TSS in P2 (Roumalla Creek) would be significantly higher when the creek is flowing or is in flood.

Table 3.1 – Summary of water quality sampling results (Engage, 2022)

Sampling parameter	Units	P1 (Sediment Pond)	P2 (Roumalla Creek)	P3 (Farm Dam)	Threshold criteria
Field results					
EC	µS/cm	181.4	286.5	59.4	30 - 350 [a]
pH		8.0	7.8	8.1	6.5 – 8.0
Laboratory results					
EC	µS/cm	260	430	79	30 - 350 [a]
pH		7.2	7.5	7.0	6.5 – 8.0
Total Suspended Solids (TSS)	mg/L	550	22	14	50

(yellow) Exceeds threshold criteria

a NSW Government Gwydir River water quality objective for upland rivers

4 Proposed surface water management strategy and infrastructure

4.1 OVERVIEW

This section describes the objectives of the proposed water management system for the Project, including a conceptual description of the proposed infrastructure to achieve the objectives.

4.2 TYPES OF WATER GENERATED ON-SITE

Land disturbance associated with existing quarrying operations has the potential to adversely affect the quality of surface runoff in downstream receiving waters through increased sediment loads. In addition, runoff from active quarrying areas may have increased concentrations of pollutants when compared to natural runoff. The proposed strategy for the management of surface water at the Project is based on the separation of water from different sources based on anticipated water quality.

The two distinct types of water generated within the Project area are:

- ***Clean water***: surface runoff from areas unaffected by quarry operations. Clean catchment water includes runoff from undisturbed areas.
- ***Sediment water***: Surface runoff from areas that are disturbed by quarry operations. This runoff may contain high sediment loads and elevated levels of other water quality parameters.

4.3 SURFACE WATER MANAGEMENT OBJECTIVES

The two key surface water management objectives for the Project site are:

- Separate clean water runoff from the sediment-laden runoff as much as reasonable and allow it to pass uninterrupted through the catchment; and
- Understand, manage and minimise the potential impact of uncontrolled discharges of sediment-laden water from the existing sediment pond.

4.4 PROPOSED WATER MANAGEMENT INFRASTRUCTURE

Figure 4.1 show indicative locations of proposed infrastructure related to the management of water on the Project site. The main components of water-related infrastructure include:

- A “dirty water drain” that will capture sediment-laden runoff (sediment water) from disturbed areas of the quarry and convey it to the existing sediment pond; and
- A “clean water drain” that will flow parallel to the dirty water drain.
  - The clean water drain will capture clean water runoff from undisturbed areas that would otherwise drain to the sediment pond under existing conditions. Clean water runoff captured by the clean water drain will be discharged downstream of the existing sediment pond.
  - The clean water drain will also capture from a small northeastern section of the quarry disturbance area. However, this section of the quarry has been rehabilitated (grassed) and therefore, runoff from this area would have similar characteristics to runoff from undisturbed areas.

The proposed drains will reduce the catchment draining to the sediment pond by approximately 70%. Additional culverts would also be required beneath the access road to convey the clean water runoff separately from the sediment water. The sizing of these proposed drainage infrastructure will be undertaken during detailed design.

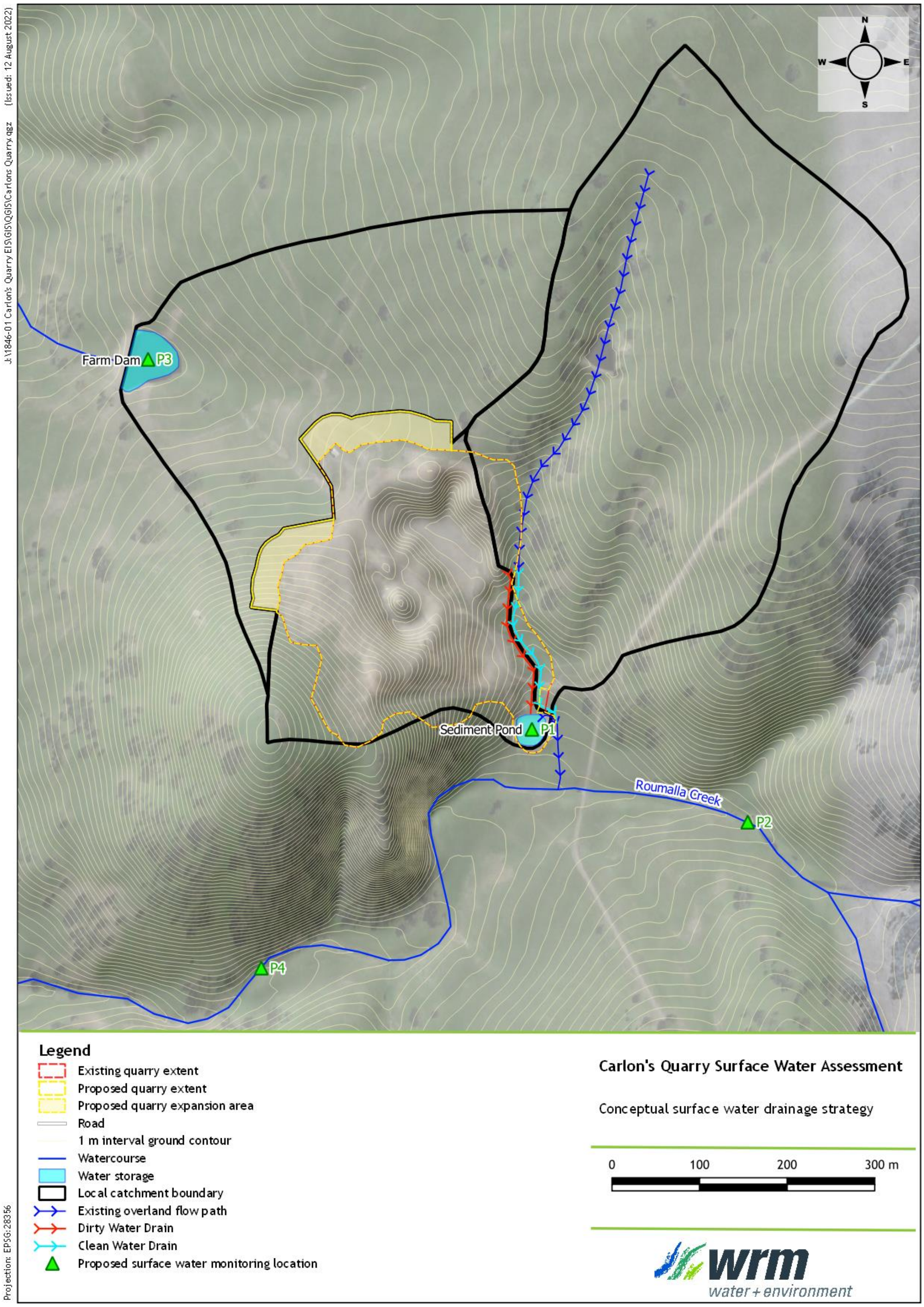


Figure 4.1 – Conceptual surface water drainage strategy

5 Assessment of impacts and management/mitigation measures

5.1 OVERVIEW

The potential impacts of the Project on surface water quality and resource include:

- Impacts on catchment area and hence downstream flows in the receiving waters; and
- Impacts on the surface water quality in the local and regional watercourses.

An assessment of each of these potential impacts of the Project is provided in the following sections.

5.2 WATER LICENSING REQUIREMENTS

The existing sediment pond is located on a mapped first order stream, which is considered a “minor stream” per the Water Management (General) Regulation 2018 (the Regulation). In addition, the existing sediment pond’s primary function is to control erosion to prevent contamination of a water source. As such, it is considered an “excluded works” dam under Schedule 1 of the Regulation and does not require licensing.

5.3 IMPACT ON SURFACE WATER CATCHMENTS

The Project will increase the quarry disturbance footprint by approximately 1 ha (as shown in Figure 4.1). It is assumed that surface runoff from the quarry expansion area will drain to the existing sediment pond following the proposed expansion. The increase in quarry disturbance footprint represents less than 0.3% of both the northern tributary catchment to the western property boundary and the Roumalla Creek catchment to the Project site.

The existing quarry does not have any in-ground pits that would capture surface runoff. This is assumed to remain the same following the proposed quarry expansion. Runoff from the quarry disturbance area would drain-offsite through the existing sediment pond. The loss of catchment flows in Roumalla Creek would be negligible and therefore, the potential impact on water quantity in Roumalla Creek due to the Project is considered negligible.

5.4 IMPACT ON SURFACE WATER DISCHARGE QUANTITIES FROM THE PROJECT SITE

5.4.1 Water balance modelling methodology

A computer-based operational simulation model (OPSIM) was used to assess the potential quantity and quality of uncontrolled discharges from the existing sediment pond. The OPSIM model was also used to estimate the runoff yield from the Roumalla Creek catchment upstream of the Project site, to assess the potential for the Roumalla Creek catchment runoff to dilute uncontrolled discharges from the sediment pond.

The OPSIM model was run in a continuous simulation mode on a daily timestep. Long term daily rainfall and evaporation data for the Project obtained from the SILO database (https://www.longpaddock.qld.gov.au/silo/) for the period January 1889 to July 2022 (133 years). Catchment runoff was estimated in the OPSIM model using the Australian Water Balance Model (AWBM) (Boughton, 2003) methodology. Distinct AWBM parameters were assigned to natural catchments and disturbed catchments, based on parameters adopted in previous studies for similar sites.

The inflow of water into the Project site is through catchment runoff and direct rainfall. Rock processing does not involve washing. Any water for dust suppression can be sourced from existing farm dams on-site and is assumed to be an insignificant amount. Therefore, the only outflow of water from the Project site is through evaporation and uncontrolled discharges from the existing sediment pond.

5.4.2 Model outcomes and impact assessment

Figure 5.1 compares the predicted annual spill volumes from the sediment pond between existing and proposed conditions. It shows that:

- Under existing conditions, there is a 50% chance that at least 17 ML of water will spill from the sediment pond in any year.
- With the proposed surface water management infrastructure in place, the catchment reporting to the sediment pond will be reduced significantly. As a result, there is a 50% chance that at least 7 ML of water will spill from the sediment pond in any year.

The surface water management strategy proposed as part of the Project will significantly reduce the volume of uncontrolled discharges from the existing sediment pond. Therefore, the annual pollutant loads discharged from the Project site to Roumalla Creek will also be reduced significantly compared to current conditions.

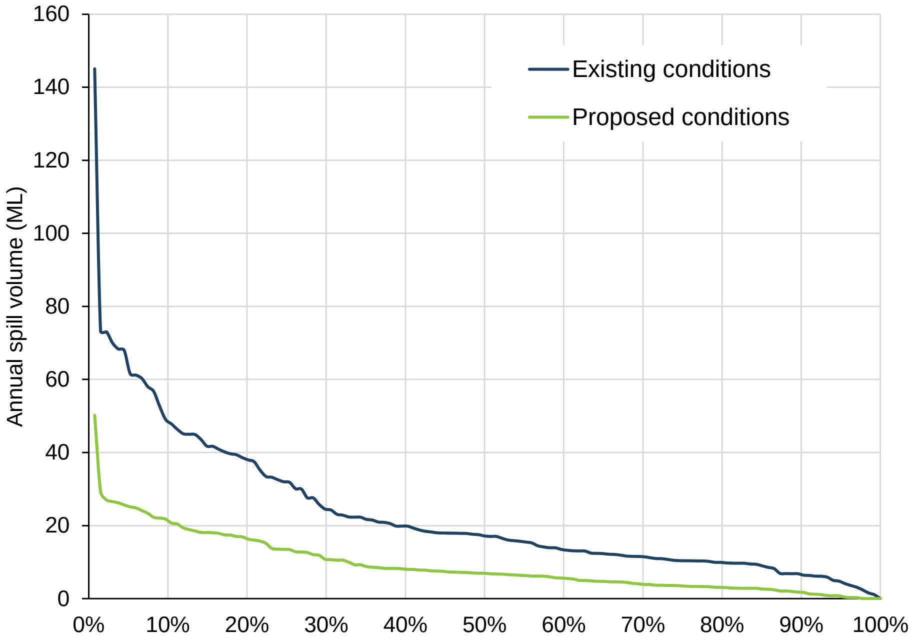


Figure 5.1 - Comparison of predicted annual spill volumes from the sediment pond between existing and proposed conditions

5.5 IMPACT ON SURFACE WATER DISCHARGE QUALITY FROM THE PROJECT SITE

The water balance model described in Section 5.4.1 was used to assess the potential impacts on surface water quality due to uncontrolled discharges from the sediment pond.

Figure 5.2 shows the predicted dilution factor that can potentially occur just downstream of the sediment pond (i.e. the ratio between the volume of runoff from the Roumalla Creek catchment and the volume of uncontrolled discharge from the sediment pond). Zero routing was assumed in the Roumalla Creek catchment, which means that the runoff volume from Roumalla Creek on each day is assumed to mix with the coincident spill volume from the sediment pond, without delay.

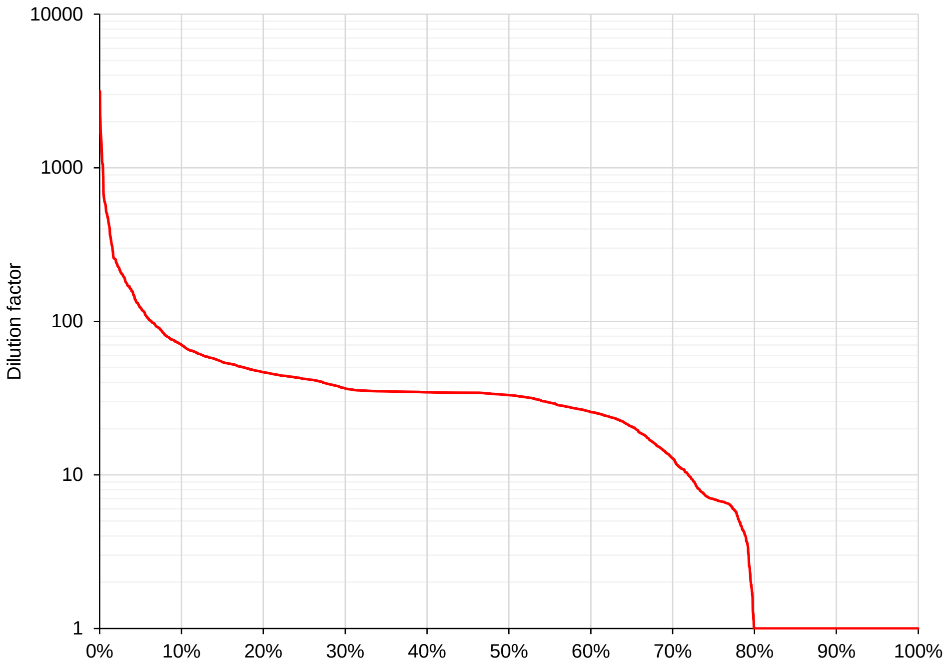


Figure 5.2 - Predicted potential dilution factor that can be achieved downstream of the existing sediment pond

The following is of note with regards to the potential impact of the project on surface water quality in Roumalla Creek:

- The water quality data (refer to Section 3.3) shows that EC and pH in the sediment pond do not exceed the threshold criteria or are similar to the background concentration in the Roumalla Creek. Therefore, the Project should not have any adverse impacts on the concentrations of these water quality parameters in Roumalla Creek.
- Total suspended solids (TSS) in the sediment pond outflows would appear to be elevated compared to background levels. However, during days when the creek is flowing, TSS in the creek would likely be much higher than shown in the water quality sample (sampled when water is not flowing).
- Based on the predicted potential dilution ratios (shown in Figure 5.2), there is an 80% chance that when the sediment pond spills, some dilution of sediment pond outflows by Roumalla Creek flows will occur. There is a 50% chance that when the sediment pond spills, contaminant concentrations in the sediment pond outflows would be diluted by a factor 33 by Roumalla Creek flows.

5.6 SURFACE WATER MONITORING

Monitoring of surface water quality both within and external to the Project site will be undertaken to better establish the baseline surface water quality, understand the impact of the Project on receiving water quality and allow for detection of any impacts and appropriate corrective action.

A single water surface water sample was taken at three sampling locations in the vicinity of the Project (refer to Section 3.3). Surface water monitoring will continue at these sites plus one additional site in Roumalla Creek downstream of the Project (monitoring location P4). Figure 4.1 shows the proposed surface water monitoring locations.

Table 5.1 defines the proposed frequency and parameters to be sampled at the proposed monitoring locations. Quarterly sampling at these locations allows for any potential issues with respect to pollutant generation on-site to be identified in advance ensuring appropriate remedial action can be taken.

Table 5.1 – Proposed surface water quality monitoring parameters and frequency

Sampling parameter	Monitoring frequency
EC	Quarterly
pH	
Total Suspended Solids (TSS)	
Oil & grease	

6 Summary of findings

6.1 OVERVIEW

The proposed surface water management strategy for the Project is based on the separation of clean water runoff from the sediment-laden runoff. Regular surface water monitoring will be undertaken to better establish the baseline surface water quality, to understand the impact of the Project on receiving water quality and allow for detection of any impacts and appropriate corrective action.

6.2 PROPOSED SURFACE WATER MANAGEMENT/MITIGATION STRATEGY

The proposed strategy for the management of surface water at the Project is based on the separation of "clean water" and "sediment water" runoff.

As a mitigation measure, it is proposed to construct a "dirty water drain" that will capture sediment-laden runoff (sediment water) from disturbed areas of the quarry and convey it to the sediment pond; and a "clean water drain" that will capture clean water runoff that would otherwise drain to the sediment pond under existing conditions and then convey it downstream of the existing sediment pond.

6.3 WATER LICENSING REQUREMENTS

The existing sediment pond is located on a mapped first order stream, which is considered a "minor stream" per the Water Management (General) Regulation 2018 (the Regulation). In addition, the existing sediment pond's primary function is to control erosion to prevent contamination of a water source. As such, it is considered an "excluded works" dam under Schedule 1 of the Regulation and does not require licensing.

6.4 IMPACT ON SURFACE WATER CATCHMENTS

The increase in quarry disturbance footprint represents less than 0.3% of both the northern tributary catchment to the western property boundary and the Roumalla Creek catchment to the Project site. Runoff from the quarry disturbance area would drain-offsite through the existing sediment pond. The loss of catchment flows in Roumalla Creek would be negligible and therefore, the potential impact on water quantity in Roumalla Creek due to the Project is considered negligible.

6.5 IMPACT ON SURFACE WATER DISCHARGE QUANTITIES FROM THE PROJECT SITE

The surface water management strategy proposed as part of the Project will significantly reduce the volume of uncontrolled discharges from the existing sediment pond. Therefore, the annual pollutant loads discharged from the Project site to Roumalla Creek will also be reduced significantly compared to current conditions.

6.6 IMPACT ON SURFACE WATER DISCHARGE QUALITY FROM THE PROJECT SITE

The water quality data shows that EC and pH in the sediment pond do not exceed the threshold criteria or are similar to the background concentration in the Roumalla Creek. Therefore, the Project should not have any adverse impacts on the concentrations of these water quality parameters in Roumalla Creek.

There is an 80% chance that when the sediment pond spills, some dilution of sediment pond outflows by Roumalla Creek flows will occur. There is a 50% chance that when the sediment pond spills, contaminant concentrations in the sediment pond outflows would be diluted by a factor 33 by Roumalla Creek flows.

Additional water quality monitoring will be undertaken to assess and confirm pollutant concentrations in the sediment pond releases and to determine if any corrective action will be required.

7 References

ANZG, 2018	Australian and New Zealand guidelines for fresh and marine water quality; 95% species protection.
Boughton, 2003	Cooperative Research Centre for Catchment Hydrology (2003). Technical Report 03/15, Calibrations of the AWBM for the use on ungauged catchments.
Engage, 2020	Engage Environmental Services, May 2022, *Surface Water Monitoring – Carlon's Quarry 1033 Kingstown Rd Balala NSW*
WRM, 2022	WRM Water & Environment Pty Ltd, August 2022, *Carlon's Quarry Expansion Project – Erosion and Sediment Control Plan*

Carlon's Quarry Expansion Project

Erosion and Sediment Control Plan

Blendee Partnership c/o Onward Consulting

1846-01-C2, 18 August 2022

Report Title	Carlon's Quarry Expansion Project, Erosion and Sediment Control Plan
Client	Blendee Partnership c/o Onward Consulting Address details
Report Number	1846-01-C2

Revision Number	Report Date	Report Author	Reviewer
1	12 August 2022	AN	MGB
2	18 August 2022	AN	MGB

For and on behalf of WRM Water & Environment Pty Ltd
Level 9, 135 Wickham Tce, Spring Hill
PO Box 10703 Brisbane Adelaide St Qld 4000
Tel 07 3225 0200

Ardianto Notodirdjo

Senior Engineer

Contents

List of Figures

List of Tables

1 Introduction

1.1 BACKGROUND

Carlon's Quarry is an existing approved gravel quarry operated by Blendee Partnership, located on Kingstown Road approximately 10 kilometres (km) west of Uralla in northern NSW (see Figure 1.1).

The existing quarry received development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW Environment Planning and Assessment Act 1979 (EP&A Act) for the Carlon's Quarry Expansion Project (the Project). This Erosion and Sediment Control Plan (ESC Plan) has been prepared to accompany the development application for the Project, with reference to the water components of the Secretary's Environmental Assessment Requirements (SEARs).

Carlon's Quarry is operated using machinery such as bulldozers, front end loaders and excavators. There has been no permanent infrastructure developed as part of the quarry.

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m^3) to a maximum 120,000 m^3 per annum with an approximate average of 80,000 m^3. The Project involves a minor extension to the north and west of the existing quarry (see Figure 1.2) and will require the operation of additional mobile equipment.

1.2 PURPOSE OF REPORT

The primary purpose of this document is to outline strategies to manage two types of surface water (**clean** water and **sediment** water) at the Project. The potential impacts of the Project on the surface water environment and the proposed surface water management strategy to mitigate these impacts are described in the Surface Water Assessment report (WRM, 2022). With respect to diverted and sediment water, this ESC Plan:

- examines and addresses all issues relevant to the generation, management, and mitigation of erosion and sediment transport at the Project;
- provides guidance in erosion and sediment related issues and management techniques applicable to the Project;
- determines the appropriate requirements for sediment and erosion control at the Project; and
- complies with relevant regulatory requirements.

1.3 REPORT STRUCTURE

This report is structured as follows:

- Section 2 describes the ESC framework including regulatory requirements;
- Section 3 describes the existing surface water environment;
- Section 4 outlines the principles of erosion and sediment control;
- Section 5 provides a description of erosion control measures;
- Section 6 provides a description of drainage control measures;
- Section 7 provides a description of sediment control measures;

- Section 8 presents the requirements for monitoring, maintenance and reporting on ESC measures; and
- Section 9 gives a list of references.

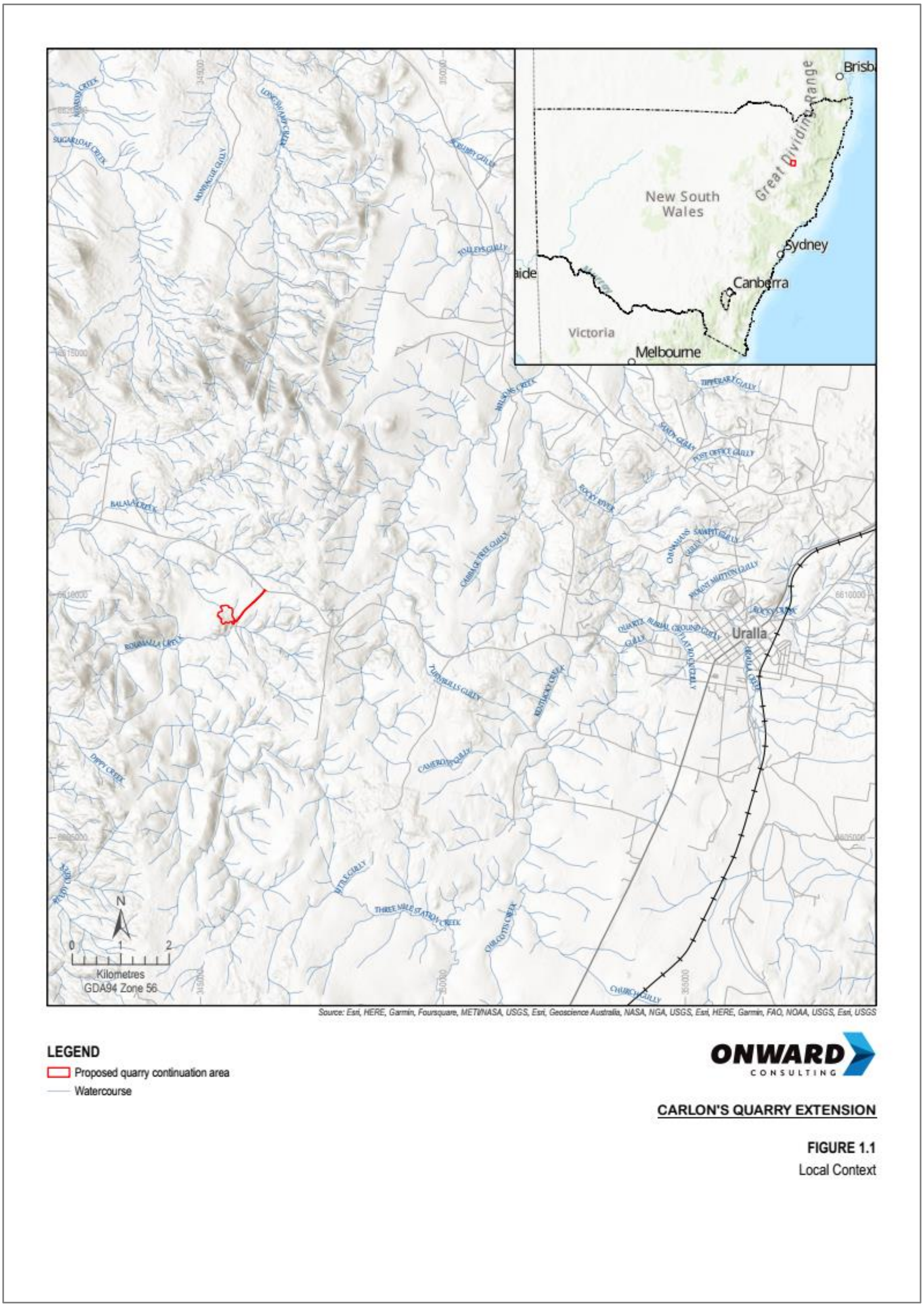


Figure 1.1 – Regional locality

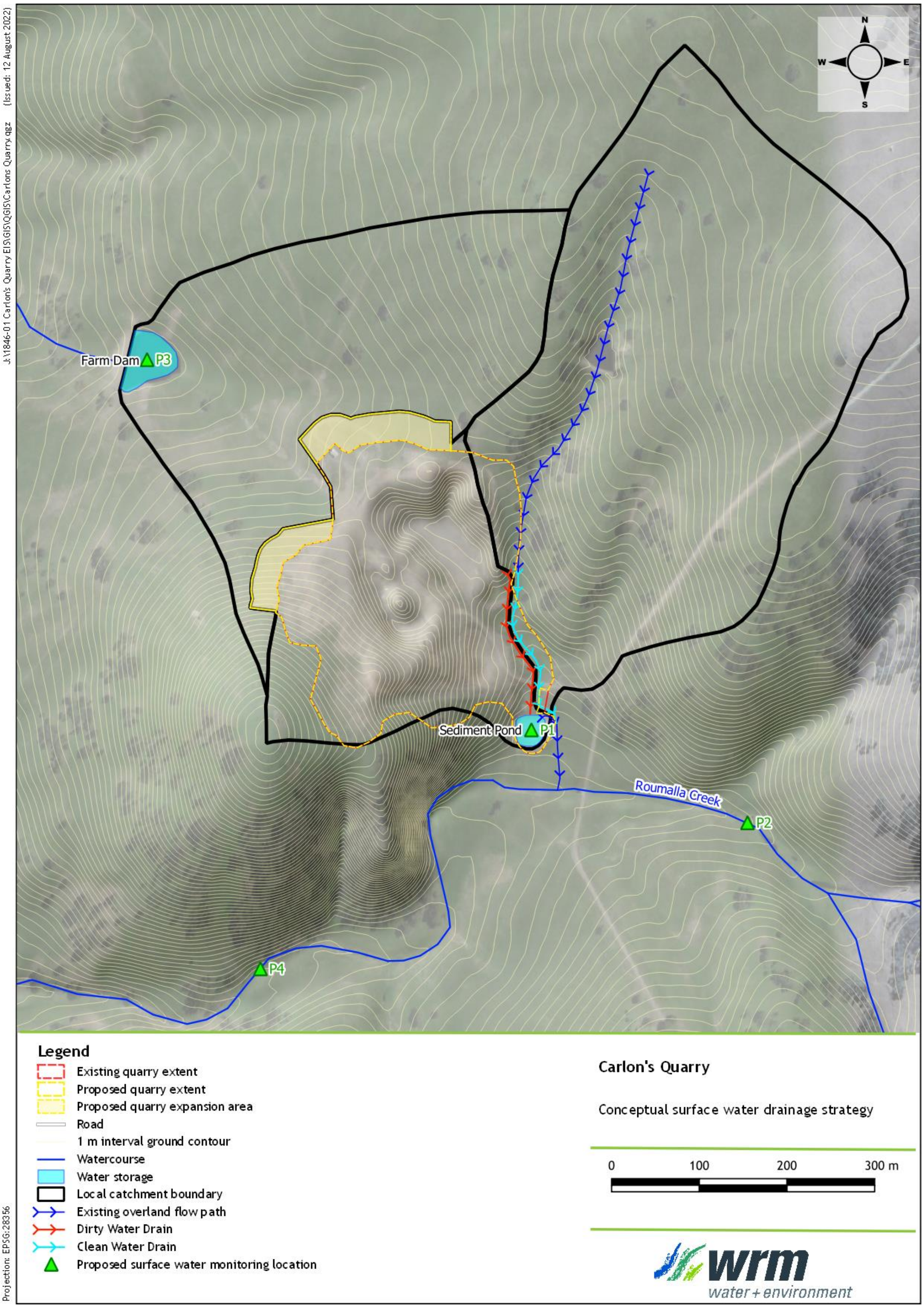


Figure 1.2 – Project site layout including the conceptual surface water drainage strategy

2 ESC framework

The following regulatory framework and relevant guidelines are applicable to the Project:

- Water Management Act 2000;
- Soil Conservation Act 1938;
- Protection of the Environment Operations Act 1997 (the POEO Act);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018);
- Best Practice Erosion and Sediment Control (IECA, 2008); and
- Managing Urban Stormwater – Soils and Constructions, Volume 2E – Mines and Quarries (Landcom, 2004).

3 Existing environment

3.1 REGIONAL DRAINAGE CHARACTERISTICS

Figure 3.1 shows the regional drainage features in the vicinity of the Project. The Project is located within the Roumalla Creek catchment. Roumalla Creek is a tributary of the Gwydir River, which is located in the upper reaches of the Murray-Darling basin.

Carlon's Quarry is located on private grazing land (Lot 3 on DP834359) (see Figure 1.2) referred to in this report as the property. Roumalla Creek flows through the property in a southwesterly direction immediately south of the quarry.

Roumalla Creek has a catchment area of about 3.8 km^2 (380 hectares [ha]) upstream of the quarry. The Roumalla Creek catchment to the western property boundary is about 29 km^2 (2,900 ha) which include the catchment of the "Southern Tributary" of the creek. A "Northern Tributary" of Roumalla Creek flows in a southwesterly direction across the northern part of the property. The Northern Tributary has a catchment area of 4.4 km^2 (450 ha) to the western property boundary.

3.2 LOCAL DRAINAGE

3.2.1 Existing conditions

Figure 3.2 shows the existing local drainage characteristics in the vicinity of the Project. Figure 3.3 shows an overview of existing quarry. Figure 3.4 to Figure 3.9 show photographs of existing drainage features within and in the vicinity of the Project site.

Most of the surface runoff from the quarry itself drains to an existing sediment pond at the southeastern corner of the quarry. This existing sediment pond has a catchment area of approximately 28.5 ha, with about 74% of the catchment consisting of undisturbed areas to the northwest of the quarry.

Some runoff from the northern parts of the existing quarry disturbance area drains northwest to an existing farm dam. The existing farm dam to the northwest of the quarry has a catchment area of approximately 13.8 ha.

Large areas of the Roumalla Creek catchment have been substantially cleared for grazing. The Roumalla Creek channel is characterised as having mostly grass cover, with some trees on the banks.

3.2.2 Proposed conditions

Figure 1.2 shows the proposed drainage characteristics for the Project. Drainage channels (refer to Section 6) will be constructed along the eastern part of the quarry to separate runoff from disturbed and undisturbed areas within the Project site. Once these channels are constructed, the catchment draining to the existing sediment pond will be reduced to approximately 9 ha.

3.3 TOPOGRAPHY

Figure 3.2 also shows the ground contours (in one metre intervals) which indicate the terrain across the Project site and surrounding areas. The Project site is located on gently undulating land which progresses in elevation from 930 m Australian height datum (AHD) in the southeast of the quarry to 960 m AHD in the northwest of the quarry. A natural ridgeline (saddle) runs along the northwestern edge of the quarry.

3.4 EXPECTED SOIL CHARACTERISTICS

Figure 3.7 and Figure 3.8 are photographs showing the ground surface conditions within the existing quarry. The 2002 Statement of Environmental Effects indicated that the geology of the

Project site consists mainly of interbedded cherts (generally formed from silica) and mudstone (generally formed from silt and clay). However, the soil classifications and/or characteristics within and in the vicinity of the quarry has not been studied.

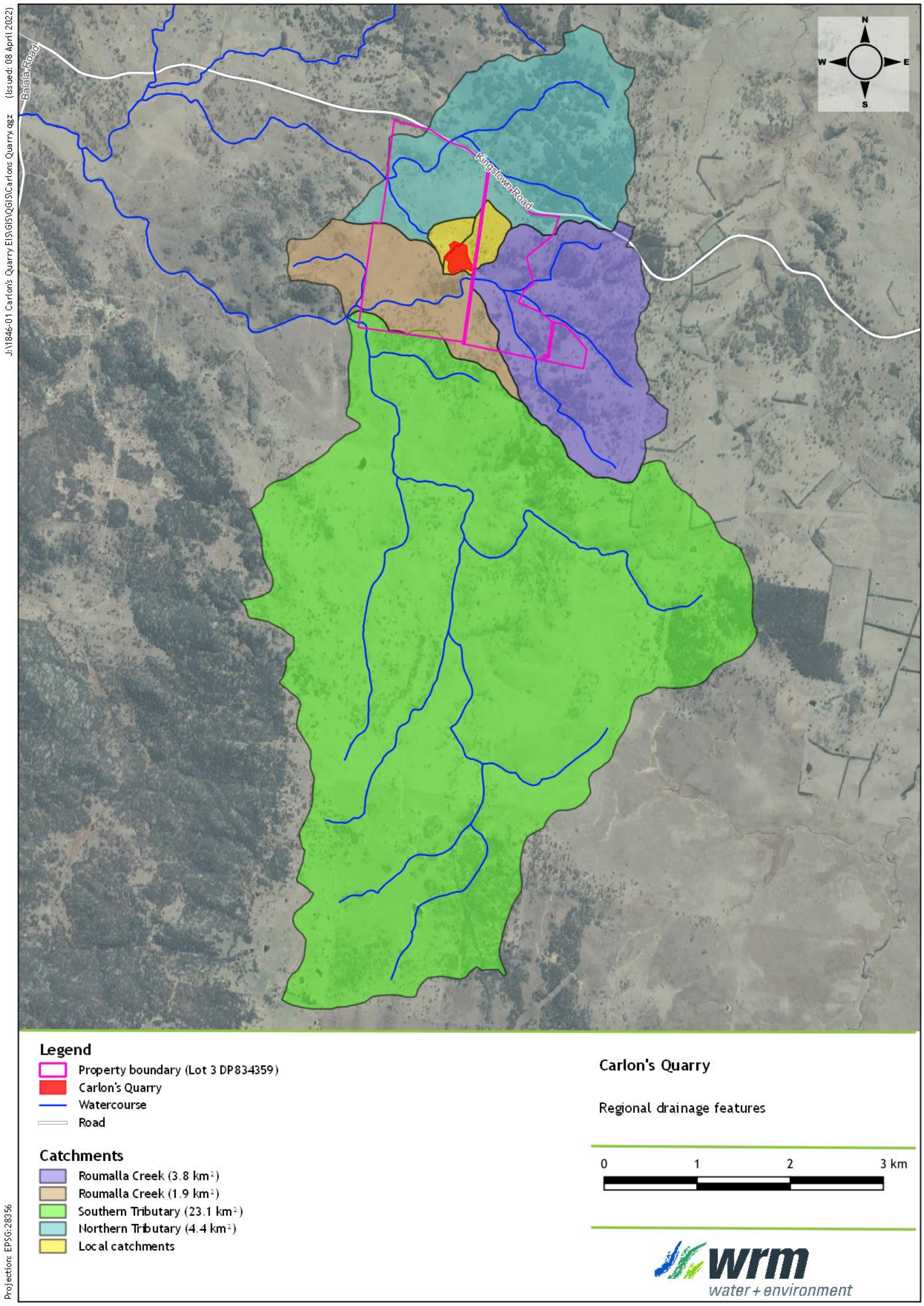


Figure 3.1 – Regional drainage characteristics

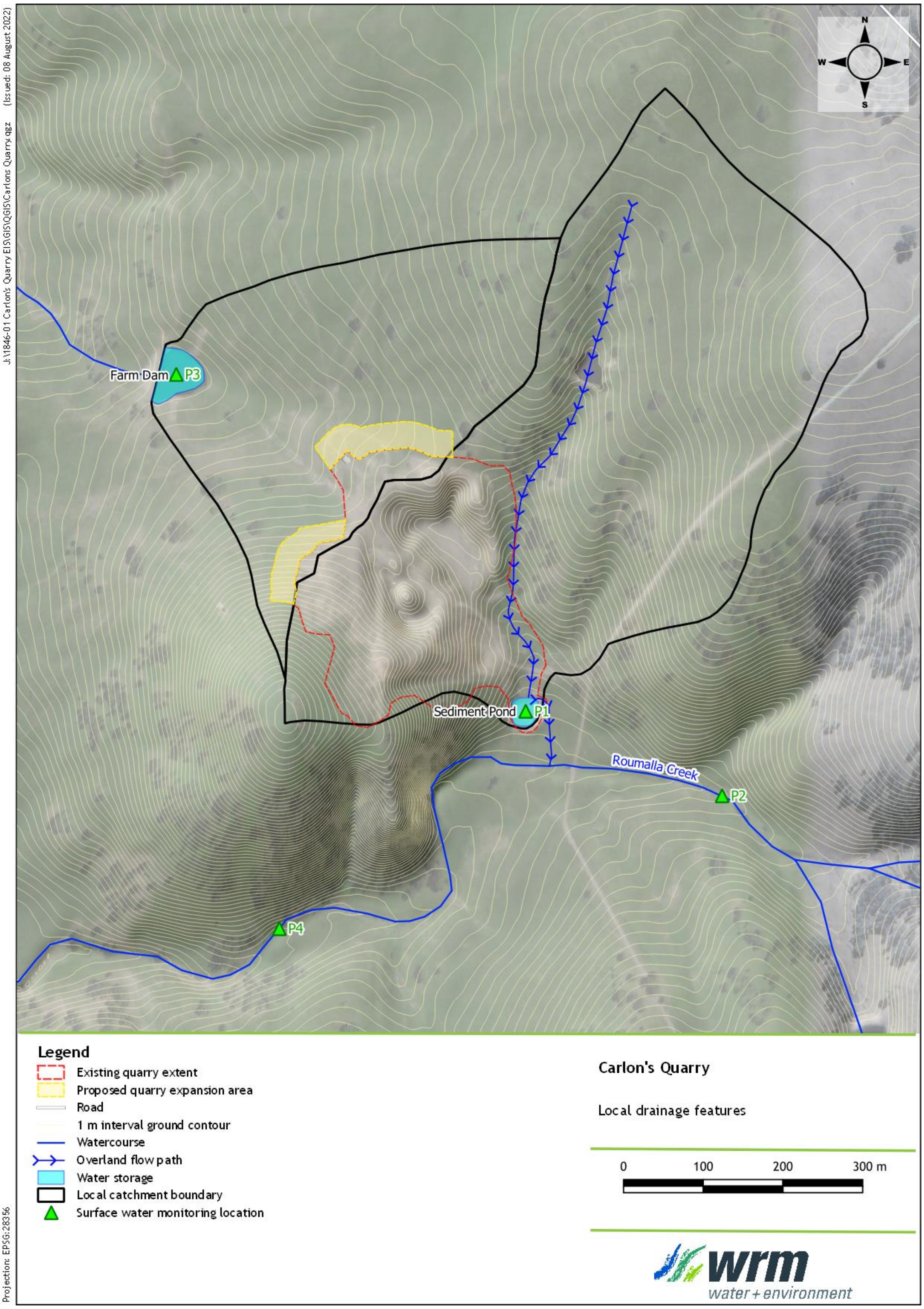


Figure 3.2 – Existing local drainage characteristics

Figure 3.3 – The existing Carlon's Gravel Pit (looking north)

Figure 3.4 – The existing sediment pond

Figure 3.5 – The existing farm dam (looking west)

Figure 3.6 – Standing water in the Roumalla Creek channel immediately south of the quarry

Figure 3.7 – Ground surface conditions at upper areas of the quarry

Figure 3.8 – Ground surface conditions at lower areas of the quarry near the sediment pond

Figure 3.9 – Existing culvert crossing at the access road to the quarry

3.5 ENVIROMENTAL VALUES

The *Water Management Act (2000)* provides a framework for identifying environmental values (EV) for a waterway and deciding water quality objectives (WQO) to protect or enhance those EV's. EV's for water are the qualities of water that make it suitable for supporting aquatic ecosystems and human water uses. These EVs need to be protected from the effects of habitat alteration, waste releases, contaminated runoff and changed flow to ensure healthy aquatic ecosystems and waterways that are safe for community use.

Roumalla Creek and its tributaries would be classified as a 'fresh' water source under this policy. The EVs selected for protection include:

- aquatic ecosystem protection
- stock watering
- human consumption
- primary, secondary and visual recreation
- drinking water

In summary, the key EVs for water that are to be protected are:

- physical, chemical and biological integrity of the watercourses within the catchment and their amenity as potential water sources for human use and to support aquatic ecosystems
- the qualitative and quantitative integrity of local groundwater as a potential water source for agricultural or other suitable uses

- the integrity of raw water supplies and associated infrastructure in the region.

3.6 WATER QUALITY OBJECTIVES

Table 3.1 shows the water quality objectives (WQOs) for the Project receiving waters. The adopted water quality trigger levels for pH and TSS were obtained from the Australian and New Zealand guidelines for fresh and marine water quality (ANZG, 2018), based on 95% species protection.

Table 3.1 – Receiving water contaminant trigger levels

Quality characteristic	Units	Trigger level
pH	pH	6.5 – 8.5
Electrical conductivity	µs/cm	30 – 350 [a]
Total suspended solids	mg/L	50

[a] – NSW Government Gwydir River water quality objective for upland rivers

4 Erosion and sediment control

4.1 OVERVIEW

This Erosion and Sediment Control (ESC) Plan is intended to assist in the management, reduction and mitigation of erosion and consequent sediment transport at the Project.

Preventing unacceptable levels of sediments and contaminants from leaving the lease and entering the receiving waters is one of the most important functions of ESC, which is managed by compliance with the Development Approval. As per Landcom (2004) this Plan adopts the three cornerstones of ESC as follows:

- Drainage control – prevention or reduction of soil erosion caused by concentrated flows and appropriate management and separation of the movement of diverted and surface water through the mining areas.
- Erosion control – prevention or minimisation of soil erosion (from dispersive, non-dispersive or competent material) caused by rain drop impact and exacerbated overland flow on disturbed surfaces.
- Sediment control – trapping or retention of sediment either moving along the land surface, contained within runoff (i.e. from up-slope erosion) or from windborne particles.

For ESC to be effective the following fundamentals are required:

- ensure ESC measures are designed and constructed effectively;
- minimise the duration and extent of soil exposure;
- promptly stabilise disturbed areas;
- maximise sediment retention on the site;
- control water movement through the site;
- minimise soil erosion wherever possible rather than applying down slope sediment controls;
- utilise existing topography and adopt construction practices that minimise soil erosion and sediment discharge from disturbed areas;
- integrate erosion and sediment control issues / measures into the planning phases of mine operations;
- choose the ESC technique to account for site conditions such as soil, weather and construction conditions;
- maintain all ESC measures in proper working order at all times; and
- monitor the site and adjust ESC practices to maintain the required performance standard.

4.2 POTENTIAL SOURCES OF EROSION

Operations at the Project may result in the alteration of existing surface water flow patterns by proposed activities and through diversion drains. Erosion may occur due to the following activities:

- topsoil and subsoil stockpiles;
- excavation as part of quarrying activities;
- cleared land ahead of quarrying activities;
- changes to catchments;

- runoff from the access road;
- vehicle and equipment movements; and
- disturbed areas not yet rehabilitated.

Potential erosion and sediment sources as well as the potential contaminants, impacts and applicable period at the Project are presented in Table 4.1.

Table 4.1 – Potential Erosion and Sediment Sources

Disturbance category	Potential category	Potential impacts	Applicable period
Topsoil stripping area	Unconsolidated materials, bare areas vulnerable to storm activity.	Sheet, tunnel, rill and gully erosion leading to movement and deposition of sediments, deleteriously impacting on receiving waters.	During quarry operations period
Topsoil stockpiles	Unconsolidated materials, sediment and turbidity	Sheet, rill erosion leading to sedimentation of waterways and loss of valuable rehabilitation material.	During quarry operations period
Access roads	Disturbed materials from surface of the road, erosion of table drain material vulnerable to storm activity	Sedimentation of nearby watercourses	During quarry operations period
Land clearing	Disturbed materials, sediment and turbidity	Sedimentation of nearby watercourses.	During quarry operations period
Drainage channels	Disturbance of landform resulting in possible bare landforms increasing sediments in runoff	Sheet, tunnel, rill and gully erosion leading to movement and deposition of sediments, deleteriously impacting on receiving waters.	During quarry operations period

4.3 EROSION POTENTIAL

Undertaking an assessment for risk of erosion is essential to determine the appropriate ESC technique to apply. There are five main categories that need to be taken into consideration, all of which influence the erosion potential and the type of control measure(s) applicable:

- soil classification;
- average slope of disturbance area;
- extent and duration of soil disturbance;
- location within the catchment (and whether run-off from upslope can be controlled); and
- proximity to waterways.

4.3.1 Soils/spoil

Soils/spoil are classified into three categories:

- dispersive soil;
- non dispersive soil; and
- blocky / competent material.

The following is provided as background to identifying soil / material types.

Dispersive soils are structurally unstable in water and tend to break down into their constituent particles which consequently cloud the water. Dispersive soils are highly susceptible to erosion on slopes and drains when exposed.

Non-dispersive soils are characterised by large, water-stable aggregates separated by large pore spaces that absorb water rapidly. These soils are typically high in clay content although some clays are highly dispersive and break down when wet making them highly erodible (i.e. dispersive). Sandy soils are generally non-dispersive on gently sloping land, however are dispersive on steep slopes.

Blocky / competent soil material is structurally sound and typically does not contribute a large portion of erosion problems or sediment runoff. These materials may be used to construct various erosion and sediment control techniques.

If there is uncertainty surrounding the soil type for any area of activity where this ESC Plan needs to be referenced, the quarry's personnel should be contacted and appropriate steps undertaken to determine soil type. This may include undertaking suitable soil assessment as per published documentation (e.g. Landcom, 2004 and IECA, 2008).

4.3.2 Slope

The steepness of the slope and slope length are important determinants in the erosion risk of the Project site. The Australian Soils and Landscapes Handbook (McKenzie, 2004) identifies that slopes can be categorised by their percentage or degree of slope. These slope categories of relevance to the Project are defined in Table 4.2. Areas with slopes steeper than very gently inclined should be avoided where possible to prevent erosion.

Table 4.2 – Definition of slope class (McKenzie, 2004)

	Approximate Slope Values			
	Tangent (%)		Degrees	
Slope Class	Upper Boundary	Average	Upper Boundary	Average
Level	1	0.6	0°35	0°20'
Very gently inclined	3	1	1°45'	0°35
Gently inclined	10	6	5°45'	3°
Moderately inclined	32	20	18°	10°

4.3.3 Area and duration

A principal of ESC is to minimise the extent and duration of soil disturbance. Therefore, mining schedules should aim to minimise the duration for which open soils are exposed to the erosive elements (wind, rain and flowing water). Reducing the period where soils are exposed to erosive elements during the construction phase lessens opportunity for displaced sediment to enter into the surrounding environment.

Strategies to minimise increased risk of erosion during the operational phase of the quarry include:

- minimise the extent of the disturbance;
- prompt revegetation of non-operational disturbed area;
- ensure both temporary earthworks and permanent land-shaping provide a landform that minimises erosion; and

- design temporary runoff collection, conveyance and disposal systems to minimise erosion.

4.3.4 Location within the localised catchments

One of the major principles in achieving effective erosion and sediment control across any site is the necessity to separate run-off from undisturbed catchments and disturbed catchments. Disturbed sites positioned low in a localised catchment with the potential to receive overland or flood flows represent an increased erosion risk. It is therefore necessary to establish site drainage works to convey overland flows safely through or around a site during the disturbance period.

A “dirty water drain” will be constructed to capture sediment-laden runoff (sediment water) from disturbed areas of the quarry and convey it to the existing sediment pond at the southeastern part of the quarry. A “clean water drain” will be constructed parallel to the dirty water drain which will capture runoff from undisturbed areas and divert it around the existing sediment pond. The proposed alignments of the dirty water and clean water drains are shown in Figure 1.2. The design of these drains will be completed during the detailed design phase of the Project.

4.3.5 Waterways

The proximity to watercourses may trigger an increased level of planning. Disturbances to existing waterways should be avoided wherever practical.

During operational phases, the proximity of ESC measures to watercourses should be undertaken where practicable and reasonable. Design should take into account floodplain extent, soil conditions and flood immunity of the selected ESC measure.

Within this process any mitigation works required to minimise erosion and sediment transport will be detailed. Any discharges to a watercourse may be conditional based on the licence or conditions of the approval to operate.

5 Erosion control measures

5.1 OVERVIEW

Soil erosion is the process through which the effects of wind, water or physical action displace soil particles, causing them to be transported. This section discusses the potential measures to mitigate or reduce erosion caused by water. The most common forms of water erosion are:

- **Splash erosion** is the spattering of soil particles cause by the impact of raindrops on soil;
- **Sheet erosion** is the uniform removal of soil in thin layers from sloping land;
- **Rill erosion** is the removal of soil by water concentrated in small but well-defined channels; and
- **Gully erosion** produces channels deeper and larger than rills (generally greater than 300 mm deep).

5.2 EROSION CONTROL TECHNIQUES

5.2.1 Soil stabilisation and protection

Erosion control at the project site will generally be undertaken by revegetation for temporary and permanent stabilisation of topsoil stockpiles.

5.2.2 Control of erosion on slopes

A list of appropriate erosion control measures to be used on flat, mild and steep slopes is given in Table 5.1.

Table 5.1 – Erosion control measures on slopes

Flat land (flatter than 1 in 10)	Mild slopes (1 in 10 - 1 in 4)	Steep slopes (steeper than 1 in 4)
Gravelling	Mulching	Cellular confinement systems
Mulching	Revegetation	Revegetation
Revegetation	Rock mulching	Rock armouring

6 Drainage control measures

6.1 OVERVIEW

This section outlines the measures to be taken when constructing drainage channels at the Project to minimise erosion and downstream sedimentation. Control measures that will be implemented at the Project site consists of temporary drainage channels that collect concentrated flow and overland flow.

6.2 OPERATIONAL DRAINAGE CONTROLS

Operational drainage is considered temporary and only used during the operational period of the Project. All operational drainage shall be decommissioned and rehabilitated.

The key drainage controls proposed at the Project are as follows (refer to Figure 1.2 for indicative locations):

- A “dirty water drain” that will capture sediment-laden runoff (sediment water) from disturbed areas of the quarry and convey it to the existing sediment pond; and
- A “clean water drain” that will flow parallel to the dirty water drain and capture clean water runoff from undisturbed areas that would otherwise drain to the sediment pond under existing conditions. Clean water runoff captured by the clean water drain will be discharged downstream of the existing sediment pond.

6.2.1 Design standards

Table 6.1 shows the proposed design standard of operational drainage structures at the Project. Operational drainage controls that are anticipated to last longer than 24 months would be designed to cater for a 20-year Average Recurrence Interval (ARI) design storm to provide effective separation of diverted and sediment water. This may involve a combination of channels and compacted embankments.

Table 6.1 – Drainage design standards for temporary drainage works

Anticipated design life (months)	Design standard (years ARI)
< 12	2
12 to 24	5
> 24	20

6.2.2 Drainage design techniques

In accordance with IECA (2008), drainage channels, whether permanent or temporary, should be designed and constructed at a gradient that limits the maximum flow velocity for the adopted design event standard (refer Table 6.1) to a value not exceeding the maximum allowable flow velocity for the given surface material. The principal factor in the selection of drainage control measures is the design discharge peak velocity. In accordance with IECA (2008), drainage channels, whether permanent or temporary, should be designed and constructed at a gradient that limits the maximum flow velocity to a value not exceeding the maximum allowable flow velocity for the given surface material.

The velocity limit for a drain depends on its gradient and the channel material. Channel material needs to be taken into consideration for erosion/scour resistance and Manning’s ‘n’ roughness, which has an impact on velocity. Table 6.2 shows the typical velocity limits for different drainage material.

Table 6.2 – Velocity limits for drain material types (IECA, 2008)

Material types	Velocity limit (m/s)
Sandy/dispersive soil/spoil	0.3
Non-dispersive soil/spoil	0.7
70% grass cover	1.3
100% Grass cover	1.7
Erosion control blankets	1.5
Erosion control mesh/rock check dams	1.7
Rock armour (D50 = 200 mm)	2.0
Rock armour (D50 = 300 mm)	2.5
Rock armour (D50 = 400 mm)	3.5

Excessive flow velocities can cause channel erosion, usually along the invert of the drain, which can then lead to bank slumping and widening of the channel. The flow velocity can be reduced by either:

- reducing the depth of flow (increasing the width of the channel);
- reducing the bed slope;
- reducing the peak discharge (reducing catchment area); and/or
- increasing channel roughness.

If the channel width, depth or gradient cannot be altered, then there are two options for controlling erosion as follows:

- reduce the flow velocity through the placement of rock check dams; and/or
- increase the effective scour resistance in the channel through the placement of an effective channel liner (e.g. rock amour).

6.2.3 Drain velocity control structures

A list of appropriate check dam velocity control structures is given in Table 6.3. Figure 6.1 shows a typical rock check dam configuration.

Table 6.3 – Velocity control structures for channels and drains

Technique	Typical use
Fibre roll	Biodegradable logs. Used in wide shallow drains where logs can be successfully anchored down. Used in locations where it is desirable to integrate into the vegetation, such as vegetated channels. Minor sediment trap.
Rock check dams	Used in drains with a depth exceeding 0.5 m and a gradient less than 10%. Minor sediment trap.
Recessed rock check dams	Used in wide, high velocity, shallow channels where sandbag check dams would likely wash away.

Technique	Typical use
	Recessed into the soil to maintain hydraulic capacity in the channel. Minor sediment trap.
Sandbag check dams	Used in shallow drains with a depth less than 50 mm and gradient less than 10%. These check dams are small and less likely to divert water out of the drain. Minor sediment trap.
Triangular ditch check	Commercially available, reusable product. Commonly used to stabilise newly formed table drains. Used in drains with less than 10% gradient. Minor sediment trap.

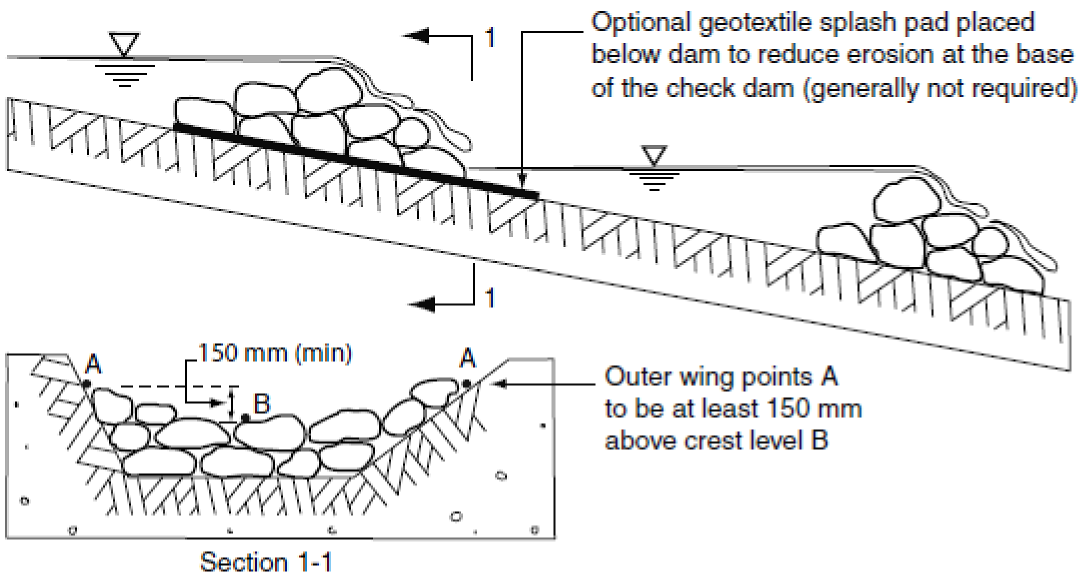


Figure 6.1 – Typical rock check dam configuration (IECA, 2008)

6.2.4 Outlet structures

All drains require an outlet structure unless they flow directly into a sediment basin. A list of appropriate outlet structures to be used at the end of chutes to provide effective scour protection is given in Table 6.4. Figure 6.2 show a typical energy dissipator configuration.

Table 6.4 – Outlet structures for scour protection

Technique	Typical use
Energy dissipator (rock protection)	Used at the end of chute drains to dissipate energy and control scour. Used as a permanent energy dissipater on pipe and culvert outlets.

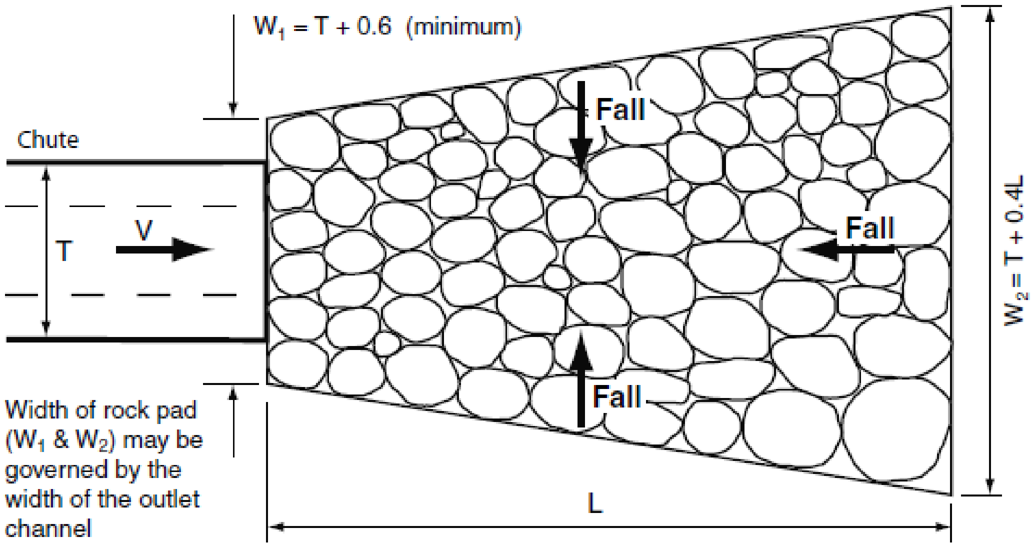


Figure 6.2 – Typical energy dissipater configuration (IECA, 2008)

6.2.5 Watercourse crossings

The only watercourse crossing at the Project site is a culvert crossing of the Roumalla Creek tributary just upstream (to the north) of the existing sediment pond. The following general principles should be followed in the design of drainage controls for watercourse crossings:

- Culvert designs should always consider the effects of debris blockages and potential erosive forces caused by overtopping flows. Ideally, culverts should have a flow capacity at least equal to the normal channel capacity of the watercourse when the water level is just below the crest of the culvert deck.
- Where possible, crossings of streams should be constructed at right angles to the flow and in locations where the channel is straight and has well defined banks.
- Crossings should be covered with a non-erodible material such as rock or gravel and the upstream and downstream batters should be armoured with rock to control erosion caused by overtopping flows.

Figure 6.3 shows a typical watercourse crossing configuration.

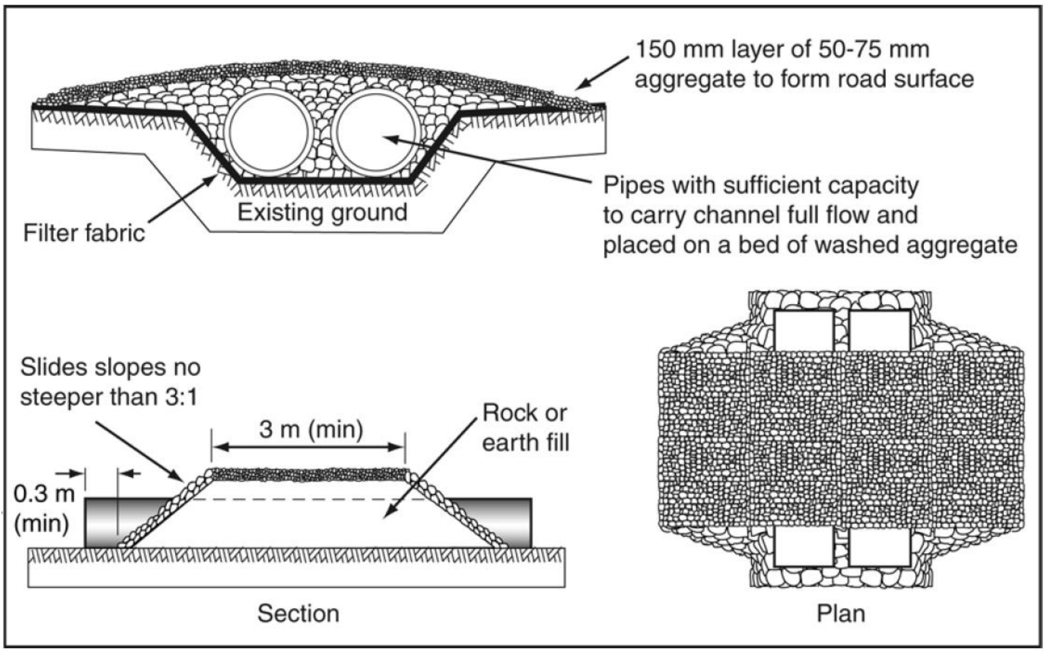


Figure 6.3 – Typical watercourse crossing configuration - culverts (IECA, 2008)

6.2.6 Typical drain configurations - channel

The configuration (dimensions) of the upslope catchment drain will be dependent on the upslope catchment area and slope. Drain design can be broken into two categories of low flows and high flows based on the upslope catchment and slope of the drain. The drain should typically contain the following features identified below and shown in Figure 6.4:

- Trapezoidal channel;
- Bank batters of between 1:2 (V:H) and 1:7 (V:H);
- Channel batters at least 1(V):2(H), but preferably 1:4 (V:H);
- Where necessary rock check dams will be used to maintain specified channel grades;
- Channel grades should not exceed 5%;
- Bank bottom widths will vary depending on the adopted bank batters;
- Diversion banks will be constructed to appropriate engineering standards.
- The channel outlet (level spreader) will be flared out to a minimum width of 1.5 x channel base width. Ground slopes below the channel outlet shall be less than or equal to the channel grade; and
- Stable grass cover to be maintained in the bed and banks of the channel and below the channel outlets (as much as possible).

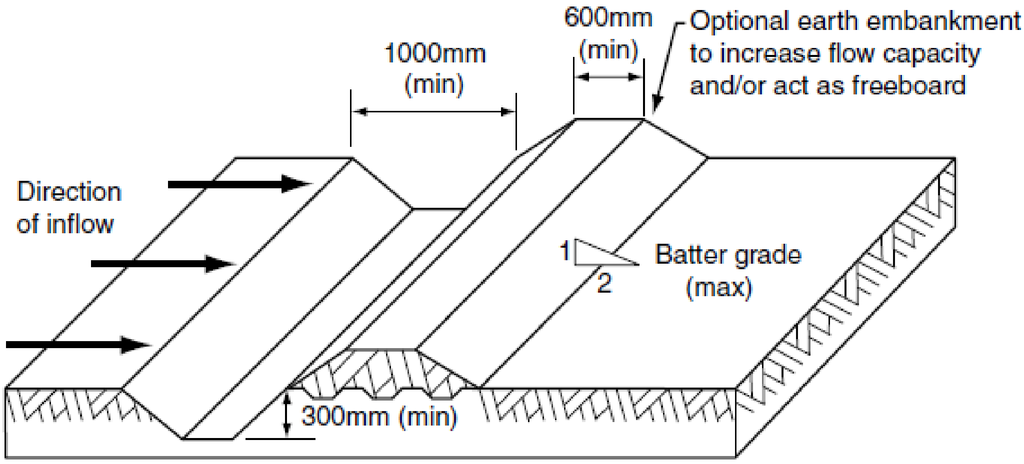


Figure 6.4 – Typical drainage configuration - channel (IECA, 2008)

7 Sediment control measures

7.1 OVERVIEW

The primary function of sediment control measures is to trap the coarser sediment fraction. Sediment basins (as proposed for the Project) and some filtration systems used during dewatering operations are possibly the only sediment control techniques that have any significant ability to trap finer sediment particles such as silts or clays. Due to the difficulty of trapping these finer sediments, priority should be given to the use of effective erosion control measures wherever practical.

The existing sediment pond at the southeastern part of the quarry functions as the primary sediment control measure for the project.

7.2 SEDIMENT CONTROL TECHNIQUES

7.2.1 Primary controls - existing sediment pond assessment

Primary control of sediment is via the existing sediment pond at the southeast of the quarry. The adequacy of this existing sediment pond as a sediment control measure was assessed by comparing against the minimum required size in accordance with the Best Practice Erosion and Sediment Control guidelines (IECA, 2008) and the revision of Appendix B in June 2018 (IECA, 2018).

The minimum sediment pond volume has been based on the following design standards and methodology for a Type D sediment basin (IECA, 2018):

- Total sediment basin volume = settling zone volume + sediment storage volume shown in Figure 7.1. The sediment storage volume is the portion of the basin storage volume that progressively fills with sediment until the basin is de-silted. The settling zone is the minimum required free storage capacity that must be restored within 5 days after a runoff event.
- Solids storage volume = 50% of settling zone volume.
- The adopted volumetric runoff coefficient (C_v) of 0.64 based on Group D soils. Note that this approach produces a conservative estimate of the minimum sediment pond volume. Further investigation will be undertaken to determine soil types at the Project site and confirm the minimum required sediment pond volume.
- Sediment basin settling zone volume based on 85th percentile 5-day duration rainfall of 38 mm, calculated using formula $R_{(Y\%,\ 5\text{-day})} = K_1 * I_{(1yr,\ 120hr)} + K_2$ and K_1 and K_2 determined from Table B4 of IECA (2008).
- A storage depth of 3 m should be adopted for the sediment dams to conceptually size their footprint.

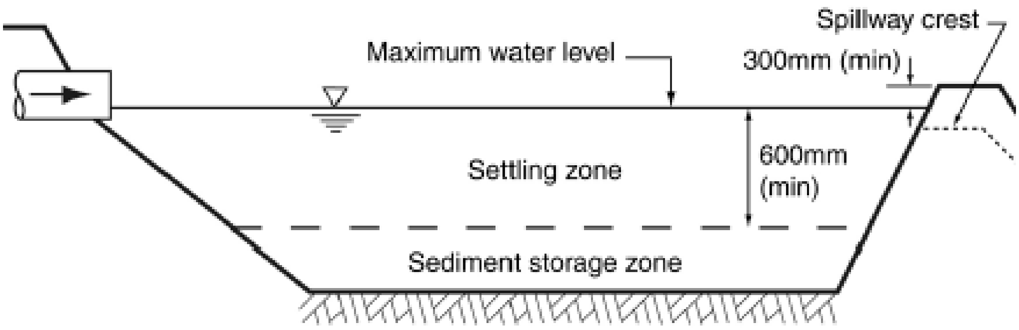


Figure 7.1 – Typical Type D sediment dam cross section (IECA, 2008)

A summary of the sediment pond volume requirement is provided in Table 7.1.

Table 7.1 – Sediment pond minimum size requirement

Dam name	Storage volume at full storage level (FSL) (ML)[1]	Surface area at FSL (ha)[2]	Maximum catchment area (ha)[3]	Overflows to[4]
SD1	3.3	0.12	9.0	Roumalla Creek

1/ The total volume including the settling volume plus the additional 50% volume for solids storage.
2/ Required Dam surface area is concept sizes only and are to be confirmed during detailed design.
3/ Adopted catchment assumes that the proposed clean and dirty water drains are constructed.
4/ Overflows occur via the dam spillway.

The capacity of the existing sediment pond is uncertain. However, based on the limited topographical data available for the Project site, it is estimated that the existing sediment pond has a capacity in the order of 2 ML to 4 ML. On this basis, it is uncertain if the existing sediment pond is adequately sized. Survey should be undertaken to confirm the size of the existing sediment pond.

There is limited opportunity to dewater the sediment pond following a rain event, as water usage at the Project will be minimal and no other on-site water storage dams exist. Therefore, it is likely that the sediment pond cannot be emptied following a rain event. However, the surface water assessment report (WRM, 2022) demonstrated that once the proposed clean and dirty water drains are constructed, potential sediment loads from the Project to Roumalla Creek would be substantially reduced compared to current conditions.

7.2.2 Supplementary sediment control techniques

Supplementary sediment controls are used in areas where the sediment producing catchment is small or the potential for producing sediment laden runoff is low. A list of appropriate primary and secondary supplementary sediment control techniques is given in Table 7.2.

Table 7.2 – Summary of supplementary sediment control techniques

Technique	Typical use
Rock filter dam	• Locations where there is sufficient room to construct a relatively large rock embankment. • The incorporation of a filter cloth is the preferred construction technique if the removal of fine-grained sediment is critical (high maintenance).
Check dam sediment trap	• Supplementary sediment trap in minor concentrated flow areas. • Trapping sediments in table drains and minor drainage lines. • Check dams may be constructed of rock, sand bags or compost filled socks.
Sediment fence	• Supplementary device for sheet flow from minor catchment areas. • Suitable for all soil types. • Require maintenance after every runoff event.

7.3 TECHNICAL NOTES

The following technical notes are adopted from IECA (2008) to provide general guidelines that should be followed for correct implementation of sediment controls:

- Every opportunity should be taken to trap sediment within the site, and as close as practicable to its source.
- The potential safety risk of a proposed sediment trap to site workers and the public must be given appropriate consideration, especially those devices located within publicly accessible areas – Hazardous Structure assessments must be completed where necessary.
- All reasonable and practicable measures must be taken to prevent, or at least minimise, the release of sediment from the site.
- Suitable all-weather maintenance access must be provided to all sediment control devices.
- Materials, whether liquid or solid, removed from sediment control devices during maintenance or decommissioning, must be disposed of in a manner that does not cause ongoing soil erosion or environmental harm.
- Settled sediment must be removed from sediment basins when the volume of the sediment exceeds the designated sediment storage volume, or the design maximum sediment storage elevation.

8 Monitoring and maintenance

An effective monitoring program is recommended to assess the effectiveness of the ESC measures. The monitoring methodology for all onsite activities is detailed in the license or conditions of the approval to operate and the internal processes of the Project.

Maintenance and routine inspection options are:

- An inspection prior to the wet season.
- A routine inspection mid-way through the wet season.
- For sediment control structures (e.g. sediment dams), check for sediment deposition and the requirement for its removal.

The ESC Inspection Proforma should state the maintenance and inspection frequency. The inspection and monitoring regime should collect and record the following key information:

- The previous condition of the infrastructure and any recommendations or works actioned since the last inspection;
- The current condition of the ESC infrastructure;
- The ESC controls currently in place, and their condition; an
- Recommendations on remedial measures or additional ESC controls.

Any failure of effectiveness of a structure will be reported and the implementation plan should include the recommendations for the incident report.

9 References

ANZECC & ARMCANZ, 2018	*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
ANZECC & ARMCANZ (2000);	*National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality*
IECA (2008)	*Best Practice Erosion and Sediment Control. International Erosion Control Association (Australasia) Picton NSW*
Landcom (2004)	*Managing Urban Stormwater – Soils and Construction Volume 1, 4th Edition, NSW government, Parramatta, March*
McKenzie (2004)	*Australian Soils and Landscapes: An Illustrate Compendium, N. McKenzie, 2004*
NSW DPI (2012)	*Guideline for riparian corridors on water front land, Department of Primary Industries, Office of Water, NSW Government, 2012*
NSW DPI (2014)	*Water Management Act 2000, Department of Primary Industry, NSW Government, 2014*
Pilgrim (1998)	*Pilgrim, DH, (ed)., Australian Rainfall & Runoff - A Guide to Flood Estimation, Institution of Engineers, Australia, Barton, ACT, 1998*
ANZECC & ARMCANZ (2000);	*National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality*
IECA (2008)	*Best Practice Erosion and Sediment Control. International Erosion Control Association (Australasia) Picton NSW*
WRM, 2022	WRM Water & Environment, August 2022, *Carlon's Quarry Expansion Project - Surface Water Assessment*

Appendix G Biodiversity Assessment

Biodiversity assessment

Carlon’s Quarry, Kingstown Rd, Balala, NSW

OFFICE
Stringybark Ecological Pty Ltd
3, 4-6 Moore St,
Armidale, NSW

T 0418 651 263
W stringybarkecological.com.au

ABN 26 650 630 336

Biodiversity assessment – Carlon's Quarry, Kingstown Rd, Balala, NSW

Revision number: 4

Document author: David Carr and Claire Chepel

Created

September 2022

While reasonable care has been taken in preparing this report to ensure the information is true and correct, the author gives no assurance as to the accuracy of any information in this report.

The author expressly disclaims, to the maximum extent permitted by law, all responsibility and liability to any person, arising directly or indirectly from any act or omission, or for any consequences of any such act or omission, made in reliance on the contents of this publication, whether or not caused by any negligence on the part of the author.

Scientific licence for collection of specimens: SL102094

Executive Summary

Stringybark Ecological was engaged by Onward Consulting to conduct a biodiversity assessment of the proposed expansion of 'Carlon's Quarry' on the Kingstown Rd approximately 10km west of Uralla. We assessed the project under the Biodiversity Conservation Act (2016) and the State Environment Planning Policy (Biodiversity and Conservation) 2021.

We conducted desktop and field surveys to assess the impacts of the project on biodiversity.

After evaluating a number of scenarios, the proponents reduced the footprint of the quarry expansion below 1ha to avoid triggering the entry to the Biodiversity Offset Scheme (BOS) under the BCA Act. This biodiversity assessment is made on the basis that the total increase in area of the quarry will be less than 1ha, with no additional roads or other infrastructure and all plant, equipment, stockpiles and other impacts confined to the existing quarry footprint. The boundary of the quarry expansion area will be clearly and permanently marked to ensure the project footprint stays below 1ha, including all associated infrastructure and roads.

The subject land is not shown on the Biodiversity Values Map, so does not enter the BOS under that trigger. The nearby Roumalla Creek is shown on the Biodiversity Values Map, however appropriate erosion and sediment control measures will be employed by the project to ensure minimal impact on the creek as a result of the proposed quarry expansion.

Initially, we found that the project, without mitigation, would have had a significant impact on the endangered species *Phascolarctos cinereus* (Koala) through the impact of vehicle strikes on the local population between the quarry and Uralla, putting it at risk of extinction. Without mitigation, the project would have been required to prepare a Biodiversity Development Assessment Report (BDAR), including actions to avoid and mitigate the prescribed impact of vehicle strikes on koalas. The BDAR would also have to specify the number of credits required to offset residual impacts on the <1ha of vegetation to be cleared as part of the quarry expansion.

The proponents agreed to two measures to mitigate the impact of truck movements on the viability of the local koala population:

1. A reduction in the maximum speed of trucks from 100kph to 80 kph between the quarry and Uralla.
2. Education about avoiding koala vehicle strikes be developed and included in new worker site inductions and daily/weekly safety briefings. Signs will be erected at the gate to remind truck drivers of their obligation to slow down to protect koalas as they travel between the quarry and Uralla.

With these mitigation measures (included as conditions of consent for the development), the impact of the development on the viability of the koala population will be reduced to a degree where the population will not be at risk of extinction, therefore a BDAR is not required.

Tests of significance were completed for Koalas and determined the proposed expansion would not have a significant impact on these species and hence also did not trigger the requirement to prepare a BDAR.

The project will not have a significant impact on any Matters of National Environmental Significance under the Commonwealth EPBC Act and does not require referral to the Minister.

We found no evidence of koalas using the trees near the site and we found no koala food trees listed in the State Environmental Planning Policy (Biodiversity and Conservation 2021 Schedule, so a Koala Plan of Management is not required.

Table of Contents

Figures and Tables

1 Introduction

Carlon’s Quarry is an existing approved gravel quarry operated by Blendee Partnership, located on the Kingstown Road approximately 10 kilometres (km) west of Uralla in northern NSW (Figure 1).

The existing quarry received development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW Environment Planning and Assessment Act 1979 (EP&A Act) for the Carlon’s Quarry Expansion Project (the Project). This Biodiversity Assessment has been prepared to accompany the development application for the Project, with reference to the biodiversity components of the Secretary’s Environmental Assessment Requirements (SEARs):

1. accurate predictions of any vegetation clearing on site;
2. a detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016; and
3. a detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.

Carlon’s Quarry is operated using machinery such as bulldozers, front end loaders and excavators. There has been no permanent infrastructure developed as part of the quarry.

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m3) to a maximum 120,000 m3 per annum with an approximate average of 80,000 m3 per annum. The Project involves a minor extension to the south-west of the existing quarry and will require the operation of additional mobile equipment.

Onward Consulting engaged Stringybark Ecological to conduct a biodiversity assessment. The proposal will include a Development Application to be considered under Part 4 of the NSW Environmental Planning and Assessment Act. Figure 1 shows the location of the property to be developed in relation to the Kingstown Rd.

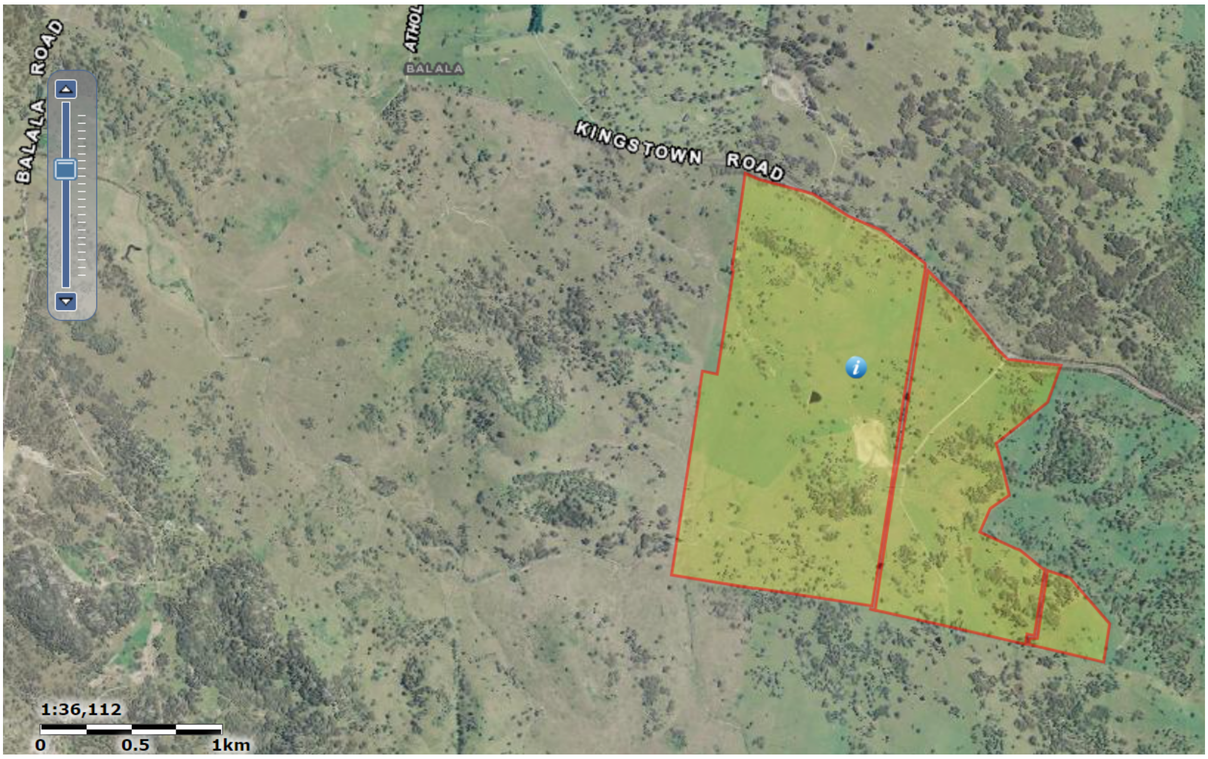


Figure 1: Location of Lot 3, DP834359. (SIX Maps)

The assessment aims to determine if the impact of the development will be such that the Biodiversity Assessment Method (BAM) must be applied and if, as a result of the BAM, a Biodiversity Development Assessment Report (BDAR) will be required. We also determined that if a BAM is not required, whether threatened species or threatened ecological communities would be impacted.

The Biodiversity Conservation Act (2016) has three thresholds to determine whether the BAM must be applied. These thresholds are:

1. Whether the amount of native vegetation being cleared exceeds an area threshold
2. Whether the impacts occur on an area of land mapped on the Biodiversity Values Map or
3. Whether the development will have a significant impact on threatened species or ecological communities.

Only one threshold must be crossed to trigger a BAM. Note that 'native vegetation' includes not just the trees, but all vegetation forms.

Depending on the size of the impact of the development, relative to the minimum lot size, a Small Area Development Module can be applied. We examined whether this was applicable.

A reduced BAM can also be applied if the Vegetation Integrity Score is below a threshold for different vegetation communities. We also examined whether this was applicable.

2 Methods

2.1 Desktop Assessment

Before visiting the site, we carried out a desktop assessment of threatened species and ecological communities, listed in the Schedules of the Biodiversity Conservation Act (2016), that have been recorded within a 10 x 10 km block centred on the site. The aim of the desktop survey is to guide field assessments and observations. We searched the NSW BioNet database for records. The species recorded in this area are listed in Appendix A.

The desktop assessment also considered whether any groundwater-dependent ecosystems were present at or near the site and if they were likely to be affected.

We also conducted a Protected Matters Search under the Environment Protection and Biodiversity Conservation Act (1999) (EPBC) in a 10 km radius of the quarry footprint (Appendix B). While several relevant Matters of National Environmental Significance (MNES) were found to be mapped as possibly or likely present in the 10 km buffer area, we limited our search to the species and communities where suitable habitat exists within the quarry footprint or which may be affected by the quarry indirectly.

2.2 Biodiversity Values Map

In order to determine whether the development would require the application of the BAM, we first inspected the Biodiversity Values Map to determine if the site was shown.

2.3 Area Threshold

We consulted the Uralla Local Environment Plan (LEP) to determine the zoning and the minimum lot size and then used this to determine if the development would trigger the area threshold.

2.4 Threatened Species and Ecological Communities Search

On 8th March, 2022 we visited the site to carry out field work to determine the vegetation communities present and the likelihood of threatened species or ecological communities being present. We walked over the site to look for variation in the vegetation on the site in order to plan assessments. With a view to a BAM survey being likely, we used BAM to establish three plots and recorded Composition, Structure and Function attributes as described in the BAM (Appendix E).

We used the data we collected to identify the Plant Community Types (PCTs) present and whether any of these were Threatened Ecological Communities (TECs). We uploaded the data to the BAM Calculator in the Biodiversity Offset Asset Management System (BOAMS) in order to generate preliminary Vegetation Integrity Scores (VIS) for each Vegetation Zone. These scores were used under different scenarios shown in Appendix D, which resulted in the proponent reducing the impact to less than the area threshold.

2.4.1 Fauna Surveys

We used the results of the desktop assessment (Bionet search) to determine whether we needed to carry out fauna surveys in the field. We determined that we would look for a number of species including those listed in Appendix A and B, if their habitat was present. We visited the site on 3/3/2022, 8/3/22 and 16/3/22. During these visits we conducted observational surveys using binoculars. We also listened for the calls of some species.

Uralla is a known region for koalas and a desktop survey determined koalas have occupied the area around the Quarry within the last 18 years (three koala generations) (Fig 2). As there is an expected increase in traffic along Kingstown Road due to the expansion of the quarry, a desktop survey was specifically targeted to Kingstown Road, for koala sightings (See Figure 2) in an area approximately 20 x 15km. Additionally, random trees were assessed along the road from the quarry back to Uralla using the Spot Assessment Technique (Phillips & Callaghan, 2011) and other surveys (koala presence, scat presence, any other signs). On Thursday 3rd March, three camera traps were deployed around the site (Figure 3). They were collected 13 days after deployment.

Figure 2: Koala records around the project site and main transport route.

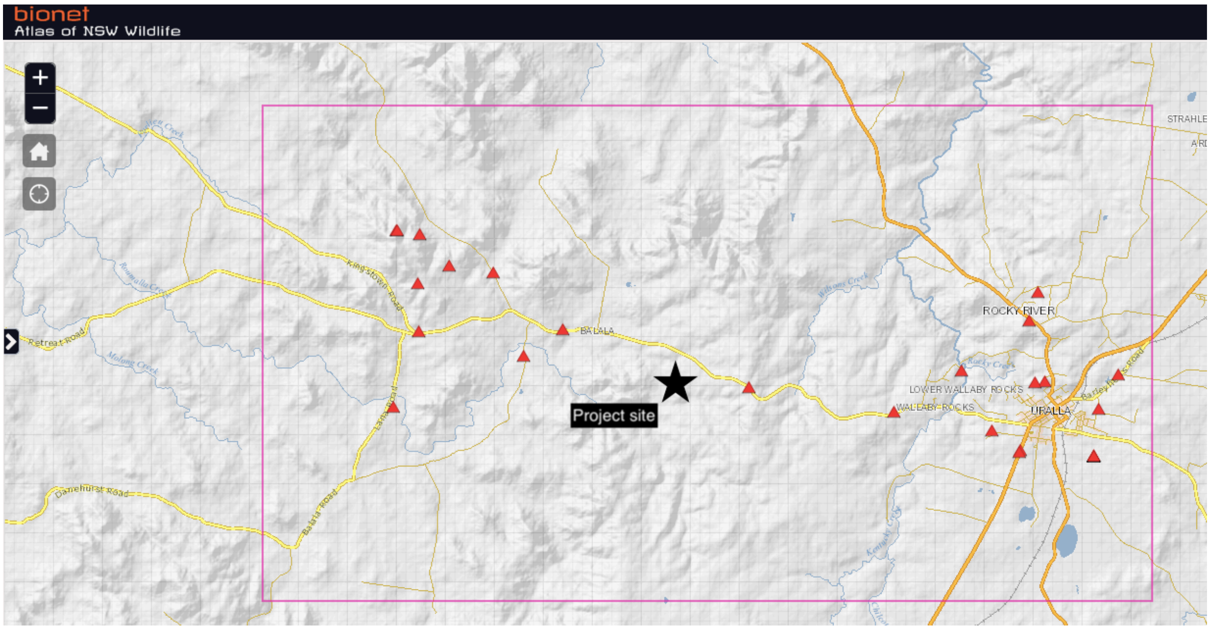


Figure 3: Location of wildlife cameras (Source: Google Earth)

The Spot Assessment Technique (SAT) Surveys were conducted around the site as well (Figure 4). This is a rudimentary assessment that involves inspecting the bases of 30 trees in search of scats, looking at the trees to see if they are occupied by any Koalas and determine any recent use.

Figure 4: Location of SAT surveys for koalas (Source: Google Earth)

We also observed the proposed quarry areas within the original footprint specifically looking for Diamond Firetails in the derived native grassland. We looked within the site and in adjacent grassy woodland on two occasions. Initially we were also looking for signs of Little Eagles (on dead trees and bare branches at the top of live trees within the original footprint. We also looked for signs of Little Lorikeets in trees around the site and for Brown Treecreepers, Dusky Woodswallows and Flame Robins within the woodland patches in and around the original footprint. Observations of these birds was made with binoculars early in the day. None of these species will be affected by the revised footprint of the quarry.

2.4.2 Flora Surveys

Dichanthium setosum

We searched for this species in the grassy woodland and derived native grassland in the area of the final footprint and in the northern half of the original footprint in early March. We also did an intensive search for this species in each of the three BAM plots we surveyed.

Thesium australe

Despite not being listed in the Bionet records, we considered it possible that *Thesium australe*, a vulnerable species under the BC Act and EPBC Act, might be found on site. This species was listed in the Protected Matters Search. We searched for this species in the grassy woodland and derived native grassland in the area of the final footprint and in the northern half of the original footprint in early March. We also did an intensive search for this species in each of the three BAM plots we surveyed.

3 Results

3.1 Vegetation Communities

We identified one vegetation community on site. This community is present in different condition states.

- Community 1: PCT 510 (Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion). This PCT is present with trees and as a Derived Native Grassland.

The Threatened Species Profiles for these communities (www.environment.nsw.gov.au) describes how to identify if they are TECs.

PCT 510 may be part of the TEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland*. Table 1 shows that the site does support the TEC.

Table 1: Identification of Threatened Ecological Community associated with PCT 510.

Attribute	Response for this site
Is the site in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregions:	Yes
Are there no native species in the understorey, and is the site is unlikely to respond to assisted natural regeneration	No
Does the site contain, or would the site have recently been likely to contain, White Box, Yellow Box or Blakely's Red Gum?	Yes, Yellow Box and Blakely's Red Gum present in adjacent zones
Is the ground layer predominantly grassy?	Yes

Despite the threatened ecological community occurring on the site (Yellow Box – Blakely's Red Gum Grassy Woodland) being a "Serious and Irreversible Impact" entity, the small area of impact and the lack of a significant impact on the community means Council does not need to consider the SAII.

This community may also be part of the EPBC-listed Critically Endangered Ecological Community *Box Gum Grassy Woodland.* The EPBC definition is:

> *The size and life-form of understorey species are such that viable populations can exist in very small areas (Prober, et al., 2015)). Therefore, in order to be the listed ecological community, an understorey patch, in the absence of overstorey trees, must have a high level of native floral species diversity, but only needs to be 0.1 hectares or greater in size. A patch in which the perennial vegetation of the ground layer is dominated by native species, and which contains at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges) is considered to have a sufficiently high level of native diversity to be the listed ecological community. At least one of the understorey species should be an important species (e.g., grazing-sensitive, regionally significant or uncommon species; such as Kangaroo Grass or orchids) in order to indicate a reasonable condition.*

The area of the expanded quarry is 1ha (>0.1ha) but does not contain 12 non-grass understorey species and no 'important' species, so the site does not meet the EPBC definition for the Critically Endangered Ecological Community *Box Gum Grassy Woodland.* No referral to the Commonwealth Minister is required.

3.2 Biodiversity Values Map

The lot boundary does show up on the Biodiversity Values Map (see Fig 5) however the mapped area of Protected Riparian Land is not within the initial proposed development footprint or the proposed extension detailed in scenario 3 (section 4.3.). Therefore, the BAM is not triggered by the Biodiversity Values Map.

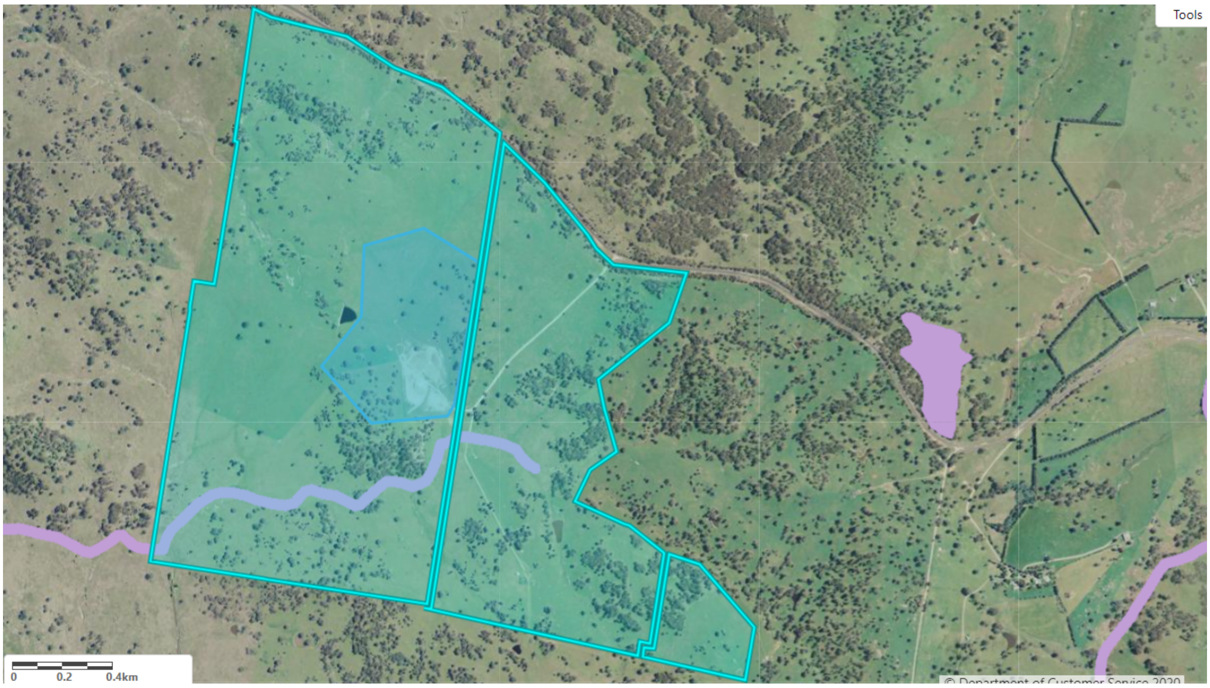


Figure 5: Biodiversity Values Map showing biodiversity value, lot boundary and development footprint for the proposed development site. (Department of Customer Service 2020).

We also considered the possibility that the project would have an indirect impact on the creek shown as highlighted on the Biodiversity Values Map. The indirect impact may have been through the run-off of sediment from the quarry entering the creek and affecting the water quality or even filling water holes. This may have a significant impact on the endangered Bell's Turtle (*Myuchelys bellii*) population in the creek. The nearest suitable habitat for Bells' Turtle in Roumalla Creek is at least 1.9km downstream.

Measures have been put in place by the proponent to manage sediment to reduce the amount reaching the creek. Broadly, the surface water management strategy will be to implement measures to reduce the size of the catchment reporting to the dam, by separating runoff from disturbed and undisturbed area using surface drainage controls. These measures are detailed in the broader EIS.

The runoff from disturbance areas would by conveyed to the sediment dam for treatment, with clean water to be diverted around the sediment dam as far as practicable. Based on these preventative measures, it is unlikely that significant quantities of sediment, above background levels, will enter the creek and reach the downstream population. The impact on the Bell's Turtle therefore, is likely to be negligible.

3.3 Area Threshold

The development site is zoned Rural Landscape (RU2) in Uralla LEP 2012 and has a minimum lot size of 200ha. The threshold for clearing in this lot size is 1ha. If the clearing for the development will exceed this threshold a BDAR is required.

Four scenarios each with a different development footprint were considered and evaluated in the BAM Calculator. These scenarios are shown in Appendix D. In order to avoid having a significant impact on the vegetation and biodiversity values at the site, the proponents have opted for Scenario 4, where less than one hectare will be developed. This means that the project will not trigger the area threshold.

The proponent will take measures to ensure that the expanded quarry does not extend beyond a defined area of less than one hectare as shown in Figure 6.

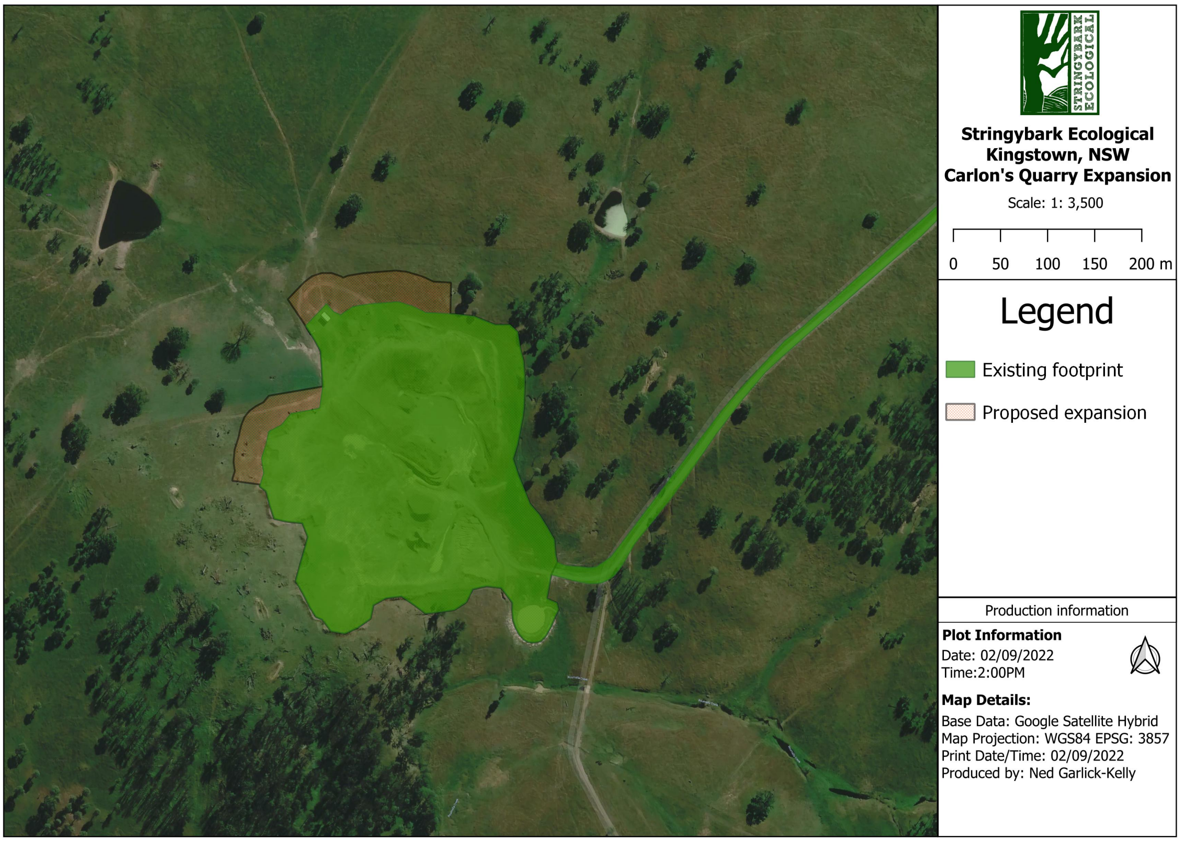


Figure 6: Footprint of the quarry expansion

3.4 Significant Impact on Threatened Species

Once the proponents had decided to reduce the development footprint below the threshold which would require a BDAR under the area threshold, the final trigger would be that the project will have a significant impact on a threatened species or threatened ecological community.

The BioNet search (Appendix A), showed that 15 threatened species (14 fauna, 1 flora) had been recorded in a 10km x 10km area centred on the project site. Of these, only three species have the potential to be impacted by the expansion of the quarry, if they are present. The other species do not have suitable habitat in the development footprint (requiring either trees or aquatic habitats), so were not considered further. An explanation of the reason for excluding these species is included in Appendix A. The initial quarry footprint included potential habitat for Little Eagle, Little Lorikeet, Brown Treecreeper, Dusky Woodswallow and Flame Robin and searches were carried out for these species.

Later modifications to the footprint excluded all areas with potential habitat for these species, so they are not considered further in this report.

The remaining three species, their habitat, and potential impacts are listed in Table 2. These three species were then targeted for field survey.

Table 2: Threatened species possibly impacted by development

Species	Common name	Habitat	Impact if present
Phascolarctos cinereus	Koala	Eucalypt woodland or forest	Vehicle strikes from increased truck movements on Kingstown Rd (Prescribed Impact)
Stagonopleura guttata	Diamond Firetail	Grassy woodland or derived native grassland	Loss of 1ha of grassland habitat
Dichanthium setosum	Bluegrass	Grassy woodland or derived native grassland	Destruction of plants within 1ha footprint

.

3.4.1 Species excluded from further assessment of significant impact following field survey

Following field surveys, it was determined further assessment would not be required for two species, as it was confirmed suitable habitat was not available on site or presence was excluded by undertaking field surveys during periods when detection is possible. Justification for excluding these species is outlined below.

Dichanthium setosum

This species is a grass which flowers over summer and Autumn and can be detected growing amongst other grasses by its characteristic seedhead. Surveys were undertaken in March, hence any individuals would have been detectable, if present. We carried out a BAM plot in the proposed expanded area for the quarry and found no individuals of this species. We also looked for this species during targeted surveys across the whole site and found no plants. As no plants were found during the surveys, we consider it unlikely *D. setosum* is present on site and is therefore unlikely to be impacted by the project.

Thesium australe

This species is a hemiparasite usually associated with Kangaroo Grass (*Themeda triandra*) or Snow Grass (*Poa sieberiana*). *Thesium australe* flowers and fruits throughout the year on the coast, however at higher altitudes, such as the location of the project, flowering is restricted to summer. Surveys were undertaken in March when plants would have been detectable before dying back to root stock in winter. Neither of these grass species or *T. australe* were found in the BAM plots (see Appendix D) or during targeted surveys. and as such no plants of *T. australe* were found or have the potential to occur on site. The project will not have an impact on this species as it does not occur on the project site.

Diamond Firetail

As Diamond Firetails are an Ecosystem Credit species, there is no specified survey window in the Threatened Biodiversity Data Collection. The project site is within the known area of occurrence for the species, which is likely to be observable at all times of the year, if present.

We looked for this species across the whole site (original footprint) but saw no individuals during the three visits to the site. This species is known to require shrubs in which to build its grassy nests as protection from predators. No shrubs are present in the footprint of the development. The species is known to be sedentary, meaning that if a local population was present, we would have detected it during one of the three separate surveys undertaken. The project will not have an impact on this species as it does not occur on the project site.

3.4.2 Koala

The proposed quarry expansion will not directly impact any areas of potential or core koala habitat, however we considered that koalas would possibly be impacted by the expansion of the quarry due to increased movement of vehicles from the quarry to, and along, along Kingstown Rd to Uralla. The proposal estimates that truck movements will increase from a peak of 50/day under current operations to 60/day from the expanded quarry.

The SAT surveys did not find any evidence of koalas on the site (Table 3). The camera traps which were mainly set up to monitor koalas did not capture any koala activity on or near the site.

Table 3: Results of SAT surveys

Survey	Trees	Scats	Koala presence
1 (Middle)	30 *(Eucalyptus melliodora, Angophora floribunda, Eucalyptus blakelyi, Eucalyptus caliginosa, Eucalyptus macroryncha)*	0/30	0/30
2 (West)	17 *(Eucalyptus melliodora, Eucalyptus blakelyi, Angophora floribunda)*	0/17*	0/17
3 (South)	30 *(Eucalyptus melliodora, Angophora floribunda, Eucalyptus blakelyi, Eucalyptus caliginosa, Eucalyptus macroryncha)*	0/30	0/30
4 (East)	30 *(Eucalyptus melliodora, Eucalyptus blakelyi, Angophora floribunda)*	0/30	0/30

*In the area for the Western SAT survey there is a fewer number of trees that fit the survey requirements therefore there was only 17 trees assessed.

Most of the trees did not show any evidence (often on stringybarks or box eucalypts the markings are not obvious), however, there was indication that some of the gum trees have been used, with previous scratch marks that match traces described in (Triggs, 2004) that show koala use (Figs. 7 & 8).

Figure 7: Excerpt from Triggs, 2004, p.212*"Characteristic pock marks made by Koalas on the trunk of a Southern Blue Gum (Eucalyptus globulus) with some longer rake marks also visible"* (Triggs, 2004)

Figure 8: Matching pock marks and some scratches on *Eucalyptus blakelyi.* along Kingstown Road.

Additionally, observational surveys were continued for the trees north of the existing quarry in the development footprint. No evidence of koala use was observed.

Koalas are known to be sparsely distributed on the Northern Tablelands so it is likely that they use the area surrounding the development site on a sporadic basis. They are known to cross the Kingstown Rd between the quarry gate and the western edge of Uralla regularly. No injured or dead koalas have been reported from this stretch of road in recent years (Denise Friedman, NT Wildlife Carers, *pers. comm*), however, koala deaths from vehicle strikes are regularly reported from the New England Hwy near Uralla Golf Course.

Given the increase in traffic on Kingstown Rd, an area where they are known to move, it is possible that the development will have a significant impact on this species. We have applied the Test of Significance (Section 7.3 of Biodiversity Conservation Act, 2016).

Test of significance – impact on koalas from increased vehicle movements

For the purpose of this assessment, the study area is defined as the area shown in the rectangle in Figure 2, including the quarry access road, the Kingstown Rd and the main road into Uralla.

a) *in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

The proponent has indicated that the expansion of the quarry will lead to an increase in the maximum daily movements of trucks from 50 to 60 and the use of trucks up to 38 tonnes (from 24 tonnes). Most of these truck movements will be towards Uralla on the Kingstown Rd, through areas known to be inhabited and crossed by koalas. These trucks are likely to reach speeds up to 100kph along this stretch. At this speed, drivers are unlikely to be able to stop in time for a koala crossing the road.

Vehicle strikes are a listed threat for koalas. Koalas regularly walk between trees and ground movement is very common in koala populations in areas of fragmented vegetation such as in the study area. Koalas are most active at night and in the late afternoon and early morning (4pm to 9am) (Archer, Cork, Hand, Phillips, & Smith, 1981). The quarry proposes to operate from 7am to 6pm Monday to Saturday; an increase from current hours of weekdays between 7.30am to 5pm. This will mean that some of the increased truck movements will be at a time when koalas are more likely to be active on the ground.

My personal data (not yet published) from GPS-collar tracking of ten koalas in the Armidale area from 2018 to 2020, shows that koalas in this region have large home ranges of 1-8km^2. Animals on the Northern Tablelands tend to be sparsely distributed (Carr, Lemon, & Wilkie, 2017), with males roaming over large areas to find mates in the breeding season.

A 38-tonne truck striking a koala on the ground at up to 100kph is almost certainly going to result in the death of the animal.

Given that there will be an increase in truck movements <u>and</u> more of these movements will be when koalas are more likely to be on the ground <u>and</u> a vehicle strike at 100kph from a truck will be fatal, it is highly likely that more koalas will be killed from vehicle strikes as a result of the expansion of the quarry, without appropriate mitigation measures being implemented. Given that the koala population in this region is sparsely distributed, the loss of a few individuals could lead to the extinction of the population in the study area, particularly if males are disproportionately affected due to their higher mobility, unless mitigation measures are put in place.

Therefore, we consider that, without mitigation, the expanded quarry may have a significant impact on koalas leading to the extinction of the population in the study area and therefore a BDAR should be prepared which considers actions to avoid and mitigate this impact or to offset the impacts which cannot be avoided or mitigated.

However, mitigation measures can be put into place to reduce the likelihood of trucks hitting and killing koalas. These measures are discussed in Table 4.

Table 4: Mitigation options to reduce prescribed impact of vehicle strikes on koalas.

Mitigation measure	Effectiveness and practicality
1. Koala fencing either side of road between quarry and Uralla	• Restrict koala movement and will fragment population • Requires negotiation and agreement with all landholders. • Any gap will concentrate koala movement • Not economically feasible
2. Koala 'bridges' across road at 2 main crossing spots	• Unlikely to be used by koalas when open crossings available • Not shown to be effective in this region. • Would require fencing to direct koalas.
3. Reduction in hours of truck movements to 8-5 (7-6 during daylight saving time).	• Would take truck movements out of key koala movement times • Easily enforceable

4. Limit truck speed to 80kph between quarry gate and Uralla, with sign at exit gate.	• Very easy to implement • Minor increase in travel time (max 2.5 minutes each way).
5. Education for drivers about watching for and avoiding koalas as part of induction and daily/weekly safety briefing.	• Easily implemented as part of Health. Safety and Environment protocols.

Given the sparse number of koalas recorded in the area, mitigation measures 1, 2 and 3 are not necessary and are not economically feasible for the small environmental gain. Mitigation measures 4 and 5 in Table 4 should be sufficient to reduce the incidence of vehicle strikes on koalas to such a level that the sparse local population is not at risk of extinction**. If these measures are put in place as conditions of development approval, we believe that the project will no longer have a significant impact on the threatened koala.**

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not relevant

c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

The proposed expansion of the quarry will not remove or directly modify any koala habitat.

While the proposed development is likely to affect koala movement through an increased risk of vehicle strike, this will not directly affect the fragmentation of habitat in the study area. **Therefore, the project will not have a significant impact on koalas as a result of loss or fragmentation of habitat.**

d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

Not relevant

e) Whether the proposed development or activity is, or is part of, a key threatening process, or is likely to increase the impact of a key threatening process.

Increased risk of death from vehicle strikes is not listed as a Key Threatening Process in NSW, so this clause is not relevant.

3.5 State Environmental Planning Policy (Koala Habitat Protection) 2020

Pursuant to section 3.3 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021, the Koala SEPP 2020 applies to RU2 land within the Uralla LGA. Part 3.2 sets out the land to which the part applies and the steps that must be considered by a council before they may grant consent to a development application for consent to carry out development on land to which Part 3.2 applies.

Part 3.2 is applicable to the site as the site is within Uralla LGA, is larger than 1 ha and is in relation to which a development application has been made. The assessment is a step wise process and is shown below.

Step 1 – Is the land potential koala habitat?

Potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. Biodiversity and Conservation SEPP. No koala feed trees listed in Schedule 1 of the Biodiversity and Conservation SEPP were identified within the site. Therefore, council is not prevented from granting consent for the development application and no further consideration of the steps in Part 3.2 or requirements of the SEPP in relation to koala habitat is required.

3.6 Groundwater-dependent Ecosystems

The site is in the upper catchment of the Murray-Darling Basin (Northern Basin). No high priority groundwater-dependent ecosystems are mapped as occurring in this area.

3.7 Environmental Protection and Biodiversity Conservation Act 1999

MNES identified in the Protected Matters Search results (Appendix B) likely to be impacted by the Project have been assessed in accordance with the Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (Australian Government Department of the Environment, 2013).

The site is not within proximity to World Heritage properties or National Heritage places, or in a Wetland of International Importance, the Great Barrier Reef Marine Park, or a Commonwealth Marine Area.

The field survey determined the site does not contain TECs listed under the EPBC Act (Table 8 in Appendix B)

Table 8 in Appendix B shows that most threatened species identified in the buffer area do not occur at the site because no suitable habitat is present, the species does not occur locally or the particular growth form of the species (tree or shrub) is not present at the site. From this table, two species (*Thesium australe, Dichanthium setosum*) were identified as possibly occurring within the footprint of the quarry expansion and a further two (*Phascolarctos cinereus, Wollumbinia bellii*) were considered to be possibly indirectly affected. We have further considered the impact on these species to determine if a referral to the Minister for the Environment is required.

3.7.1 Endangered species

Koala

Koalas may potentially be impacted by the proposed works and were assessed in accordance with the Significant Impact Guidelines for critically endangered or endangered species. No suitable habitat for koalas exists within the footprint. There is a possibility of an increase in vehicle strikes on koalas due to increased truck movements, mainly between the quarry and Uralla. This matter has been considered in depth in Section 3.4.2 and the following table refers to that section for more detail.

Table 5 provides an assessment in accordance with the criterion in the Guidelines for critically endangered or endangered species known or likely to occur within the site. The EPBC Act and Guidelines define 'population' as an occurrence of a species in an area. Occurrences include, but are not limited to:

- a geographically distinct regional population, or collection of local populations, or
- a population, or collection of local populations, that occurs within a particular bioregion.

Table 5: Assessment of project in accordance with significant impact criteria for endangered koala population

Criterion	Question	Response
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of a population	No important populations occur within the site. With proposed mitigation measures, koala deaths due to vehicle strike are not likely to increase.
2)	reduce the area of occupancy of the species	No important populations occur within the site. With proposed mitigation measures, koala deaths due to vehicle strike are not likely to increase.
3)	fragment an existing population into two or more populations	No important populations occur within the site. With proposed mitigation measures, koala movement is not likely to be affected.
4)	adversely affect habitat critical to the survival of a species	No critical habitat for these species occurs within the site.
5)	disrupt the breeding cycle of a population	No important populations occur within the site. With proposed mitigation measures, koala breeding is not likely to be affected due to vehicle strike.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No habitat will be directly affected.
7)	result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	Invasive weeds are not a threatening process for koalas. Native vegetation clearing will be restricted to grassland only. As such the Project is unlikely to result in invasive animals becoming established in endangered species' habitat.
8)	introduce disease that may cause the species to decline, or	Environmental safeguards to reduce introduction of pathogens onto the site will be implemented. Therefore, pathogens that are not already on present on site are unlikely to be introduced as a result of the Project.

9)	interfere substantially with the recovery of the species.	The prescribed impacts are considered to be insignificant, and no important populations occur within the site. Therefore, the Project is unlikely to interfere substantially with the recovery of these species.
Is there likely to be a significant impact?		**No**

3.7.2 Vulnerable species

The following MNES, known or considered likely to occur on the site and may potentially be impacted by the proposed works were assessed in accordance with the Significant Impact Guidelines for critically endangered or endangered species:

- *Dichanthium setosum*
- *Thesium australe*
- *Wollumbinia bellii (syn Myuchelys bellii)* Bell's Turtle

Of these three species, the first two were found to not occur on the site and will not be impacted by the development. No further assessment of impact is required.

Bell's Turtle will not be directly impacted by the development but there is a possibility they may be directly impacted if sediment flows from the quarry into nearby Roumalla Creek.

Table 6 provides an assessment in accordance with the criterion in the Guidelines for the vulnerable Bell's Turtle. In accordance with the Guidelines, an 'important population' is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Bell's Turtles require streams with clean water and sandy beaches. They live in and around pools within creeks on the western catchments on the New England Tableland and Nandewar bioregions in northern NSW. They prefer pools less than 3m deep in river reaches 20-30m long with sandy banks. Threats include sedimentation of suitable pools, predation of eggs by foxes and pigs and trampling of banks by livestock.

The species is known to occur in Roumalla Creek approximately 5 km downstream of the site at Balala Station, based on Bionet records. It is likely that they occur further upstream than the records indicate. We inspected Roumalla Creek immediately downstream of the quarry site on 8/3/2022. At this point and for a further 1 km downstream (at least) the creek is shallow and narrow, with a relatively steep gradient. The banks are damaged from cattle and sheep grazing and there is no shrub cover. The habitat in this section of the creek is not suitable for Bell's Turtles and highly unlikely to be occupied by them.

At a point 1.9 km downstream of the quarry, Roumalla Creek is joined by another minor stream and at this point there are larger pools which are more suitable as habitat. We have considered the likelihood that this habitat would be affected by sedimentation from the expanded quarry. As discussed in Section 3.2, a Sedimentation and Erosion Control Plan (WRM Water and Environment Pty Ltd, 2022) has been prepared to minimise the amount of sediment entering Roumalla Creek from quarry operations. The plan includes the separation of water from disturbed and undisturbed areas and catching water from the disturbed area in a sediment pond. Together with erosion control measures in the quarry and the road, there will not be a significant increase in sediment reaching the creek as a result of the quarry. Given that the nearest Bell's Turtle habitat is at least 1.9km away it is highly unlikely that sufficient sediment would reach this habitat to have an impact on the local population.

Table 6: Assessment of project in accordance with significant impact criteria for Bell's Turtle

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
2)	reduce the area of occupancy of an important population	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
3)	fragment an existing important population into two or more populations	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
4)	adversely affect habitat critical to the survival of a species	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
5)	disrupt the breeding cycle of an important population	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No important populations occur within the site and off-site impacts on the habitat will be negligible with appropriate sedimentation and erosion control as planned.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Foxes are a significant threat to Bell's Turtle because they predate eggs in the nest. Given the nearest population is at least 1.9km away it is highly unlikely that the development will do anything to increase the risk of predation by foxes. Native vegetation clearing will be restricted to grassland only. As such the Project is unlikely to result in invasive animals becoming established in vulnerable species' habitat.
8)	introduce disease that may cause the species to decline, or	Bell's Turtle is at risk from accidental introduction of the Bellinger River virus which has affected a similar species. There will be no risk that the quarry expansion will increase the chance of this

		virus spreading to the bell’s Turtle population downstream of the site.
9)	interfere substantially with the recovery of the species.	The prescribed impacts are considered to be insignificant, and no important populations occur within the site. Therefore, the Project is unlikely to interfere substantially with the recovery of these species.
Is there likely to be a significant impact?		**No**

The assessments identified that the proposed works were unlikely to have a significant impact on endangered and vulnerable species known or considered likely to occur on the site and may potentially be impacted by the proposed work. Therefore, no referral of project impacts to the Minister for the Environment is necessary.

4 Conclusion

The direct impact of the quarry expansion will be on less than 1ha of the Threatened Ecological Community *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*, so the area threshold is not triggered by the proposal. The site does not feature on the Biodiversity Values Map, so a BDAR is not triggered.

The direct footprint of the quarry will not have any significant impact on any threatened species. The boundary of the expansion area of the quarry should be clearly marked to ensure that the footprint stays below the 1 ha threshold. No biodiversity credits will be required to offset the impact of the quarry on the vegetation or any threatened species.

The proposed expansion of the quarry does not require preparation of a Biodiversity Development Assessment Report because the mitigation measures suggested in Table 4 (points 4 and 5) will be implemented and form conditions of approval, so the project will not have a significant impact on koalas. Assessments of significance determined the project will not have a significant impact on threatened species.

Despite the threatened ecological community occurring on the site (Yellow Box – Blakely's Red Gum Grassy Woodland) being a "Serious and Irreversible Impact" entity, the small area of impact and the lack of a significant impact on the community means Council does not need to consider the SAII.

The project will not have a significant impact on any Matters of National Environmental Significance under the Commonwealth EPBC Act and does not require referral to the Minister.

The project will not impact on "Potential Koala Habitat" under the State Environmental Planning Policy (Biodiversity and Conservation (2021) so Council does not need to require a Koala Plan of Management.

5 Works Cited

Archer, M., Cork, S., Hand, S., Phillips, S., & Smith, M. (1981). *Koala: Australia's Endearing Marsupial.* Reed Books.

Australian Government Department of the Environment. (2013). *Matters of National Environmental Significance: Significant Impact Guidelines 1.1.* Australian Government.

Carr, D., Lemon, J., & Wilkie, A. (2017). *Cool Country Koala Project (South):Final Project Report and Koala Management Plan - Armidale/Uralla, Walcha and Nowendoc.* Unpublished report to Northern Tablelands LLS.

Phillips, S., & Callaghan, J. (2011). The Spot Assessment Technique: a tool for determining localised levels of habitat use by koalas Phascolarctos cinereus. *Australian Zoologist, 35*, 774-780.

Prober, S. M., Byrne, M., McLean, E. H., Steane, D. A., Potts, B. M., Vaillancourt, R. E., & Stock, W. D. (2015). Climate-adjusted provenancing: a strategy for climate-resilient ecological restoration. *Frontiers in Ecology and Evolution 3, 65*.

Triggs, B. (2004). *Tracks, Scats, and Other Traces: a field guide to Australian mammals (Revised edition).* Melbourne: Oxford University Press.

WRM Water and Environment Pty Ltd. (2022). *Carlons Quarry Expansion Project: Erosion and Sedimentation Control Plan, 1846-01-C1.*

Appendix A Bionet search results

Table 7: Bionet search results over a 10 x 10km square centred on the site. Accessed 5/3/2022.

Kingdom	Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Number of records	Assessed? (Y/N)	Why?
Animalia	Reptilia	Chelidae	*Myuchelys bellii*	Western Sawshelled Turtle, Bell's Turtle	E1,P	V	163	N	No suitable habitat. Requires freshwater creeks with pools and sand/gravel banks.
Animalia	Aves	Anatidae	*Oxyura australis*	Blue-billed Duck	V,P		1	N	No suitable habitat. Requires aquatic habitat.
Animalia	Aves	Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	1	N	No suitable habitat. Requires aquatic habitat with dense reeds and rushes.
Animalia	Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		2	N	No suitable habitat. Requires tall living or dead trees.
Animalia	Aves	Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	1	N	No suitable habitat. Requires grassy edges of shallow freshwater inland wetlands.
Animalia	Aves	Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	1	N	No suitable habitat. Requires fresh or brackish wetlands or swamps.
Animalia	Aves	Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V,P		1	N	No suitable habitat. Requires flowering eucalypts with hollows.

Animalia	Aves	Strigidae	*Ninox strenua*	Powerful Owl	V,P,3		1	N	No suitable habitat. Requires large areas of continuous forest or woodland.
Animalia	Aves	Climacteridae	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		59	N	No suitable habitat. Requires woodland.
Animalia	Aves	Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	1	N	No suitable habitat. Requires flowering eucalypts
Animalia	Aves	Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		8	N	No suitable habitat. Requires woodland or forest with dense understorey.
Animalia	Aves	Petroicidae	*Petroica phoenicea*	Flame Robin	V,P		1	N	No suitable habitat. No suitable habitat. Requires woodland or forest with dense understorey.
Animalia	Aves	Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V,P		1	Y	Requires open grassland or grassy woodland with flowering grasses.
Animalia	Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala	E,P	E	21	Y	Requires eucalypts in the vicinity.
Plantae	Flora	Poaceae	*Dichanthium setosum*	Bluegrass	V	V	1	Y	Occurs in grassy woodland or derived native grassland.

Appendix B Protected Matters Search Tool

We used the Protected Matters Search Tool to look for Matters of National Environmental Significance (MNES) within a 10 km radius (buffer) of the original quarry footprint. Tables 8 shows the results and indicates whether suitable habitat for each MNES is present and whether further field survey is required.

Table 8: Protected Matters Search in an area of 10km radius centred on the site.

Community ID	Community Name	Threatened Category	Rank	Buffer Status	Habitat suitability, presence and further survey
43	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area	Not present according to EPBC listing advice
39	Upland Wetlands of the New England Tablelands (New England Tableland Bioregion) and the Monaro Plateau (South Eastern Highlands Bioregion)	Endangered	Community likely to occur within area	In buffer area only	Not present
83	New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community likely to occur within area	In feature area	Not present

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Buffer Status	Habitat suitability, presence and further survey
1848	*Litoria castanea*	Yellow-spotted Tree Frog, Yellow-spotted Bell Frog	Frog	Likely	Species or species habitat likely to occur within area	Critically Endangered	In buffer area only	Locally extinct

744	*Lathamus discolor*	Swift Parrot	Bird	May	Species or species habitat may occur within area	Critically Endangered	In feature area	No trees in quarry footprint
82338	*Anthochaera phrygia*	Regent Honeyeater	Bird	Known	Species or species habitat known to occur within area	Critically Endangered	In feature area	No trees in quarry footprint
4325	*Euphrasia arguta*	null	Plant	Likely	Species or species habitat likely to occur within area	Critically Endangered	In feature area	Requires grassy areas adjacent to a stream and only known from Nundle SF. Suitable habitat not present.
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Likely	Species or species habitat likely to occur within area	Critically Endangered	In feature area	No suitable habitat. Requires fresh or brackish wetlands or swamps.
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species habitat likely to occur within area	Endangered	In feature area	No suitable habitat. Requires fresh or brackish wetlands or swamps.
18325	*Diuris pedunculata*	Small Snake Orchid, Two-	Plant	May	Species or species	Endangered	In buffer	Highly susceptible to grazing. Quarry footprint has been heavily grazed so habitat is no longer suitable.

		leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid			habitat may occur within area		area only	
16542	*Lepidium hyssopifolium*	Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed	Plant	Likely	Species or species habitat likely to occur within area	Endangered	In buffer area only	Does not occur in the buffer area.
75184	*Dasyurus maculatus maculatus (SE mainland population)*	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Mammal	Likely	Species or species habitat likely to occur within area	Endangered	In feature area	No suitable habitat.
1001	*Botaurus poiciloptilus*	Australasian Bittern	Bird	May	Species or species habitat may occur within area	Endangered	In buffer area only	No suitable habitat. Requires fresh or brackish wetlands or swamps.
64924	*Leionema lachnaeoides*	null	Plant	May	Species or species habitat may occur within area	Endangered	In buffer area only	No shrubs present in footprint area. No suitable habitat.
85104	*Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)*	Koala (combined populations of Queensland, New South Wales and the	Mammal	Known	Species or species habitat known to occur	Endangered	In feature area	No trees in footprint. See notes in 3.4.2 regarding impacts on koalas.

		Australian Capital Territory)			within area			
92384	*Vincetoxicum forsteri*	null	Plant	May	Species or species habitat may occur within area	Endangered (listed as Tylophora linearis)	In buffer area only	No suitable habitat present.
67036	*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No Casuarina or Allocasuarina trees in footprint.
9828	*Cadellia pentastylis*	Ooline	Plant	May	Species or species habitat may occur within area	Vulnerable	In buffer area only	Does not occur in this region and at this altitude.
86071	*Wollumbinia belli*	Bell's Turtle, Western Sawshell Turtle, Namoi River Turtle, Bell's Saw-shelled Turtle	Reptile	Known	Species or species habitat known to occur within area	Vulnerable	In feature area	Possible impacts from sedimentation of nearby Roumalla Ck. Assess effectiveness of Sediment and Erosion Control Plan.
15202	*Thesium australe*	Austral Toadflax, Toadflax	Plant	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	Survey required (See 3.4.1)

83395	*Nyctophilus corbeni*	Corben's Long-eared Bat, South-eastern Long-eared Bat	Mammal	May	Species or species habitat may occur within area	Vulnerable	In feature area	No suitable habitat present.
470	*Grantiella picta*	Painted Honeyeater	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No suitable habitat present.
66633	*Maccullochella peelii*	Murray Cod	Fish	May	Species or species habitat may occur within area	Vulnerable	In buffer area only	No suitable habitat present.
55198	*Homoranthus prolixus*	null	Plant	May	Species or species habitat may occur within area	Vulnerable	In buffer area only	No suitable habitat present.
56193	*Eucalyptus caleyi subsp. ovendenii*	Ovenden's Ironbark	Plant	May	Species or species habitat may occur within area	Vulnerable	In buffer area only	No suitable habitat present.
9338	*Arthraxon hispidus*	Hairy-joint Grass	Plant	Likely	Species or species habitat likely to occur	Vulnerable	In feature area	No suitable habitat. Occurs adjacent to rainforest or moist areas.

					within area			
20199	*Eucalyptus mckieana*	McKie's Stringybark	Plant	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No trees present in footprint area.
84578	*Uvidicolus sphyrurus*	Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko	Reptile	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No suitable habitat present.
14159	*Dichanthium setosum*	bluegrass	Plant	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	Survey required (See 3.4.1)
225	*Petrogale penicillata*	Brush-tailed Rock-wallaby	Mammal	May	Species or species habitat may occur within area	Vulnerable	In feature area	No suitable habitat present.
19799	*Acacia pubifolia*	Velvet Wattle	Plant	May	Species or species habitat may occur within area	Vulnerable	In buffer area only	No shrubs present in footprint area.

738	*Polytelis swainsonii*	Superb Parrot	Bird	May	Species or species habitat may occur within area	Vulnerable	In feature area	No trees present in footprint area.
183	*Chalinolobus dwyeri*	Large-eared Pied Bat, Large Pied Bat	Mammal	May	Species or species habitat may occur within area	Vulnerable	In feature area	No suitable habitat present.
186	*Pteropus poliocephalus*	Grey-headed Flying-fox	Mammal	May	Foraging, feeding or related behaviour may occur within area	Vulnerable	In feature area	No suitable habitat present.
87600	*Petaurus australis australis*	Yellow-bellied Glider (south-eastern)	Mammal	May	Species or species habitat may occur within area	Vulnerable	In feature area	No suitable habitat present.
20992	*Eucalyptus nicholii*	Narrow-leaved Peppermint, Narrow-leaved Black Peppermint	Plant	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No trees present in footprint area.
682	*Hirundapus caudacutus*	White-throated Needletail	Bird	Known	Species or species habitat known to	Vulnerable	In feature area	No suitable habitat present.

					occur within area			
55581	*Callistemon pungens*	null	Plant	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No shrubs present in footprint area.
929	*Falco hypoleucos*	Grey Falcon	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	In feature area	No trees present in footprint area.

Appendix C Site photos

Figure 9: Plot 1. This plot is mostly within the footprint of the quarry expansion.

Figure 10: Plot 2

Figure 11: Plot 3

Figure 12: View looking south towards existing quarry footprint

Appendix D Development scenarios

Several variations of the development footprint were run through the BAM-C to assess viability. These scenario's all assumed total VIS loss.

5.1 Development scenario 1

Scenario 1 assumed total loss across the entire development footprint. In this scenario, three vegetation zones were identified (see Figure 13).

Figure 13: Vegetation zones for development scenario 1. (Google Earth).

VIS were generated using the BAM-C for each zone and used to determine potential credit requirements (Table 5).

Table 9: Vegetation zones and credit summary for scenario 1.

Zone	Area (ha)	VIS	No. of credits required to offset impact
510_Poor	12.01	21.5	162
510_Moderate	11.23	41.2	289
510_Good	1.38	78.3	68

5.2 Development scenario 2

Scenario 2 slightly revised total area for the 510_Poor vegetation zone and assumed total loss in 510_Poor (Fig 14). This scenario was designed to minimise impact and subsequently reduce credit obligation for the developer by limiting development to vegetation zones in a poor condition state.

Figure 14: Vegetation zones for development scenario 2 & 3. (Google Earth).

VIS were generated using the BAM-C for each zone and used to determine potential credit requirements (Table 6). A full credit requirement and payment report is available in Appendix B.1.

Table 10: Vegetation zones and credit summary for scenario 2.

Zone	Area (ha)	VIS	No. of credits required to offset impact
510_Poor	12.01	21.5	162

5.3 Development scenario 3

Scenario 3 was based off the vegetation zones used in scenario 2 and included an additional area of 510_Poor outside the proposed development footprint (see Figure 14). This adjustment aimed to increase the total area available for development and minimise impact on the biodiversity values of the site. VIS were generated using the BAM-C for each zone and used to determine potential credit requirements (Table 11).

Table 11: Vegetation zones and credit summary for scenario 3.

Zone	Area (ha)	VIS	No. of credits required to offset impact
510_Poor	12.01	21.5	245

5.4 Development scenario 4

Scenario 4 reduces the development footprint to an area less than the threshold which would trigger the area threshold entry into the Biodiversity Offsets Scheme (1ha). However, if a BDAR was triggered by the impact of vehicle strikes on koalas between the quarry and Uralla being unmitigated, the residual impact of clearing of the 1ha of vegetation under this scenario will need to be offset through the purchase of appropriate credits.

Table 12: Vegetation zones and credit summary for scenario 4.

Zone	Area (ha)	VIS	No. of credits required to offset impact
510_Poor	0.99	21.5	13

Appendix E Plot data sheets (BAM assessments)

Plot 1

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form Site Sheet no:

WP 2012 975m.

		Survey Name	Zone ID	Recorders			
Date	8 / 3 / 21	CARLONS	Pasture	DC, NG			
Zone 56J	Datum GDA94	**Plot ID**	220308-01	**Plot dimensions**	50×20	**Photo #**	1309-50
Easting 345341	Northing 6609455	**IBRA region**	NET	**Midline bearing from 0 m**	0°		Magnetic
Vegetation Class							Confidence: H M L
Plant Community Type		510	DNG			EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	8
	Forbs	12
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	88.4
	Forbs	2
	Ferns	0
	Other	0.1
High Threat Weed cover		0.2

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1	Tally space

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	8	12	10	6	6	2	1	1	4	1	0	0	1	0	0	5	0	0	20	0
Average of the 5 subplots	8.4					2					0.2					5				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element	Upper Slope	Landform Pattern	Gently undulating	Microrelief	—
Lithology	Metasediment	Soil Surface Texture	Gravelly clay	Soil Colour	Grey brown	Soil Depth	Shallow
Slope	3°	Aspect	NW	Site Drainage	Good.	Distance to nearest water and type	300m Dam

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	O	
Cultivation (inc. pasture)	–		
Soil erosion	–		
Firewood / CWD removal	–		
Grazing (identify native/stock)	1	R	Manure
Fire damage	–		
Storm damage	–		
Weediness	2	R	See list.
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	8 3 22	CARLONS	220308-01	DC, NG

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
G	Cynodon dactylon		80	1000+		
X	*Erodium cicutarium		0.2	20		
X	Paronychia brasiliana		0.1	20		
X	Conyza bonariensis.		1	100		
G	Sporobolus creber		0.1	10		
X	~~Bromus catharticus~~ Setaria sp		0.1	10		
G	Austrostipa scabra		3	100		
G	Bothriochloa macra		0.1	1		
G	Austrostipa verticillata		3	20		
F	Oxalis perennans.		0.3	50		
X	Cirsium vulgare		3	50		
X	Hypochaeris radicata		0.1	20		
F	Urtica incisa		0.1	2		
X	Polygonum (wire weed)		0.1	1		
F	Dysphania carinata		0.1	20		X
X	Solanum nigrum		0.1	5		
X	Marrubium vulgare.		0.1	2		
F	Rumex brownii		0.1	2		
F	Euchiton sphaericus.		0.1	30		
F	Calotis cuneifolia		0.1	5		
F	Einadia nutans.		0.1	5		
F	Wahlenbergia stricta		0.1	2		
G	Microlaena stipoides		2	100		
G	Eragrostis leptostachya		0.1	10		
X	Vulpia bromoides		1	100		
G	Cyperus fulvus.		0.1	1		X
X	Unknown forb Asteraceae exotic	E	0.5	100		✓
X	Trifolium sp		0.1	2		
O	Glycine tabacina		0.1	2		
X	Eleusine sp		0.1	1		
F	Dichondra repens		0.2	100		
F	Cynoglossum australe		0.1	10		
F	Geranium solanderi		0.2	5		
X	Paspalum dilitatum	HTE	0.2	2		
X	Lepidium bonariense		0.1	1		
X	Modiola caroliniana.		0.1	2		
X	Malva neglecta		0.1	1		
X	Verbena bonariensis		0.1	3		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Within 100m - E. melliodora, E. blakelyi, E macrorhyncha

Plot 2

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form Site Sheet no:

WP 2013 942m

		Survey Name	Zone ID	Recorders		
Date	8/3/22	Carlons	Box Gum	DC, NG		
Zone 56J	Datum GDA94	Plot ID	220308-02	Plot dimensions	50x20	Photo # 1351-2
Easting 345293	Northing 6609704	IBRA region	NET	Midline bearing from 0 m	0°	
Vegetation Class						Confidence: H M L
Plant Community Type		510		EEC:		Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	8
	Forbs	4
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	30
	Shrubs	0
	Grasses etc.	71.5
	Forbs	5.4
	Ferns	0
	Other	0.1
High Threat Weed cover		0.1

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	153	
50 – 79 cm		
30 – 49 cm		
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0	Tally space

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, ..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	65	15	10	30	17	5	0	2	0	2	0	0	1	0	2	3	0	1	0	0
Average of the 5 subplots	27.4					1.8					0.4					0.8				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element	Lower slope	Landform Pattern	Gent und	Microrelief	–
Lithology	Metasediment	Soil Surface Texture	Clay	Soil Colour	Brown	Soil Depth	Mod
Slope	1°	Aspect	N	Site Drainage	Mod	Distance to nearest water and type	100m Dam

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	2	O	
Cultivation (inc. pasture)	–		
Soil erosion	–		
Firewood / CWD removal	–		
Grazing (identify native/stock)	3	R	Sheep / Cattle dung.
Fire damage	–		
Storm damage	–		
Weediness	1	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 8/3/22	CARLONS	220308-02	DC NG

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 Eucalyptus melliodora		30	1		
G	2 Cynodon dactylon		65	1000+		
F	3 Microseris lanceolata		5	200		
X	4 Vulpia bromoides		1	100		
X	5 Lolium sp.		0.5	10		
X	6 Plantago lanceolata		0.1	20		
X	7 Cirsium vulgare		2	40		
G	8 Panicum effusum		1	30		
O	9 Desmodium varians		0.1	2		
X	10 Paronychia brasiliana		0.3	100		
X	11 Polygonum (wireweed)		0.2	20		
X	12 Trifolium repens		0.1	10		
X	13 Amaranthus powellii		0.1	5		
X	14 Malva neglecta		0.1	5		
G	15 Sporobolus creber		4	100		
G	16 Eragrostis leptostachya		1	50		
G	17 Austrostipa scabra		0.1	5		
X	18 Cenchrus longisetus	HTE	0.1	1		
F	19 Rumex brownii		0.1	1		
X	20 Conyza bonariensis		0.1	10		
G	21 Bothriochloa macra		0.2	30		
X	22 Bromus catharticus		3	200		
F	23 Urtica incisa		0.1	2		
G	24 Lachnagrostis aemula		0.1	1		
G	25 Rytidosperma sp		0.1	1		
F	26 Euchiton sphaericus		0.2	20		
X	27 Hordeum vulgare		0.1	1		
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Nearby: E. bridgesiana, E. blakelyi

Plot 3

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form Site Sheet no: of

WP 2014 941m

		Survey Name	**Zone ID**	**Recorders**			
Date	8/3/22	CARLONS	BOX GUM	DC, NG			
Zone 56J	Datum GDA94	**Plot ID**	220308-03	**Plot dimensions**	50x20	**Photo #**	1352-3
Easting 345692	Northing 6609705	**IBRA region**	NET	**Midline bearing from 0 m**	0°		Magnetic °
Vegetation Class							Confidence: H M L
Plant Community Type		510				EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	4
	Shrubs	2
	Grasses etc.	10
	Forbs	13
	Ferns	1
	Other	2
Sum of Cover of native vascular plants by growth form group	Trees	31.1
	Shrubs	0.4
	Grasses etc.	80.7
	Forbs	7.1
	Ferns	0.1
	Other	0.4
High Threat Weed cover		0

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm	67, 51	
30 – 49 cm	47, 35	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm	19	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	5	Tally space

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	50	40	25	38	3	0	0	2	0	5	0	0	0	0	0	5	4	2	0	0
Average of the 5 subplots	31.6					1.4					0					2.2				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element	Lower Slope	Landform Pattern	Gently Und	Microrelief	Creek
Lithology	Metasediment	Soil Surface Texture	Rocky clay	Soil Colour	Grey-brown	Soil Depth	Shallow
Slope	4°	Aspect	SW	Site Drainage	Good	Distance to nearest water and type	5m Creek

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	–		
Cultivation (inc. pasture)	–		
Soil erosion	1	R	Gully.
Firewood / CWD removal	–		
Grazing (identify native/stock)	3	R	Sheep / Cattle Dung.
Fire damage	–		
Storm damage	–		
Weediness	1	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Trainin

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 8 3 22	CARLONS	220308-03	DC, NG

GF Code	Top 3 native species in each growth form group: Full species name mandatory. All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	CC stratum	FPC voucher
T	1 Eucalyptus melliodora		18	1	25	70
T	2 Eucalyptus caliginosa		10	1	15	70
T	3 Eucalyptus blakelyi		3	1		
G	4 Microlaena stipoides		30			
G	5 Sporobolus creber		10			
G	6 Poa sieberiana		10			
G	7 Juncus usitatus		0.1	1		
X	8 Trifolium repens (white)		0.1	10		
X	9 Cirsium vulgare		1	30		
F	10 Geranium solanderi		5	500		
X	11 Plantago lanceolata		0.7	100		
X	12 Paronychia brasiliana		0.2	30		
X	13 Setaria sp		0.4	20		
X	14 Hypochaeris radicata		0.1	10		
F	15 Asperula conferta		0.1	10		
F	16 Acaena agnipila		0.1	5		
E	17 Cheilanthes sieberi		0.1	20		
X	18 Solanum nigrum		0.1	2		
$	19 Glycine tabacina		0.4	50		
F	20 Einadia nutans		0.1	1		
G	21 Panicum effusum		20	500		
G	22 Eragrostis leptostachya		10	200		
X	23 Trifolium arvense (Hares' Foot)		0.1	5		
F	24 Calotis cuneifolia		0.4	30		
G	25 Elymus scaber		0.1	1		
X	26 Petrorhagia nanteuilii		0.1	1		
G	27 Rytidosperma sp.		0.1	1		
G	28 Bothriochloa macra		0.3	20		
F	29 Chrysocephalum apiculatum		0.5	20		
X	30 Conyza bonariensis		0.1	5		
O	31 Desmodium varians		0.3	40		
X	32 Centaurium erythraea		0.1	10		
O	33 Glycine clandestina		0.1	5		
F	34 Hydrocotyle laxiflora		0.2	100		
S	35 Hibbertia obtusifolia		0.3	20		
F	36 Euchiton sphaericus		0.2	20		
X	37 Verbascum thapsus		0.1	1		
F	38 Hypericum gramineum		0.1	20		
S	39 Cassinia quinquefaria		0.1	1		
G	40 Lomandra filiformis		0.1	1		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Nearby: Angophora floribunda, E. bridgesiana

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 8/3/22	CARLONS	220308_03	DL NG

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
X	1	~~Tolpis barbata~~ Vulcan Yellow		0.2	20		✓
F	2	Dichondra repens		0.1	10		
F	3	Mentha satureoides		0.1	1		
F	4	Desmodium brachypodum		0.1	1		
X	5	Trifolium campestre		0.3	20		
X	6	Dactylis glomerata		0.1	1		
F	7	Wahlenbergia stricta		0.1	2		
T	8	Angophora floribunda (seedling)		0.1	2		
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Appendix H Archaeological Technical Report

A view of the Carlon's Quarry Project Study Area.

ARCHAEOLOGICAL TECHNICAL REPORT

CARLON'S QUARRY PROJECT

CARLON'S QUARRY – KINGSTOWN ROAD, URALLA

AUGUST 2022

Report prepared by

OzArk Environment & Heritage

for Blendee Partnership

OzArk
Environment & Heritage

145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
enquiry@ozarkehm.com.au
www.ozarkehm.com.au

This page has intentionally been left blank.

Document Controls

Proponent	Blendee Partnership	
Client	Onward Consulting	
Document Description	Carlon Quarry Project– Archaeological Technical Report	
File Location	OzArk Job No.	
Clients\Onward\Carlons Quarry March 2022\ATR	3370	
Document Status: V3.2 Final		Date: 1 August 2022
Draft V1: OzArk internal edits		V1.0: Roger Mehr authors 4/4/22
Draft V2: OzArk and client edits		V2.0 BC edits 8/4/22
Final V3: Final document		V3.0 BC finalises with client comments 5/5/22 V3.1 BC amends on client comment 16/5/22 V3.2 BC amends on client comment 1/8/22
Prepared for		Prepared by
Mike Gale Senior Environmental Consultant Onward mike.gale@onward.net.au		Ben Churcher Principal Archaeologist OzArk Environment & Heritage 145 Wingewarra Street (PO Box 2069) Dubbo NSW 2830 P: 02 6882 0118 ben@ozarkehm.com.au

Acknowledgement

OzArk acknowledge the traditional custodians of the area on which this assessment took place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the Elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by Onward Consulting, on behalf of Blendee Partnership (the proponent) to complete an *Archaeological Technical Report* (ATR) of a small parcel of land which has the potential to be impacted by an extension of the footprint of the existing Carlon's Quarry (the Quarry, the proposal). The Quarry is situated approximately 10 kilometres (km) west of Uralla on the Kingstown Road in the New England Northern Tablelands region of NSW.

The existing quarry is situated directly at the northern base of a small hill and west and south of several low hills. This intermittent drainage lines of this small catchment converge at the approximate location of the Quarry and flow roughly east then north to join with Balala Creek approximately 8 km northeast of the Project Study Area.

The south-eastern section of the Project Study Area has been heavily disturbed through the impacts of works associated with the existing Quarry. The rest of the Project Study Area is less disturbed but has been impacted by land clearing and pastoral activities since colonial settlement in the area.

The field survey was undertaken by OzArk on Wednesday 30 March 2022 with the assistance of the Iwatta Aboriginal Corporation.

One Aboriginal object is located within the Project Study Area: an Aboriginal scarred tree site CQST1 (20-6-0081) that was identified in the northern extent of the Project Study Area. It is recommended that the proponent must conserve this site in the landscape.

Given the disturbed nature of all other land within the Project Study Area, it is considered unlikely that any further archaeological constraints exist, except for a five metre (m) buffer around CQST1.

Recommendations concerning Aboriginal cultural values within the Project Study Area are as follows:

1. Aboriginal scarred tree site CQST1 (20-6-0081) will not be harmed, and the tree will be clearly fenced and demarcated to protect it from any inadvertent harm. A 5 m buffer around the tree will be sufficient. The site will be marked on any applicable site plans so that its position is known.
2. The proposed work may proceed at the Quarry without further archaeological investigation under the following conditions:
    a) All land and ground disturbance activities will be confined to within the Project Study Area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.

b) All staff and contractors involved in the proposed work will be made aware of the legislative protection requirements for all Aboriginal sites and objects.

3. This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 3**) will be followed.
4. Inductions for work crews will include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 4**) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol.*

CONTENTS

FIGURES

TABLES

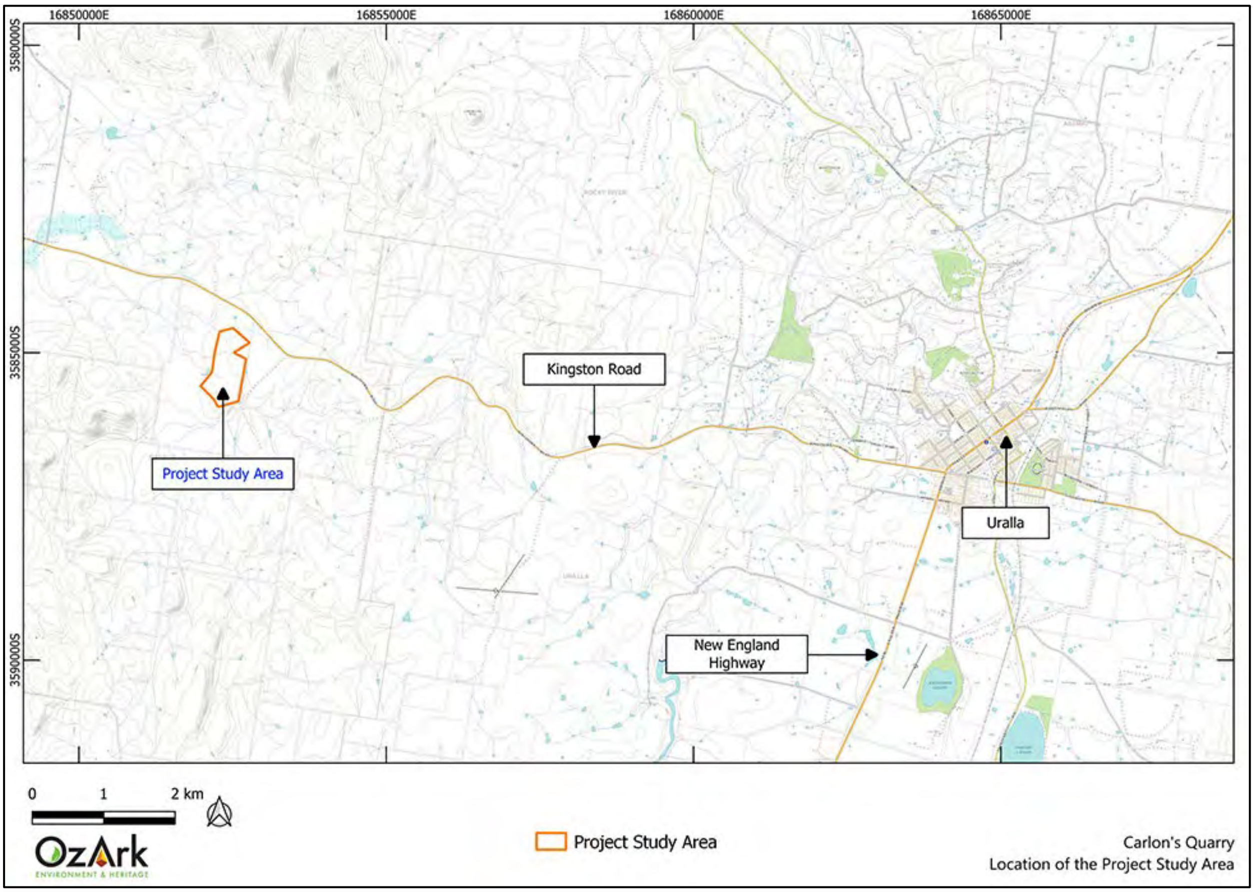
PLATES

1 Introduction

1.1 Description of the Proposal

OzArk Environment & Heritage (OzArk) has been engaged by Onward Consulting, on behalf of Blendee Partnership (the proponent) to complete an *Archaeological Technical Report* (ATR) of a small parcel of land which has the potential to be impacted by an extension of the footprint of the existing Carlon's Quarry (the Quarry, the proposal). The Quarry is situated between Uralla and Balala on the Kingstown Road (1033 Kingstown Road, Balala, NSW 2358 [Lot 3 DP834359]). The proposal is in the Uralla Local Government Area (LGA) (**Figure 1-1**).

Figure 1-1: Map showing the location of Quarry.

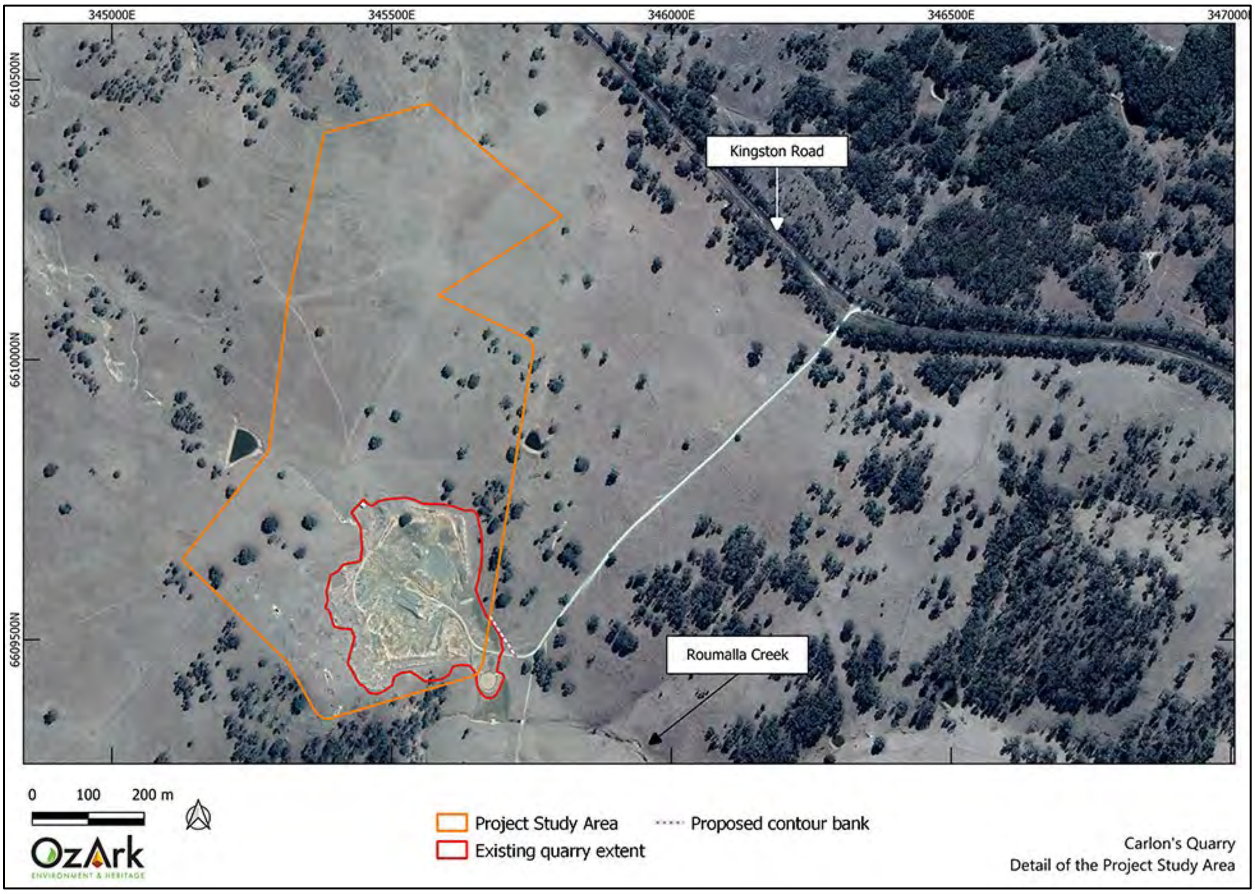


1.2 Proposed Work

Due to the increasing demand from large scale renewable energy projects in the New England region, the proponent wishes to increase the size and production rate at the Quarry to provide materials for the development of roads, tracks, and infrastructure.

The proponent intends to increase the size of the Quarry to approximately 32 hectares (ha) maximum (**Figure 1-2**) and a maximum production rate of 120,000 cubic metres (m^3) per annum with an approximate average of 80,000 m^3 per annum.

Figure 1-2: Aerial showing the Project Study Area.



1.3 PROJECT STUDY AREA

The Project Study Area is limited to those lands covered by the proposed project as shown on **Figure 1-2**. The final footprint of the proposed extension area will not encompass the entire Project Study Area but will fall entirely within its boundary and thus all possible areas of future disturbance from the proposed project have been assessed as part of the study.

The only exception is a proposed contour bank that is located to the east of the Project Study Area. This contour bank (up to 0.1 ha) is proposed north of the quarry entrance to divert clean water draining from the access road into Roumalla Creek.

1.3.1 Landscape context of the Project Study Area

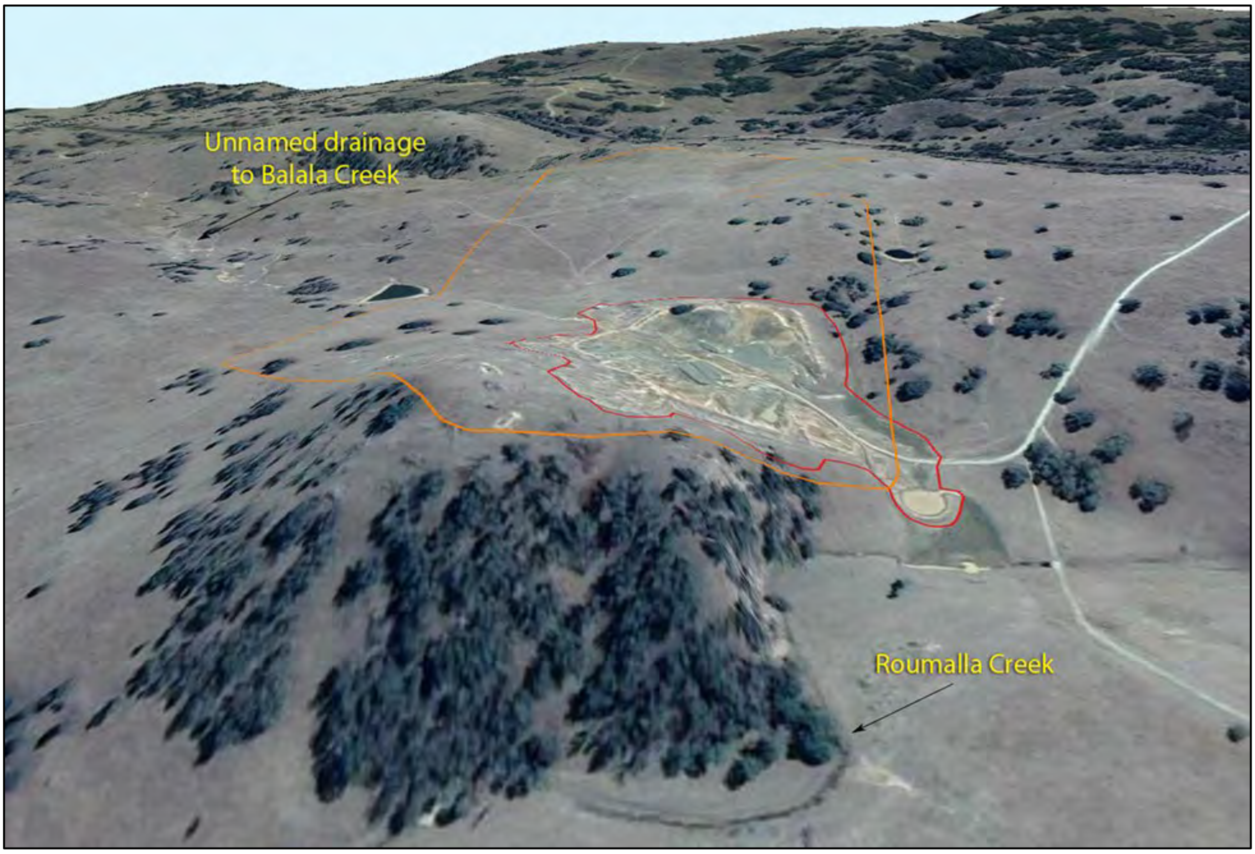
The Project Study Area is situated in the far eastern part of the Gwydir catchment, which comprises lands covering approximately 26,600 square kilometres (km^2) and extends 670 kilometres (km) from the Great Dividing Range to the Barwon River near Collarenebri.

The Project Study Area is bounded by low hills to the north, east and south; all of which contain first order drainage channels. Most of these drainages converge in the west of the Quarry and then flow to the west and north where they join with Balala Creek which eventually flows into the greater Murray-Darling catchment. A small portion of landforms at the south of the Quarry (mostly within the existing quarry) is within the Roumalla Creek catchment that is located to the south of the Project Study Area.

The topography of the Project Study Area is comprised of low to medium height hills, with the highest hill being situated in the southeast of the Project Study Area where the existing quarry is located. The hills have a general western aspect and are covered by many minor drainage channels which would be generally dry, but due to heavy rain in the period immediate leading up to the survey, were mostly flowing at the time of inspection.

A digital elevation model shown on **Figure 1-3** views the Project Study Area from the south showing the isolated crest in the southwest and the drainage catchment flowing to the west.

Figure 1-3: Digital elevation model of the Project Study Area.



The Project Study Area is situated within a geological landscape of Devonian-Carboniferous sedimentary rocks. The local lithology is characterised by sedimentary rocks including quartz-rich pebbly sandstone and conglomerate units deposited in fluvial systems, and also siltstone, mudstone and sandstone with lithic fragments. Also present in high density within the Project Study Area were numerous exposures of basalt, although no granite was identified. Inspection of the periphery of the Quarry identified a subsurface matrix of fine black soils with a high concentration of layered sedimentary siltstone unsuitable for manufacture of stone tools. The basalt rocks identified throughout the Project Study Area were also of poor integrity and considered not suitable for use as a lithic resource by the traditional Aboriginal occupants of the area.

Historical land use of the area is pastoral with the entire Project Study Area showing evidence of historical clearing. The south-eastern extent of the Project Study Area currently comprises a working quarry. At the time of survey the ground surface had been subject to heavy rainfall in the previous month and an unusually wet summer immediately prior to that. This has resulted in the drainage channels all being full and extremely dense foliage (mainly high grasses) covering over 95% of the Project Study Area. The survey track was adjusted considerably in the field to allow for conditions, however, the overall area surveyed on the day was higher than that covered in the planned methodology.

1.3.2 Aboriginal peoples past and/or current use of the Project Study Area

No evidence regarding the past use of the lands within the Project Study Area is available. The entire New England area is an understudied part of NSW, from the perspective of Aboriginal cultural heritage management, and no archaeological or cultural reports were identified that specifically covered the landforms within the Project Study Area.

Given that the topography of the Project Study Area mostly comprises hill slopes and steep drainage lines, it is considered unlikely that Aboriginal people would have utilised any of the land for activities such as camping. Although a significant amount of basalt was identified throughout the Project Study Area, it was neither of sufficient quality nor density at any specific location to likely represent a significant raw material source for the local Aboriginal people (**Plate 3**).

2 THE ARCHAEOLOGICAL ASSESSMENT

2.1 RELEVANT LEGISLATION

Cultural heritage is managed by several state and national Acts. Baseline principles for the conservation of heritage places and relics can be found in the *Burra Charter* (Burra Charter 2013). The *Burra Charter* has become the standard of best practice in the conservation of heritage places in Australia, and heritage organisations and local government authorities have incorporated the inherent principles and logic into guidelines and other conservation planning documents. The *Burra Charter* generally advocates a cautious approach to changing places of heritage significance. This conservative notion embodies the basic premise behind legislation designed to protect our heritage, which operates primarily at a state level.

Several Acts of parliament provide for the protection of heritage at various levels of government.

2.1.1 Commonwealth legislation

2.1.1.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act, administered by the Commonwealth Department of Agriculture, Water and the Environment, provides a framework to protect nationally significant flora, fauna, ecological communities, and heritage places. The EPBC Act establishes both a National Heritage List and Commonwealth Heritage List of protected places. These lists may include Aboriginal cultural sites or sites in which Aboriginal people have interests. The assessment and permitting processes of the EPBC Act are triggered when a proposed activity or development could potentially have an impact on one of the matters of national environment significance listed by the Act. Ministerial approval is required under the EPBC Act for proposals involving significant impacts to national/commonwealth heritage places.

2.1.1.2 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* is aimed at the protection from injury and desecration of areas and objects that are of significance to Aboriginal Australians. This legislation has usually been invoked in emergency and conflicted situations.

<u>Applicability to the proposal</u>

It is noted there are no Commonwealth or National heritage listed places within the Project Study Area, and as such, the heritage provisions of the EPBC Act and other Commonwealth Acts do not apply.

2.1.2 State legislation

2.1.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

This Act established requirements relating to land use and planning. The main parts of the EP&A Act that relate to development assessment and approval are Part 4 (development assessment) and Part 5 (environmental assessment). The Department of Planning and Environment (DPE) is responsible for the Act.

The EP&A Act currently provides the primary legislative basis for planning and environmental assessment in NSW. The objects of the EP&A Act include encouragement of:

- The proper management, development, and conservation of natural resources
- The provision and coordination of the orderly and economic use and development of land
- Protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats
- Ecologically sustainable development.

The objects also provide for increased opportunity for public involvement and participation in environmental planning and assessment.

The EP&A Act includes provisions to ensure that the potential environmental impacts of a development or activity are rigorously assessed and considered in the decision-making process.

The framework governing environmental and heritage assessment in NSW is contained within the following parts of the EP&A Act:

- Part 4: Local government development assessments, including heritage. May include schedules of heritage items.

<u>Applicability to the proposal</u>

The current proposal will be assessed under Part 4 of the EP&A Act.

2.1.2.2 National Parks and Wildlife Act 1974 (NPW Act)

The NPW Act provides for the protection of Aboriginal objects (sites, objects, and cultural material) and Aboriginal places. Under the Act (Part 6), an Aboriginal object is defined as: any deposit, object, or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction and includes Aboriginal remains.

An Aboriginal place is defined under the NPW Act as an area which has been declared by the Minister administering the Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.

It is an offence under Section 86 of the NPW Act to 'harm or desecrate an object the person knows is an Aboriginal object'. It is also a strict liability offence to 'harm an Aboriginal object' or to 'harm or desecrate an Aboriginal place', whether knowingly or unknowingly. Section 87 of the Act provides a series of defences against the offences listed in Section 86, such as:

- The harm was authorised by and conducted in accordance with the requirements of an *Aboriginal Heritage Impact Permit* (AHIP) under Section 90 of the Act
- The defendant exercised 'due diligence' to determine whether the action would harm an Aboriginal object
- The harm to the Aboriginal object occurred during the undertaking of a 'low impact activity' (as defined in the regulations).

Under Section 89A of the Act, it is a requirement to notify the Secretary of the Department of Premier and Cabinet (DPC) of the location of an Aboriginal object. Identified Aboriginal items and sites are registered on Aboriginal Heritage Information Management System (AHIMS) that is administered by Heritage NSW.

<u>Applicability to the proposal</u>

Any Aboriginal sites within the Project Study Area are afforded legislative protection under the NPW Act.

Under Section 89A of the NPW Act, it is a requirement to notify the Secretary of DPC of the location of an Aboriginal object. Identified Aboriginal items and sites are registered on AHIMS that is administered by Heritage NSW.

2.1.2.3 Secretary's Environmental Assessment Requirements

SEARs were issued by DPIE on 3 December 2021. In relation to Aboriginal cultural heritage, the SEARs state:

> *Heritage – including:*
>
> *An assessment of the potential impacts on Aboriginal heritage (cultural and archaeological), including evidence of appropriate consultation with relevant Aboriginal communities/parties and documentation of the views of these stakeholders regarding the likely impact of the development on their cultural heritage.*

2.2 Assessment Approach

The archaeological field assessment followed the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice; DECCW 2010; Requirements 1–9).

The Aboriginal cultural heritage assessment has also followed the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (the Guide; OEH 2011; Section 2).

2.3 PURPOSE AND OBJECTIVES

The purpose of this study is to identify and assess heritage constraints relevant to the proposal.

The study will apply the field investigation aspects of the Code of Practice and the Guide in the completion of the Aboriginal cultural heritage assessment to meet the following objectives:

Objective One: Undertake background research on the Project Study Area to formulate a predicative model for site location within the Project Study Area

Objective Two: Identify and record Aboriginal cultural heritage values within the Project Study Area. This includes intangible cultural values, Aboriginal objects, and any landforms likely to contain further archaeological deposits. A knowledgeable Aboriginal knowledge holder will accompany the field survey to provide feedback on the cultural values of the area

Objective Three: To assess the significance of any recorded Aboriginal cultural values, Aboriginal objects, or sites in limited consultation with the Aboriginal community

Objective Four: Assess the likely impacts of the proposed work to Aboriginal cultural heritage values and provide management recommendations.

2.4 DATE OF ARCHAEOLOGICAL ASSESSMENT

The field survey was undertaken by OzArk on Wednesday 30 March 2022.

2.5 OZARK INVOLVEMENT

2.5.1 Field survey

The fieldwork survey was undertaken by:

- Fieldwork Director: Roger Mehr (B.Arts, M.Arts).

2.5.2 Reporting

The reporting component of the Archaeological Technical Report was undertaken by:

- Report author: Roger Mehr (B.Arts, M.Arts)
- Contributor: Steven Ahoy (Aboriginal participant's report), Senior Sites Officer – Iwatta Aboriginal Corporation (see **Appendix 1**)
- Reviewer: Ben Churcher (OzArk Principal Archaeologist, BA(hons), Dip Ed.).

2.6 ABORIGINAL COMMUNITY INVOLVEMENT IN THE ASSESSMENT

As the report is not of a level required to support an AHIP application (i.e. an Aboriginal Cultural Heritage Assessment Report [ACHAR]), limited consultation was carried out with the local Aboriginal community. Steven Ahoy (Iwatta) attended the field survey and provided a brief report including cultural knowledge and field observations, the content of which has been incorporated into this report (**Appendix 1**, **Table 2-1**).

Table 2-1: Aboriginal community involvement in the fieldwork.

Individual/group	Name	Day of participation
Iwatta	Steven Ahoy	30 March 2022

3 ARCHAEOLOGICAL CONTEXT

The Project Study Area is situated within the traditional lands of the Anaiwan people, who have lived in the region for more than 6,000 years.

The Project Study Area falls within the Aboriginal language group boundary of the *Nganyaywana*; also known as the *Anaiwan*. Norman Tindale (1974) recorded the location of the Anaiwan as "*New England tableland from Guyra and Ben Lomond south to Uralla and Moombie Range; northwest to Tingha; at Bendemeer and Armidale*". *The Encyclopaedia of Aboriginal Australia* (AIATSIS) follows Tindale's boundary but classifies the language spoken as *Nganyaywana* which was coined by linguist Terry Crowley (EMM 2018: 27). Crowley identified that the *Nganyaywana* had two dialects: *Himberong* spoken to the south in the Walcha district and *Iuwon* spoken in the areas of Armidale, Uralla and Bundarra. As the Project Study Area is situated close to Uralla, it is likely that people in the Survey Boundary would have spoken the *Iuwon* dialect of the *Nganyaywana*.

3.1 PREVIOUS STUDIES IN OR NEAR THE PROJECT STUDY AREA

3.1.1 Aboriginal occupation of the New England Tablelands

Academic-based archaeological investigations in the New England Tablelands dating back to the 1960s have provided a wealth of high-level information that has attempted to link large datasets of sites together and create meaningful Aboriginal occupational models. As such, information about the regional archaeological character of the Tablelands has an advantage over other parts of NSW in areas where there are numerous consultancy reports but no overarching studies tying the data together.

These archaeological studies of the Tablelands are closely associated with the University of New England (UNE) along with archaeological consultancy investigations in response to proposed developments across the region. The academic studies in particular have led to the development of regional Aboriginal occupation models particularly from the mid-Holocene onwards.

Initial archaeological research by UNE indicated that Aboriginal occupation of the Tablelands was seasonal and transitory. This was argued to be because of the cold climate during winter and the associated lack of resources for subsistence (Bowdler 1981). In the 1970s, McBryde emphasised the harshness of the Tablelands, suggesting that it would have been a major obstacle to year-round occupation, resulting in a sparse distribution of sites in this zone compared with other more temperate climates. Some argued that instead, the Tablelands were mainly used for ceremonial purposes which was supported by the rich archaeological record of Bora rings, art sites, stone arrangements, and carved trees along with Aboriginal knowledge of intangible sites (Flood 2010: 238–239).

The initial hypotheses of seasonal occupation in the Tablelands were challenged as a result of further research at UNE. In a major study, Luke Godwin argued that the Tablelands were not abandoned in winter at all but occupied all year round by small mobile groups. His evidence, based on ethno-history, climate, and surface archaeology, suggests that the cold winter climate of the Tablelands was not a barrier to year-round settlement (EMM 2018: 35). Goodwin identified that the Tablelands had varying resources zones of woodland, grassland, and wetlands.

A recent study by Beck, Haworth and Appleton published in 2015 built upon the theory of year-round settlement, with a specific focus on the resources of lagoons in the upland wetlands (EMM 2018: 36). The researchers found that during the later Holocene, Aboriginal occupation in this area became more visible, including a high number of ceremonial sites in association with areas of greatest lagoon concentration. They hypothesise that the drier, more uncertain climate of the late Holocene would have concentrated game around larger lagoons which became the focus of consumption and exchange for Aboriginal people. They argue that the concentration of resources would have supported larger numbers of people often associated with ceremonial activity.

By distinguishing certain features of stone tools that are common to all sites, the dating of Aboriginal occupation in the Tablelands can be achieved within a rough estimate. The heavy core and flake scrapers (40,000–10,000 years ago) of the ‘Australian Core Tool and Scraper Tradition’ have been associated with making wooden tools such as boomerangs, spears, clubs and throwing sticks. Tools of the newer industries (10,000–5,000 years ago) are relatively small and are defined by shape as points, adzes and backed (blunted) blades and are known as the ‘Small Tool and Scraper Tradition’. These smaller tools are found in conjunction with chisels and axes. The oldest examples of these stone tools come from the New England region (Binns and McBryde 1972, McBryde 1974). There was a further change in technology (1,000–400 years ago) with a loss of some items from the range (backed blades and finely retouched [re-sharpened] blades) were replaced with simple flakes, bipolar pieces and ground edge axes and a greater use of shell, bone and glass for tool making.

From the available evidence of stone tool typology, therefore, it would appear that the Tablelands were increasingly occupied during the Holocene but that earlier dates are infrequent and often unreliable. Archaeological and linguistic evidence suggests that the Tablelands were most intensively occupied from around 4,000 years ago (EMM 2018: 36). This is based on the finds of surface or near-surface artefacts, with very little found at greater depth. The oldest known Aboriginal site (c 4,300 years old) is near Bendemeer on the southern edge of the Tablelands (EMM 2018: 36).

3.1.2 Site types in the New England Tablelands

A reasonable amount of archaeological work has been undertaken in the Tablelands and consequently only a brief regional archaeological context that focuses on work in similar landforms to the Project Study Area is provided here. The results of these investigations provide an archaeological context for the current assessment.

Carved trees, ceremonial Bora grounds and art sites have all been identified within the Tablelands and indicate the original inhabitants' important spiritual and physical connection to the landscape. Other surviving material remains include seed grinding and axe grinding grooves in rock slabs, cooking areas and stone artefact scatters representing open camp sites. Studies identify that Aboriginal occupation was patterned, not random. Activities in the landscape were focused on places where people lived and worked (quarries, camp sites and ceremonial sites), with a preference for areas with clustered resources, such as lagoons, and also along tracks and pathways which were followed for ritual and secular purposes. Transitory areas feature fewer archaeological traces, sometimes only marked by isolated or low-density stone artefact scatters.

Stone quarry and grinding groove sites are site types that represent more utilitarian, even industrial practices. Stone quarries are relatively common in the Tablelands and range from significant quarries such as that at Moore Creek, to smaller but significant working areas on isolated outcrops such as the Salisbury Court axe quarry site (AHIMS 21-4-0004). The Moore Creek quarry site is in the Tamworth LGA approximately 60 km south-southwest of the Project Study Area on a ridge approximately 300 metres (m) above a valley and features a large outcrop of andesitic greywacke.

McBryde noted in her 1974 publication that suitable rock for grinding grooves is rare across the Tablelands, and therefore grinding groove sites often comprise small portable sandstone blocks (McBryde 1974: 159). She noted that the closest grooves were near Walcha at the time. However, since then, a number of grinding groove sites have been identified in the local area. A number of these sites are noted to be on outcropping granite bedrock, but there is some ambiguity in the geological terminology. EMM 2018 postulate that areas of suitably coarse outcropping silcrete have been used for grinding grooves which may sometimes be mistaken for granite.

In the later Holocene, Aboriginal occupation in upland areas became more visible in the archaeological record, including a number of ceremonial sites in conjunction with lagoons.

Stone arrangements in various groupings such as cairns, circles, lines and corridors have also been identified although little is known about them. McBryde identified stone cairn sites at a number of locations across north-eastern NSW, which were often grouped along crests, ridges, and knolls (McBryde 1974: 31–33). The study noted that stone arrangements on the Tablelands did not reveal any significant landscape patterning "*apart perhaps from the preference for elevated sites with a good outlook*". One site at Black Mountain (approximately 43 km northeast of the Project Study Area) was known as part of a Bora ground and featured 17 large heaps of stones on a "*slight hollow on the top of a peak, one of the highest points in the area*" (McBryde 1974: 41).

Bora rings in the Tablelands have been identified as circular cleared areas (typically 10–15 m in diameter) edged with a low bank of earth up to 1 m in height and nearly 2 m wide (McBryde 1974: 52). Literary accounts suggest that Bora grounds often comprised two circles joined by a pathway, often flanked by ground drawings of human and animal figures, and carvings of geometric designs in nearby trees. McBryde listed 26 Bora sites known at the time in the Tablelands (McBryde 1974: 59–62).

Archaeological evidence of burials has been identified in rock shelters, but also as open sites marked by earth mounds, piles of stones and nearby carved trees (McBryde 1974: 136–153).

3.1.3 EMM 2018 New England Solar Farm

A recent investigation in landforms 12–16 km to the southeast was conducted for the New England Solar Farm by EMM Consulting (EMM) in 2018. This investigation was conducted over a number of terrain types, some of which are not represented in the Project Study Area, however, as a recent investigation, it adds to our knowledge of Aboriginal distribution and use of the region.

Through background research and landscape analysis, EMM predicted that the study area had the potential to feature a range of Aboriginal sites including stone artefacts, scarred trees, quarries and grinding grooves. Based on a search of the AHIMS register, no Aboriginal sites had previously been recorded in the EMM study area.

EMM conducted a targeted archaeological survey over 19 days in mid-2018 with the support of Aboriginal community representatives.

The EMM survey identified 95 Aboriginal sites during the 19 days of archaeological field survey. Site recordings from EMM 2018 are shown in **Table 3-1**. As demonstrated by this table, most of the sites recorded by EMM were artefact sites, with artefact scatters and isolated finds (with and without potential archaeological deposit [PAD]) comprising 74% of the recordings

Table 3-1. Sites recorded by EMM 2018.

Site type	Number of sites recorded	Percentage of total
Isolated find	43	45
Artefact scatter	16	17
Scarred tree	13	14
Artefact scatter with potential archaeological deposit (PAD)	9	9
Quarry, artefact scatter, PAD	5	5
Grinding groove, artefact scatter, PAD	4	4
Isolated find, PAD	3	3
Grinding groove	1	1
Grinding groove, PAD	1	1

EMM identified Aboriginal sites in each of the landform classes defined for the survey. The highest frequency of sites was identified on crests (57%), followed by hill slopes (30%), flats (6%) and watercourses (6%). Notably, all site type features are represented on crest landforms and contain the most archaeologically significant sites, including all the stone quarry sites, all open stone artefact sites attributed with PAD and the most significant grinding groove site (NE09). It is noted, however, that the crest landforms in the EMM study area are not widely represented in the Project Study Area.

Sites were identified an average of approximately 218 m from 1st or 2nd order streams, 960 m from 3rd order streams and 1,750 m from 4th order and above streams, with the minimum distance being 3 m and the maximum distance being 764 m. The median distance from mapped watercourses was 166 m. The considerable average distance from higher order streams indicates that lower order streams (particularly 2nd order) could support low intensity camping and resource gathering activities.

Approximately half of the sites identified on hill slope landforms were isolated artefacts which are largely attributed to 'background scatter' caused by isolated events or accidental discard. Over half of the scarred trees identified were on hill slope landforms.

Three of the six grinding groove sites identified were on hill slope landforms in areas with outcropping silcrete bedrock. Most of the sites identified on flats and watercourses were isolated artefacts but also included isolated incidences of scarred trees and artefact scatters.

Stone artefact scatters (including those with PAD) were mostly identified on crest landforms (n=19, or 76%). The remaining artefact scatters were rare and occurred on hill slopes (n=5) and on a watercourse in one instance (NE44). Isolated finds were more widely distributed throughout the landscape, whereby only half occurred on crests (n=23), followed by hill slopes (n=14), flats (n=5) and watercourses (n=4). The wider representation of isolated finds suggests they are generally a product of more transitory occupation, except where on a crest considered to have PAD. The artefact scatters (n=9) and isolated artefacts (n=3) associated with PAD are mainly on crests defined by outcropping granite and/or silcrete boulders which has acted to protect these sites from considerable disturbance. Artefacts were commonly identified amongst the outcropping boulders and noticeably discontinued outside of the crest areas, even if ground surface visibility levels remained favourable for artefact detection.

A total of 238 surface artefacts were recorded during the survey. Artefact frequencies ranged from 1 to 19 across the sites that featured stone artefacts. The average artefact frequency per site was low at only 2.6, which is noted by EMM as being not surprising considering that 46 of the 80 sites that featured stone artefacts were isolated finds.

The largest percentage of artefacts is classed as complete flakes (42%). Fragments of broken flakes including proximal, medial, and distal portions, as well as flaked pieces and longitudinally split flakes make up a further 14% of the assemblage. Notably, a total of 75 cores were identified, making up 31% of the assemblage. EMM notes that his is a very high proportion when compared to typical artefact assemblages and is a strong indicator that much of the raw material for stone tool manufacture was sourced locally.

A total of 12 retouched flakes were identified (8%), eight of which were classed as retouched axe blanks. Five of the axe blanks were identified as basalt and three were identified as metamorphosed greywacke. Notably, none of the axes showed evidence of grinding and all were bifacially flaked. The remaining four retouched flakes were all silcrete and included two scrapers and two flakes with retouch along their lateral margins.

Silcrete was the predominant artefact raw material (n=112). A total of 52 chert artefacts were identified, and over half of these were flakes (n=31). Material labelled as 'volcanic' included basalts and metabasalts. Quartzite made up only 5% of the assemblage.

Six grinding groove sites were identified during the survey. All the grinding groove sites were identified in areas of outcropping coarse silcrete bedrock resembling granular quartzite.

Grinding groove sites were identified within an elevation range between 1,030-1,080 m above sea level. This closely correlates with Appleton's observation of silcrete outcropping at 1030 m above sea level throughout the Tablelands (EMM 2018: 77).

The most significant and extensive grinding groove site was identified on a prominent hill crest along the southern boundary of the northern array area (NE09). The survey team counted approximately 100 grooves made up of concentrations across the width of the crest on outcropping silcrete bedrock. EMM postulated that further grinding grooves are likely to occur on the site where soil and vegetation debris are obscuring the bedrock surface.

NE09 is relatively far from a waterway, being over 220 m from a 1st order stream and over 850 m from the nearest 3rd order stream. EMM note that grinding activities typically require the aid of water to assist stone abrasion and it is assumed that the bedrock pavements at NE09 easily captured water in rock pools. The grooves observed were elongated and oval in shape typical of the axe grinding process. Additionally, stone artefacts including basalt, silcrete and chert flakes, and a basalt hammerstone were identified within 20 m of the outcropping silcrete at the periphery of the site. Despite concentrated survey effort further from the site, surface artefacts did not appear to extend past this distance.

Dating of sediments abutting buried grooves indicates that some of the grooves are at least 2,225 years old; if the association of surrounding sediment to the grooves can be firmly established (Colin Ahoy, pers comm).

A total of 13 scarred trees were recorded across the EMM study area. All the examples were on dead trees and typically scars where small and round to oval in shape, starting from around 350–400 mm but up to 100 mm from the base of the tree. Such scars may have been used for containers (such as coolamons) or shields, but the ambiguity of bark regrowth makes it difficult to determine their original forms. Larger, more elongated scars were rarer, with one scar (N39) extending over 2 m which could possibly represent bark removal for a single-person canoe or bark for shelter.

The survey team identified five open stone artefact sites which are considered to be Aboriginal stone quarries. Stone quarries were defined by the presence of outcropping stone material with adjacent evidence of the same material type used in stone tool manufacture process. Stone quarries of a variety of material were identified in the survey area, comprising silcrete (NE14 and NE22), basalt (NE21 and NE33) and greywacke. However, EMM note that quarry sites were rarely identified considering the high amount of outcropping material, including basalt, silcrete, greywacke, chert, and jasper, observed on crests and slopes during the survey.

In their significance assessment, EMM ranked assessed four sites, all grinding groove sites, as having high scientific significance. 31 sites are assessed as having moderate scientific significance and 60 are assessed as having low scientific significance.

The sites assessed as having high scientific significance demonstrated rare and unique features, high educational potential as evidenced by their easily distinguishable characteristics and aesthetic qualities, and high research potential. Moderate scientific significance was frequently attributed to sites with some research potential for their predicted subsurface archaeological material. The 60 sites (62%) assessed to be of low scientific significance do not have the same capacity as the other sites to inform about past Aboriginal life. Notwithstanding the limited information potential, EMM noted that each site is of cultural significance to the Aboriginal community.

3.2 DESKTOP DATABASE SEARCHES CONDUCTED

A desktop search was conducted on the following databases to identify any previously recorded heritage within the Project Study Area. The results of this search are summarised in **Table 3-2**.

An AHIMS database search with a 5 km radius centred on and including the Project Study Area was undertaken (GDA Zone 56, Eastings: 341550–350049, Northings: 6604632–6614926; see **Appendix 2**).

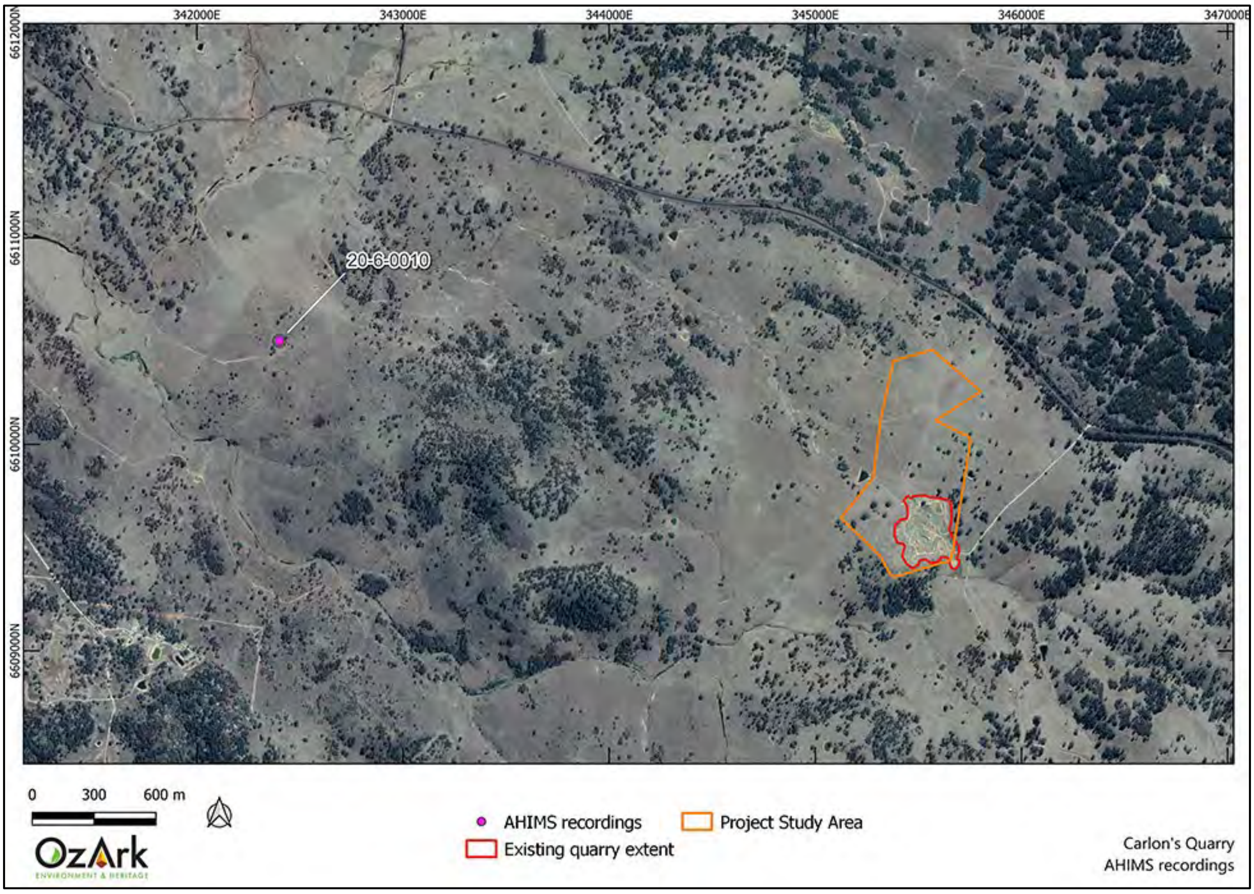
One registered site was identified, (AHIMS 20-6-0010) which is located approximately 3 km to the west of the Project Study Area, at Balala (**Table 3-2** and **Figure 3-1**). This is a site recording for a rock shelter with art.

Table 3-2: Aboriginal cultural heritage: desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings	11/4/22	Uralla LGA	No places are listed on either the National or Commonwealth heritage lists located within the Uralla LGA

Name of Database Searched	Date of Search	Type of Search	Comment
National Native Title Claims Search	11/4/22	NSW	No Native Title claims cover the Project Study Area.
AHIMS	23/3/22	5 x 5 km centred on the Project Study Area	1 site AHIMS# 20-6-0010 within the search area.
Local Environmental Plan (LEP)	11/4/22	Uralla LEP of 2012	None of the places listed in Schedule 5 of the LEP are within the Project Study Area.

Figure 3-1: Location of previously recorded AHIMS sites in relation to the Project Study Area.



3.3 PREDICTIVE MODEL FOR SITE LOCATION

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including plant and animal foods, stone and ochre resources and rock shelters, as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently, sites tend to be found along permanent and ephemeral water sources, along access or trade routes, or in areas that have good flora/fauna resources and appropriate shelter.

In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally, it is the more durable materials such as stone artefacts, stone hearths, shells, and some bones that remain preserved in the current landscape. Even these, however, may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport, both over short- and long-time scales, or (b) the historical impacts associated with the introduction of European farming practices including grazing and cropping, land degradation, and farm related infrastructure. Scarred trees, due to their nature, may survive for up to several hundred years but rarely beyond.

3.3.1 Site types in the region of the Project Study Area

The site types listed in **Table 3-3** are present in the region of the Project Study Area. The likelihood of these sites being present within the Project Study Area is discussed in **Table 3-5**.

Table 3-3: Site types recorded in the region of the Project Study Area.

Site type	Site description
Isolated finds	May be indicative of random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or subsurface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
Open artefact scatters	Artefact scatters are defined as two or more artefacts, not located within a rock shelter, and located no more than 50 m away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short- or long-term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of tools but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of a background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs, and are sometimes referred to as 'open camp sites'. Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources. Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.
Culturally modified trees	Aboriginal scarred trees contain evidence of the removal of bark (and sometimes wood) in the past by Aboriginal people, in the form of a scar. Bark was removed from trees for a wide range of reasons. It was a raw material used in the manufacture of various tools, vessels, and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed because of gathering food, such as collecting wood boring grubs or creating footholds to climb a tree for possum hunting. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose for any example of bark removal. Scarred trees may occur anywhere old growth trees survive. The identification of scars as Aboriginal cultural heritage items can be problematical because some forms of natural trauma and European bark extraction create similar scars. Many remaining scarred trees probably date to the historic period when bark was removed by Aboriginal people for both their own purposes and for roofing on early European houses. Consequently, the distinction between European and Aboriginal scarred trees may not be clear.
Quarry sites	Typically consist of exposures of stone material where evidence for human collection, extraction and/or preliminary processing has survived. Typically, these involve the extraction of siliceous or fine grained igneous and meta-sedimentary rock types for the manufacture of artefacts. The presence of quarry/extraction sites is dependent on the availability of suitable rock formations.
Grinding grooves	Grinding grooves are the remnants of ground edge hatchet manufacture and sometimes from food preparation. The site is most likely to occur on flat outcrops of coarse-grained sandstone in the

Site type	Site description
	vicinity of water sources, however, grinding grooves have also been recorded on fine-grained granite and quartzite outcrops.
Rockshelters and art sites	Utilised in the past for both habitation and ceremonial purposes. The term 'rock shelter site' refers to rock shelters/rock overhangs that contain evidence such as stone artefacts and/or bones and/or plant remains (from meals eaten at the site) and/or hearths (fireplaces). Most rock shelter sites are secular in nature, however, those that also contain rock art or engravings are often believed to be non-secular in nature. The term 'rock art site' generally refers to Aboriginal ochre paintings or ochre or charcoal drawings located on a rock slab (generally in a sheltered place like the floor of a cave or rock shelter), boulder, cliff-face, cave or rock shelter wall or roof, or wall of a rock overhang. Most rock art sites are found in locations that are sheltered from the elements. This observation, however, is probably biased to some extent, as rock art would not preserve well in open positions. Rock art sites are generally believed to be non-secular in nature.
Rock engravings or petroglyphs	A type of Aboriginal art that are often located on high vantage points along ridge lines at the headwaters of creeks but can be located on any suitable fine-grained stone surface. Examination into the rock engraving process notes that it presumably first included sketching the outline of the motif; then a series of holes was drilled along the line, using a pointed stone or shell. Finally, the holes were joined by rubbing a sharp stone along the line.
Hearths/ovens	Features used by Aboriginal people for the preparation of food and would generally be in the vicinity of available resources, such as water sources to procure fish and shellfish, and on elevated ground to avoid impact from environmental threats.
Middens	Formed from Aboriginal exploitation and consumption of shellfish, in marine, estuarine, or freshwater contexts. Middens may also include faunal remains such as fish or mammal bone, stone artefacts, hearths, charcoal, and occasionally, burials. They are usually located on elevated dry ground close to the aquatic environment from which the shellfish has been exploited and where freshwater resources are available. Deeper, more compacted, midden sites are often found in areas containing the greatest diversity of resources, such as river estuaries and coastal lagoons.
Burials	Generally found in soft sediments such as aeolian sand, alluvial silts, and rock shelter deposits. In valley floor and plains contexts, burials may occur in locally elevated topographies rather than poorly drained sedimentary contexts. Burials are also known to have occurred on rocky hilltops in some limited areas. Burials are generally only visible where there has been some disturbance of sub-surface sediments or where some erosional process has exposed them.
Bora/Ceremonial sites	Places which have ceremonial or spiritual connections. Ceremonial sites may comprise of natural landscapes or have archaeological material. Bora sites are ceremonial sites which consist of a cleared area and earthen rings.

3.3.2 Predictive modelling

Utilising data that has been collected both regionally and locally, broad statements about archaeological sites that have the potential to occur within the Project Study Area can be made. These predictions are:

- Aboriginal sites appear to be most prominent on crest and ridge landforms. Sites are relatively common on slope landforms where there is the presence of outcropping bedrock, particularly silcrete bedrock. Other sites on slopes occur within a secondary context
- Sites are also identified on flat landforms in relation to water. All orders of watercourses have a higher potential to record archaeological sites
- The predominant site type in the region are stone artefact sites
- All site types have the potential to be present, with relatively high numbers of grinding groove sites, quarries, scarred trees, and ceremonial sites identified in the area
- The predominant material utilised for artefact manufacture is silcrete. A relatively large number of artefacts in the region are also manufactured from chert, and there is the potential for artefact manufactured from volcanics to be present.

Based on knowledge of the environmental contexts of the Project Study Area and a desktop review of the known local and regional archaeological record, the following predictions are made concerning the probability of landforms within the Project Study Area to contain Aboriginal objects (**Table 3-4**), and what types of sites may be present within the Project Study Area (**Table 3-5**).

Table 3-4: Likelihood of landforms within the Project Study Area to contain Aboriginal objects.

Survey Unit	Landform type	Likelihood to contain Aboriginal objects
1	Elevated undulating	Elevated, undulating landforms distant to permanent water sources often have a low potential to record Aboriginal objects. These landforms have often been impacted by soil loss and agricultural disturbances.
2	Slopes	Slopes are a degrading landform, especially in the Project Study Area where vegetation removal has accelerated soil loss. These landforms are unsuitable for occupation and Aboriginal objects recorded in such landforms are likely to be in a secondary context. The exception is in localised flat benches, if they are present, where occupation may have been possible.
3	Crests	Archaeological studies in the region indicate that crest and spur landforms with proximity to water were favoured occupation locations. However, due to tree clearance and long-term grazing in the Project Study Area, soils in these landforms tend to be thin and degrading. Should Aboriginal objects be recorded in these landforms, they are likely to be surface manifestations and likely displaced from their primary depositional context.

Table 3-5: Likelihood of certain site types being present in the Project Study Area.

Site type	Likelihood of being present in the Project Study Area
Isolated finds	As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Project Study Area.
Open artefact scatters	As most of the Project Study Area is within sloping landforms distant to permanent water, this site type is not predicted to be common. However, in flat or ridge landforms this site type is possible although the moderate degree of disturbance in the Project Study Area will probably mean that the scatter has become displaced. It is likely that any sites associated with such landforms are likely to have a low artefact density and a low complexity of tool types as the sites are either one-off events or only infrequently used.
Culturally modified trees	Due to the near-total clearance of trees from within the Project Study Area, this site type is predicted to be very rare. It is also noted that this site type is very rare at a regional level.
Quarry sites	This site type could be recorded within the Project Study Area should suitable rock outcroppings be available.
Hearths/ovens	This site type is considered possible in areas where A-Horizon soils are relatively undisturbed. However, given the high levels of disturbance across the Project Study Area the likelihood of identifying this site type *in situ* is significantly reduced.
Burials	Although it is possible that this site type could be found within the Project Study Area, it is considered a rare site type especially given the disturbance that has occurred within the Project Study Area.
Bora/Ceremonial sites	This site type does not necessarily follow landform predictability and are, overall, a rare site type with a low likelihood of being present and remaining extant. These sites are generally identified through consultation with the Aboriginal community.

Although a lack of historical reports for this area limits the information available for formulation of a predictive model, the landscape features and land use history identified within the Project Study Area would indicate a moderate possibility of isolated finds and only a low chance of locating any other site types.

- There is only one registered AHIMS site within 5 km of the Project Study Area. This should be considered as likely to be an example of statistical bias within the AHIMS database as any true indication of the number, or type, of Aboriginal sites located within the immediate landscape surrounding the Project Study Area.

- The Project Study Area has been almost entirely cleared of pre-contact vegetation; however, some remnant vegetation may retain evidence of traditional Aboriginal use in the form of bark or wood modification.

- The only areas suitable for any form of occupation of long-term activity within the Project Study Area would be the small riparian area in the south of the Project Study Area, which was largely submerged at the time of survey, or the semi-level hill crest area in the northeast. The actual crests of the two hills in the north of the Project Study Area are situated a few hundred metres from the Project Study Area and the only true hillcrest within the Project Study Area is that situated directly to the south of the existing quarry operation.

- A small section of land in the northeast of the Project Study Area constitutes a relatively flat and level terrace that may have been more suited to short term occupation, particularly at times when the ephemeral watercourses were flowing and resources abundant, such as when the survey was carried out. The main crests of either of the two slopes in the north of the Project Study Area lie outside of the Project Study Area with this small and semi level area being the only area, apart from the small riparian corridor in the south, likely to retain surface objects.

- The southern section of the Project Study Area would have once constituted a confluence of several small ephemeral drainage lines that joined to form a creek which flowed to the west. Historical land use, in particular the existing quarry operation in the southeast, have eradicated a significant section of this landform unit. It is possible that Aboriginal objects, most likely stone artefacts and/or grinding grooves may be in the south-western extent of the Project Study Area but these would likely be in a disturbed state as a result of historical clearing and other historical land-use.

- The topography of the Project Study Area is heavily dominated by moderate to steep slopes with many ephemeral drainage lines. All land within the Project Study Area have been affected by moderate to high levels of impact from post-contact land use practices.

- It is possible that stone objects may be present within the landscape, but they would almost certainly be present in a disturbed context. Grinding grooves may be possible if any suitable rock exposures or outcrops exist within the drainage line in the south of the Project Study Area although it is noted that sandstone is not present in the underlying geology.

- Aboriginal scar or carved trees may be present as part of the few remnant trees within the heavily cleared Project Study Area.

- Other site types are possible but considered unlikely based on all the available information.

4 Results of Aboriginal Archaeological Assessment

4.1 Sampling strategy and field methods

Standard archaeological field survey and recording methods were employed in this study (Burke & Smith 2004).

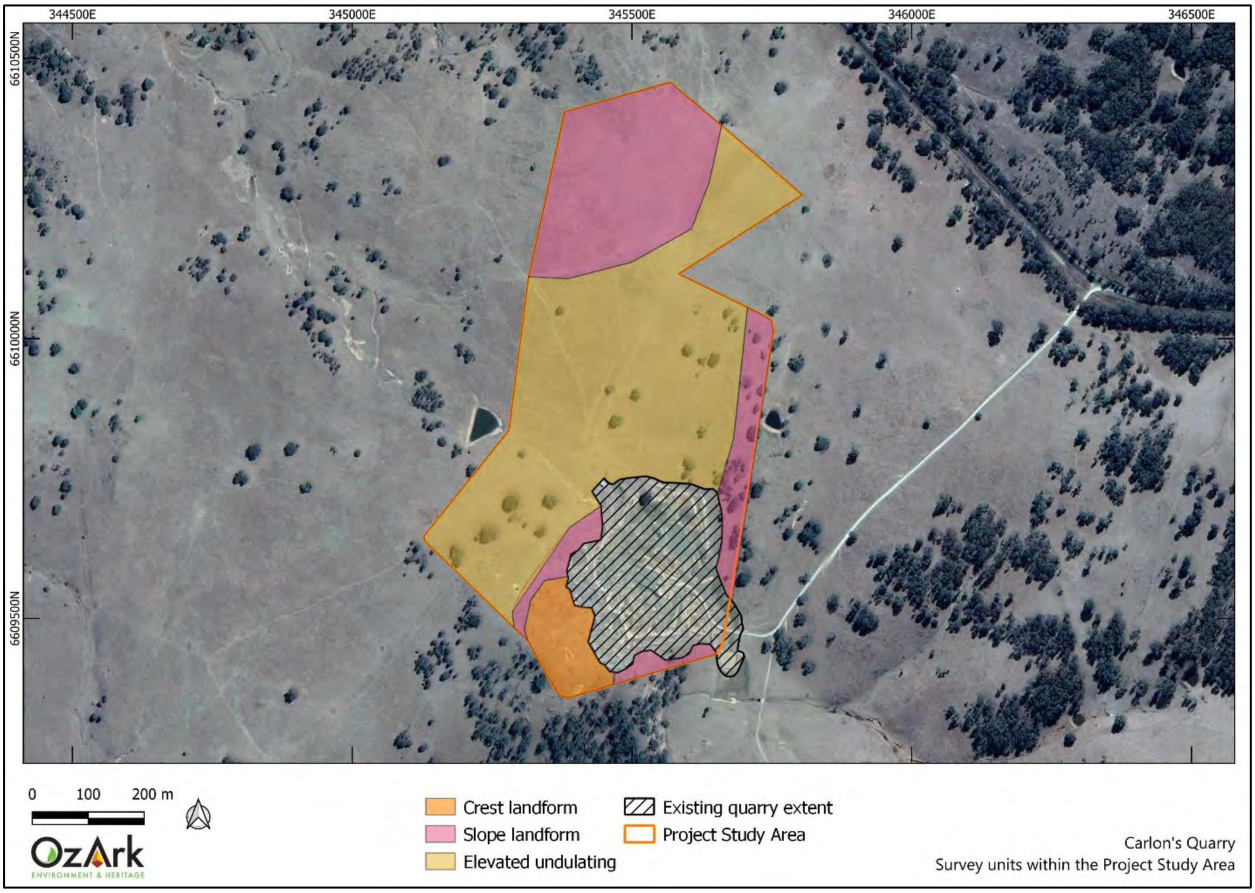
The Project Study Area was reviewed by desktop analysis prior to attending the field. Three primary survey units were identified as being present:

- SU1: Elevated undulating, sometimes with gentle–moderate slopes. Approximately 51% of Project Study Area.
- SU2: Hill slopes: hillslopes – mostly southern aspect. Approx. 28% of Project Study Area.
- SU3: Hill crests: level elevated – hillcrests or benches. Approx. 4% of Project Study Area.

The remining 17% of the Project Study Area is disturbed land from the existing quarry.

Figure 4-1 shows the survey units.

Figure 4-1: Aerial showing the survey units.



A single linear survey route was proposed which would provide adequate sampling of all three survey units and provide adequate coverage of the Project Study Area to confidently characterise the likelihood and presence of any Aboriginal objects within the Project Study Area (**Figure 4-2**).

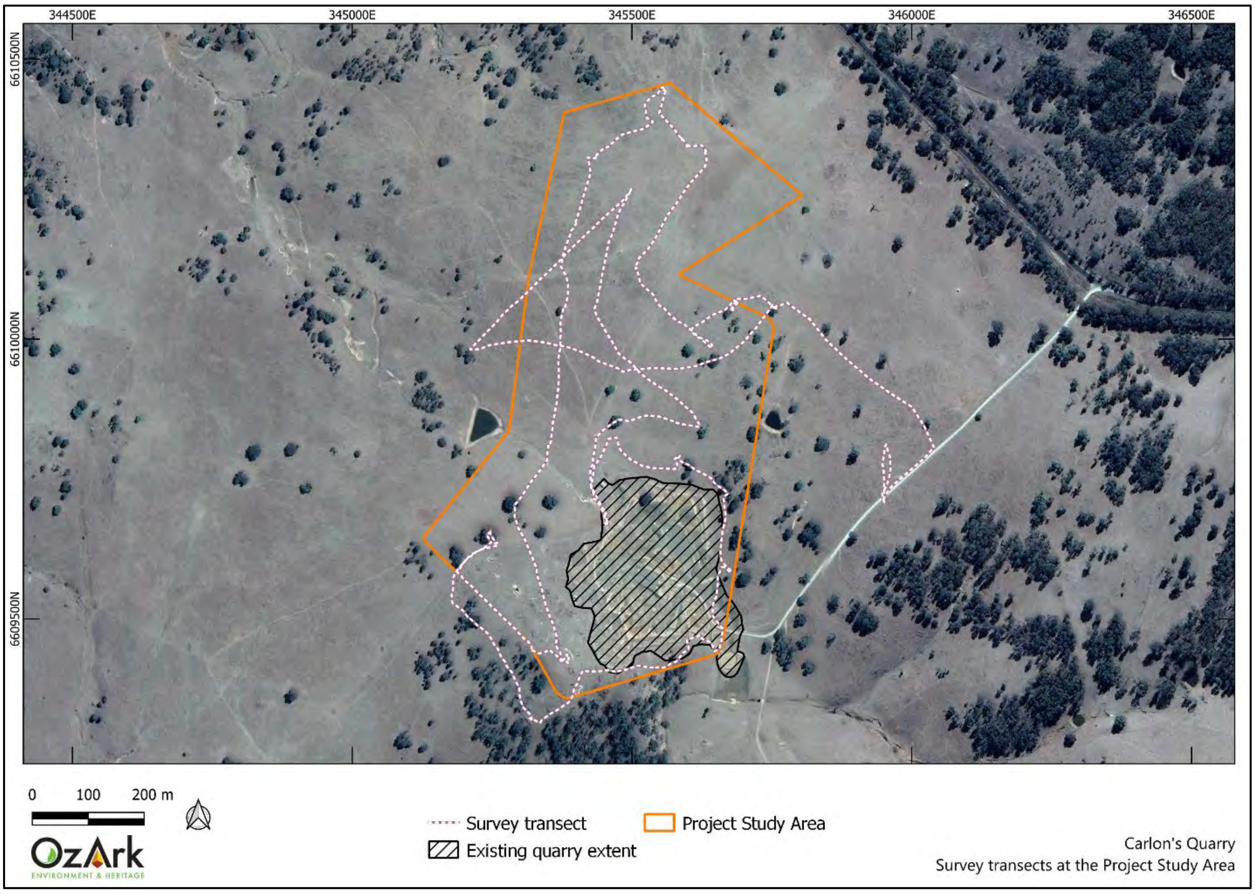
The survey began at the administration buildings for the Quarry which is the location at which the vehicle was parked adjacent to the Project Study Area. The team proceeded south west for approximately 100 m. A few trees were examined but no evidence of modification by traditional Aboriginal people was identified. The survey then continued to the northwest for approximately 200 m then in a roughly northerly, then westerly direction to the northwest corner of the Project Study Area. Ground surface vegetation was very thick the entire way and the ground surface underfoot was saturated almost universally (**Plate 1**). A part of the northern section of the Project Study Area consisted of a flat landform and level bench area approximately two thirds of the way up the slope (**Plate 2**). The entire Project Study Area was punctuated by small outcrops of poor-quality basalt (**Plate 3**), however, most of these were not visible due to the thickness of ground vegetation.

At the very northern extent of the Project Study Area, Steve Ahoy identified a likely Aboriginal scarred tree (**Section 4.3**). The tree was a dead eucalypt with a single elongated scar on the northern side of its trunk (**Plate 4** and **Plate 5**). The scar is almost completely overgrown with only a relatively thin slit showing of what would likely have once been a much wider and longer scar. The fact of the heavy regrowth not only made it impossible to determine the exact shape, and thus likely purpose of, any bark that had been removed, but also made categorical determination of the scar as anthropogenic in nature impossible. It is also noted that the scar shape is different from those recorded by EMM at the nearby New England Solar Farm development (**Section 3.1.3**). During discussions with Steve Ahoy in the field, and afterword, he indicated that he thought the tree likely to be a ‘marker’ or navigation tree.

The survey then continued south along the eastern edge of the hill crest and then down a long slope to where it met the small east–west running creek at the base of the slope and up the slope on the other side. It then proceeded to the southwest and up a steep slope to the crest of the highest hill in the Project Study Area (**Plate 6**). The survey then proceeded down the hill to northwest and a small stand of remnant trees was inspected but no evidence of cultural modification or other Aboriginal objects was identified.

The team then proceeded southeast and then northeast to skirt the southern side of the steep hill and the southwestern edge of the existing quarry operation. The survey path then proceeded to the northwest and up through the centre of the Project Study Area.

Figure 4-2: Survey coverage of the Project Study Area.



As identified through the preliminary desktop assessment the Project Study Area consisted of three survey units. The incidence of site recordings within these survey units is shown in **Table 4-1**.

Table 4-1: Survey results by survey unit.

Identifier	Description	% Survey Area	%Surveyed	Aboriginal Objects
SU1	Elevated undulating	51	70	0
SU2	Hill slopes	28	30	1
SU3	Hill crest	4	50	0
	Existing quarry	17	0	0

4.2 PROJECT CONSTRAINTS

Significant local and regional heavy rainfall in the period immediately preceding the survey posed significant constraints on the field survey methodology. The entire Project Study Area (including hillslopes) was heavily saturated with ground water, numerous minor drainage lines were full and flowing, and the ground vegetation cover (mostly long grasses) was over waist high in approximately 85% of the Project Study Area. Where any ground visibility was identified the archaeologist and the Aboriginal community member targeted those locations for more thorough assessment.

These factors not only inhibited the participants' ability to view and assess the ground surface but also impacted significantly of the ability to follow the proposed transect whilst surveying. Whilst sticking to the rough line of the proposed survey route where possible, repeated, and numerous deviations were necessary to complete the work.

4.3 Aboriginal Sites Recorded

Table 4-2 summarises the Aboriginal cultural heritage sites recorded during the survey of the Project Study Area. Further details on each site follows.

Table 4-2: Aboriginal cultural heritage sites recorded during the survey.

AHIMS ID	Site name	Site type	Coordinates (GDA Zone 55) East	Coordinates (GDA Zone 55) North	Survey Unit
20-6-0081	Carlon's Quarry Scarred tree 1 (CQST1). Registered as CQ st-1	Scarred tree	345558	6610445	SU3

Carlon's Quarry Scarred tree 1 (CQST1)

Site type: Scarred Tree (possible)

GPS coordinates: GDA Zone 56, 345558E, 6610445N

Location of site: Hill crest in northern extent of Project Study Area (**Figure 4-1**).

Description of site: The site is a dead tree in the very northern extent of the Project Study Area (**Figure 4-3**). It has a single northward facing scar (**Figure 4-2**, **Plate 4**, **Plate 5**). The condition of the tree is very poor – dead with significant rot and numerous fallen limbs all about on the cleared ground surface. The extent of overgrowth conceals any evidence as the exact original nature of the scarring event. Relevant dimensions are detailed in **Table 4-3**.

While the origin of the scar was discussed in the field, OzArk believed there were too few attributes visible to be certain that the tree is an Aboriginal object. However, after the field survey, the site was registered by the Iwatta Aboriginal Corporation (Mr Steven Ahoy) as culturally modified tree (CQ st-1; 20-6-0081) without the knowledge of OzArk.

Table 4-3: CQST1 attributes.

Scar Type	Tree Girth	Scar Width	Scar Height	Overgrowth
Unknown	3100 mm	100 mm	1150 mm	Scar is almost entirely closed over indicating significant regrowth prior to death of tree.

Figure 4-3: Aerial showing the location of CQST1.

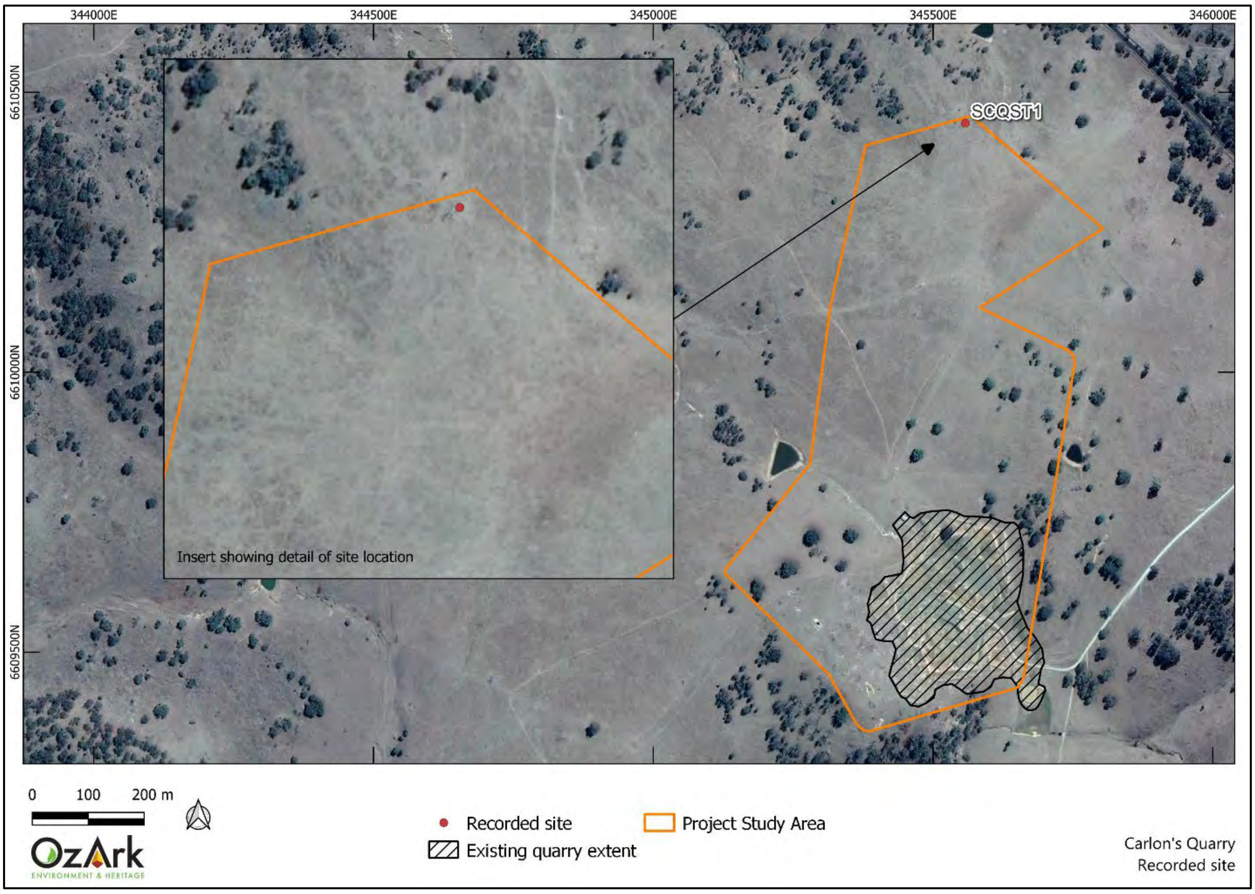


Figure 4-4: CQST1. View of site.

	
1. View west of CQST1 – tree in foreground	2. Detail image of CQST1 scar.

4.4 Previously recorded Aboriginal sites located

No previously recorded Aboriginal sites are located within the Project Study Area.

4.5 Fieldwork observations by the Aboriginal community

In their report on the survey (**Appendix 1**), Iwatta Aboriginal Corporation noted:

During the Cultural Heritage investigation survey, conducted on the 30/03/2022 by Iwatta Aboriginal Corporation's (Senior Sites Officer) Steven Ahoy and OzArk's Environment & Heritage (Archaeologist) Roger Meher (sic), resulted with no Aboriginal Cultural Heritage Artefact being located within the Project Study Area of the proposed extension footprint, the absence of Artefacts is no determination of Aboriginal occupation within the Project Study Area, as the ground surface visibility was less than 10%, making it almost impossible to locate any cultural materials covered by the dense ground cover.

With evidence of heavy tree clearing being present, we estimated only 10% of the original woodlands now exist. No Culturally Modified Trees were located during the survey[1]. Iwatta Aboriginal Corporation's members and staff are happy with the level of consultation during the Aboriginal Cultural Heritage Assessment and Recommend no further Cultural Investigation will be required for the project's footprint. If for any reason changes are made to the footprint outlined in this report, further Archaeological investigation will be required.

4.6 SUMMARY OF SURVEY RESULTS

In summary, the survey conditions were a significant hindrance to the identification of any surface objects. Knee to waist high, thick wet grass covered most of the Project Study Area and the other areas were either a currently operational quarry or semi-flooded highly saturated waterways.

Based on the information available from archaeological, geographical, and ethnographical sources, there is a possibility of Aboriginal objects being present, particular on the hill crest areas and associated with the main drainage line flowing to the northwest from the Project Study Area. Although this is the case, nearby locations within 3 km of the Project Study Area, including granite ridges and caves and more reliable higher order streams, would be more likely to represent locations where traditional Aboriginal people would have based their activities. In contrast, the Project Study Area was probably utilised for hunting, gathering and social forays; activities that do not normally require in situ stone tool manufacture.

The entire Project Study Area has been subject to significant levels of post-contact disturbance. Historical impacts still observable within the landscape are widespread clearing and pastoral use of the entire area and impact in the form of an existing quarry operation in the south-eastern portion of the Project Study Area.

One tree, identified as a possible Aboriginal scarred tree, and now recorded on the AHIMS sites register with Heritage NSW (20-6-0081), was located at the northern periphery of the Project

[1] Subsequently, Iwatta Aboriginal Corporation (Mr Steven Ahoy) registered the culturally modified tree CQST1 (CQ st-1) (20-6-0081) that is in the Project Study Area. See **Section 4.3** for more information on this site.

Study Area. It is considered that this tree's proximity to the border of the Project Study Area would facilitate an outcome whereby any final footprint for ground disturbing works could be designed to avoid the tree, with an appropriate buffer, thus negating the need for the client to seek an AHIP from Heritage NSW.

The Iwatta Aboriginal Corporation note in their report (**Appendix 1**) that:

> *Iwatta Aboriginal Corporation's members and staff are happy with the level of consultation during the Aboriginal Cultural Heritage Assessment and Recommend no further Cultural Investigation will be required for the project's footprint.*
>
> *If for any reason changes are made to the footprint outlined in this report, further Archaeological investigation will be required.*

5 SIGNIFICANCE ASSESSMENT

5.1 INTRODUCTION TO SIGNIFICANCE ASSESSMENT

5.1.1 Identifying cultural significance

The concept of cultural significance is used in Australian heritage practice and legislation to encompass all the cultural values and meanings that might be recognised in a place. The *Burra Charter*'s definition of cultural significance is broad and encompasses places that are significant to Indigenous cultures (Burra Charter 2013).

The *Burra Charter* definition of 'place' is also broad and encompasses Indigenous places of cultural significance. 'Place' includes locations that embody spiritual value (such as Dreaming places, sacred landscapes, and stone arrangements), social and historical value (such as massacre sites), as well as scientific value (such as archaeological sites). In fact, one place may be all these things or may embody all these values at the same time.

In some cases, the find-spot of a single artefact may constitute a 'place'. Equally, a suite of related locations may together comprise a single 'place', such as the many individual elements that make up a Songline. These more complex places are sometimes called a cultural landscape or cultural route.

The Guide (OEH 2011: 8–9) notes that cultural significance is comprised of an assessment of social values, scientific values, aesthetic values, and historic values. These values are described below.

5.1.1.1 Social or cultural value

Social or cultural value refers to the spiritual, traditional, historical, or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them.

Places of social or cultural value have associations with contemporary community identity. These places can have associations with tragic or warmly remembered experiences, periods, or events. Communities can experience a sense of loss should a place of social or cultural value be damaged or destroyed.

There is not always consensus about a place's social or cultural value. Because people experience places and events differently, expressions of social or cultural value do vary and, in some instances, will be in direct conflict. When identifying values, it is not necessary to agree with or acknowledge the validity of each other's values, but it is necessary to document the range of values identified.

Social or cultural value can only be identified through consultation with Aboriginal people. This could involve a range of methodologies, such as cultural mapping, oral histories, archival documentation, and specific information provided by Aboriginal people specifically for the investigation.

Cultural value involves both traditional links with specific areas, as well as an overall concern by Aboriginal people for their sites generally and the continued protection of these. This type of value may not be in accord with interpretations made by the archaeologist: a site may have low archaeological value but high social value, or vice versa.

5.1.1.2 Scientific (archaeological) value

This refers to the importance of a landscape, area, place or object because of its rarity, representativeness, and the extent to which it may contribute to further understanding and information (Burra Charter 2013).

Assessing a site in this context involves placing it into a broader regional framework, as well as assessing the site's individual merits in view of current archaeological discourse. This type of value relates to the ability of a site to answer current research questions and is also based on a site's condition (integrity), content and representativeness.

The overriding aim of cultural heritage management is to preserve a representative sample of the archaeological resource. This will ensure that future research within the discipline can be based on a valid sample of the past. Establishing whether a site can contribute to current research also involves defining 'research potential'. Questions regularly asked when determining significance are: can this site contribute information that no other site can? Is this site representative of other sites in the region?

Information about scientific values will be gathered through any archaeological investigation undertaken. Archaeological investigations must be carried out according to Heritage NSW's Code of Practice (DECCW 2010).

Often scientific values are informed by social values that allow a contemporary understanding of the archaeological data to be understood.

5.1.1.3 Aesthetic value

This refers to the sensory, scenic, architectural, and creative aspects of the place. It is often closely linked with the social values. It may consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use (Burra Charter 2013).

5.1.1.4 Historic value

Historic value refers to the associations of a place with a historically important person, event, phase, or activity in an Aboriginal community. Historic places do not always have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). They may have ‘shared’ historic values with other (non-Aboriginal) communities.

Places of post-contact Aboriginal history have generally been poorly recognised in investigations of Aboriginal heritage. Consequently, the Aboriginal involvement and contribution to important regional historical themes is often missing from accepted historical narratives. This means it is often necessary to collect oral histories along with archival or documentary research to gain enough understanding of historic values.

5.2 ASSESSED SIGNIFICANCE OF THE RECORDED SITES

Table 5-1 presents a summary of the significance assessment of Aboriginal cultural heritage sites recorded during this assessment. Further details of each of the assessment criteria are provided below.

Social or Cultural Value

Aboriginal scarred trees are considered rare as far as regional representation goes. Their numbers have been significantly affected since contact through land management (clearing) practices and natural attrition. Natural attrition results from two main sources. The first is that, as traditional subsistence activities lessened because of cultural dispossession, less scarred trees have been created within the landscape. This factor coupled with the nature of trees having a limited mortality has resulted in Aboriginal scarred trees being poorly represented within the landscape.

Based on this understanding it is considered that all Aboriginal scarred trees, regardless of their state of preservation or other factors, are considered as being of high social/cultural value, not only to the local Aboriginal population but also from a broader cultural perspective.

Archaeological/Scientific Value

All Aboriginal scarred trees are of relatively high scientific value; however, the scientific value of any specific scarred tree is largely dependent on its integrity.

Although the scarred tree identified during the survey has scientific value based on its location within the landscape, the nature of the scarring activity and the tree species, its very poor state of preservation, its isolation through clearing, and its lack of context with other cultural objects or values reduces its specific scientific value considerably.

The perspective of representativeness is perhaps the most important scientific aspect of this tree. Its advance state of deterioration and ground disturbance in the immediate vicinity significantly reduce its scientific value as a specific object in its own right.

Aesthetic Value

The aesthetic value of the tree is highly compromised due to its advanced state of deterioration, both rot and major loss of branches since dying. The aesthetic value is further compromised due to the isolation of the tree in the landscape because of historic land use practices.

Historic Value

The site has no known association with a known person or historical event and therefore has no historic value.

Table 5-1: Aboriginal cultural heritage: significance assessment.

Site Name	Social or Cultural Value	Archaeological / Scientific Value	Aesthetic Value	Historic Value
CQST1 (20-6-0081)	Moderate to High	Low	Low	Nil

5.2.1 Statement of significance

Overall the Project Study Area generally is considered to have a relatively low significance from a cultural or archaeological perspective.

The landscape with moderate to steep hillslopes, would have once represented an average type hunting ground largely unsuitable for occupation. The edge of the northern section of the study contains the periphery of flat hill crests, but there are only very small portions of these landforms within the Project Study Area, with almost their entire extent lying outside of the Project Study Area. These locations have undergone significant historical disturbance and there are many locations to the southwest, the west, and the north that are all much better suited for use as camps or base sites.

Roumalla Creek to the south of the Project Study Area would have only run at certain times after rain and would not have provided the resources to encourage long-term occupation by Aboriginal people. Landforms associated with the creek have also been heavily disturbed by the general clearing of vegetation and other activities, and by the existing quarry operation. Given the poor levels of visibility near the creek line and generally poor survey conditions, it is still considered possible that Aboriginal objects may present along its course outside of the Project Study Area and the area of the proposed contour bank, however, if any sites are present, they are likely to be low-density scatters or isolated finds.

The Aboriginal cultural values across the wider district relate to a number of important places and themes associated with both tangible and non-archaeological cultural values. These places mainly relate to spiritual and ceremonial connections across the broader landscape that may encompass areas of culturally significant geographical features and sometimes tangible values as well, such as the Uralla Grinding Grooves, located approximately 20 km to the east of the

Project Study Area and the Mt Yarrowyck art and occupation site complex approximately 20 km to the north.

Although there may be places with intangible cultural significance within the Project Study Area, no specific locations have so far been identified by the Aboriginal community. It was noted during the field survey by Steven Ahoy that he considered nearby (visible but some distance from the Project Study Area) granite ridgelines and outcrops likely to contain areas of greater cultural and scientific significance such as rock shelters, stone arrangements, and art sites.

The scientific value of the only recorded site within the Project Study Area (CQST1) is considered to have low-moderate potential to provide further information on the traditional Aboriginal use of the New England Tablelands region. The remainder of the Project Study Area has very low scientific value as it is confined to areas away from optimal occupation locations such as along reliable water sources or landforms which provide shelter.

Apart from the general understanding of the aesthetic qualities of the Project Study Area, there are no known places with identified aesthetic values within the Project Study Area.

6 ASSESSING HARM

6.1 AVOIDING AND MINIMISING HARM

6.1.1 Conserving significant Aboriginal cultural heritage

An object of the NPW Act is the '*conservation of objects places and features… of cultural value within the landscape, including… places, objects and features of significance to Aboriginal people*' (s.2A(1(b)(i)).

As heritage professionals, OzArk, strives for good conservation outcomes. In particular, OzArk is primarily concerned with the conservation and protection of Aboriginal cultural heritage that is of significance to Aboriginal people.

Two primary objectives when managing harm to an Aboriginal object are:

- Impacts to significant Aboriginal objects and places should always be avoided wherever possible
- Where impacts to Aboriginal objects and places cannot be avoided, proposals should be amended to reduce the extent and severity of impacts to significant Aboriginal objects and places using reasonable and feasible measures.

6.1.1.1 Opportunities to conserve Aboriginal cultural heritage values

Only one single location with identified, or likely, Aboriginal objects was identified during the survey (CQST1: 20-6-0010). This location can be demarcated and protected from harm through the proposed works. No other constraints were identified and further objects that would benefit from conservation were not located.

Conservation of the scarred tree (CQST1) will ensure its remaining presence in the landscape until such time as it naturally deteriorates further.

6.2 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE PROPOSAL

The recommendation in this report is for full conservation of possible scarred tree CQST1. If this is possible, the proposal will not harm Aboriginal objects.

7 Management of Aboriginal Cultural Heritage Sites

7.1 General management principles

Appropriate management of cultural heritage items is primarily determined based on their assessed significance as well as the likely impacts of the proposal. **Section 5.2** and **Section 6.2** describe, respectively, the significance / potential of the recorded sites and the likely impacts of the proposal. The following management options are general principles, in terms of best practice and desired outcomes, rather than mitigation measures against individual site disturbance.

- <u>Avoid impact</u> by altering the proposal to avoid impact to a recorded Aboriginal site. If this can be done, then a suitable curtilage around the site must be provided to ensure its protection both during the short-term construction phase of development and in the long-term use of the area. If plans are altered, care must be taken to ensure that impacts do not occur to areas not previously assessed.

- <u>If impact is unavoidable</u> then approval to disturb sites under the authority of an AHIP must be sought from Heritage NSW. Whether the AHIP is consented will depend on many factors including the site's assessed significance. To apply for an AHIP, an ACHAR will be required, informed by undertaking full consultation following the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010b).

7.2 Management and mitigation of recorded Aboriginal sites

One Aboriginal site was recorded within the Project Study Area being a (likely) Aboriginal scarred tree identified as CQST1. This tree is located at the extreme northern end of the Project Study Area. This tree should be clearly demarcated and avoided by all activities associated with the proposed works including being appropriately fenced with a 5 m buffer if there is a risk of inadvertent harm, as well as being marked on all appropriate plans so that its location is known.

8 RECOMMENDATIONS

Under Section 89A of the NPW Act it is mandatory that all newly recorded Aboriginal sites be registered with AHIMS. As a professional in the field of cultural heritage management it is the responsibility of OzArk to ensure this process is undertaken.

To this end it is noted that one Aboriginal site was recorded during the assessment. This site has already been registered with AHIMS by the Iwatta Aboriginal Corporation (Mr Steven Ahoy) as CQ st-1 (20-6-0081).

The following recommendations are made based on these impacts and regarding:

- Legal requirements under the terms of the NPW Act whereby it is illegal to damage, deface or destroy an Aboriginal place or object without an approved AHIP
- The findings of the current investigations undertaken within the Project Study Area and the interests of the Aboriginal community.

Recommendations concerning Aboriginal cultural values within the Project Study Area are as follows:

1. Aboriginal scarred tree site CQST1 (20-6-0081) will not be harmed, and the tree will be clearly fenced and demarcated to protect it from any inadvertent harm. A 5 m buffer around the tree will be sufficient. The site will be marked on any applicable site plans so that its position is known.
2. The proposed work may proceed at the Quarry without further archaeological investigation under the following conditions:
   a) All land and ground disturbance activities will be confined to within the Project Study Area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
   b) All staff and contractors involved in the proposed work will be made aware of the legislative protection requirements for all Aboriginal sites and objects.
3. This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work will cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 3**) will be followed.
4. Inductions for work crews will include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 4**) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the Unanticipated Finds Protocol.

REFERENCES

Binns and McBryde 1972	Binns, R., McBryde, I. *A petrological analysis of Ground Edge Artefacts from Northern New South Wales*. AIAS, Canberra.
Bowdler 1981	Bowdler, S. Hunters in the highlands: Aboriginal adaptations in the Eastern Australian uplands. *Archaeology in Oceania* Vol 16, p.99.
Burke & Smith 2004	Burke, H. and Smith, C. 2004. *The Archaeologist's Field Handbook*, Blackwell, Oxford.
Burra Charter 2013	International Council on Monuments and Sites 2013. *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*.
DECCW 2010	Department of Environment, Climate Change and Water, Sydney (now Heritage NSW). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.
DECCW 2010b	Department of Environment, Climate Change and Water, Sydney (now Heritage NSW). *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.
EMM 2018	EMM Consulting Pty Limited. *New England Solar Farm - Aboriginal cultural heritage assessment*. Report for UPC November 2018.
Flood 2010	Flood, J. *Archaeology of the dreamtime: the story of prehistoric Australia and its people*. Gecko Books, Marleston, South Australia.
McBryde 1974	McBryde, I. *Aboriginal prehistory in New England*. Sydney University Press, Sydney.
OEH 2011	Office of Environment and Heritage 2011. *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.*
Tindale 1974	Norman Tindale. *Aboriginal tribes of Australia : their terrain, environmental controls, distribution, limits, and proper names*. Australian National University Press.

PLATES

Plate 1: Photograph showing density of ground cover. This was consistent over almost entire Project Study Area excepting the existing quarry in the southeast.

Plate 2: Edge of level bench at the northern end of Project Study Area.

Plate 3: Example of random outcrop of unworked, basalt.

Plate 4: Possible Aboriginal scarred tree (CQST1).

Plate 5: Detailed view of possible scarred tree (CQST1).

Plate 6: View northeast from highest point in Project Study Area.

APPENDIX 1: IWATTA ABORIGINAL CORPORATION REPORT

Please note: the mapping provided in this report should be seen as indicative and the mapping in the main report correctly shows the Project Study Area and the area of the existing quarry.

Iwatta Aboriginal Corporation
32 Dale Cres, Armidale, NSW 2350

Carlons Quarry

- ABORIGINAL CULTURAL HERITAGE INVESTIGATION REPORT-

Carlons Quarry

located on the Kingstown Road, Balala, approximately 10 kilometres (km) west of Uralla in the New England region of NSW.

Report prepared by: Steven Ahoy on the 1st April 2022

For OzArk Environment & Heritage PO Box 2069 Dubbo, NSW 2830.

IAC

In preparing this report, IWATTA Aboriginal Corporation (IAC) has relied upon information, data, surveys and/or site inspection results taken at the time and under the conditions specified herein. Iwatta Aboriginal Corporation has also relied on verbal information and documentation provided by the Proponent/Client and/or third parties representing the Proponent/Client, but has not attempted to [independently] verify the accuracy or completeness of that information. To the extent the conclusions and recommendations in this report are based in whole [or in part] on such information, they are also [therefore] based upon the validity of that information. Iwatta Aboriginal Corporation assumes no responsibility for any consequences arising from the information or condition(s) concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Iwatta Aboriginal Corporation . The findings contained in this report are the result of methodologies used in accordance with normal practices and standards. To the best of my knowledge, they represent a reasonable interpretation of the condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site/sites at all points in space and time. Given the changing nature of the landscape in response to processes including erosion/weathering from wind and rain, and the erosive nature of current and/or past farming and grazing activities, the circumstances reported herein may alter. As such Iwatta Aboriginal Corporation places a shelf life of [no more than] four years on its reports. The formulation of any Indigenous archaeological heritage management strategy or cultural heritage management plan (CHMP) based upon the information provided in this report beyond that time (four years), must be viewed with caution and is NOT recommended. Any representation, statement, opinion or advice, expressed or implied in this report is made in good faith but on the basis that Iwatta Aboriginal Corporation is not liable (whether because of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking (or not taking) action in respect of any recommendation, statement, or advice referred to above. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Proponent/Client. Iwatta Aboriginal Corporation accepts no responsibility for the use of this report by parties other than the Proponent/Client for which it was written. Iwatta Aboriginal Corporation accepts no responsibility for use of this report beyond its shelf life.

IAC

On behalf of the proponent, OzArk Environment & Heritage engaged with Iwatta Aboriginal Corporation to conduct an Aboriginal heritage survey, for the Carlons Quarry extension, located on the Kingstown Road, Balala, approximately 10 kilometres (km) west of Uralla in the New England region of NSW. See Image 1. The proponent is proposing to increase the size and production rate of Carlon's Quarry.

Image 1:Carlons Quarry.

Highlighted in red, the footprint of the proposed extension, Highlight in Blue the extent of the existing quarry.

2

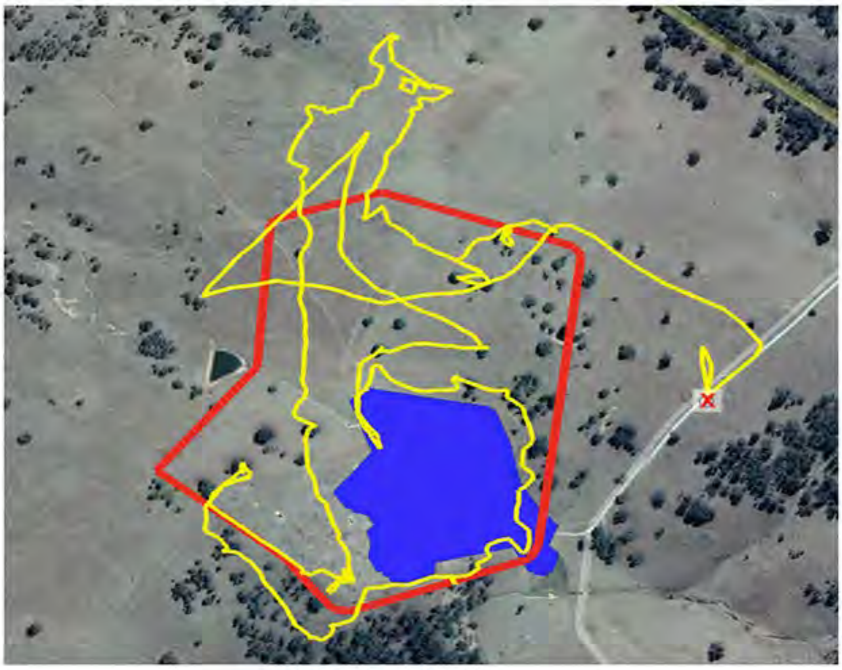
IAC

During the Cultural Heritage investigation survey, conducted on the 30/03/2022 by Iwatta Aboriginal Corporation's (Senior Sites Officer) Steven Ahoy and OzArk's Environment & Heritage (Archaeologist) Roger Meher, resulted with no Aboriginal Cultural Heritage Artefact being located within the project area of the proposed extension footprint, the absence of Artefacts is no determination of Aboriginal occupation within the project area, as the ground surface visibility was less than 10%, making it almost impossible to locate any cultural materials covered by the dense ground cover.

With evidence of heavy tree clearing being present, we estimated only 10% of the original woodlands now exist. No Culturally Modified Trees were located during the survey.

Image 2: Carlons Quarry

Highlighted in Yellow, Iwatta Aboriginal Corporation's Transects.



3

IAC

Iwatta Aboriginal Corporation's members and staff are happy with the level of consultation during the Aboriginal Cultural Heritage Assessment and Recommend no further Cultural Investigation will be required for the project's footprint.

If for any reason changes are made to the footprint outlined in this report, further Archaeological investigation will be required.

THE LEGISLATIVE CONTEXT

The NSW National Parks and Wildlife Act 1974 The NSW National Parks and Wildlife Act 1974 (the 'NPW Act') provides protection for all Aboriginal cultural heritage (ACH) sites and objects in New South Wales and promotes the conservation of Aboriginal cultural heritage objects and places that are of high cultural significance. Sections 84, 86, and 87 of the Act provide protection for Aboriginal places (S84), describe that it is an offence to harm or desecrate and Aboriginal object or declared Aboriginal place (S86) and set out defences and exemptions available for activities that have the potential to result in harm and/or desecration (S87) to Aboriginal cultural heritage objects and/or places. Section 86 also sets out the penalties and regulations as defined in the National Parks and Wildlife Regulations, Part 8A.

The NPW Act 1974 (the 'NPW Act') is the primary piece of legislation for the protection of Aboriginal cultural heritage in New South Wales. The Office of Environment and Heritage (OEH) administers the NPW Act and it provides statutory protection for Aboriginal objects by making it illegal to harm them (Aboriginal objects) and Aboriginal places, and by providing two tiers of offence against which individuals or corporations who harm Aboriginal objects or Aboriginal places can be prosecuted. The NPW Act defines Aboriginal objects and Aboriginal places thus: Aboriginal object means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Aboriginal place means any place declared to be an Aboriginal place under section 84. If Aboriginal cultural heritage objects and/or places are present or are likely to be present and the proposed activity will harm those objects and/or places then Sections 90-90R of the NPW Act outline the permit process that must be followed prior to the commencement of that activity. These sections provide details of the Aboriginal Heritage Impact Permit (AHIP) system as

4

IAC

regulated by the Director-General of the Office of Environment and Heritage (OEH) and describe the Aboriginal Heritage Information Management System (AHIMS), the database of registered Aboriginal site information across New South Wales.

In 2010 the Department of Environment, Climate Change and Water (DECCW, precursor to the OEH) introduced a range of guidelines regarding the assessment and management of Aboriginal cultural heritage in New South Wales including the;

o Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010a).

o Code of Practice for Archaeological Investigation of Archaeological Objects (2010b).

o Due Diligence Code Of Practice for the Protection of Aboriginal Objects (2010c).

o Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage (2011).

The highest tier offences under the NPW Act are reserved for knowledgeable harm of Aboriginal objects or knowledgeable desecration of Aboriginal places. Second tier offences are strict liability offences—that is, offences regardless of whether or not the offender knows they are harming an Aboriginal object or desecrating an Aboriginal place—against which defences may be established under the NSW National Parks and Wildlife Regulation 2009.

APPENDIX 2: AHIMS SEARCH

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : CarlonsQuarryAHIMSBasic

Client Service ID : 671443

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
20-6-0010	Balala;	AGD	56	342400	6610500	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Uralla Shire Council					Permits		

** Site Status

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground.

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified.

Report generated by AHIMS Web Service on 29/03/2022 for Roger Mehr for the following area at Datum :GDA, Zone : 56, Eastings : 341550.0 - 350049.0, Northings : 6604632.0 - 6614926.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 1

Page 1 of 1

APPENDIX 3: ABORIGINAL HERITAGE: UNANTICIPATED FINDS PROTOCOL

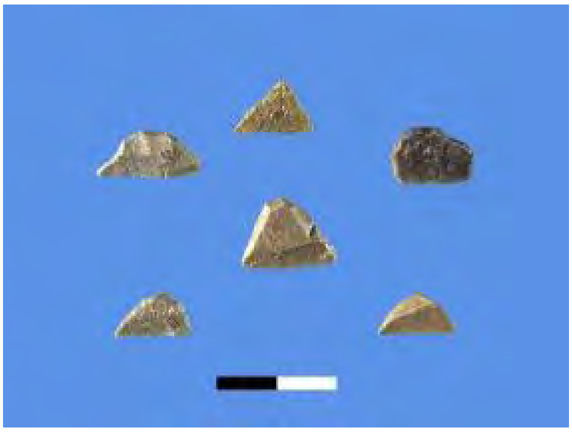
An Aboriginal artefact is anything which is the result of past Aboriginal activity. This includes stone (artefacts, rock engravings etc.), plant (culturally scarred trees) and animal (if showing signs of modification; i.e. smoothing, use). Human bone (skeletal) remains may also be uncovered while onsite.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also consider scientific and educational value.

Protocol to be followed if previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:
   a. Not further harm the object
   b. Immediately cease all work at the particular location
   c. Secure the area to avoid further harm to the Aboriginal object
   d. Notify Heritage NSW as soon as practical on (02) 9873 8500 (heritagemailbox @environment.nsw.gov.au), providing any details of the Aboriginal object and its location
   e. Not recommence any work at the particular location unless authorised in writing by Heritage NSW.
2. If Aboriginal burials are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access and NSW Police and Heritage NSW contacted.
3. Cooperate with the appropriate authorities and relevant Aboriginal community representatives to facilitate:
   a. The recording and assessment of the find(s)
   b. The fulfilment of any legal constraints arising from the find(s), including complying with Heritage NSW directions
   c. The development and implementation of appropriate management strategies, including consultation with stakeholders and the assessment of the significance of the find(s).
4. Where the find(s) are determined to be Aboriginal object(s), recommencement of work in the area of the find(s) can only occur in accordance with any consequential legal requirements and after gaining written approval from Heritage NSW (normally an Aboriginal Heritage Impact Permit).

Appendix 4: Aboriginal Heritage: Artefact Identification

	
A retouched silcrete flake	A quartz flake
	
Microliths (scale = 1 cm)	Volcanic flakes
	
Flake characteristics (scale = 1 cm)	A mudstone/tuff core from which flakes have been removed

Appendix I Historic Heritage Assessment

OzArk Environment & Heritage

<u>Head office</u>: Dubbo
Satellite offices:
Queanbeyan | Wollongong
Newcastle | Brisbane

T: 02 6882 0118
enquiry@ozarkehm.com.au
www.ozarkehm.com.au

ABN 59 104 582 354

145 Wingewarra St
PO Box 2069
DUBBO NSW 2830

1 August 2022

Mike Gale
Senior Environmental Consultant
Onward Consulting

MEMORANDUM

CARLON'S QUARRY: HISTORIC HERITAGE ASSESSMENT

Dear Mike,

This memorandum provides assessment and recommendations of the historic heritage values within or near the Carlon's Quarry Project.

OzArk Environment & Heritage (OzArk) has been engaged by Onward Consulting, on behalf of Blendee Partnership (the proponent) to complete heritage investigations at a small parcel of land which has the potential to be impacted by an extension of the footprint of the existing Carlon's Quarry (the Quarry, the proposal). The Quarry is situated between Uralla and Balala on the Kingstown Road (1033 Kingstown Road, Balala, NSW 2358 [Lot 3 DP834359]). The proposal is in the Uralla Local Government Area.

Due to the increasing demand from large scale renewable energy projects in the New England region, the proponent wishes to increase the size and production rate at the Quarry to provide materials for the development of roads, tracks, and infrastructure.

The Project Study Area is limited to those lands covered by the proposal. The final footprint of the proposed extension area will not encompass the entire Project Study Area but will fall entirely within its boundary and thus all possible areas of future disturbance from the proposal have been assessed as part of the study.

The proponent intends to increase the size of the Quarry to approximately 32 hectares maximum and a maximum production rate of 120,000 cubic metres (m^3) per annum with an approximate average of 80,000 m^3 per annum.

The field survey was undertaken by Roger Mehr (OzArk Archaeologist; B.Arts, M.Arts) on Wednesday 30 March 2022. This memorandum has been written by Ben Churcher (OzArk Principal Archaeologist, BA(hons), Dip Ed.). The Aboriginal cultural values assessment is included in the *Archaeological Technical Report* (OzArk May 2022), while this memorandum focuses on the historic heritage values that may be harmed by the proposal.

During the field survey no items of historic heritage significance were recorded and therefore the proposal will not directly harm historic heritage values.

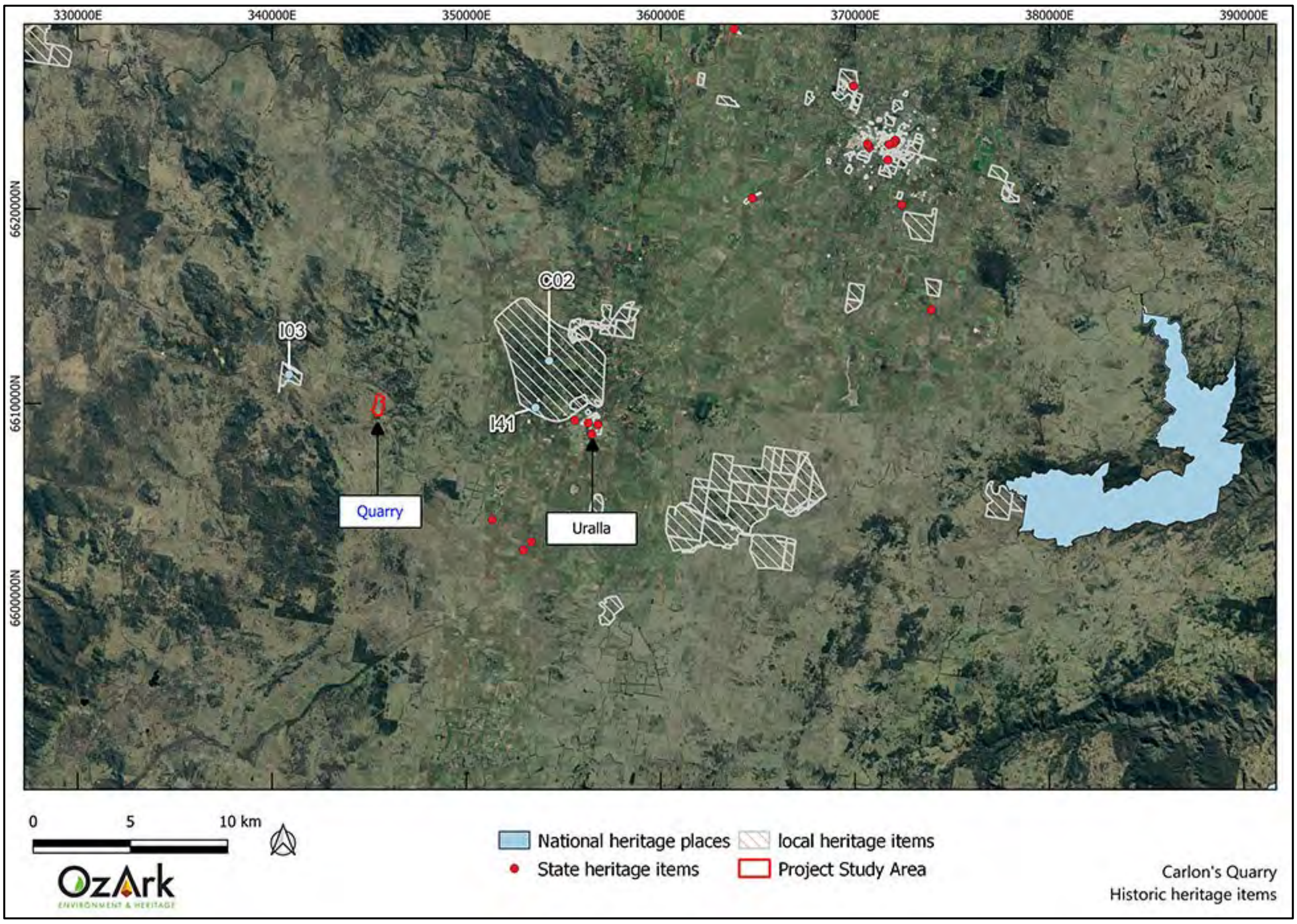
To ensure that the proposal will not indirectly harm historic heritage values, a desktop search was conducted on the following databases to identify any potential previously recorded heritage items near the Project Study Area. The results of this search are summarised in **Table 1-1**.

Table 1-1: Historic heritage: desktop-database search results.

Name of database searched	Date of search	Type of search	Comment
National Heritage List and Commonwealth Heritage List	1/6/22	Uralla Local Government Area	One item: Gondwana Rainforests of Australia is located 31.5 km east of the proposal.
State Heritage Register	1/6/22	Uralla Local Government Area	Nine items including four items in the town of Uralla (10 km east from the proposal) and sites associated with Captain Thunderbolt (9 km to the southeast).
Local Environmental Plan (LEP)	1/6/22	Uralla Local Environmental Plan 2012	The closest listed item is Balala Station Homestead (I03) located 4 km to the west of the proposal. Other listed items near the proposal are the Rocky River Goldmining Precinct (C02) located 7 km to the east and Wallaby Rocks (I41) located 8 km to the east. The Rocky River Goldmining Precinct is a conservation zone and Wallaby Rocks are a significant item with natural heritage values.

The desktop searches of the national, state, and local heritage lists indicates that the closest listed item is further than 4 km from the proposal (**Figure 1-1**). As a result, the proposal will not indirectly harm listed heritage items.

Figure 1-1: Location of listed heritage items in relation to the proposal.



The assessment for the proposal, including the results of a field survey at the Quarry, concludes that the proposal will not directly or indirectly harm known or potential significant heritage values.

Recommendations

As harm to significant heritage items is unlikely, there are no specific management recommendations related to historic heritage values.

However, to ensure that the legal requirements of the *Heritage Act 1977* (Heritage Act) are followed, inductions for work crews should include a historic heritage awareness procedure to ensure they are aware of the legislative protection of significant heritage items under the Heritage Act and the contents of the Unanticipated Finds Protocol (**Appendix 1**).

Ben Churcher
OzArk Principal Archaeologist

APPENDIX 1: HISTORIC HERITAGE: UNANTICIPATED FINDS PROTOCOL

A historic artefact is anything which is the result of past activity not related to the Aboriginal occupation of the area. This includes pottery, wood, glass, and metal objects as well as the built remains of structures, sometimes heavily ruined.

Heritage significance of historic items is assessed by suitably qualified specialists who place the item or site in context and determine its role in aiding the community's understanding of the local area, or their wider role in being an exemplar of state or even national historic themes.

The following protocol should be followed if previously unrecorded or unanticipated historic objects are encountered:

1. All ground surface disturbance in the area of the finds should cease immediately, then:
   a) The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted
   b) The site supervisor will be informed of the find(s).
2. If finds are suspected to be human skeletal remains, then NSW Police must be contacted as a matter of priority.
3. If there is substantial doubt regarding the historic significance for the finds, then gain a qualified opinion from an archaeologist as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be significant. If a quick opinion cannot be gained, or the identification is that the item is likely to be significant, then proceed to the next step.
4. Notify Heritage NSW as soon as practical on (02) 9873 8500 (heritagemailbox@environment.nsw.gov.au) providing any details of the historic find and its location.
5. If in the view of the heritage specialist or Heritage NSW that the finds appear not to be significant, work may recommence without further investigation. Keep a copy of all correspondence for future reference.
6. If in the view of the heritage specialist or Heritage NSW that the finds appear to be significant, facilitate the recording and assessment of the finds by a suitably qualified heritage specialist. Such a study should include the development of appropriate management strategies.
7. If the find(s) are determined to be significant historic items (i.e. of local or state significance), any re-commencement of ground surface disturbance may only resume following compliance with any legal requirements and gaining written approval from Heritage NSW.

Appendix J Traffic Assessment

constructive solutions

Civil | Structural | Environmental

Carlon's Quarry Expansion

Traffic Impact Assessment

Prepared for

Onward Consulting

October 2022

Report prepared by Constructive Solutions Pty Ltd

PO Box 1498
TAMWORTH NSW 2340

Phone: 02 6762 1969
Fax: 02 6762 1969
Email: admin@constructivesolutions.com.au

DOCUMENT HISTORY AND STATUS

Issue	Rev	Issued To	Date	Reviewed	Approved
0	1	Client	01/08/22	M. Gale	B. Rossiter
0	2	Client	05/10/2022	M. Gale	B. Rossiter

Author: Ben Rossiter
Project Manager: Ben Rossiter
Project Name: Carlon's Quarry Expansion
Project Number: 2022006
Name of Client: Onward Consulting

Table of Contents

Commonly used acronyms

AADT	Average Annual Daily Traffic
AUL	Auxiliary left turn lane
BAL	Basic left turn lane
BAR	Basic right turn lane
CHL	Channelised left turn lane
CHR	Channelised right turn lane
HV	Heavy vehicle
LV	Light vehicle
TfNSW	Transport for NSW
SEARs	Secretary's Environmental Assessment Requirements
SISD	Safe intersection sight distance
USC	Uralla Shire Council

Executive Summary

This report has been prepared for Onward Consulting Pty Ltd on behalf of Blendee Partnership ("the Applicant") to assess traffic related impacts of the proposed continued operation (and extension) of Carlon's Quarry ("the Proposal"). The report will form part of an Environmental Impact Statement for the Proposal.

The Applicant is proposing to continue operating the Quarry within an expanded footprint and increase the rate of extraction to an annual average of 80,000m^3 and a maximum extraction rate of 120,000m^3 per annum. At maximum extraction, quarry generated traffic is anticipated to be 8 light vehicle and 60 heavy vehicle movements per day.

The purpose of this report is to assess the existing road network, the existing operations, and the proposed ongoing transportation of the quarry products until the haulage vehicles reach the New England Highway.

The Carlon's Quarry is located 10.3km west of Uralla and is accessed via Kingstown Road.

The assessment has been prepared in accordance with the NSW Roads and Traffic Authority's (RTA) (2002) Guide to Traffic Generating Developments (now Transport for NSW) and Austroads Road Design Guide and addresses the Secretary's Environmental Assessment Requirements issued by the Department of Planning and Environment, as well as requirements nominated by Transport for NSW (TfNSW) and Uralla Shire Council.

The scope of the transport assessment has been limited to the local road network utilised to and from the Carlon's Quarry i.e., until these roads intersect with the State road network (the New England Highway). The New England Highway has only been considered at the respective intersection.

An appreciation of the existing traffic situation relating to Carlon's Quarry was gained by examining the existing road network, reviewing available traffic volume data, and liaising with relevant stakeholders. These aspects are discussed in this report.

This assessment has concluded that the amendments to the existing transport arrangements can be successfully mitigated for the Proposal.

1 Introduction

1.1 Background

Carlon's Quarry is an existing approved gravel quarry operated by Blendee Partnership, located on the Kingstown Road approximately 10 kilometres (**km**) west of Uralla in northern NSW (Figure 1-1).

The existing quarry obtained development consent on 27 August 2002 from Uralla Shire Council (USC) (DA3291) and supplies high quality rock material for the construction and upgrade of roads, and for foundations of buildings and other infrastructure.

Blendee Partnership is seeking a new development consent under Part 4 of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act) for the Carlon's Quarry Expansion Project (the Project). This Traffic Impact Assessment has been prepared to accompany the development application for the Project, with reference to the traffic and transport components of the Secretary's Environmental Assessment Requirements (SEARs).

Carlon's Quarry is operated using machinery such as bulldozers, front end loaders and excavators. There has been no permanent infrastructure developed as part of the quarry.

The Project is proposing to increase the production rate of the quarry from 30,000 cubic metres (m^3) to a maximum 120,000 m^3 per annum with an approximate average of 80,000 m^3 per annum. The Project involves a minor extension to the north and west of the existing quarry and will require the operation of additional mobile equipment.

1.2 Scope of report

This report has been prepared to accompany the Environmental Impact Statement for Blendee Partnership, prepared by Onward Consulting Pty Ltd, in accordance with Part 4 of the Environmental Planning & Assessment Act 1979 (EP&A Act), and assesses the related impacts of the Proposal on the surrounding road network that would be affected for the duration of the Proposal. This report assesses the traffic related impacts in accordance with the TfNSW's Guide to Traffic Generating Developments, the Department of Planning EIS Guidelines Roads and related Facilities and the Secretary's Environmental Assessment Requirements (SEARs) prepared for the Proposal by the Department of Planning and Environment.

1.3 Overview of existing transport arrangements

Laden trucks transporting gravel products from Carlon's Quarry turn right at the quarry access onto the Kingstown Road and travel 10.3km to the New England Highway. At least 80% of the traffic turn left onto the New England Highway and return on the same route. The remainder turn right heading south along the New England Highway.

A very small percentage of the materials are transported west on Kingstown Road, which is primarily associated with meeting Uralla Shire Council's demand for road pavement materials.

2 Consultation

The key issues to be addressed as part of this TIA are outlined in the Secretary's Environmental Assessment Requirements 1622 (SEARs). The following consultation with Uralla Shire Council (USC) and Transport for NSW (TfNSW) as the Road Authorities was undertaken:

- Meeting with USC on 10 March 2022
- Meeting with USC on 16 March 2022
- Meeting with TfNSW on 21 March 2022

The coverage of the SEARs and other Government agency requirements are included in Table 1.

Table 1 – Coverage of SEARs and other Government Agency Requirements

Traffic & Transport Requirements	Requirement	Section Reference
• Accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;	SEARs	Section 3.3
• An assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;	SEARs	Section 4
• A description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;	SEARs	Section 4.11
• Evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance; and	SEARs	Section 2 Section 4.9
• A description of access roads, specifically in relation to nearby Crown roads and fire trails.	SEARs	Section 3.1.3
• Material tracking onto Kingstown Road and sealing of the Quarry access.	USC Meeting	Section 4.3
• Concerns regarding road safety and pavement impacts are to be addressed.	USC Meeting	Section 4

3 Existing road network

3.1 Roads

3.1.1 New England Highway

The New England Highway is a State Road (National Highway 15) which provides an arterial link between the Hunter region to the south through to the Qld State border to the north. The highway provides a strategic link between the Hunter, Northwest Slopes and Plains and Northern Tablelands regions. It also provides an alternative parallel route to the Pacific Highway between Newcastle and Brisbane.

The highway, within the town boundary, has a single lane in either direction with associated turn treatments at numerous intersections. The turn treatments at the subject intersection are discussed in Section 3.2.2.

A traffic count undertaken at Hill Street in 2011 has the total daily traffic as 8,093 in both directions. This is consistent with the count undertaken in 2007. It is anticipated that this count would be higher than it is at the Kingstown Road (or East Street) intersection as Hill Street is within the central business district of Uralla. The permanent classifier site at Bendemeer implies that traffic volumes have been reasonably consistent either side of 4000 Average Annual Daily Traffic (AADT) with 20% HVs between 2014 and 2021.

3.1.2 Kingstown Road (including East Street)

The Kingstown Road is a local road providing a link from Uralla to the village of Kingstown and the locality Retreat. Its primary function is to provide access to these regions which are associated with agricultural activities, primarily extensive grazing. There are smaller rural residential holdings within the vicinity of Uralla, between the Quarry access and the town boundary.

Another quarry is in operation approximately 22km west of Uralla at 2076 Kingstown Road. Actual quantities are unknown however it is envisaged that the quarry operates sporadically to meet the demand for sand in the broader region. The sand quarry is operated by Ducats Earthmoving Pty Ltd who are based in Armidale.

The town cemetery is situated just beyond the transition of the speed limit to 100km/h on the right-hand side. Other accesses of note include the cellar door for Whyworry Wines and the Harnham Station of the Kentucky Rural Fire Brigade, which are in close proximity, approximately 3.7km out of town.

The road in sections has inherent safety issues associated with its alignment, lack of forward sight distance, road width, steep unprotected batters and hazards within the clear zone. These aspects are not uncommon throughout the rural road network within the USC and surrounds.

Intersecting roads include Queen Street, Quartz Gully Road, Wallaby Rocks Lane, Panhandle Road and Devoncourt Road. A summary of each of the intersecting roads is provided in Table 2. Plates 1 through 4 show examples of the Kingstown Road characteristics.

Table 2 - Kingstown Road Intersection Estimated Sight Distances

Chainage#	Intersecting Road	Sight Distance East (m)	Sight Distance West (m)	Speed Zone (km/h)	SISD* (m)	Intersection Controls
0.37	Queen Street	 280m	 410m	50	97m	Sight screen only.
0.75	Quartz Gully Road	 >500m	 140m	100	248m	No controls, i.e., no sight screen, give way or hold line.
2.50	Wallaby Rocks Lane	 300m	 240m	100	248m	No controls, i.e., no sight screen, give way or hold line.
2.89	Panhandle Road	 90m	 100m	100	248m	Sight screen only.

Chainage#	Intersecting Road	Sight Distance East (m)	Sight Distance West (m)	Speed Zone (km/h)	SISD* (m)	Intersection Controls
3.33	Devoncourt Road	 180m	 190m	100	248	Sight screen only.
* Safe intersection sight distance based on reaction time of 2.0 seconds (Austroads 2017)						

Plate 1 – Kingstown Road (East Street) within the town boundary

Plate 2 – Kingstown Road (near the cemetery) looking east

Plate 3 – Kingstown Road 7.5km from the Highway looking east

Plate 4 – Kingstown Road (out the front of Wyworry Wines and the RFS shed) looking east

3.1.3 Quarry Access

The access road from the Kingstown Road to the quarry site is an unsealed road that traverses over private property. There are no fire trails within its proximity. Whilst no Crown roads are contained within the direct Quarry footprint, the access road passes across a Crown road adjacent to the Quarry and this will remain the same situation for the expanded Quarry. The Applicant has consulted with Crown Lands and will seek the appropriate authorisation for the continued maintenance of and access to the Crown road via a direct crossing.

Although not designed to a specific standard, the access road traverses gently undulating country and is therefore relatively straight with good forward sight distance with the exception of the crest near the near the Kingstown Road intersection.

Plate 5 – Quarry Access looking north

Plate 6 – Quarry Access looking south

3.2 Intersections

3.2.1 Quarry Access and Kingstown Road

The quarry access road heads to the south off Kingstown Road and is located approximately 10.3km from the New England Highway. The quarry access is gravel to the edge of the bitumen and approaches on a downhill grade.

There are no controls at the intersection. Gravel has ravelled over the road and there are some potholes developing within the travel lanes. Incoming and outgoing trucks are following the same track via the southeast corner of the intersection, indicating that drivers leaving the quarry may be attempting to maintain some momentum through the intersection due to the uphill grade encountered on the return leg.

The sight distance in either direction along the Kingstown Road is good in both directions (refer Plates 7 and 8). Safe intersection sight distance (SISD) for 100km/hr speed zone as per the Austroads Guides is 248m and as a result, the available sight distance is considered to be adequate.

Plate 7 - Carlon's Quarry Access Road looking west

Plate 8 - Carlon's Quarry Access Road looking east

3.2.2 Kingstown Road intersection with the New England Highway

The Kingstown Road (also known as East Street between Queen Street and the Highway) form a four-way intersection at their junction with the New England Highway. Both of the right turn manoeuvres from the Highway have channelised right turn lanes (refer Plate 9). The left turn manoeuvres onto and off the Kingstown Road are directly from the travel lane.

There is no centreline on the approach from the Kingstown Road. A hold line and single give way on the left-hand side are provided. An offset sight screen is situated on the southeast corner. Parking is limited by a no parking sign for vehicles over 4.5t in front of the service station and a no parking sign adjacent to the southbound lane of the highway. The pavement is in reasonable condition as is the line marking on the Highway.

On the day of the inspection haulage vehicles associated with the quarry were observed making all relevant turn manoeuvres other than proceeding straight. With the exception of the right turn out of the Kingstown Road, the dimensional capacity appears adequate. When making the right turn out into the southbound lane of the New England Highway the haulage vehicle had to traverse over the channelised right turn lane. It was also noted that the haulage vehicles had a tendency to swing wide when turning left onto the Kingstown Road when vehicles were parked on the southern side of the Kingstown Road.

Plate 9 – Kingstown Road (East Street) Intersection with the New England Highway

3.3 Traffic volumes

3.3.1 Current Traffic Volumes

The current traffic volumes have been estimated based on the information provided by TfNSW and Uralla Shire Council. The count for the New England Highway was presumed based on the two available counts. Counts for the two locations along Kingstown Road were provided. The existing traffic volumes are summarised in Table 3.

Table 3 - Traffic Volumes

Road	Site	Existing Traffic		
		LV	HV	Total
New England Highway	Hill Street#	8,093		8,093
	South of Bendemeer (2021)	2,966	837 (22%)	3,803
	Kingstown Road (assumed)	5000	1,200 (19.5%)	6,200
Kingstown Road	800m from Queen Street (July 21)	456	51 (10%)	507
	Wallaby Rocks Bridge (July 21)	342	56 (14%)	398
	Wallaby Rocks Bridge (August 21)	221	30 (12%)	251
	West of Carlon's Pit (August 21)	201	10 (5%)	211

Notes: There were no counts on the New England Highway within the proximity of the Kingstown Road intersection. A count has been assumed for the purpose of this assessment based on the two available counts, of which the Hill Street site is believed to be distorted by its position within the main street of Uralla.

Road	Site	Existing Traffic		
		LV	HV	Total
# 2011 survey available on TfNSW website. No split in LV and HV.				

A summary of the vehicle classifications at the Wallaby Rocks Bridge (July 2021) site is shown in Table 4.

Table 4 - Traffic Volumes

Class	Description	Number	%
1	Short Vehicle	202	51.4
2	Short Vehicle Towing	6	1.6
3	Two Axle Truck	142	36.1
4	Three Axle Truck	15	3.7
5	Four Axle Truck	0	0
6	Three Axle Articulated Vehicle	11	2.8
7	Four Axle Articulated Vehicle	5	1.2
8	Five Axle Articulated Vehicle	1	0.2
9	Six Axle Articulated Vehicle	10	2.5
10	B Double	1	0.2
11	Double Road Train	1	0.3
12	Triple Road Train	0	0

3.3.2 Quarry Operation Traffic

Forecast traffic volumes have been calculated for Kingstown Road. The following assumptions have been made in relation to vehicle movements associated with Carlon's Quarry:

- A maximum quarry production rate at 120,000m^3 (216,000 tpa), maximum average daily truck movements are anticipated to be 29 laden trips (or 58 movements) per day.
- An average annual quarry production rate 80,000m^3 (144,000 tpa), average daily truck movements are anticipated to be 19 laden trips (or 38 movements) per day.
- Light vehicle movements, associated with the quarry employees average 4 per day as a result of the two employees originating from Uralla.
- Other miscellaneous traffic result from the following activities:
  - Fuel deliveries 1 per week
  - Maintenance vehicles 1 per week
  - Other 2 per week

Expected light and heavy vehicle daily traffic volumes are listed in Table 5. Current and forecast combined traffic volumes are shown Table 6 and Table 7 respectively with the presumed quarry activity during 2021 subtracted from the actual traffic volume counts. The traffic volumes presumed for the quarry operations have been assumed to be at maximum production to reflect the worst-case scenario.

Table 5 - Daily Range in Quarry Related Traffic Movements

	Daily Range LV	Daily Range HV
Kingstown Road	0 to 8	0 to 60

See Appendix 2 for calculations.

Assumptions

- Ranges do not specifically align with haulage volumes as they include miscellaneous traffic assumptions.
- 120,000m^3 is equivalent to approximately 216,000t maximum annual production.
- It has been assumed that maximum annual production would be achieved over 250 days of haulage, at a uniform rate, utilising rigid (20%) truck and dog (75%) and semi tipper (5%) configurations.

3.3.3 Quarry Operation Traffic

Table 6 summarises the existing current traffic combined with the quarry operation traffic, at maximum production, for the roads and locations shown. Table 7 provides a 10-year forecast (2032). An average annual growth estimate of 2% per annum for background traffic has been assumed in accordance with the advice provided by USC staff.

Table 6 - Quarry Operation, Estimated Current Traffic and Combined Traffic Volumes at Maximum Production

Road	Existing Traffic (less Quarry traffic)		Maximum Quarry Traffic Levels		Combined Traffic		Quarry Contribution to Total Traffic (%)	Quarry Contribution to Heavy Vehicle Traffic (%)
	LV	HV	LV	HV	LV	HV		
Kingstown Road#	336	40	8	60	344	100	15%	60%
New England Highway (North)	4995	1187	6	47	5002	1235	1%	4%
New England Highway (South)	4999	1197	2	12	5000	1209	0%	1%

Kingstown Road data is taken from the Wallaby Rocks count site using the highest count undertaken in 2021. Estimates for Kingstown Road to the west of the quarry entrance are not shown as the traffic generated to/from this direction is considered negligible.

Table 7 - Quarry Operation, Forecast Traffic (Year 2032) and Combined Traffic Volumes at Maximum Production

Road	Forecast Traffic (less Proposal traffic)#		Maximum Quarry Traffic Levels		Combined Traffic		Quarry contribution to total traffic (%)	Quarry Contribution to Heavy Vehicle Traffic (%)
	LV	HV	LV	HV	LV	HV		
Kingstown Road	410	49	8	60	418	109	13%	55%
New England Highway (North)	6089	1447	6	47	6096	1495	1%	3%
New England Highway (South)	6094	1459	2	12	6095	1471	0%	1%
# 2% average annual growth rate applied in accordance with USC advice.								

As can be seen from Table 6 and Table 7 above, the percentage contribution to heavy vehicle movements is significant for Kingstown Road but negligible on the New England Highway. The HV movements will require mitigation however is well within the acceptable volumes for a two way two lane sealed rural road.

The impact on the New England Highway intersection, from an 'intersection performance' perspective, are considered negligible therefore SIDRA analysis has not been undertaken. The quarry's output will be constrained to its ability to despatch trucks which has been assumed to be 10 HVs every hour limiting the potential number of HVs through the intersection in any hour to 20 total movements.

3.4 Accident (crash) Data

A summary of recent crash data was provided by TfNSW. The details are provided in Table 8.

Table 8 - Summarised Crash Data

Road	Description	Year	Fatal	Injury
Kingstown Road	Westbound vehicle off carriageway near Wallaby Rock Lane. Daytime overcast and dry.	2018	1	0
	Westbound vehicles off carriageway approximately 400m east of Wallaby Rocks Lane. Daytime overcast and wet.	2018	0	1

Whilst there is limited data to form any conclusions both incidents occurred in close proximity. Specific consideration should be given to this location with respect to the increased traffic generated by the quarry. It should be noted that both accidents are unrelated to the quarry operations.

4 Assessment and Recommendations

The amendments to the haulage frequencies and payloads associated with the Proposal are achievable with amendments to the existing road network including the following:

- Amendments to the Kingstown Road / New England Highway Intersection;
- Extension of 50km/h speed limit to the west of the cemetery;
- Introduction of 80km/h speed limit from the cemetery to the west of the Devoncourt Road / Kingstown Road intersection;
- Upgrade of the quarry intersection;
- Localised shoulder widening around tight radius curves with narrow seal width; and
- Improved delineation and signage.

Other aspects considered applicable include:

- Consideration of the school bus run;
- Drivers and haulage vehicles;
- Pedestrian and cyclist activity;
- Road maintenance; and
- Cumulative traffic impacts.

4.1 Kingstown Road / New England highway intersection

This intersection is generally considered suitable for the increase in vehicle movements. The increase in turning traffic is not anticipated to affect traffic interaction as the majority will turn left into the northbound lane and return via the channelised right turn lane (southbound).

Testing with an articulated vehicle identified that the swept path for right turning vehicles was impaired by the extent of the channelised right turn lane. It is recommended that the channelised right turn lane (northbound) onto East Street be shortened to cater for the swept path of a 26m b double. Alternatively, no right turn into East Street could be considered if supported by TfNSW and USC.

The no stopping zone adjacent the southbound lane of the highway should be reinforced with associated signage as the shoulder is narrow.

Articulated heavy vehicles turning left onto Kingstown Road were swinging wide over the centre of the side road to avoid parked vehicles on the southern side of the road adjacent to the service station. It is recommended that a no stopping zone be introduced for approximately 20m to alleviate this issue. This combined with the installation of a centreline should encourage drivers to remain in the appropriate lane reducing the potential of conflicts between vehicles travelling in opposing directions.

4.2 Extension of 50km/h Speed Limit and Introduction of 80km/h Speed Limit

The speed limit travelling west changes abruptly from 50km/h to 100km/h just west of Queen Street. Travelling west, the following aspects are encountered in a high-speed environment:

- Uralla Cemetery;
- Concealed accesses;
- Crests and tight radius curves, which in certain circumstances is coupled with steep grades; and
- Limited forward sight distance and SISD.

An extension of the 50km/h speed zone to the west of the cemetery would help improve road safety at the cemetery particularly whilst funerals are in progress as there are numerous slow moving turning vehicles and pedestrians. This would also assist in improving traffic interaction at the Quartz Gully Road intersection.

The introduction of an 80km/h speed limit at least to the west of the Devoncourt Road intersection would alleviate many of the issues encountered in this section. The requirement for SISD reduces from 248m to 181m at 80km/h which would be considered a significant improvement given the lack of available sight distance at some of the concealed intersections. Heavy vehicle stopping distances will also dramatically improve with the proposed reduction in speed limit.

In the absence of a regulatory 80km/h speed limit being introduced it is recommended that a self imposed speed limit be adopted for the Kingstown Road (outside of the 50km/h section) for all HVs associated with the quarry operations for the reasons outlined above.

A reduction in speed limit to 80km/h may also have a positive influence over safety in and around the section of Kingstown Road east of the Wallaby Rocks lane intersection where both crashes have occurred.

Vegetation within this section also obscures sight distance at some of the concealed accesses. Vegetation removal/control should be considered to ensure sight distance isn't unnecessarily impeded by vegetation.

4.3 Upgrade of the quarry intersection

The current intersection is insufficient to cater for the increase in heavy vehicle movements. It is recommended that a basic left (BAL) and basic right turn (BAR) treatments be installed with a sealed approach to the grid, to prevent material ravelling onto the Kingstown Road. The intersection should be checked to ensure that suitable dimensional capacity is provided avoiding any conflict between opposing vehicles. Controls should as a minimum include a give way sign and associated hold line, appropriate line marking and appropriate advanced warning of the intersection.

An asphalt wearing course over the Kingstown Road would assist in reducing the incidence of pavement failures and associated safety hazards.

4.4 Localised shoulder widening and Vegetation Removal

The increases to heavy vehicle movements will increase the incidence of articulated haulage vehicles passing along the roadway. There are numerous curves with substandard pavement widths which would require articulated vehicles to leave the sealed roadway damaging the shoulder. Widening of at least 1m to either or both shoulders, in identified areas where there is substandard width for two HVs to pass without leaving the roadway, is recommended prior to the installation of the new centreline.

The cut batter opposite Wallaby Rocks Lane should be excavated back to improve the road width and forward sight distance.

4.5 Delineation and Signage

Improved delineation is recommended along the haul route to improve lane compliance subsequently reducing conflicts. This as a minimum should include a centreline and preferably edge lines. The line marking should include glass beads improving visibility at night and low light conditions including fog.

Guideposts should be reinstated where they are either damaged or lack reflectivity. Curve alignment marker (CAM) signage should be installed where there are substandard curves.

Signage should be improved at all of the intersections and, as a minimum, include intersection controls (give way or stop sign), a sight screen and advanced warning. Where this signage has already been provided the position and reflectivity should be checked with new signage installed where appropriate.

Advanced warning for all of the intersections should be provided along the Kingstown Road with the exception of Queen Street.

4.6 School Bus Run

There is currently one bus running on the Kingstown Road by JA and AM Carlon. The bus commences picking up just west of the Quarry intersection at approximately 8:30 and ceases at 8:45 at the New England Highway during the morning run. The afternoon run turns on to Kingstown Road at 3:35pm and goes past the quarry intersection at approximately 3:50pm.

At present the bus only picks up and drops off at the Devoncourt Road however the proprietor advised that this does change. Consideration of the school bus operations is required particularly where there is a change to the pickup and drop off locations. In such instances a suitable check is required to ensure the suitability of the location and that this information is conveyed to all HV drivers.

All school bus routes should be sign posted and ideally all school bus pick up and drop off locations should be identified, sign posted and communicated to the HV drivers. Ideally the school bus should be fitted with a UHF which could be operated on the same channel as the haulage vehicles frequenting the quarry.

4.7 Drivers and Haulage Vehicles

A Drivers Code of Conduct should be developed to cover the Carlon's Quarry Operations. As a minimum the following should be encompassed:

- Known hazards updated where applicable to cover the aspects raised in this assessment;
- Vehicle checking and maintenance procedures;
- School bus routes and pick up and drop off locations (updated where applicable);
- Reasons why a self-imposed speed limit of 80km/h has been adopted; and
- Chain of responsibility requirements relating to fatigue.

It would be considered advantageous for the Applicant to develop an Operations Traffic Management Plan encompassing the aspects discussed in this section to ensure an integrated approach is taken to address the risks associated with the haulage operations.

4.8 Pedestrian and Cyclist Activity

There was no pedestrian or cycling activity observed along the road network, however there would likely be large numbers of pedestrians adjacent to the cemetery when funerals are held. This should be adequately reflected in the Drivers Code of Conduct to ensure the drivers are aware that increased pedestrian activity is likely in this area. Consideration of a self-imposed speed limit of 40km/h occur adjacent to the cemetery when funerals are observed regardless of the implementation (or otherwise) of the 50km/h speed zone extension.

If significant pedestrian or cyclist activity (i.e. a bike race along this route) is anticipated in the future, the impacts would need to be considered and mitigated.

4.9 Road Maintenance

Pavement deformations, edge break and other minor pavement defects should be rectified, in accordance with Council's intervention requirements, to prevent a vehicle losing control or the pavement ravelling. The bituminous seals should also be monitored to ensure moisture ingress is limited and a reasonable surface texture is maintained.

Maintenance of the roads utilised for the Proposal would be an ongoing requirement of USC as the respective Road Authority. Council's Section 7.11 Development Contributions Plan identifies that a contribution rate of $0.111[1] per tonne per km is applicable on regional or local sealed roads. The rate is applied as a developer contribution towards the maintenance, upgrade and construction works within Uralla Shire Council.

The pavement is inherently of an average to poor standard with the exception of some rehabilitated sections. Whilst relevant this is considered to be a legacy issue and as such should not be the responsibility of the Applicant.

Wet weather presents a significant issue as the seal and pavement are quite porous which results in exacerbated rate of pavement failures. Haulage operations resulting from the quarry should be minimised post rain events that exceed 20mm for at least one day to reduce impacts.

4.10 Cumulative Traffic Impacts

There are no known cumulative traffic impacts that are likely to affect the roads considered in this report. There are no major projects listed on the Major Projects portal that would impact on the Kingstown Road.

4.11 Mitigation Summary

Table 9 - Summary of Mitigation Measures

Location	Recommendations
Kingstown Road / New England Highway Intersection	• Consult and request USC / TfNSW review swept path right turn out heading southbound and implement outcomes that minimise conflict.
Extension 50km/h speed limit, Implementation 80km/h	• Consult and request USC / TfNSW consider the extension of the 50km/h speed zone and implement an 80km/h speed zone to reflect the road environment and its inherent safety issues. • In the absence of a regulatory 80 km/h speed limit being introduced a self-imposed speed limit would be implemented for the Kingstown Road (outside of the 50 km/h section).
Quarry Intersection	• Quarry Intersection to be upgraded to include appropriate turn treatments with associated controls. Seal to extend at least to the grid. Heavy duty wearing course over the primary section of the roadway is recommended to improve the durability of the pavement and its susceptibility to failure.
School Bus Run	• Communicate on a regular basis the location of the current school bus stop locations.

[1] Rate in June 2021. Rates subject to indexation adjusted in accordance with the consumer price index.

Location	Recommendations
	• Install UHF in school bus and operate haulage vehicles on same channel (if acceptable to the School Bus Proprietor)
Drivers and Haulage Vehicles	• Develop a driver's code of conduct. • Implement Chain of Responsibility requirements. • Develop an Operations Traffic Management Plan to encompass these recommendations.
Pedestrian and Cyclist Activity	• Implement a self-imposed speed limit of 40km/h adjacent to the cemetery when funerals are undertaken. • Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary.
Road Maintenance	• Payment of the Section 7.11 contribution for road maintenance including delineation, signage, vegetation removal and localised shoulder widening. • Haulage cease where rain events exceed 20mm for at least one day.

Additional measures that are considered to be beyond the scope of the Applicant have been identified that would further improve the overall safety on Kingstown Road. These measures are the responsibility of and would be undertaken by the relevant roads authority and include the following:

- Maintenance of the road and localised shoulder widening[2], using funding from Section 7.11 contributions.
- Removal of vegetation that obscures sight distance, particularly in close proximity to accesses and intersections.
- Delineation should be improved by installing a centreline and preferably edge lines (including glass beads).
- Guideposts should be reinstated and CAM signage installed around substandard curves.
- Install intersection controls and provide advanced warning of intersections along the Kingstown Road.
- Continually assess the location and suitability of the school bus stop locations.
- Sign post school bus routes and where possible current pick up and drop of locations.
- Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary.

[2] Localised shoulder widening should be undertaken where there is substandard width for two HVs to pass without leaving the roadway.

5 Conclusion

Assessment of the proposed operations and the local road network has identified that the Applicant could continue to operate at a higher extraction rate, with no significant impact to the road network, provided the mitigation measures are adopted for the life of the project.

There are some indications of wear on the local road network that require maintenance. Furthermore, there are inherent safety issues that should be addressed. These activities may, in part, be funded through the ongoing contributions paid to USC by the Applicant.

Appendix 1: Traffic Calculations

Production output summary

Table 1

	Expanded operations			
Density (t/m3)	**Annual ave (m3)**	**Annual maximum (m3)**	**Annual ave (t)**	**Annual maximum (t)**
1.5	80000	120000	120000	180000
1.8	80000	120000	144000	216000

Production output (by truck)

Table 2

			Expanded operations	
Truck type	**Payload (t)**	**Fleet movements (%)**	**Annual ave (t)**	**Annual maximum (t)**
Rigid	14	20	13621.62	20432.43
Truck and dog	34	75	124054.05	186081.08
Semi tipper	26	5	6324.32	9486.49
TOTAL			**144000.00**	**216000**

Truck movements

Table 3

			Expanded operations				
Truck type	**Payload (t)**	**Fleet movements (%)**	**Annual ave (mvmts)**	**Annual maximum (mvmts)**	**Daily ave (mvmts)**	**Daily maximum (mvmts)**	**Hourly maximum (mvmts)**
Rigid	14	20	1945.95	2918.92	7.78	11.68	4
Truck and dog	34	75	7297.30	10945.95	29.19	43.78	15
Semi tipper	26	5	486.49	729.73	1.95	2.92	1
TOTAL			**9730**	**14595**	**39**	**58**	**20**

Constructive Solutions Pty Ltd

www.constructivesolutions.com.au

Tamworth Office:

PO Box 1498

Tamworth NSW 2340

Phone: 02 6762 1969

Email: admin@constructivesolutions.com.au

Brisbane Office

PO Box 133

Paddington QLD 4064

Phone: 0427 011 143

Email: admin@constructivesolutions.com.au

constructive solutions

Civil | Structrual | Environmental

Appendix K Land Use Conflict Analysis

Land Use Conflict Analysis

The Project will involve the continuation and extension of quarrying activities at the Premises and to date is not considered to have had a major impact on existing agricultural activities within the Premises and surrounding properties. A Land Use Conflict Risk Assessment (LUCRA; NSW DPI, 2011) has been undertaken to identify and assess the potential for land use conflict between the Project and neighbouring properties. There are four key steps to undertaking a LUCRA are:

- gather information about proposed land use change and associated activities;
- evaluate the risk level of each activity;
- identify risk reduction management strategies; and
- record LUCRA result.

Step 1: Gather information

Consideration of site specific factors of the Project undertaken in accordance with Step 1, including identification of activities and potential conflicts to provide an Initial Risk Evaluation (**Table K-1**).

Step 2: Evaluate the risk level of each activity

A Risk Ranking Matrix (**Table K-1**), is used to rank the identified potential land use conflicts. The risk ranking matrix assesses the environmental, public health and amenity impacts according to the:

- probability of occurrence; and
- consequence of the impact.

Table K-1: Risk ranking matrix (LUCRA Guide)

Risk matrix		Probability				
		A	B	C	D	E
Consequence	1	25	24	22	19	15
	2	23	21	18	14	10
	3	20	17	13	9	6
	4	16	12	8	5	3
	5	11	7	4	2	1

The risk ranking matrix yields a risk ranking from 25 to 1. It covers each combination of five levels of 'probability' (a letter A to E as defined in **Table K-2**) and 5 levels of 'consequence', (a number 1 to 5 as defined in **Table K-3**) to identify the risk ranking of each impact. For example an activity with a 'probability' of D and a 'consequence' of 3 yields a risk rank of 9.

Table K-2: Measure of probability (LUCRA Guide)

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

Table K-3: Measure of consequence (LUCRA Guide)

Level	Descriptor	Description
1	Severe	– Severe and/or permanent damage to the environment – Irreversible – Severe impact on the community – Neighbours are in prolonged dispute and legal action involved
2	Major	– Serious and/or long-term impact to the environment – Long-term management implications – Serious impact on the community – Neighbours are in serious dispute
3	Moderate	– Moderate and/or medium-term impact to the environment and community – Some ongoing management implications – Neighbour disputes occur
4	Minor	– Minor and/or short-term impact to the environment and community – Can be effectively managed as part of normal operations – Infrequent disputes between neighbours
5	Negligible	– Very minor impact to the environment and community – Can be effectively managed as part of normal operations – Neighbour disputes unlikely

Step 3: Risk reduction

The process of risk reduction aims to identify management strategies that affect the probability of an event occurring, such as the implementation of certain procedures, new technology or scientific controls that might lower the risk probability values. The objective of risk reduction controls is to lower the risk ranking score to 10 or below.

Mitigation measures determined in the EIS relevant to the identified potential conflicts are provided in **Table K-4**.

Step 4: Record LUCRA results

The potential conflicts, their risk level, recommended management strategies and revised risk level are provided in full in **Table K-4**.

Table K-4: LUCRA results

Step 1 Identified potential conflict	Step 2 Unmitigated risk rating[1]	Step 3	
		Risk reduction management strategy	Revised risk rating
Generation of dust affecting human health, animal health and viability of grazing activities.	4	Revegetation of disturbed areas as soon as practicable to minimise exposed areas.	2

Step 1 Identified potential conflict	Step 2 Unmitigated risk rating[1]	Step 3 Risk reduction management strategy	Revised risk rating
Erosion of land and sediment run off into adjacent waterways entering neighbouring properties, particularly during rain events that alters the topography of that land and requires works to be carried out that would rectify the issue. This may affect livestock drinking water quality downstream.	12	Preparation and implementation of an Erosion and Sediment Control Plan in accordance with the *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2E Mines and Quarries* (DECC, 2008). At a minimum, the ESCP would include the following provisions: – install erosion and sedimentation control measures prior to disturbance – ensure vehicles, plant and equipment leave the Premises in a clean condition to minimise mobilisation of sediment onto adjacent roads – soil handling and stockpiling procedures – stabilise and rehabilitate disturbed areas as soon as practicable. The following mitigation measures to proactively control potential surface water quality impacts would be implemented and documented within an EMP: – Design and construct dirty water / clean water drainage structures to capture sediment water from the Indicative Quarry Extraction Area and convey it to the existing sediment pond while allowing clean water from undisturbed and rehabilitated areas to be conveyed downstream of the existing sediment pond. – Quarterly surface water quality monitoring for pH, EC, TSS and oil and grease would be undertaken at monitoring locations shown in Figure 6-7 to establish baseline surface water quality and incorporate a trigger action framework to identify and correct issues. – Development of an Erosion and Sediment Control Plan to identify measures to minimise soil erosion and transport of sediment off-site.	8
The Project is not compatible with exploration activities and potential future extraction activities.	6	The holder of EL8980 and EL9087 was contacted during the preparation of this EIS. Whilst a response was not received, it is noted that the holder is aware of the quarry's existence and their current area of interest does not overlie the Project. Therefore, the Project is not expected to prevent the continuation of exploration activities. Where any changes to the Project are proposed, the holder would be contacted during the approvals process. Additional mitigation measures are not proposed.	3
Degradation of Kingstown Road as a result of increased heavy vehicle movements leading to a decline in road pavements conditions that may cause damage to, or pose a safety risk, to other vehicles.	17	Maintenance of the road would be the responsibility of and undertaken by USC. In return, the Applicant would pay the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads). Haulage would be ceased where rain events exceed 20 mm for at least a 24 -hour period to reduce impacts on pavement.	5

Step 1 Identified potential conflict	Step 2 Unmitigated risk rating[1]	Step 3 Risk reduction management strategy	Revised risk rating
Increased heavy vehicle movements on Kingstown Road resulting in road safety issues, including other vehicles and livestock (when grazing permitted in road corridor)	13	Measures to mitigate the traffic impacts would be implemented and documented within an EMP. Consult and request USC / TfNSW review swept path right turn out heading southbound and implement outcomes that minimise conflict. Consult and request USC / TfNSW consider the extension of the 50 km/h speed zone and implement an 80 km/h speed zone to reflect the road environment and its inherent safety issues. In the absence of a regulatory 80 km/h speed limit being introduced a self-imposed speed limit would be implemented for the Kingstown Road (outside of the 50 km/h section). Quarry intersection to be upgraded to include appropriate turn treatments with associated controls. Seal to extend at least to the existing cattle grid. Heavy duty wearing course over the primary section of the roadway is recommended to improve the durability of the pavement and its susceptibility to failure. Communicate to drivers on a regular basis the location of the current school bus stop locations. Install UHF in school bus and operate haulage vehicles on same channel (if acceptable to the School Bus Proprietor). Develop a Driver's Code of Conduct to encompass known hazards, vehicle checking and maintenance procedures, school bus routes and pick up/drop off locations, self-imposed speed limit of 80 km/h on Kingstown Road and chain of responsibility requirements relating to fatigue. Implement a self-imposed speed limit of 40 km/h adjacent to the cemetery when funerals are undertaken. Continue to assess significant pedestrian and/or cyclist activity and mitigate where necessary. Payment of the Section 7.11 contribution for road maintenance, including delineation, signage, vegetation removal and localised shoulder widening (contribution rate of $0.111 per tonne per km current as of June 2021 applicable on regional or local sealed roads). Haulage would be ceased where rain events exceed 20 mm for at a 24-hour period to reduce impacts on pavement.	9