MT BUNDARBO QUARRY EIS

Mt Bundarbo Quarry

May 2021

Project Number: 20-481



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DOCUMENT VERIFICATION

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CERTIFICATION

For submission of an Environmental Impact Statement under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979*.

EIS prepared by: NGH Pty Ltd

Applicant: Bald Hill Quarry Pty Ltd

Proposed development:

The Mt Bundarbo Quarry Proposal includes the construction, operation and rehabilitation of a quarry extension to existing quarry operations. Bald Hill Quarry Pty Ltd is approved to extract and process 100,000 to 150,000 tonnes per annum (tpa) with peak demands of up to 300,000 tpa. This Proposal does not seek to alter existing extraction and processing volumes.

Land to be developed:

Lot 148 DP753592, Lot 9 DP439146, Lot 7002 DP1031310 and road reserve.

Certification:

I certify that I have prepared the contents of this Environmental Impact Statement in accordance with Schedule 2 of the Environmental Planning and Assessment Regulations 2000. To the best of my knowledge, this assessment contains all available information that is relevant to the environmental assessment of the project and that information is neither false nor misleading.

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ACRONYMS AND ABBREVIATIONS

AHIMS	Aboriginal heritage information management system
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCD	Biodiversity Conservation Division of DPIE (formerly OEH)
BLM	Bureau of Land Management
BOM	Australian Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CEMP	Construction environmental management plan
CNET	Construction Noise Estimator Tool
Cwth	Commonwealth
DD	Due Diligence
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater Dependant Ecosystem
GHG	Greenhouse Gases
ha	hectares
Heritage Act	*Heritage Act 1977* (NSW)
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
km	kilometres
LALC	Local Aboriginal Land Council
LCU	Landscape character unit
LEP	Local Environment Plan
LGA	Local government area
LMZ	Local management zones
m	metres
MNES	Matters of National environmental significance under the EPBC Act (*c.f.*)
NML	Noise management level
NPI	*Noise Policy for Industry 2017* (NSW)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
PMF	Probable maximum flood (level)
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)

SEARs	Secretary's Environmental Assessment Requirements
Sensitive receiver	A place or object that is sensitive to a particular environmental impact. e.g. school, place of worship, residence, heritage building/structure, pipeline (for vibration/blasting). These may be separately defined by government and industry policies and guidelines
SEPP	State Environmental Planning Policy (NSW)
sp/spp	Species/multiple species
TfNSW	Transport for NSW
TIA	Traffic Impact Assessment
tpa	tonnes per annum
UFP	Unexpected Finds Protocol
VIA	Visual Impact Assessment
VOCs	Volatile Organic Compounds
ZVI	Zone of Visual Influence

TABLE OF DEFINITIONS

The Proponent	Bald Hill Quarry Pty Ltd (BHQ)
Subject Land	All land within the affected lot boundaries. The subject land comprises Lots 9 DP 439146, Lot 148 DP 753592, Lot 11 DP 133540, Lot 7002 DP 1031210, and crown road reserve, approximately 354.63 ha.
Development site / Proposal area	The area of land that would be leased for the proposal. The development site is approximately 29.57 ha and includes the section of new access track. The development site is the area surveyed for this assessment prior to identified constraints and exclusions.
Development footprint	The area of land that is directly impacted by the quarry and new section of access track. The development footprint is approximately 12.96 ha.
Proposal	The overall project as described in 1.2.

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) identifies and assesses the environmental issues associated with the construction and operation of Mt Bundarbo Quarry, as well as the extension of the haul road from North Ridge Quarry, which is located approximately 700 m north of the Proposal. The development is located approximately 7.5 km southeast of Jugiong, in the Hilltops Local Government Area (LGA). The total development footprint covers approximately 12.96 ha of land, which is comprised of Crown Lands and lands held by two title owners. The Quarry has a maximum extraction potential of 4 million tonnes over its twenty-year life cycle.

NGH has prepared the EIS on behalf of the Proponent, Bald Hill Quarry Pty Ltd (BHQ). The Proposal is for the purpose of an extractive industry and is classified as Designated and Integrated Development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This EIS has been prepared in accordance with Part 4 of the EP&A Act to support a Development Application (DA) to be lodged with Hilltops Council for assessment. The Proposal is Regionally Significant Development according to the provisions of the State Environmental Planning Policy (State and Regional Development) 2011 and would be determined by a regional planning panel.

The objective of this EIS is to fulfil the requirements of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and Section 4.15 of the EP&A Act. The structure and content of the EIS is to address the Secretary's Environmental Assessment Requirements (SEARs), provided by the NSW Department of Planning, Industry and Environment (DPIE) on 27 May 2020, which were revised 13 January 2021 (refer Appendix A).

PROPOSAL DESCRIPTION

The proposed Mt Bundarbo Quarry would have a maximum extraction potential of 4 million tonnes over its twenty-year life cycle and would include:

- A new 800 m section of haul road.
- A new quarry footprint of approximately 8 ha.
- Drill and blasting for extraction up to five to ten times a year.
- Use of existing quarrying equipment for road construction and quarry operations.
- Haulage of extracted rock via the new and existing haul road to the existing processing plant at the Bald Hill Quarry, located approximately 4 km north.

BHQ proposes no change to the current and ongoing scale of the existing North Ridge winning, haulage and processing operation. The proposed Mt Bundarbo pit would only be fully extracted once North Ridge resources have diminished and ensuring compliance within the extraction limits. BHQ is approved to extract and process 100,000 to 150,000 tonnes per annum (tpa) with peak demands of up to 450,000 tpa from North Ridge.

The Proposal would include the current operating conditions of the North Ridge Quarry and Bald Hill Landfill including:

- Seven to ten staff in the quarry and two staff at the current landfill.
- The same number of truck movements.
- No additional permanent buildings or ancillary facilities.
- No additional water use.
- Use of the on-site rock processing plant located adjacent to the Bald Hill Landfill.
- Use of existing stockpile areas.

The development site would be accessed via the Hume Highway onto an existing local road and internal haul roads. The Hume Highway provides access to the region's transport network.

The Proposal would require the Option Deeds to be processed for Lot 148 DP 753592, Lot 9 DP 439146 and Lot 11 DP 133540. The Proposal would also require a determination of the land claims associated with the Crown Land Lot 7002 DP 103131. A submission has been made to the Crown Lands Aboriginal Land Claims Unit to expedite a determination. The parcel of Crown Land is located in the final pit schedule. Resource would not be extracted from this lot until a positive determination.

The Proposal is expected to operate for 20 years. The construction phase of the Proposal is expected to take three months and will commence as soon as the development is approved. After the operating phase, the Proposal will be decommissioned. Following closure, a Quarry Closure Plan would be enacted to rehabilitate the site before returning it to the landowner.

STRATEGIC NEED

The *NSW South East and Tablelands Regional Plan 2036* (the Regional Plan) (DPE, 2017) guides the NSW Government's land use priorities over the next 20 years, providing an overarching framework to guide subsequent land use plans, development Proposals and infrastructure funding decisions.

The Regional Plan is broken down into a number of goals and directions, which detail a number of actions to be considered during the planning process.

The Hilltops Council has prepared the *Hilltops 2040, Hilltops Council Local Strategic Planning Statement 2020-2040* (LSPS) (Hilltops Council, 2020), which sets out the 20 year vision for land-use in the local area, the special character and values that are to be preserved and how change will be managed into the future. The LSPS is the strategic document that distils strategic objectives, priorities and directions from the Hilltops Community Strategic Plan and relevant State and Regional policy to ensure these are reflected and furthered through land use planning in Hilltops.

PROJECT BENEFIT

Social and Economic Benefits

Social and economic benefits have been considered for the Proposal. The Proposal would be beneficial to the community and economy of the region because:

- The Proposal would result in employment retention. The site currently has five Fulltime Equivalent (FTE) staff, three casual and three mechanics that service the site.
- Support local employment and regional development and economic opportunities, outside of the operations on the site.
- Over the life of the Proposal it would provide approximately $60 Million of capital investment value in the region.
- The use of the extracted material locally or within the region would result in increased visitation to towns and localities for services including food and accommodation, resulting in shared economic benefits.
- The Proposal would meet local strategic and statutory provisions, endorsed by the local Council and community, that apply to the Proposal.
- It would potentially reduce road kilometres to development sites in the region, and in turn potentially reduce greenhouse gas emissions that contribute to climate change, by providing a resource that can be locally sourced and is well located to access major roads and train lines minimising travel.

Environmental Benefits

Locally acquired material, basalt, currently used for the purposes of aggregate and road base material to local councils and other clients within the region, would reduce road kilometres and reduce the impacts of Greenhouse Gasses (GHG).

Benefits of the proposed rehabilitation works would include:

- Revegetated areas would reintroduce habitat and foraging resources back into the landscape.
- The water collected and pumped from the sediment basin would be used for filling farm dams for the landholder to use for watering stock.
- Land within the footprint would be returned to agricultural production.
- A constructed and maintained road would be available for the landholder to use.

SITE SUITABILITY

The reasons for this development site include:

- Identification of the hard rock resource.
- Existing rock crushing and processing infrastructure in proximity to the site.
- Existing workshop in proximity to the site.
- Existing staff facilities and amenities in proximity to the site.

KEY ENVIRONMENTAL ASSESSMENT ISSUES

The following environmental risks were considered to be key issues for detailed assessment and consideration of mitigation strategies within the EIS:

- Land Use.
- Biodiversity.
- Water use and quality (surface water and groundwater).
- Climate and air quality.
- Visual amenity.
- Aboriginal heritage.
- Noise and vibration impacts.
- Traffic, transport, and road safety.

In addition, the following were also identified as being environmental assessment issues of lower risk: topography, geology and soils, historic heritage, socio-economic and community, hazards, resource use and waste generation, and cumulative impacts.

Biodiversity, Aboriginal heritage, traffic, and air quality impacts were investigated by specialists.

Land Use

NGH assessed the land use impacts of the Proposal, using a land use conflict risk assessment (LUCRA) carried out in accordance with the Department of Primary Industry's *Land Use Conflict Risk Assessment Guide* (DPI 2011). Given the proposed quarry is different to the surrounding land use activities, primarily agriculture, this assessment aims to identify and rank potential land use conflicts so that they may be adequately managed. Where expected conflicts are adequately managed, the rights of the existing and proposed land uses can be protected. Although the Proposal is not reversible, the Proposal would result in a small permanent loss (approximately 12 ha) of agricultural land.

The range of scores in the LUCRA revised risk rating were low to moderate, demonstrating that the proposed construction of the quarry would have minimal impact to surrounding land uses.

Biodiversity

The native vegetation determined to be present on the development site includes two PCTs and exotic vegetation. The exotic vegetation, vegetation zone 3, covers 6.03 hectares in the proposed development site.

The PCTs that are present on site include the following:

- 23.01 hectares of PCT 266 *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion* within the quarry site including Vegetation Zone 1 (PCT 266 exotic understory) and Vegetation Zone 2 (PCT 266 Derived Grassland).
- 0.05 hectares of PCT 277 *Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion* at the Hume Highway intersection including Vegetation Zone 4 (PCT 277 exotic understory).

Targeted flora surveys were carried out for seven species. No threatened flora were recorded on site, therefore no species credits for threatened flora were generated. Targeted fauna surveys were carried out for 14 species.

Brush-tailed Phascogale was unable to be surveyed for during the assessment phase. Therefore, it is assumed this species is present on site in PCT 266 Vegetation Zone 1. The impact area covers 6.83 ha (Vegetation Zone 1) generating 70 species credits. There will be a loss of 105 Hollow-bearing trees in Vegetation Zone 1.

Box Gum Woodland is listed as an entity that is at a risk of a Serious and Irreversible Impact (SAII) under the BC Act. An assessment has been completed in accordance with BAM 2020 and the principals set out in the BC Regulation to assist the determining authority in determining whether a SAII is possible.

An Assessment of Significance was completed for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) listed species (below). However, it was determined no EPBC referral is required.

The Assessments of Significance were completed for six fauna species.

To prevent any indirect impacts to surrounding native vegetation, mitigation measures have been outlined for the construction phase of the development. With the retirement of credits and effective implementation of the mitigation measures, the proposal would be consistent with the requirements of the BAM.

Water Use and Quality

No discharge of water into natural waterbodies is expected to take place from the Proposal. Due to the lack of groundwater in the locale and below the subject site, impacts to groundwater and groundwater dependant ecosystems are considered negligible during the construction process and should pose no constraints upon the subject site.

Erosion risk, especially from runoff entering neighbouring properties would be minimal during the construction phase. This would be due to the enclosed nature of the pit, centripetal drainage pattern and the source material is rock. All on-site runoff would be intercepted by stormwater devices and transferred to holding dams. No additional erosion risks on surrounding land would be presented from ongoing use of the development site. Vegetation should be maintained wherever possible to limit erosion risk.

During operation, site water demands would be negligible and water disposal methods would replicate the process used by the adjacent North Ridge quarry. Water disposal methods would include reuse for dust suppression on roads, processing plant and amenities. It is expected that 5 to 10,000 L of water per day would be used by the Proposal during operation. A large component of this is non-potable water for dust suppression and would be sourced from the North Ridge Quarry or Mt Bundarbo Quarry pits or the licensed groundwater bore when required. Rainwater is used for staff amenities, collected in tanks receiving runoff from the buildings. Potable water for staff is supplied as bottled water.

The Proposal is not prone to flood inundation from the Murrumbidgee River or surrounding ephemeral streams. During operation, the topography of Mount Bundarbo would dramatically change, however due to the enclosed

nature of the proposed pit, no additional runoff is expected from the site that would impact regional flood behaviour on properties, assets, and infrastructure. In the unlikely event of storm water flooding, where water may pool from heavy rainfall events, the quarry pit would likely remain stable with the implementation of benching quarry walls and pumping excess water.

Climate and Air Quality

No new impacts on air quality, different to that already experienced by nearby receptors, is expected as part of the proposed works. Dust generation would accompany clearing, excavation, and other earthworks as well as the movement of trucks and work vehicles along the unsealed access road during construction of the quarry.

Access tracks would be regularly maintained, sealed where necessary and dust suppression applied when required. Dust creation is expected to be limited to short-term unsealed roads and unsealed roads within the development site. As such, a noticeable increase in dust creation is considered unlikely.

Several pollutants, such as nitrogen oxides, sulphur dioxide, carbon monoxide and Volatile Organic Compounds (VOCs), are released during the operation of onsite quarry plant and equipment. Pollutants released from the combustion of fuels are unlikely to compromise air quality goals at the nearby site receptors given the scale and nature of the Proposal.

Transport (including operation of machinery) is likely to be the largest source of GHG emissions during operation from fuel combustion contributing to climate change, this includes minor additions to heavy vehicle movements along the extension of haul road. Explosive events are likely to generate GHG emissions, however would occur 5-10 times per year. Land use change and vegetation clearing would also be a contributor to GHG emissions; the disturbed landscape would be revegetated during the rehabilitation phase of the project. All these minor additions to GHG emissions can be reduced with the implementation of the mitigation measures outlined in Table 6-15.

The existing quarry processing facility can only process up to 1200 tonnes per day and with the addition of a mobile processing plant, a maximum of 2000 tonnes per day of rock can be processed. Therefore no additional GHG emissions would be generated as a result of this Proposal as the volume of rock processed per day would not increase.

Visual Impact

NGH completed a Visual Impact Assessment (VIA) utilising field surveys, community consultation, background investigations, mapping, and an assessment of the viewshed and local vantages in order to evaluate the operational visual impact of the Proposal.

Two involved and nine uninvolved residences were located within 4 km of the subject land. Four Landscape Character Units (LCU) were identified within Jugiong and surrounding areas:

- Rural (including agricultural lands).
- Residential (viewpoints near residences).
- Industrial (major roads, quarries, landfill, electrical and other built infrastructure).
- Commercial (businesses, town centre).

Ten representative viewpoints were identified using the Bureau of Land Management (BLM) methodology and within the Zone of Visual Influence (ZVI). The operational visual impact assessment was undertaken considering:

- The scenic quality of the study area's LCU.
- The expected sensitivity at representative viewpoints.
- The proximity of each representative viewpoint.

All ten viewpoints were assessed as having low visual impact from the proposed quarry. The development site is completely invisible from six of these locations, due to the undulating nature of the landscape. No visual mitigation is required for the Proposal.

Dust would be controlled in response to visual cues during construction of the development. Night lighting can also contribute to glare and waste energy. The operation of night lighting would be minimised to the maximum extent possible and compliant with all relevant standards, codes of practice and policies.

Aboriginal Heritage

NGH prepared a Due Diligence (DD) assessment to provide an assessment of the Aboriginal cultural values associated with the Development site and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded. The consultation was undertaken in consultation with Aboriginal stakeholders.

Ninety Aboriginal sites were recorded within the search area and no Aboriginal places. Site types included artefacts, culturally modified trees, potential archaeological deposits and an artefact and watering hole. No previously registered AHIMS sites are located within or adjacent to the development site. The closest AHIMS site is located approximately 6 km west of the development site.

The impact of the Proposal on Aboriginal cultural heritage has been assessed to be low. Works would proceed with caution and an Unexpected Finds Protocol (UFP) would be prepared and followed should there be an inadvertent discovery of Aboriginal objects during construction.

Noise and Vibration Impacts

The construction and operation of the quarry has the potential to affect the community due to noise and vibration. NGH completed a quantitative noise assessment for both the construction and operation of the Proposal in accordance with the NSW EPA Noise Policy for Industry 2017 (NPI) and the NSW EPA Interim Construction Noise Guideline 2009 (ICNG). An operational noise impact assessment has been prepared in accordance with the NSW Road Noise Policy. The Transport for NSW (TfNSW) NSW Construction Noise Estimator Tool (CNET) (TfNSW, 2016) was used to quantify noise impacts from the construction and operation of the Proposal.

A review of the existing environment identified noise sources from land use adjacent to the development site would generally consist of livestock grazing, cultivation, harvesting of fodder, and road traffic from the Hume Highway. Noise generating equipment would include livestock, tractors, quad bikes, light vehicles, and heavy vehicles. These land uses characterise the background noise within the area. Noise levels from farm activities would likely be concentrated at peak times within given seasons. Hume Highway road traffic noise is generated from the 10,000 plus vehicles per day including 40% heavy vehicles (NSW Live Traffic - Coolac). Blasting already takes place at the existing quarry four times per year. The proposed quarry would blast up to five times a year.

Five sensitive receivers (rural residences) are located within 3 km of the development site boundary (Figure 6-8). The nearest receiver is a farmstead located about 1450 m north-east of the development site boundary. All five receivers have been included in this assessment.

It is predicted that no noise exceedance above the project Noise Management Level (NML) would occur for the five receivers located within 3 km of the Proposal during construction and operation.

Traffic, Transport, and Road Safety

NGH engaged Amber to prepare a Traffic Impact Assessment (TIA) to assess the traffic impacts of the Proposal, refer to Appendix G. Access to the site is proposed via the existing connection with the Hume Highway which is proposed to be upgraded to accommodate heavy vehicles. The TIA determined the following:

- The site is expected to generate up to 184 vehicle movements per day as part of the Proposal, which is an increase of 50 vehicle movements per day and 6 vehicle movements during the peak hour.
- The road network is able to readily accommodate the traffic generated by the development and will be less than the daily variation of the road network.
- The intersection of the site access with the Hume Highway is proposed to be upgraded to accommodate a heavy vehicle to enter the site at the same time as a heavy vehicle exits the site.

The TIA concluded that the proposed access arrangements for the quarry are suitable to accommodate the expected vehicle types and traffic volumes.

Topography, Geology and Soils

The site is currently the crest and upper slopes of Mt Bundarbo, which has a peak elevation of around 597 m Australian Height Datum (AHD). Surrounding topography is moderately steep to steep hilly terrain. The site surface comprises predominantly granite boulders and grasses in varying ratios.

Earthworks required during construction include construction of access roads, removal and stockpiling of topsoil and overburden and creation of a sediment basin (refer to Figure 6-18 and Figure 6-19.

Pit development is a staged process. Topsoil and overburden would be removed in stages. The area impacted for stage 1 includes approximately 2,954 m^2 for the pit, which would become the sediment basin for stage 2 onwards, approximately 287 m^2/ha for the dam and approximately 1 ha for the haul road. Topsoils would be removed and stockpiled separately to the overburden. Excavated subsoils would be stockpiled and contained to avoid potential dispersion and sediment transfer. The stockpile site would be located at the south-eastern toe of stage 1 pit development. ‘

These activities would remove the existing groundcover and disturb soils, potentially increasing their susceptibility to erosion and subsequent sedimentation in areas offsite. Soil compaction would occur as the extension to the haul road is created. This would reduce soil permeability thereby increasing run off and the potential for concentrated flows.

The risk of erosion is considered low. With limited topographic relief, runoff is considered to be readily manageable and unlikely to cause substantial erosion or lead to substantial sediment loads entering any natural waterways. The existing road has proven durable and has proven resistant to erosion.

Historic Heritage

In the Hilltops Local Government Area (LGA) there were four items listed on the Commonwealth Heritage list, three items on the NSW State Heritage Register and ten items/places on the NSW State Agency Heritage Register. There are 112 listed items/places in the *Greater Hume Local Environment Plan (LEP) 2012*. None of the items listed in the State Heritage Search were located within 3 km of the Proposal.

No impacts are considered likely on heritage values by the Proposal.

Socio-economic and Community

The Proposal is unlikely to cause negative impacts on the local economy. BHQ and its employees would benefit a range of local and regional economies through direct spending of wages and employing contactors, consultants, trades people, transport operators and other associated service providers.

Hazards

Hazards onsite would be managed in accordance with the Bald Hill Quarry's Integrated Work, Health, Safety and Environment Management System and Mine Safety Management Plan (MSMP), and within guidelines in accordance with the *Work Health and Safety Act 2011* NSW (WH&S Act), the Work Health and Safety Regulation 2017 and relevant Australian Standards.

Preliminary Risk Screening

Dangerous goods stored and used at Bald Hill Quarry Jugiong site at the existing landfill, workshop, and processing plant area already occur and are not considered as part of this assessment. Hazardous materials that would occur as part of this Proposal would be the storage of fuels within bunded containers within the quarry pit.

The project is not considered to be a potentially hazardous development with respect to the storage, use or transportation of hazardous substances. Therefore, in accordance with SEPP 33, a PHA is not required, and no further risk analysis or assessment is required.

Bushfire

Majority of the development site would be cleared of the existing vegetation. The surrounding area is subject to previous quarrying activities. The surrounding area is not identified as bushfire prone land (RFS 2021). However, the risk still exists due to the remote location and remnant vegetation, which represents a potentially significant fuel load capable of sustaining and promoting the spread of bushfire.

As such, the potential risk to the extraction operations from bushfire attack are assessed from the point of view of emergency evacuation and management in the case of a bushfire emergency and the potential for the operations to cause a bushfire for example, from the operation of machinery.

Resource Use and Waste Generation

During construction and rehabilitation, resources used would be associated with:

- Site establishment.
- Maintenance activities.
- Use of machinery and vehicles.

Construction activities that would produce wastes include:

- Excavation of topsoils, overburden and vegetation clearing.
- Used oils and grease from plant and equipment maintenance.

Topsoil and overburden would be reused on site. Topsoil would be used during rehabilitation activities. Overburden would be reused to fill the sediment basin following stage 1 of pit operations and for blending with the product. Water would be required during construction for activities including watering of roads, topsoil stockpiles and in the site office and amenities compound.

Where possible, recyclable materials would be sourced where required. Recycling bins are provided on site, along with general rubbish bins at the existing office building, workshop and staff amenities. General waste would be disposed of at the adjacent Bald Hill Ecofill Landfill. Recyclable material would be sent to an appropriate recycling facility.

During operation, the solid waste streams would be associated with maintenance activities and presence of employees. Some materials, such as fuels, lubricants and metals may require replacement over the operational life of the Proposal.

Most of the Proposal components are reusable or recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

Cumulative Impacts

The incremental effects of the Proposal on existing background conditions in the study area have been considered in the preceding assessment sections. The proposed Mt Bundarbo Quarry would contribute to overall infrastructure development in the region.

Cumulative impacts may have a minor impact to State Significant Development (SSD) Proposals occurring within the LGAs. Mechanisms to consult with local industry are however, included in section 5 and Appendix C, and would assist to manage cumulative impacts should additional developments become relevant to the Proposal.

During construction and operation, key cumulative impacts may include community complaints regarding visual amenity impacts, stress on local business for supply and demand, staff accommodation, noise impacts, air quality, waste management, traffic etc.

Rehabilitation

Wherever possible, rehabilitation would be completed progressively as part of ongoing development of the quarry. Rehabilitation of areas disturbed during the establishment and construction phase for the Proposal would occur generally within two to three months of completion of earthworks. This approach would minimise the visual impact of the project from surrounding areas and stabilise the surfaces, thereby reducing the potential for erosion.

1. INTRODUCTION

Definitions used within this EIS:

Subject Land: All land within the affected lot boundaries. The subject land comprises Lots 9 DP 439146, Lot 148 DP 753592, Lot 11 DP 133540, Lot 7002 DP 1031210, and crown road reserve, approximately 354.63 ha.

Development site: The area of land that would be leased for the Proposal. The development site is approximately 29.57 ha and includes the section of new access track. The development site is the area surveyed for this assessment prior to identified constraints and exclusions.

Development footprint: The area of land that is directly impacted by the quarry and new section of access track. The development footprint is approximately 12.96 ha with a pit footprint of 8 ha.

1.1. PURPOSE AND SCOPE OF THIS DOCUMENT

This Environmental Impact Statement (EIS) identifies and assesses the potential environmental impacts associated with the construction and operation of the proposed Mt Bundarbo Quarry (the proposal). NGH has prepared this EIS on behalf of the Proponent, Bald Hill Quarry Pty Ltd (the Proponent).

The proposal is classified as integrated development under section 4.46 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) as it requires additional statutory authorisations.

The Proposal (extractive industries) is Designated Development under section 4.10 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 3 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

This EIS has been prepared in accordance with Part 4 of the EP&A Act to support a Development Application (DA) to be lodged with Hilltops Council.

The objective of this EIS is to fulfil the requirements of Schedule 2 of the EP&A Regulation and Section 4.15 of the EP&A Act. The structure and content of the EIS is to address the Secretary's Environmental Assessment Requirements (SEARs), provided by the NSW Department of Planning, Industry and Environment (DPIE) on 27 May 2020, which were revised 13 January 2021 (refer Appendix A).

The Proponent has engaged NGH to prepare the EIS. Other independent consultants have been engaged to provide specialist technical assessments as required. This EIS will be independently evaluated by the NSW Southern Regional Planning Panel (SRPP), considering input from the community provided during the public exhibition period. The process provides for public transparency, accountability, and participation in development approval decision-making.

The development assessment process places the onus on the Proponent to provide the information required for the SRPP to make an informed decision. It is considered that this EIS provides the required information to enable the assessment of the Proposal.

1.2. PROJECT OVERVIEW

1.2.1. The Proponent

Bald Hill Quarry Pty Ltd (BHQ) was established in 1989 to manage and operate the Bald Hill Quarry. BHQ now operate a regional landfill (Bald Hill Ecofill Landfill) and quarry adjacent to the Hume Highway approximately 7.5 km southeast of Jugiong in Southern NSW. Basalt quarry operations have been operating in the area for more than 30 years. The current operations include open pits, crushing,

screening and transporting material offsite providing the local area with aggregates and road base material.

Additionally, BHQ has two mobile crushing plants that operate on a contract basis providing crushing and screening services for local and state government enterprises along with Tier 1 & 2 civil construction companies.

1.2.2. Development Site Location

The location of the development site is provided in Figure 1-1. The new pit and extension to the haul road for site access would be located across the following Lot and DP numbers (Figure 1-2):

- Lot 9 DP 439146 for an extension to the haul road / site access.
- The following lots for extraction:
  - Lot 7002 DP 1031310 – Crown Reserve (trig station)
  - Part of Crown Reserve (undedicated) – paper road.
  - Part of Lot 148 DP 753592.
  - Part of Lot 11 DP 133540.

The location of the development site for the intersection upgrade of the Old Hume Highway is included in Figure 1-3.

The site is located approximately 7.5 km southeast of Jugiong in the Hilltops Council Local Government Area (LGA). The site is approximately 700 m south-south east of the existing quarry area and accessed off the Hume Highway north of the site.

The development site is located within a rolling hills agricultural landscape; the majority of woodland in the surrounding landscape has been cleared. Farm dams are located along drainage lines. The Murrumbidgee River is the receiving water. Vehicles and livestock are the main land disturbances of the study area. A landfill, operational quarry, haul road, hard rock processing plant and soil stockpiling site are the other disturbing land uses in proximity to the Proposal (Figure 1-4).

1.2.3. Key Components of the Mt Bundarbo Quarry

The Proposal involves a quarry operation on the eastern and south-eastern side of Mt Bundarbo and an extension of the haul road from the North Ridge quarry, located approximately 700 m north.

The Proposal would include:

- A new 800 m section of haul road.
- A new quarry footprint of approximately 8 ha.
- Drill and blasting for extraction up to five to ten times a year.
- Use of existing quarrying equipment for road construction and quarry operations.
- Haulage of extracted rock via the new and existing haul road to the existing processing plant at the Bald Hill Landfill site, located approximately 4 km north.

The Proposal would include the current operating conditions of the North Ridge Quarry and Bald Hill Landfill including:

- Five full time staff, three casual, three maintenance staff and administration staff.
- The same number of truck movements.
- No additional permanent buildings or ancillary facilities.
- No additional water use.
- No new accesses to the local and regional road network.
- Use of the on-site rock processing plant located adjacent to the Bald Hill Landfill.
- Use of existing stockpile areas.

The Proposal seeks approval for extraction of 150,000 tonnes per annum (tpa) with peak periods of 450,000 tpa over a period of 20 years. However, total extraction would not exceed 4 million tonnes of resource for the life of the project.

Full details of the Proposal are contained in section 3.

1.2.4. Capital Investment

The Proposal would have a capital investment of approximately $225,000.

1.2.5. Land Ownership

The subject land is owned by one title holder and Crown Lands (Table 1-1). The land ownership for all lots of BHQ operations including the haul road corridor and the rock processing plant are included in Table 1-2.There is a total of three landowners across the whole operations. Landowner 1 (involved), Landowner 2 (proponent) and Landowner 3 (involved).

Table 1-1 Land ownership of the subject land for the Proposal

Property Description	Zoning	Landowner	Components
Lot 9 DP 439146 Lot 148 DP 753592 Lot 11 DP 133540	RU1 Primary Production	Landowner 1 (involved)	Southern portion of Mt Bundarbo Pit Haul road corridor extension.
Lot 7002 DP 1031310 Part of Crown Reserve (undedicated)	RU1 Primary Production	Crown Lands	North-western portion of pit footprint. Permanent survey mark TS6184 Centre of pit footprint.

Table 1-2 Land ownership of the subject land for BHQ operations

Property Description	Zoning	Landowner ID	Components
Lot 7 and 9 DP 133540 Lot 11 and 12 DP 439146 Suburb of Berremangra, Local Government Area (LGA) of Hilltops	RU1 Primary Production	Landowner 2 (involved – Proponent)	Site Access Road Bald Hill Quarry Processing Plant and Stockpile area Haul Road Corridor
Lot 178 DP 753592 Suburb of Berremangra, LGA of Hilltops	RU 1 Primary Production	Landowner 3 (involved)	Haul Road Corridor
Lots 7 and 8 DP 439146 Lot 43 and 148 DP 753592 Suburb of Berremangra, LGA of Hilltops	RU1 Primary Production	Landowner 1 (involved)	Haul Road Corridor North Ridge Quarry Soil Stockpile area

The use of the site is based on a Licence to Operate or Access Agreement between the Proponent and the landowners 1 and 3.

Approval was sought by the client to remove the permanent survey marker (TS6184) located within Lot 7002 DP 1031310. Removal has been approved by the Surveyor-General (Appendix C).

The Crown Land Lot 7002 DP 103131 is subject to land title claims. A submission has been made to the Crown Lands Aboriginal Land Claims Unit to expedite a determination. Resource would not be extracted from this lot until a positive determination. If resource cannot be extracted from Lot 7002 DP 1031310, a right of way access would be made available for land title claimants to access the site.

1.2.6. Development History

Development consent for the Bald Hill Quarry Proposal was originally granted in 1984. In 1989, following significant investment and restructuring, Bald Hill Quarry Pty Ltd commenced a strategic market development plan targeting a quality product to a market specifically seeking high quality crushed rock products.

A Development consent for the North Ridge operation was granted in April 1999 (DA T.98.027) for the extension of hard rock quarrying activities, new extraction site, ongoing use of existing processing plant, new raw feed haul route and product transportation. Bald Hill can extract 100,000 to 150,000 tonnes per annum (tpa) with peak demands of up to 450,000 tpa. A modification to DA T/98.027 was approved in March 2020 (DA T98.027.1 to extend the quarry life to April 2024.

BHQ Jugiong also operates under Environmental Protection Licence (EPL) number 2552, last updated in October 2020.

The original Bald Hill pit is now a Bald Hill Ecofill Landfill and the North Ridge pit is still in operation, as outlined in the Environmental Impact Statement (1998) and Development approval DA T.98.027.1.

The Landfill known as “Ecofill” is accommodated in a disused quarry void. The Bald Hill Ecofill Landfill is operated under DA262-09-01 and EPL 2552. Bald Hill Ecofill Landfill has a contractual arrangement with a consortium of Local Government Councils known as South West Regional Waste Management Group (SWRWMG). Bald Hill Ecofill Landfill takes waste from SWRWMG waste transfer stations. The Facility is open five (5) days a week with most waste being delivered by truck.

A search for State Significant Development (SSD) on the Major Projects website (accessed 13/11/2020) of the Hilltops Council LGA indicated the following Development Applications, none of which are located within or in proximity to the development site:

- Bango Wind Farm (and Mod 1) (Determination).
- Young High School Library and Joint Use Community Facility (Determination).
- Yass Valley Wind Farm (and Mod 1) (Determination).
- Rye Park Wind Farm (Determination) and Mod 1 (Assessment).

A search for undetermined development applications and development applications on exhibition on the Hilltops Council website (accessed 13/11/2020) did not indicate any Development Applications on the development site.

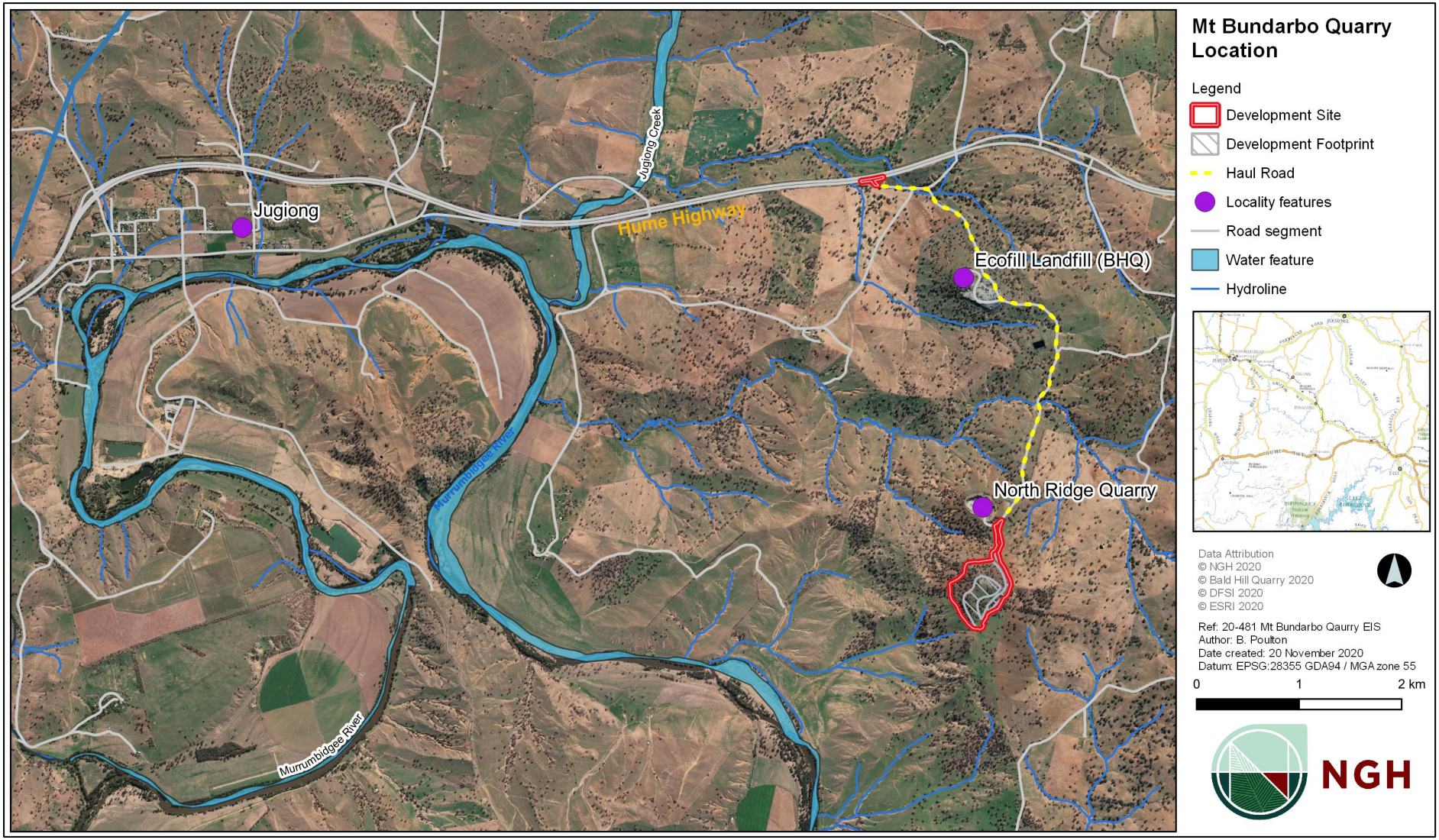


Figure 1-1 General location of the Proposal

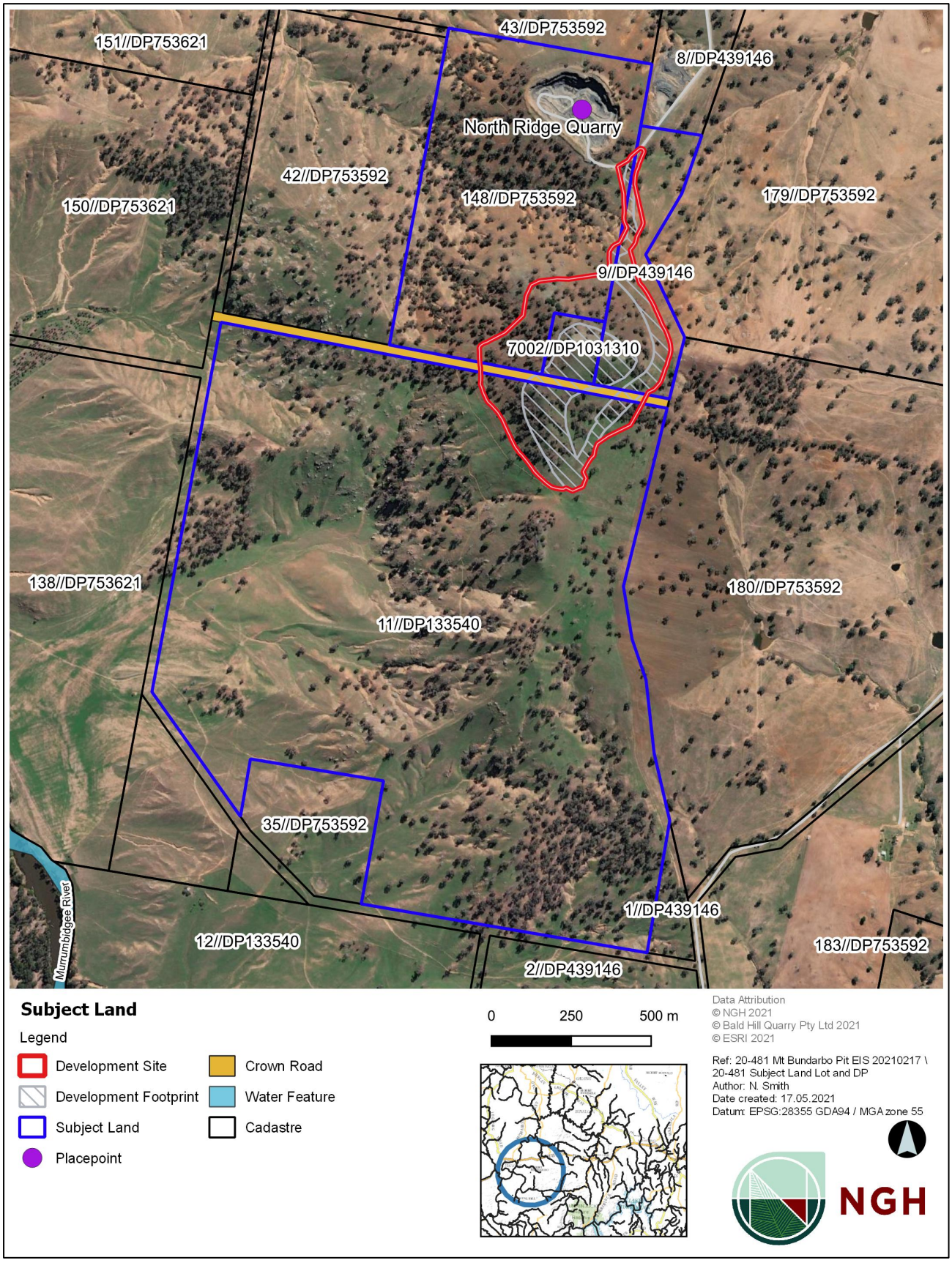


Figure 1-2 Development site within the subject land

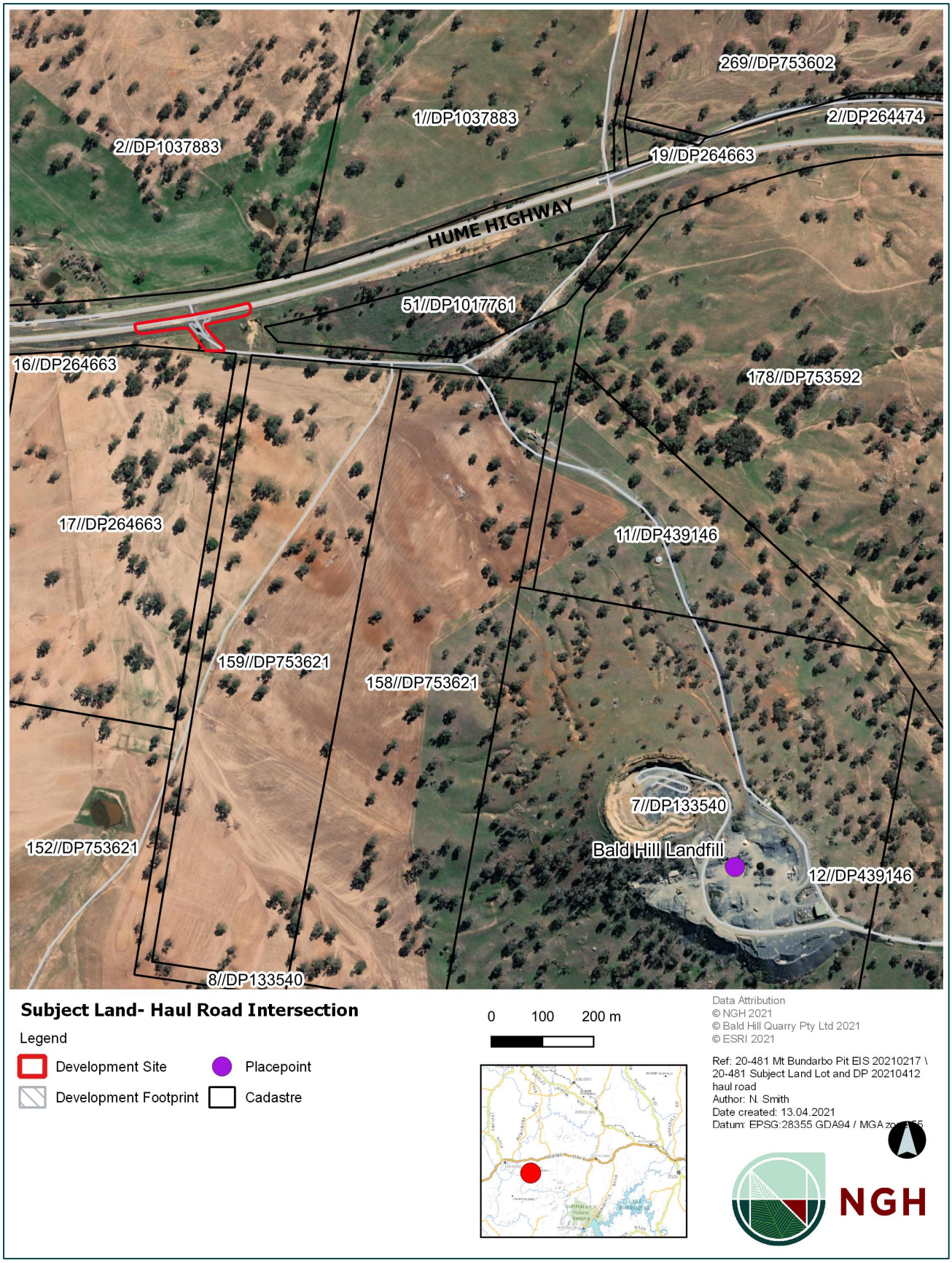


Figure 1-3 Development footprint of the Old Hume Highway intersection upgrade

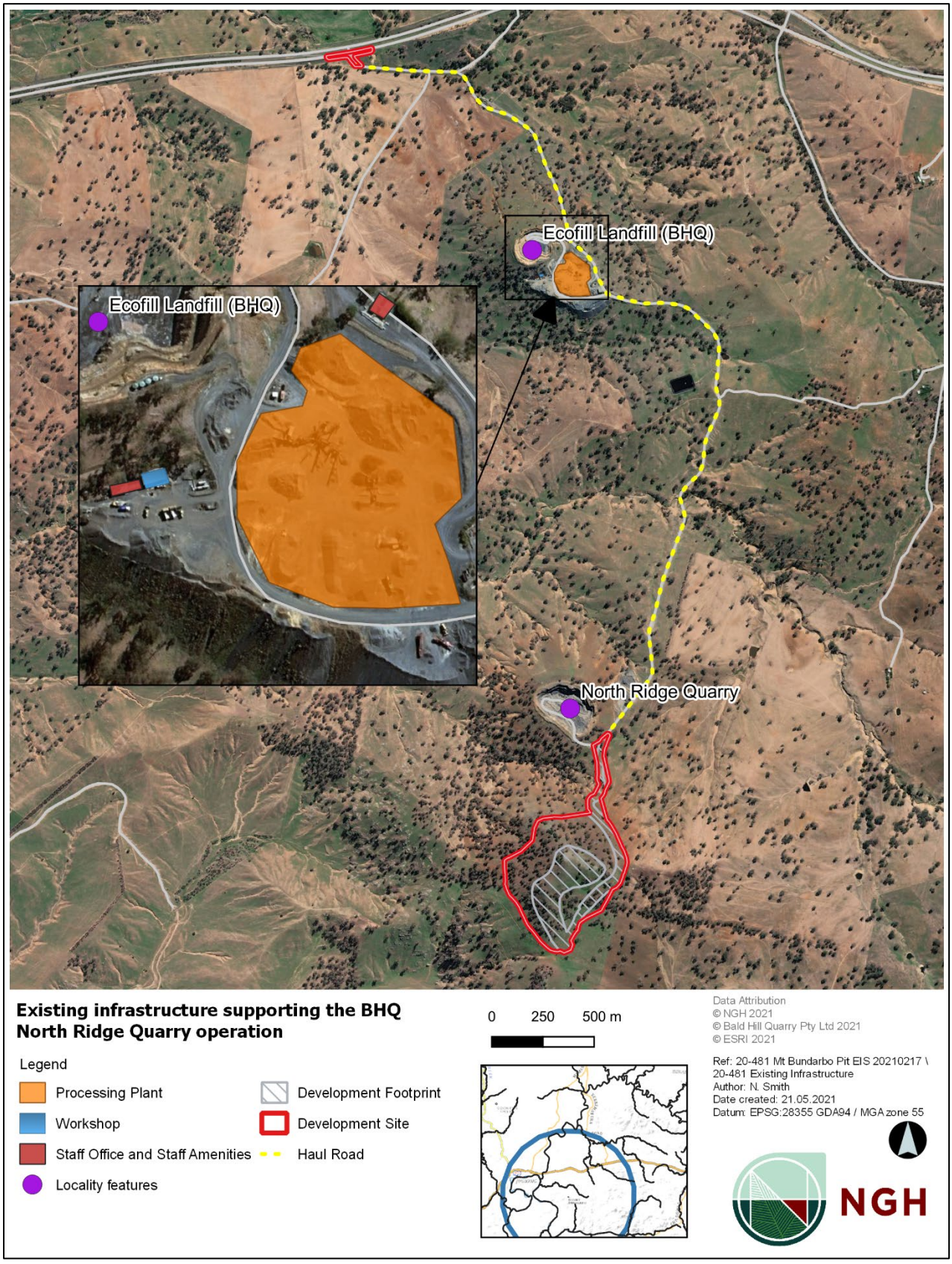


Figure 1-4 Existing infrastructure supporting the BHQ North Ridge Quarry operation – rock processing plant, staff amenities and workshop

2. STRATEGIC JUSTIFICATION AND ALTERNATIVES CONSIDERED

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

ENVIRONMENT PROTECTION AGENCY

Consideration of alternatives and justification for the Proposal

- *Consider the environmental consequences of adopting alternatives, including alternative:*
  - *a) sites and site layouts;*
  - *b) access modes and routes;*
  - *c) materials handling and production processes;*
  - *d) waste and water management;*
  - *e) impact mitigation measures;*
  - *f) energy sources.*
- *Selection of the preferred option should be justified in terms of:*
  - *a) ability to satisfy the objectives of the Proposal;*
  - *b) relative environmental and other costs of each alternative;*
  - *c) acceptability of environmental impacts and contribution to identified environmental objectives;*
  - *d) acceptability of any environmental risks or uncertainties;*
  - *e) reliability of proposed environmental impact mitigation measures;*
  - *f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.*

2.1. STRATEGIC NEED

The need for the Proposal remains with need for a local supply of hard rock resources in the region. The resources of the North Ridge quarry are depleting and it is nearing the end of its capacity. Therefore, a replacement local hard rock quarry is required. The need for this Proposal is supported by the NSW South East and Tablelands Regional Plan 2036 and the Hilltops 2040 Local Strategic Planning Statement, described in sections 2.1.1 and 2.1.2.

2.1.1. NSW South East and Tablelands Regional Plan 2036

The *NSW South East and Tablelands Regional Plan 2036* (the Regional Plan) (DPE, 2017) guides the NSW Government's land use priorities over the next 20 years, providing an overarching framework to guide subsequent land use plans, development Proposals and infrastructure funding decisions.

The Regional Plan is broken down into a number of goals and directions, which detail a number of actions to be considered during the planning process. The goals and local government narratives (and set priorities for Hilltops Council) outlined in Table 2-1 are applicable to the Proposal and were considered as part of this EIS.

Table 2-1 South East and Tablelands Regional Plan 2036 considerations

Goal/Priority	Application/Relevance to this Proposal
Goal 1 A connected and prosperous economy:	The quarry is considered a value-add/co-location opportunity for the agricultural base of the area and would maximise use of existing infrastructure, decrease supply chain costs, increase

Goal/Priority	Application/Relevance to this Proposal
• **Direction 5 Promote agricultural innovation, sustainability, and add-on opportunities.** • **Direction 8 Protect important agricultural land.** • **Direction 13 Manage the ongoing use of mineral resources.**	economies of scale and may potentially attract further investment. The Proposal would provide materials for local and regional use, including in road construction. The regional plan states that the region relies on an efficient transport network. This Proposal supports this and the region's potential growth sectors of: • Tourism. • Agriculture and aquaculture. • Freight and logistics. The Proposal avoids and minimises impacts on important agricultural land. Although not a mineral under the Mining Act, direction 13 includes extractive materials. The regional plan states: *The location of many of these resources, near rail lines and freeways, and their proximity to Australia's biggest construction materials market in Sydney, makes them particularly important to NSW.* This Proposal is well suited to make use of local, regional and state transport routes. It is noted that DPIE received comments on the project from NSW Division of Resources and Geoscience (DRG) about management of resources with the SEARs: *Basalt is not a prescribed mineral under the Mining Act 1992. Therefore, the Division has no statutory role in authorising or regulating the extraction of this commodity, apart from its role under the Work Health and Safety Act 2011 and associated regulations and the Work Health and Safety (Mine and Petroleum Sites) Act 2013 and associated regulations, for ensuring the safe operation of mines and quarries. However, the Division is the principal government authority responsible for assessing the State's resources of construction materials and for advising State and local government on their planning and management.* As requested by NSW DRG, a resource assessment is provided at section 3.2 of this EIS which: • Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and • Documents the methods used to assess the resource and its suitability for the intended applications. In order to assist in the collection of construction material production data, the Proponent would provide annual production data for the subject site to the NSW Division of Resources and Geoscience.

Goal/Priority	Application/Relevance to this Proposal
Local Government Narratives – Priorities - Hilltops • **Enhance community access to jobs, goods and services.**	The Proposal would provide employment opportunities for the local population. Provision of jobs locally can encourage the younger generations to remain and support growth of rural towns and villages.
Local Government Narratives – Economy and employment - Hilltops • **Grow and diversify the area's agricultural base, including value-add activities, expansion into agricultural research and technology and access to national and international markets.**	The quarry is considered a value-add/co-location opportunity for the site. Opportunities may be available for use in local agriculture, potentially where intensive land uses are encouraged.

2.1.2. Hilltops 2040 Local Strategic Planning Statement (LSPS)

Hilltops Council has prepared the *Hilltops 2040, Hilltops Council Local Strategic Planning Statement 2020-2040* (LSPS) (Hilltops Council, 2020), which sets out the 20-year vision for land-use in the local area, the special character and values that are to be preserved and how change will be managed into the future. The LSPS is the strategic document that distils strategic objectives, priorities and directions from the Hilltops Community Strategic Plan and relevant State and Regional policy to ensure these are reflected and furthered through land use planning in Hilltops.

The LSPS outlines the importance of the rural landscape within the LGA, including highlighting the huge impact rural uses have on Hilltops' economy. It is noted that it is essential to sustain the capacity of these lands to support competitive and successful agricultural and mining sectors. In addition, recognising the diversity of rural production and mining activities and associated uses these landscapes support now and may support in the future is critical. Mining is a key economic activity for the LGA resulting in generation of $110m to the Hilltops economy in 2019.

Objectives of the LSPS, relevant to this proposal, include:

- *Intensive agricultural and mining activities are supported subject to the full consideration of topography, soil types, and environmental impact.*
- *The extraction, processing and transportation of natural resources minimises adverse impacts on the community and the environment.*

This EIS shows that the extractive activity, as proposed, in consideration of the topography, soil types, and potential environmental impacts to the environment and the community, can be supported as the impacts of the development are avoided, minimised, mitigated or offset as required.

Local zoning objectives

The land zone for the subject land under the Harden Local Environmental Plan 2011 (Harden LEP) is RU1 - Primary Production. The objectives of the RU1 zone are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To encourage the development of non-agricultural land uses that are compatible with the character of the zone.*

For the life of the proposal, the proposed development would extract natural resource (hard rock). The activity would impact on land availability for primary production; however, it would be developed in a way that would minimise fragmentation and alienation of resource land and minimise land use conflict. Upon completion of the Proposal, the development footprint would be rehabilitated, and agricultural use could continue around the pit.

Further analysis of the proposal against the provisions of the Harden LEP is provided in section 4.4.1 of this EIS.

2.2. PROPOSAL BENEFITS

2.2.1. Socio-economic Benefits

Social and economic benefits have been considered for the Proposal. The Proposal would be beneficial to the community and economy of the region because:

- The Proposal would result in employment retention. The site currently has four Fulltime Equivalent (FTE) staff.
- Support local employment and regional development and economic opportunities, outside of the operations on the site.
- Over the life of the Proposal, it would provide approximately $60 Million of capital investment value in the region.
- The use of the extracted material locally or within the region would result in increased visitation to towns and localities for services including food and accommodation, resulting in shared economic benefits.
- The Proposal would meet local strategic and statutory provisions, endorsed by the local Council and community, that apply to the Proposal.
- It would potentially reduce road kilometres to development sites in the region, and in turn potentially reduce greenhouse gas emissions that contribute to climate change, by providing a resource that can be locally sourced and is well located to access major roads and train lines minimising travel.

2.2.2. Environmental Benefits (during extraction and post rehabilitation)

Locally acquired material, basalt, currently used for the purposes of aggregate and road base material to local councils and other clients within the region, reduces road miles and lessens impacts of greenhouse gasses.

Benefits of the proposed rehabilitation works would include:

- Revegetated areas would reintroduce habitat and foraging resources back into the landscape.
- The water collected and pumped from the sediment basin would be used for filling farm dams for the landholder to use for watering stock.
- Land within the footprint would be returned to agricultural production as part of the rehabilitation.

- A constructed and maintained road would be available for the landholder to use.

2.3. PROPOSAL OBJECTIVES

The objectives of the Proposal are to:

- Continue the supply of a broad range of aggregate and road base material within the local area to local councils and other clients within the region.
- Conform with the requirements of the relevant statutory authorities in the operation of the quarry.
- Minimise the environmental impacts associated with construction and operation of the Proposal.

2.4. ALTERNATIVES CONSIDERED

Various options relating to the location, technology and scale of the Proposal were evaluated in developing the Proposal. These were considered, accounting for the objectives of the Proposal and how the benefits of the Proposal could be maximised. This section outlines the alternatives that were considered and justification for the preferred option that is the subject of this EIS.

2.4.1. The 'do nothing' option

The 'do nothing' option must always be considered in any evaluation of options. It represents the status quo situation; avoiding all development impacts but similarly not realising any potential benefits.

The 'do nothing' option would not see the establishment of a quarry and no quarrying would occur. This option would not meet the economic demands for hard rock resources in the region. Material would need to be sourced elsewhere for local projects and may have a greater greenhouse gas emissions impact to service local developments, resulting in greater environmental impact than the Proposal.

The 'do nothing' option would avoid the environmental impacts associated with the construction and operation of the Proposal. However, current land use/actions on the subject land would continue to have potential to result in:

- Ongoing impacts associated with the operations of the North Ridge quarry.
- Removal of native vegetation for farming purposes under the *Local Land Services Act 2013* provisions for allowable activities and land management code processes.
- Unintentional harm to heritage.
- Biosecurity impacts including weed and pathogen spread.

2.4.2. Reasons for the Chosen Development Site

The reasons for this development site include:

- Identification of the hard rock resource.
- Existing rock crushing and processing infrastructure in proximity to the site.
- Existing workshop in proximity to the site.
- Existing staff facilities and amenities in proximity to the site.

No alternative location was considered for this quarry. The location of the quarry is defined by the underlying geology. Also, existing infrastructure such as the landfill, North Ridge Quarry and rock processing plant are already located in proximity to the Proposal.

3. PROJECT DESCRIPTION

3.1. DEVELOPMENT SITE DESCRIPTION

The subject land (affected lots) comprises about 311 ha of freehold land, identified as Lot 9 DP 439146, Lot 7002 DP 1031310, Crown Reserve (undedicated), Lot 148 DP 753592 and Lot 11 DP 133540. The development site would occupy 29.57 ha of the 311 ha subject land following lot realignment.

The Hume Highway is located approximately 4 km north of the development site with access via a private unsealed haul road (Figure 1-1).

The development site comprises three large lots, an area of Crown Reserve and a paper road. The area is located on sloped terrain with some areas cleared of native vegetation for grazing. Remnant woodland exists within the development site on the steep sloping sides of Mt Bundarbo, to the south and west. Agriculture is the dominant land use in the area with current quarrying and landfilling operations in proximity to the Proposal. Figure 3-1 shows the steep cleared and rocky peak of Mt Bundarbo with the Trig Station. Figure 3-2 indicates the height of the Mt Bundarbo peak in the landscape, the woodland and Murrumbidgee River to the south.

There are no residences within the development site. The subject land and most adjoining lands are unirrigated and used for grazing agriculture.

No farm dams or waterways are located within the development site. Remnant woodland is comprised of White Box (*Eucalyptus albens*) and Kurrajong (*Brachychiton populneus*). An absence of middle storey vegetation was noticeable across the development site. Cleared areas were heavily infested with weeds (Figure 3-3).



Figure 3-1 Existing Mt Bundarbo summit



Figure 3-2 Facing south towards Murrumbidgee River on Mt Bundarbo



Figure 3-3 Thistle infestation on Mt Bundarbo.



Figure 3-4 White Box (*Eucalyptus albens*) with predominantly barley grass as the groundcover.

3.2. PROPOSED MT BUNDARBO QUARRY

Mt Bundarbo is a Tertiary basalt flow rock deposit with an approximate peak of 595 m Australian Height Datum (AHD). The area of exposed basalt cap is approximately 400 m by 200 m.

BHQ proposes no change to the current and ongoing scale of the existing North Ridge winning, haulage and processing operation. The proposed Mt Bundarbo pit would only be fully extracted once North Ridge resources have diminished and ensuring compliance within the extraction limits. BHQ is approved to extract and process 100,000 to 150,000 tpa with peak demands of up to 450,000 tpa from North Ridge. This annual amount would not be exceeded, even if material is extracted from both pits. This is limited by the processing plant's capacity.

Extraction of materials would continue as a combination of mechanical and 'drill and blast' processes (approximately 5 to 10 blasts per year) with raw feed haulage via the existing haul road to the process and stockpiling pad around 4 km away.

The Mt Bundarbo pit would be a new open cut pit. The Proposal would also include an 800 m private haul road connecting the new pit to the existing haul road. The total development footprint would cover an area of approximately 12.96 ha, which includes the pit footprint of 8 ha, the footprint of the haul road and associated erosion and sediment controls, and the upgrade of the intersection.

Intersection Upgrade

Access to the development site is via the existing connection with the Hume Highway and the haul road. The intersection is proposed to be upgraded to allow for the simultaneous two-way vehicle movement for a 19 m long articulated vehicle. This intersection upgrade has been included into and assessed as part of the development footprint (Figure 1-3). The area of the intersection upgrade footprint is approximately 860 m^2.

The intersection upgrade includes road widening along the haul road to allow for suitable access by the design vehicle, accordingly, the proposed intersection upgrade and associated turn restrictions are expected to be able to safely allow vehicles longer than 19 m to access and exit the site.

3.2.1. Proposal Layout

The proposed layout has been developed iteratively in tandem with the environmental assessment to ensure potential impacts are avoided or minimised wherever possible. The design of the layout has also been developed in consultation with the Department of Planning, Industry and Environment – Division of Resources and Geoscience *Mining Design Guidelines*. The Proposal Area constraints are provided in Figure 3-5.

3.2.2. Proposed Infrastructure

The development site would be accessed from the Hume Highway and then an existing private haul road from the north of the site. Approximately 800 m of additional haul road would be constructed as part of the Proposal for site access. The extension of the haul road would be constructed of engineered fill topped with crushed stone pavement. The driving surface would be 10 m wide (including shoulders and any required drainage). The haul road extension is shown on Figure 1-3.

The haul road would be maintained throughout the construction and operation of the quarry. If required, water trucks would be used to suppress dust on the unsealed haul road during construction and operation. Additional stabilising techniques and/or environmentally acceptable dust control would also be applied if required to suppress dust.

3.2.3. Existing BHQ operations

The material processing plant, stockpile site, site office, mechanic workshop, crib rooms, amenities, fuel storage pre-coat tanks are located adjacent to existing BHQ operations (Figure 1-4). These would be utilised as part of Proposed project. The workshop is the storage location of waste oil. The Bald Hill Ecofill Landfill takes all general waste generated by BHQ operations.

3.2.4. Characteristics of the Resource

A resource assessment was requested by NSW DRG. The assessment:

- Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and
- Documents the methods used to assess the resource and its suitability for the intended applications.

The resource was assessed by BHQ using a methodology that included surface geological survey, sampling and analysis. Thirteen Percussion Drill Hole (PDH) to depths of 25-30 m were used to determine the lateral extent of the deposit and determine its nature`. Three core holes were drilled to depths of greater than 50 m to confirm the deposit homogeneity and quality and extent. The maximum total depth of basalt was confirmed to be approximately 60 m at its deepest.

Rock samples were supplied for petrological analysis. Combined results of the surface geological sampling, drilling and analysis indicate approximately 3 – 4 million tonnes of resource, conservatively. Materials testing undertaken on the Mt Bundarbo rock samples show a more consistent and higher quality basalt to that currently quarried at the Bald Hill Quarry – North Ridge. It therefore meets or exceeds all relevant hard rock product

specifications. The resource comprises medium to high strength Olivine basalt in a sequence of horizontally layered flows.

3.3. CONSTRUCTION

The construction phase for Mt Bundarbo pit is anticipated to take approximately 3 months. No additional permanent buildings are required as part of this Proposal. The main construction activities would include:

- Site establishment and preparation for construction – ground preparation, drainage, and erosion and sediment controls.
- Extension to the haul road.
- Earth works for the pit.

Construction of the Proposal would be a staged process with impact to the following areas (Figure 3-6:

- Stage 1 – haul road, pit and sediment basin.
- Stage 2 – pit.
- Stage 3 – pit.
- Stage 4 – pit.
- Stage 5 – pit.
- Stage 6 – pit.

Site preparation would include clearing and earthworks using excavator and dozer. Soils within the development footprint have been disturbed by decades of farming activities. Ground disturbance resulting from the earthworks associated with the Proposal would be minimal and limited to:

  - Construction of the haul road extension and associated drainage
  - Removal of overburden of the pit footprint.
  - Construction of the sediment basin for stage one of pit operations.

Topsoil and overburden from the development footprint would be retained on-site and would be used as bunds in the initial stages of the development of the pits, as fill for the removal of the sediment basin following stage 1 (rehabilitation), for blending with rock material and as rehabilitation around the sites.

Where required, weed treatments would be undertaken prior to earth works commencing to reduce the potential for spread of these species within the Proposal footprint.

Aggregate material for the haul road extension would be sourced locally from Bald Hill Quarry. Approximately 2 ha of gravel would be required to surface the haul road.

Access to the site would be via the Hume Highway, onto a short portion of the Old Hume Highway and the private haul road that extends past the Bald Hill Ecofill Landfill and the North Ridge Quarry. No additional movements on public roads are expected during construction activities. Turning treatments already exist on the Hume Highway for Bald Hill Quarry traffic. However, line marking is recommended and would be installed in accordance with previously approved design and detailed further in section 6.9. The intersection at the Old Hume Highway would be sealed to enable a heavy vehicle to enter the site at the same time as a heavy vehicle exits the site. (Figure 1-3). It is the only construction road upgrade required.

Construction activities would be undertaken during standard daytime construction hours (7.00 am to 6.00 pm Monday to Friday and 7.00 am to 1.00 pm on Saturdays). Any construction outside of these normal or agreed working hours, if required, would only be undertaken with prior approval from relevant authorities, or unless in emergency circumstances e.g., to make work safe.

No additional permanent buildings are proposed.

Materials and resources

The main construction materials could include:

- Aggregates, road base (sourced from existing quarry onsite).
- Sediment and erosion control material (gabion, fencing, scour protection rock)

Estimated quantities or required resources are shown in Table 3-1 and would be confirmed during the detailed design stage:

Table 3-1 Volume of material required for construction.

Resource	Estimated Quantity (Quarry)	Estimated Quantity (Haul Road)	Estimated Quantity (Intersection Upgrade)
Aggregates / road base	N/A	1000 m^3	800 m^3
Drainage control material (pipes etc)	TBC	40m x 300mm pipe	TBC
Sediment and silt fencing	TBC	TBC	TBC

Labour, machinery, and equipment

Construction of the road will be undertaken by BHQ employees, four personnel at any one time and a contractor with specialist machinery at some points throughout construction. It is anticipated that up to four construction staff comprising supervisors, tradesmen and labourers would be engaged to complete the work during the construction phase (3 months). Every effort would be made to hire staff locally.

Staff would be accommodated at Jugiong, Yass, or nearby surrounding areas.

Plant to be used during construction may include:

- Dozer
- 30 tonne excavators
- Grader
- Water truck
- Truck and dog
- Dump truck
- Wheeled loader

Water Requirements

Approximately 30-40,000 Litres (L) of water would be required during construction, predominantly for dust suppression. The bulk of this water would be available from the existing North Ridge Quarry or via the Proponent's licensed groundwater bore, which has an annual allowance of 10 ML. Potable water is provided

as bottled water, located in the existing staff office and amenities building. Rainwater is used for the staff amenities and collected onsite.

Intersection Upgrade

Line-marking and construction of the intersection upgrade would occur prior to construction of the Proposal. Materials, resources, labour, machinery, and equipment outlined above would be used for road construction. It is unlikely the construction of the upgrade would exceed three weeks. The following plant would be required for the intersection upgrade:

- Excavator.
- Posi track.
- Grader.
- Multi tyre roller.
- Smooth drum roller.
- AC paver.
- Line marker.

3.4. OPERATION

Operation activities would include:

- Staged extraction of material through mechanical methods and drill and blast processes.
- Extraction of material would be through drill and blast with approximately five to ten blasts a year.
- Blasted rock will be dealt with via two options:
- An excavator or loader would be used during extraction. Unprocessed material would be taken to the existing material processing plant approximately 4 km away via dump truck.
- Where required campaign material crushing would occur within the pit or laydown area located within the development footprint. A loader or excavator would load rock in the dump truck to cart material to the crusher for processing. A loader would then be used to load truck and dogs.
- Material would be processed at either or both the options mentioned above processing a maximum of 2,000 tonnes per day in total during peak demand.

Fuel storage for plant and equipment for the Proposal would be contained within a bunded fuel storage tank located within the pit or laydown. Existing fuel storage is at the workshop located at adjacent to the Bald Hill Ecofill Landfill (Figure 1-4). No permanently lit night lighting would be installed as part of the Proposal.

During operation non-potable water would be used for dust suppression during quarrying activities and, where required, on haul roads and the processing plant. Around 1.5 ML to 3.12 ML annually (5,000 to 10,000 L per day) would be required and sourced from the Proposal sediment basin, North Ridge Quarry or the licensed groundwater bore. Potable water is provided as bottled water, located in the existing staff office and amenities building. Rainwater is used for the staff amenities and collected onsite.

The operation of the quarry would result in the employment retention of five FTE, which would be the operators in the quarry. The Proposal would provide continuing employment for subcontractors for various activities such as maintenance.

Daily operations and maintenance by site staff would be undertaken indicatively during standard working hours of:

- Monday – Friday 6.00 am to 6.00 pm.

- Saturday and Sunday 7.00 am to 6.00 pm.
- No work on public holidays.
- No blasting on Sundays.

3.5. CLOSURE AND REHABILITATION

BHQ is committed to the effective rehabilitation and closure of all the impact from its operations. This is achieved through progressive rehabilitation where practicable and managing the quarry throughout operations.

As part of the detailed quarry closure planning process, a detailed Quarry Closure Plan will be developed approximately three years prior to cessation of quarrying activities. The Quarry Closure Plan will describe in detail the Proposal operational and progressive rehabilitation procedures for the remainder of the quarry life and subsequent quarry closure. Closure objectives and criteria for the quarry are outlined in section 7.

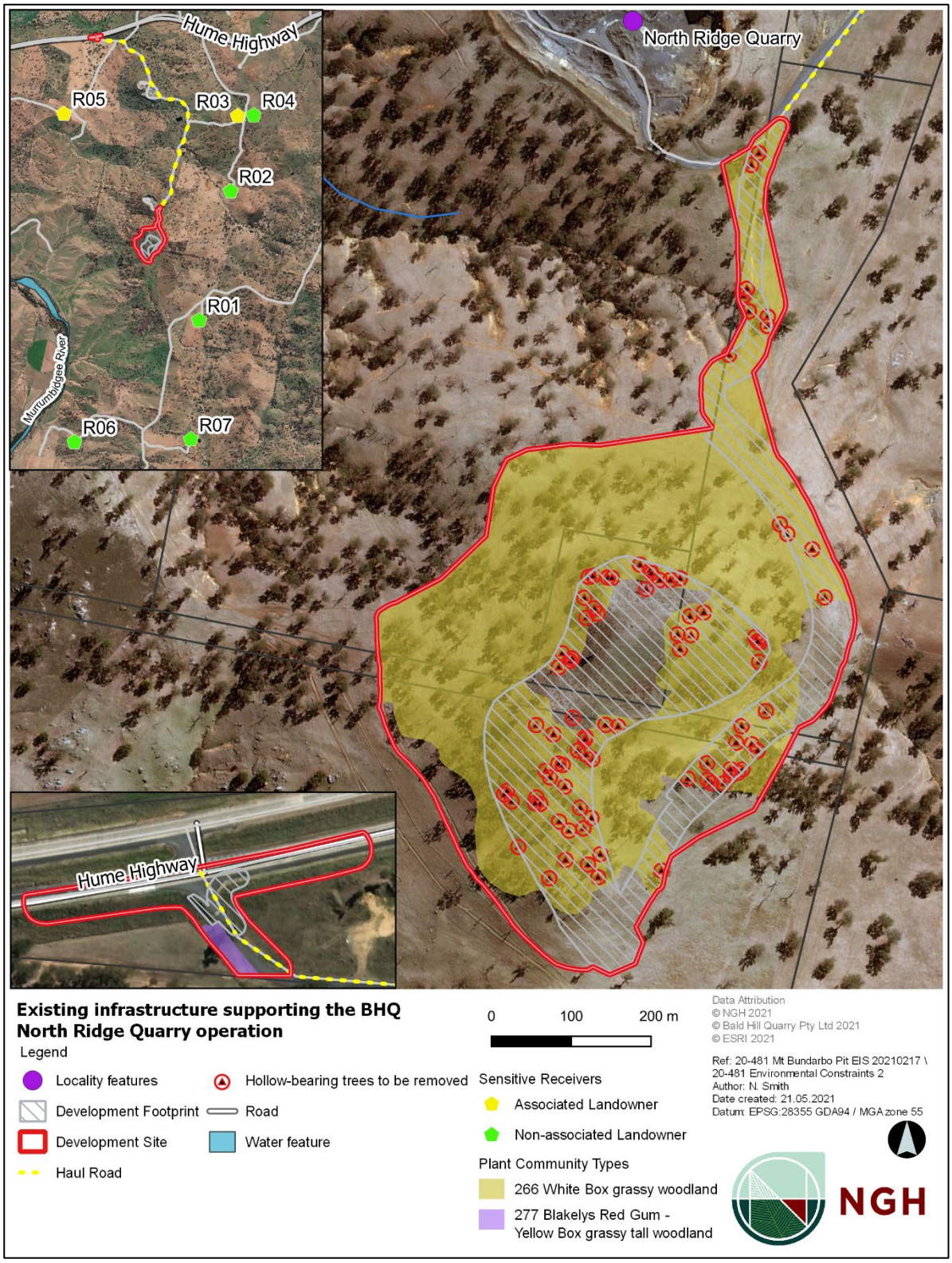


Figure 3-5 Proposal Area constraints map

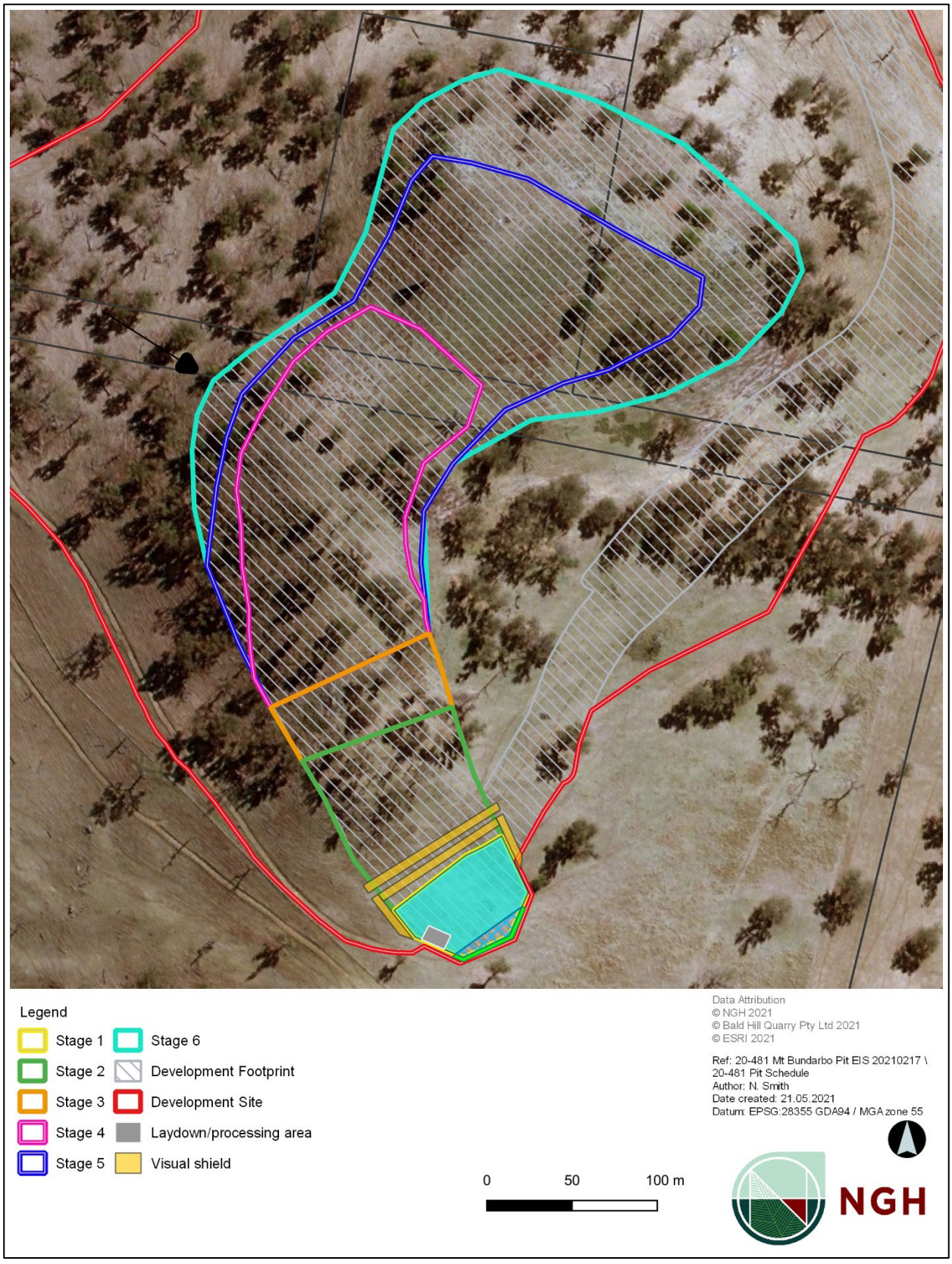


Figure 3-6 Pit staging and the indicative layout for Stage 1

4. LEGISLATIVE AND PLANNING CONTEXT

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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.

This section of the EIS confirms the planning assessment pathway. The Proposal has been considered against the relevant Commonwealth, State and Local legislation. Included is a summary of approvals and licences required for the Proposal.

For the consideration of local strategies, refer to Section 2.1 of this report.

4.1. COMMONWEALTH LEGISLATION

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE). Under the EPBC Act, if the Minister determines that an action is a 'controlled action' which would have or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval of the Minister.

The EPBC Act identifies nine MNES:

- World heritage properties.
- National heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water source, in relation to coal seam gas development and large coal mining development.

When a person proposes to take an action that they believe may be a 'controlled action' under the EPBC Act, they must refer the Proposal to the DEE for a decision about whether the proposed action is a 'controlled action'.

A search of the Commonwealth Protected Matters Search Tool on 16 November 2020 indicated that there are no World Heritage Properties or National Heritage Places within the development site. Search results listed four Wetlands of International Importance that are either known to occur or have potential to occur in the area, however no Ramsar wetlands are located within 10 km of the development site. Section 6.3 discusses the results of searches in relation to threatened species, ecological communities and migratory species. Table 4-1, Table 4-2, and Table 4-3 summarise the results of the searches.

Table 4-1 Summary of Matters of National Environmental Significance (10 km search radius)

Matters of National Environmental Significance	Addressed in this EIS
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance	4
Great Barrier Reef Marine Park	N/A
Commonwealth Marine Areas	N/A
Threatened Ecological Communities	3
Listed Threatened Species	31
Listed Migratory Species	11

Table 4-2 Summary of other matters protected by the EPBC Act (10 km search radius)

Other matters protected by the EPBC Act	Addressed in this EIS
Commonwealth Lands	1
Commonwealth Heritage Places	None
Listed Marine Species	N/A
Whales and Other Cetaceans	N/A
Critical Habitats	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	N/A

Table 4-3 Summary extra information (10 km search radius)

Extra information	Addressed in this EIS
State and Territory Reserves	None
Regional Forest Agreements	None
Invasive Species	29

Extra information	Addressed in this EIS
Nationally Important Wetlands	None
Key Ecological Features (Marine)	N/A

Commonwealth listed threatened ecological communities, threatened species, migratory species and invasive species are discussed in the Biodiversity section (section 6.3) and the BDAR (Appendix D). A significant impact to any of these entities is considered highly unlikely and the proposed activity is considered highly unlikely to be a controlled action.

No other MNES would be affected by the proposed development.

4.1.2. Native Title Act 1993

The *Native Title Act 1993* provides a legislative framework for the recognition and protection of common law native title rights. Native title is the recognition by Australian law that Indigenous people had a system of law and ownership of their lands before European settlement. Where that traditional connection to land and waters has been maintained and where Government legislation has not removed it, the law recognises the persistence of native title.

Native title may exist in areas such as:

- Vacant Crown land.
- Some national parks, forests and public reserves.
- Some types of pastoral lease.
- Some land held for Aboriginal communities.
- Beaches, oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

A search of the National Native Title Tribunal Register was carried out on 20 November 2020. No native title claims have been made in the Hilltops LGA. Past applications have all been dismissed or discontinued. Majority of the development site is located on freehold land and not subject to any native title claims at this time.

4.2. NSW LEGISLATION

4.2.1. Environmental Planning and Assessment Act 1979

The Proposal requires development consent and is considered to be Designated Development pursuant to Section 4.10 of the EP&A Act. This section of the EIS considers the provisions of the EP&A Act relevant to the Proposal.

Objects

Development in NSW is subject to the requirements of the EP&A Act and the EP&A Regulation. Environmental planning instruments prepared under the Act set the framework for development approval in NSW.

The objects of the EP&A Act are:

(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,
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,
(c) to promote the orderly and economic use and development of land,
(d) to promote the delivery and maintenance of affordable housing,
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),
(g) to promote good design and amenity of the built environment,
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,
(j) to provide increased opportunity for community participation in environmental planning and assessment.

The objects of the EP&A Act have been considered throughout this environmental assessment, including natural resources and competing land uses. The Proposal aims to promote the orderly and economic use of the land through the establishment of a new quarry in proximity to the existing North Ridge quarry, benefiting from existing infrastructure and reducing the overall net impact of the Proposal. The Proposal would provide for the considered management of an essential nature resource, providing high quality crushed basalt to local and State government enterprises and Tier 1 & 2 civil construction companies. The Proposal has been located and designed so that it would avoid environmentally sensitive land and clearing of native vegetation as much as possible. For these reasons it is considered that the Proposal is consistent with the objects of the EP&A Act.

Section 4.10 Designated development

Under section 4.10(1) of the EP&A Act, development is declared to be Designated Development by an environmental planning instrument or the regulations. Schedule 3 of the EP&A Regulation prescribes the thresholds for extractive industries to be declared Designated Development. For consideration of the Proposal against the provisions of Schedule 3 refer to section 4.2.2 below.

Section 4.15 Matters for consideration

Under section 4.15 of the EP&A Act, the consent authority is required to consider several matters when determining a DA under Part 4. These matters are listed in Table 4-4 and assessed in terms of their relevance to the Proposal.

Table 4-4 Matters of consideration under the EP&A Act.

Provision	Relevance to the Proposal and where addressed in this EIS
Any environmental planning instrument	Relevant Environmental Planning Instruments (EPIs) are discussed in section 4.3 and 4.4.

Provision	Relevance to the Proposal and where addressed in this EIS
Any proposed instrument that is or has been the subject of public consultation under the EP&A Act and that has been notified to the consent authority	There are no draft instruments relevant to the Proposal.
Any development control plan (DCP)	There is no DCP applicable to the development site.
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	There are no planning agreements that have been entered into, nor are there any proposed planning agreements that relate to the Proposal.
The regulations (to the extent that they prescribe matters for consideration)	Clause 92 of the EP&A Regulation identifies additional matters requiring consideration. There are no additional matters relevant to the Proposal.
The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	The potential impacts of the Proposal are detailed in sections 6 and 7. This EIS demonstrates that the environmental impacts of the Proposal have been avoided or minimised through careful project design. Overall impacts are considered manageable with the implementation of recommended safeguards and mitigation measures.
The suitability of the site for the development	The suitability of the site for the development is assessed in this EIS. Characteristics that make it suitable for a quarry are identified and justified, specifically for land use and compatibility with surrounding land uses, strategic need, the resource need, and the low environmental constraints and minimised impacts to the community and environment, as discussed in sections 6 and 7.
Any submissions made in accordance with the EP&A Act or the regulations	Public submissions would be sought by Council and responded to as part of the EIS determination process. The Proponent would consider and respond to any submissions made in relation to the Proposal following the public exhibition (notification) period, if or as directed to by Council.
The public interest	The development is considered to be in the public interest and would result in a number of public benefits as discussed in section 2.2. Specifically, the Proposal would: • Meet local strategic and statutory provisions, endorsed by the local Council and community, that apply to the Proposal. Therefore, the Proposal is considered to meet the expectations of the community for desired character and is considered to be a permissible and suitable development for the site and region. • Provide local employment. • Support regional development opportunities.

Provision	Relevance to the Proposal and where addressed in this EIS
	• Provide local economic opportunities within the region. • Provide opportunities for reduced road kilometres to regional development sites.

Integrated Development

In accordance with Section 4.46 of the EP&A Act, Integrated Development is development that in order for it to be carried out, requires development consent and one or more of the following approvals. A review of the proposed development against Integrated Development triggers has been carried out in Table 4-5.

Table 4-5 Integrated Development triggers per Section 4.46 of the EP&A Act

Act	Provision	Approval	Relevant
***Coal Mine Subsidence Compensation Act 2017* (NSW)**	s 22	approval to alter or erect improvements, or to subdivide land within a mine subsidence district	No
***Fisheries Management Act 1994* (NSW)**	s 144	aquaculture permit	No
	s 201	permit to carry out dredging or reclamation work	No
	s 205	permit to cut, remove, damage or destroy marine vegetation on public water land or an aquaculture lease, or on the foreshore of any such land or lease	No
	s 219	permit to: (a) set a net, netting or other material, or (b) construct or alter a dam, floodgate, causeway or weir, or (c) otherwise create an obstruction, across or within a bay, inlet, river or creek, or across or around a flat	No
***Heritage Act 1977* (NSW)**	s 58	approval in respect of the doing or carrying out of an act, matter or thing referred to in s 57 (1)	No
***Mining Act 1992* (NSW)**	ss 63, 64	grant of mining lease	No

Act	Provision	Approval	Relevant
***National Parks and Wildlife Act 1974* (NSW)**	s 90	consent to knowingly destroy, deface or damage or knowingly cause or permit the destruction or defacement of or damage to, a relic or Aboriginal place	No, there were no Aboriginal cultural heritage objects or sites identified in the Due Diligence Assessment.
***Petroleum (Onshore) Act 1991* (NSW)**	s 16	grant of production lease	No
***Protection of the Environment Operations Act 1997* (NSW)**	ss 43 (a), 47 and 55	Environment protection licence to authorise carrying out of scheduled development work at any premises.	No
	ss 43 (b), 48 and 55	Environment protection licence to authorise carrying out of scheduled activities at any premises (excluding any activity described as a "waste activity" but including any activity described as a "waste facility").	Yes, an EPL, or modification of the existing North Ridge EPL, would be required.
	ss 43 (d), 55 and 122	Environment protection licences to control carrying out of non-scheduled activities for the purposes of regulating water pollution resulting from the activity.	No
***Roads Act 1993* (NSW)**	s 138	consent to: (a) erect a structure or carry out a work in, on or over a public road, or (b) dig up or disturb the surface of a public road, or (c) remove or interfere with a structure, work or tree on a public road, or (d) pump water into a public road from any land adjoining the road, or (e) connect a road (whether public or private) to a classified road	Yes, a permit would be required from TfNSW for minor linemarking works to the access road intersection off Hume Highway.
***Rural Fires Act 1997* (NSW)**	s 100B	authorisation under section 100B in respect of bush fire safety of subdivision of land that could lawfully be used for residential or rural residential purposes or development of land for special fire protection purposes	No

Act	Provision	Approval	Relevant
***Water Management Act 2000* (NSW)**	ss 89, 90, 91	water use approval, water management work approval or activity approval under Part 3 of Chapter 3	No

Accordingly, the proposed development is classified as Integrated Development as per Section 4.46 of the EP&A Act as it requires a permit from TfNSW for minor works (linemarking) and the upgrade of the Old Hume Highway and Hume Highway intersection and an EPL from NSW EPA under Section 48 of the NSW *Protection of the Environment Operations Act 1997.*

4.2.2. Environmental Planning and Assessment Regulation 2000

The EP&A Regulation Schedule 3 prescribes thresholds for the declaration of development to be Designated Development. A review of the declared provisions (whether by reference to the type, purpose or location of development or otherwise) for extractive industries is listed in Table 4-6 below.

Table 4-6 EP&A Regulations - Schedule 3 Designated Development - extractive industries

Extractive industries	As applicable to this Proposal
(1) Extractive industries (being industries that obtain extractive materials by methods including excavating, dredging, tunnelling or quarrying or that store, stockpile or process extractive materials by methods including washing, crushing, sawing or separating):	
(a) that obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per year, or	The Proposal is Designated Development as it would obtain more than 30,000 cubic metres of basalt per year. The Proposal would result in a maximum total extraction of 450,000 tonnes of hard rock per year from a total resource not exceeding 4 million tonnes.
(b) that disturb or will disturb a total surface area of more than 2 hectares of land by— **(i) clearing or excavating, or** **(ii) constructing dams, ponds, drains, roads or conveyors, or** **(iii) storing or depositing overburden, extractive material or tailings, or**	The Proposal is Designated Development as it would disturb an area greater than 2 hectares. The proposed excavation area is around 14 ha.
(c) that are located— **(i) in or within 40 metres of a natural waterbody, wetland or an environmentally sensitive area, or** **(ii) within 200 metres of a coastline, or** **(iii) in an area of contaminated soil or acid sulphate soil, or**	The Proposal is Designated Development because it is: • On land that slopes at more than 18 degrees to the horizontal. • Within 500 metres of the site of another extractive industry that has operated during the last 5 years (North Ridge quarry).

Extractive industries	As applicable to this Proposal
(iv) on land that slopes at more than 18 degrees to the horizontal, or **(v) if involving blasting, within 1,000 metres of a residential zone or within 500 metres of a dwelling not associated with the development, or** **(vi) within 500 metres of the site of another extractive industry that has operated during the last 5 years.**	

4.2.3. Protection of the Environment Operations Act 1997

The POEO Act is administered by the NSW EPA. Under section 48 of the POEO Act, premises-based scheduled activities (as defined in Schedule 1 of the POEO Act) require an Environment Protection Licence (EPL). Clause 19 of Schedule 1 of the POEO Act concerns extractive industries. Extraction of more than 30,000 tonnes annually is a scheduled activity and requires an EPL.

The Proposal would extract more than 30,000 tonnes of material a year, accordingly, an EPL is required under the POEO Act for the Proposal. North Ridge Quarry currently operates under EPL No. 2552, which would be modified(varied) to incorporate the proposed Mt Bundarbo extension.

Sections 143 and 145 of the POEO Act also creates offences relating to pollution and the transport and disposal of waste and imposes a duty on the occupier of a site to notify certain 'pollution incidents.' The Proponent must comply with the POEO Act in carrying out the Proposal.

4.2.4. Roads Act 1993

The *Roads Act 1993* (Roads Act) provides for the classification of roads and for the declaration of roads authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads.

Any work within the road reserve, such as upgrades that interfere with the structure of the road, require consent from the road authority under section 138 of the Roads Act. Transport for NSW (TfNSW) is the roads authority for the Hume Highway. The access track off the Hume Highway is located on Crown land leased by the Proponent.

Section 138 consent would likely be required for minor linemarking works to the access route intersection off the Hume Highway.

4.2.5. Crown Lands Management Act 2016

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Crown Land

Where Crown Land is impacted by project activities it will be necessary for the applicant to seek an Extractive Industry Licence issued under the Crown Land Management Act 2016 prior to any work commencing on Crown land.

The Proposal will directly impact Crown land including a Crown reserve (Lot 7002 DP 1031310) which is gazetted for trigonometrical purposes. It will be required to liaise with the Surveyor General regarding the proposed use of this trig reserve, which is also subject to an incomplete Aboriginal Land Claim (Claim No 11046) by the NSW Aboriginal Land Council. Concurrence must be provided by the Aboriginal Land Council (ALC), or the claim withdrawn, before the Proposal could proceed over the claim area.

As the Proposal will directly impact on a Crown Road north of Lot 11 DP 133540, Crown Lands suggests that Bald Hill Quarry pursue the closure of the affected roads and seek an easement for access where not already in place.

A tenure may be required to authorise the proposed use and occupation of the Crown land involved. This will be dependent upon the outcome of consultation with the Surveyor General and the Aboriginal Land Council Claimant.

The main aims of the *Crown Lands Management Act 2016* are to provide for the ownership and management of Crown land in NSW, and provide clarity concerning the law applicable to Crown land. Works within a Crown Reserve require environmental, social, cultural heritage and economic considerations to be considered and must facilitate the use of land by the NSW Aboriginal people.

A network of Crown paper roads exist in the locality of the Proposal including one which runs through the development footprint shown in Figure 1-2. Landowner 1 has submitted an application to purchase and close the paper road. Currently, no response has been received.

The permanent survey marker (TS6184) located within Lot 7002 DP 1031310 is approved to be removed (Appendix C). This lot is also identified as being subject to an incomplete Aboriginal Land Claims (Claim No 11046 and 51172) by the NSW Aboriginal Land Council. A request to expedite the undetermined land claim has been made by BHQ to the Crown Lands Aboriginal Land Claims Unit.

4.2.6. Water Management Act 2000

The *Water Management Act 2000* (WM Act), currently administered by the Department of Industry (Water), is progressively being implemented throughout NSW to manage water resources. The aim of the WM Act is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses as well as to provide for protection of catchment conditions.

Water access licences are issued under the WM Act with some issued under the *Water Act 1912.*

No additional access to water resources would be required by the Proposal. Water would be sourced under existing licences when required. The Proponent operates with a Water Access Licence (WAL 28736), which has an existing annual allocation of 10 ML. Groundwater is sourced from the Lachlan Fold Belt Murray-Darling Basin Groundwater Source.

The Proposal does not include development on waterfront land, and is located over 40 m from any existing watercourse, therefore a Controlled Activity Approval is not required.

4.2.7. National Parks and Wildlife Act 1974

Under the *National Parks and Wildlife Act 1974* (NPW Act), the Director General of the Office or Environment and Heritage (OEH), now the Biodiversity and Conservation Division (BCD) of DPIE, is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. The Director General of BCD is also responsible under this legislation for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW.

The provisions of the NPW Act have been considered for the Proposal. The nearest national parks or nature reserves to the Proposal are the Ulandra Nature Reserve located 43.3 km west of the development site, followed by the Young Nature Reserve located 54 km north of the Proposal. The development site is not located within 10 km of any nature reserve or forest protected under the NPW Act.

No Aboriginal sites or places were identified in the Development site and works can proceed with caution. An AHIP is not required for the Proposal under the NPW Act.

4.2.8. Wilderness Act 1987

There are no wilderness areas within proximity to the Development site.

4.2.9. Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to conserve heritage values. The Heritage Act defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts listed in the Local or State Heritage Significance Register. A property is a heritage item if it is listed in the heritage schedule of the local Council's Local Environmental Plan or listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW.

No relics or other items protected under the Heritage Act were located on the development site. The closest sites of local significance, Reedy Creek Homestead and sites within the rural village of Jugiong, are located approximately 6-7 km north east and north west of the development site, as outlined in section 6.11 of this report. A permit under the Heritage Act is not required.

Section 146 of the Heritage Act requires any person who believes they have discovered or located a relic (in any circumstances) to notify the NSW Heritage Council.

4.2.10. Biosecurity Act 2015

The objects of the *Biosecurity Act 2015* (Biosecurity Act) are:

> *(1) The primary object of this [Biosecurity] Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.*
>
> *(2) The other objects of this [Biosecurity] Act are as follows:*
>
> *(a) to promote biosecurity as a shared responsibility between government, industry and communities.*
>
> *(b) to provide a framework for the timely and effective management of the following:*
>
> *(i) pests, diseases, contaminants and other biosecurity matter that are economically significant for primary production industries.*
>
> *(ii) threats to terrestrial and aquatic environments arising from pests, diseases, contaminants and other biosecurity matter.*
>
> *(iii) public health and safety risks arising from contaminants, non-indigenous animals, bees, weeds and other biosecurity matter known to contribute to human health problems.*
>
> *(iv) pests, diseases, contaminants and other biosecurity matter that may have an adverse effect on community activities and infrastructure.*

(c) to provide a framework for risk-based decision-making in relation to biosecurity.

(d) to give effect to intergovernmental biosecurity agreements to which the State is a party.

(e) to provide the means by which biosecurity requirements in other jurisdictions can be met, so as to maintain market access for industry.

The Proponent as a land manager would comply with the general biosecurity duties under the Biosecurity Act through management of on-site weeds and pests.

Prior to commencement, a weed management procedure would be developed as part of the Biodiversity Management Plan for the Proposal to prevent and minimise the spread of weeds. This would include:

- A management protocol for declared priority weeds under the Biosecurity Act during operation and rehabilitation stages
- A weed hygiene protocol in relation to plant and machinery and stockpile sites.

4.2.11. Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) establishes a new regulatory framework for assessing and offsetting the biodiversity impacts of proposed developments. The BC Act contains provisions relating to flora and fauna protection, threatened species and ecological communities listing and assessment, a biodiversity offsets scheme (BOS), a single biodiversity assessment method (BAM), calculation and retirement of biodiversity credits and biodiversity assessment and planning approvals. The BC Act is supported by the Biodiversity Conservation Regulation 2017.

The BC Act has been considered in the preparation of this EIS, in the provision of a Biodiversity Development Assessment Report (BDAR) (refer to Appendix D) and commitment to offsetting in accordance with the BOS.

The BDAR is summarised in section 6.3.

4.2.12. Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The Proposal's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption.
- Resource recovery (including reuse, reprocessing, recycling and energy recovery).
- Disposal.

Waste management during the operations would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (NSW) (WARR Act).

The Proposal aims to reduce waste by reusing materials where appropriate. This includes the reuse of water for dust suppression and processing, reuse of the dust generated at the processing plant and the reuse of overburden in erosion controls, visual amenity bunds and backfilling. Waste minimisation and management is addressed in section 7.5 of the EIS.

4.3. NSW ENVIRONMENTAL PLANNING INSTRUMENTS

4.3.1. State Environmental Planning Policy (Infrastructure) 2007

The State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) was introduced to facilitate the effective delivery of infrastructure across the State by improving regulatory efficiency through a consistent planning regime for infrastructure and services across NSW.

Clause 104 Traffic generating development

The Proposal is not considered to be traffic generating development, in accordance with Schedule 3 of the ISEPP, given the Proposal is expected to generate an additional six truck movements during the morning peak hour and 50 truck movements per day, which is below the 200 vehicles an hour specified for development with no direct access to a classified road. Truck and dog vehicles would primarily be used to transport the quarry material, with the Mt Bundarbo Quarry.

Local widening on the Hume Highway already exists for a Channelised Right Turn and Auxiliary Left Turn, in accordance with the Austroads Guidelines. However, currently no line-marking exists and is recommended in the Traffic Impact Assessment (TIA) (Appendix G). The TIA recommends intersection upgrades on the Old Hume Highway to enable a heavy vehicle to turn into the site as a heavy vehicle is leaving (Appendix G).

4.3.2. State Environmental Planning Policy (State and Regional Development) 2011

The aims of the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) are to identify and facilitate development or infrastructure of State or regional significance.

State Significant Development

Clause 8 of the SRD SEPP provides that development is declared to be SSD for the purposes of the EP&A Act if:

- the development is not permissible without consent under Part 4 of the EP&A Act.
- the development is specified in Schedule 1 or 2 of the SRD SEPP.

Clause 7 of Schedule 1 of the SRD SEPP includes:

> *(1) Development for the purpose of extractive industry that—*
>
> *(a) extracts more than 500,000 tonnes of extractive materials per year, or*
>
> *(b) extracts from a total resource (the subject of the development application) of more than 5 million tonnes, or*
>
> *(c) extracts from an environmentally sensitive area of State significance.*
>
> *(3) Development for the purpose of extractive industry related works (including processing plants, water management systems, or facilities for storage, loading or transporting any construction material or waste material) that—*
>
> *(a) is ancillary to or an extension of another State significant development project, or*
>
> *(b) has a capital investment value of more than $30 million.*

The Proposal is not state significant development because:

- The Proposal would not exceed a total extraction of 450,000 tonnes of hard rock per year from a total resource not exceeding 4 million tonnes.
- The site is not an environmentally sensitive area of State significance.
- There are no extractive industry related works ancillary to, or an extension of another State significant development project.

Regionally Significant Development

Clause 20 of the SRD SEPP provides that development is declared to be regionally significant development for the purposes of the EP&A Act if:

- the development is specified in Schedule 7 of the SRD SEPP.

According to clause 7 Schedule 7 of the SRD SEPP the following development is to also be considered Designated Development:

Development for the purposes of—

(a) extractive industries, which meet the requirements for designated development under clause 19 of Schedule 3 to the Environmental Planning and Assessment Regulation 2000.

The Proposal is therefore to be considered regionally significant development.

4.3.3. State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP) is designed to provide for the proper management and development of mineral, petroleum and extractive material resources and establish appropriate planning controls to encourage ecologically sustainable development through environmental assessment and management.

In particular, the Mining SEPP outlines land that has been classed as Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC). The land has not been identified as BSAL or CIC.

The Mining SEPP also identifies development permissible with consent and outlines matters for consideration in the assessment of development applications. Relevant to this development are the provisions for extractive industries:

- *Clause 7(3) Extractive industry _Development for any of the following purposes may be carried out with development consent— (a) extractive industry on land on which development for the purposes of agriculture or industry may be carried out (with or without development consent).*

This Proposal complies with this provision as the quarry is for an extractive industry, and not mining, and is proposed on land where agriculture may be carried out.

- *Clause 12 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).

This EIS has considered the surrounding land uses and potential for impacts to land use (refer to Section 6.2), socio-economic and community impacts (refer to section 6.12), and cumulative impacts of the Proposal (refer to section 6.15).

Benefits of the project (including public benefits) are listed in section 2.2.

The full list of mitigation measures proposed to avoid or minimise any incompatibility are provided in section 7.5.

4.3.4. State Environmental Planning Policy No. 55 – Remediation of Land

SEPP No. 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. The SEPP applies to the whole of the State.

Clause 7 of SEPP No. 55 requires that the remediation of land be considered by a consent authority in determining a development application.

A search of the NSW Environment Protection Authority (EPA) contaminated land public record (NSW EPA 2020) was undertaken for contaminated sites within the Hilltops LGA on 26 October 2020. The research returned five results within the Hilltops LGA, of which one is within the Harden area, located over 30 kilometres north of the Proposal.

The risk of contamination associated with agricultural activities (e.g. pesticides, current or historical use) on the site is considered in section 6.8 of this EIS and includes recommended mitigation measures.

4.3.5. State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

SEPP 33 defines and regulates the assessment and approval of potentially hazardous or offensive development. The SEPP defines 'potentially hazardous industry' as:

"…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' is defined as:

…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.

Potentially hazardous development

SEPP 33 Hazardous and Offensive Development requires a Preliminary Hazard Assessment (PHA) to be prepared for potentially hazardous or offensive development. Appendix 3 of the Applying SEPP 33 guidelines (DOP, 2011) lists industries that may fall within SEPP 33; the guidelines do not include extractive industries as they are not classed as an Industry under the LEP definitions, however the guidelines refer to the EPA's IAEA Table II, from the Multi-level Risk Assessment, for further indication of potentially hazardous industries and correspondingly their most important substances likely to be handled.

IAEA Table II lists activities such as fuel storage, transport of fuel, and explosive use. As these activities would occur on the site and to ensure best practice and minimise impacts of the development the guidelines have been considered. Appendix 2 of the guidelines provides a risk screening procedure and a checklist to identify Hazardous and Offensive Development in instances where the applicability of SEPP 33 is not immediately apparent. Information relevant to the risk screening and the checklist is provided below.

The SEPP 33 screening procedure is based on the quantity of dangerous goods stored or transported, the frequency of transportation movements and, in some cases, the distance of the materials from the site boundary. The guidelines require goods to be classified according to the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code). The ADG Code lists the following classes of dangerous goods:

- Class 1 Explosives
- Class 2 Gases
- Class 3 Flammable liquids
- Class 4 Flammable solids
- Class 5 Oxidising substances and organic peroxides
- Class 6 Toxic and infectious substances
- Class 7 Radioactive material
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles, including environmentally hazardous substances.

There is no proposed change to the management of explosives at the site as they are not kept on site. There are no proposed changes to the transportation threshold or methods, or existing storage quantities or storage arrangements for fuels for machinery used at the quarry. SEPP 33 provides for systematic assessment of potentially hazardous and offensive development for the purpose of industry or storage. For development Proposals classified as 'potentially hazardous industry' the policy requires a preliminary hazard analysis (PHA) to determine risks to people, property and the environment. The development would not be considered potentially hazardous and would not require the preparation of a PHA.

Potentially offensive development

The *Hazardous and Offensive Development Application Guidelines, Applying SEPP 33* (NSW Planning, 2011) states in deciding if a Proposal is 'potentially offensive industry' consent authorities need to determine whether, in the absence of safeguards, the Proposal would emit a polluting discharge which would cause a significant level of offence, including odours, liquid run-off, noise, waste, etc.

An Environment Protection Licence (EPL) is required under the *NSW Protection of the Environment Operations Act 1997*.

The Proposal would result in noise generation and dust emissions and would require surface water management. The potential for impacts on the community and surrounding environment have been considered:

- The operation of the quarry has the potential to affect the community due to noise and vibration. A quantitative noise assessment in accordance with the NPI (EPA 2017) and the Transport for NSW (TfNSW) NSW Construction Noise Estimator Tool (CNET) (TfNSW 2016) was undertaken for the general operation works of the quarry. The assessment also considered the impacts of blasting from ground vibration and overpressure.
- The Proposal would result in some vehicle and machinery exhaust and dust emissions during operation. The emissions occur outside, in a rural locality, and would be readily dispersed and would typically be road dust or dust from quarrying activities. The air quality emissions would not be considered offensive within the context of SEPP 33.
- Earthworks are required during establishment of the site and include the construction of the haul road extension, removal of the overburden and its use for the construction of the external batters of the pit, mining operations, and the shallow topsoils on site will have to be removed. All processing areas (during operation) would drain towards onsite water bodies due to the enclosed nature of the pit. No discharge of processing waters from the site would occur under normal conditions and impact upon the regional surface water regime.

The potential impacts, as discussed above, would be avoided or minimised with the implementation of the mitigation measures committed to in this EIS. Refer to section 8.2 for the full list of mitigation measures to avoid potentially offensive effects of the Proposal.

4.3.6. State Environmental Planning Policy (Primary Production and Rural Development) 2019

The *State Environmental Planning Policy (*Primary Production and Rural Development), known as the PPRD SEPP, simplifies the NSW planning system by consolidating, updating and repealing provisions in five former agriculture-themed SEPPs, including the Rural Lands SEPP. This aims to ensure local industry and community have greater access to and awareness of the agricultural land use planning provisions that apply. The intent of the SEPP is to deal with agricultural land use matters of State or regional significance only.

The aims of the PPRD SEPP are:

(a) to facilitate the orderly economic use and development of lands for primary production.
(b) to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources.
(c) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations.
(d) to simplify the regulatory process for smaller-scale low risk artificial waterbodies, and routine maintenance of artificial water supply or drainage, in irrigation areas and districts, and for routine and emergency work in irrigation areas and districts.
(e) to encourage sustainable agriculture, including sustainable aquaculture.
(f) to require consideration of the effects of all proposed development in the State on oyster aquaculture.

(g) to identify aquaculture that is to be treated as designated development using a well-defined and concise development assessment regime based on environment risks associated with site and operational factors.

The objectives of Part 2 (State Significant Agricultural Land) of PPRD SEPP are as follows:

(a) to identify State significant agricultural land and to provide for the carrying out of development on that land,
(b) to provide for the protection of agricultural land:
i. that is of State or regional agricultural significance, and
ii. that may be subject to demand for uses that are not compatible with agriculture, and
iii. if the protection will result in a public benefit.

Land that is considered State Significant Agricultural Land is listed in Schedule 1 of the Primary Production SEPP. Schedule 1 of the SEPP is currently incomplete/blank. As such, reference to the significance of agricultural land from Schedule 2 of the previously repealed *State Environmental Planning Policy (Rural Lands) 2008* is applied within this EIS (see below).

4.3.7. State Environmental Planning Policy (Koala Habitat Protection) 2020

The subject land is located within the Hilltops LGA, which is listed on Schedule 1 of the State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP). The subject land comprises an area greater than 1 hectare and therefore the provisions apply to the Proposal.

According to clause 8, Council must not grant consent unless it has considered whether the land constitutes potential koala habitat, being an area of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

If the land is considered potential koala habitat, Council must not grant consent unless it has considered whether the land constitutes core koala habitat. This is defined as 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.

Targeted surveys were undertaken for Koalas. The Koala Spot Assessment Technique tree results were completed by assessing all trees. No trees were found to have scratches. Common Brush-tailed Possum scat was observed at a number of HBTs. No Koalas were observed within any of the trees in the development site. Following a result of five in the EPBC Act Koala Habitat Assessment tool, an Assessment of Significance was prepared for the Koala, refer to the Assessments of Significance in the Biodiversity Development Assessment Report in Appendix D.

4.4. LOCAL PLANNING PROVISIONS

4.4.1. Harden Local Environmental Plan 2011

The development area is located within Hilltops LGA and is subject to the provisions of the *Harden Local Environmental Plan 2011* (Harden LEP).

(2) The particular aims of this Plan are as follows—

(a) to protect and encourage a diversity of sustainable primary industry production,

(b) to protect primary industry production areas from conflicting land uses,

(c) to encourage the proper management, development and conservation of natural and human resources in Harden by protecting, enhancing, managing and conserving—

(i) areas of high scenic or recreational value, and

(ii) areas of significance for nature conservation, and

(iii) timber, minerals, soil, water, vegetation and other natural resources, and

(iv) landscapes, places and buildings of archaeological or heritage significance,

(d) to provide opportunities for—

(i) industrial relocation and development, employment, economic and enterprise growth, and

(ii) the expansion of Harden-Murrumburrah township and village areas to meet future urban growth needs, and

(iii) rural small holding subdivisions,

(e) to encourage a built environment which is attractive to visitors, residents and investors.

It is considered that the Proposal is compatible with the aims of the Harden LEP, especially in encouraging proper management of natural resources and providing opportunities for employment and economic growth. The Hilltops LSPS identifies quarrying to be an industry of local importance.

Land zoning and Permissibility under the LEP

Land is zoned under the relevant LEP and has a set of objectives to guide development with the aim to achieve the future desired character and land uses or maintain the existing character and land uses.

The development area is zoned RU1 Primary Production under the Harden LEP. Extractive industry is listed as development permitted with consent within the zone.

Extractive industry, as defined under the LEP means:

> *the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming.*

The Proposal is classified as an extractive industry (and not mining) because the material proposed to be extracted is rock (basalt) and is defined as an extractive material under the LEP (as listed below):

> ***extractive material*** *means sand, soil, gravel, rock or similar substances that are not minerals within the meaning of the Mining Act 1992.*

Land zone objectives

The Harden LEP states that the consent authority must have regard to the objectives for development in a zone when determining a development application. The objectives of the RU1 zone are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To encourage the development of non-agricultural land uses that are compatible with the character of the zone.*

The Proposal aims to minimise the fragmentation and alienation of resource lands through the establishment of a new quarry in proximity to the existing North Ridge quarry, benefiting from existing infrastructure and reducing the overall net impact of the Proposal. The Proposal would provide for the considered management of an essential natural resource, providing high quality crushed basalt to local and State government enterprises and Tier 1 & 2 civil construction companies. Extractive industries are considered to be a compatible non-agricultural use in the zone, according to the Mining SEPP. The environmental and amenity impacts of the Proposal on surrounding receivers are considered acceptable as outlined in Section 6 of this report.

Additional Local Provisions of the LEP

The Proposal is not located within land mapped as land or water sensitive under the Harden LEP or on bushfire or flood prone land. The closest bushfire prone land is located to the south and east of the Development site.

However, the proposed development land is located on land mapped on the Natural Resources Biodiversity Map as 'sensitive land-significant vegetation'. Clause 6.2 of the LEP applies to land with this overlay. The objective of this clause is to maintain terrestrial biodiversity. In assessing the application, the potential impacts to biodiversity must be considered. This EIS has addressed the potential impacts of the Proposal and has prepared a BDAR in accordance with the BC Act. Refer to the findings summarised in section 6.3 of this EIS.

4.4.2. Development Control Plans and Council policies

There is currently no Development Control Plan in force for the former Harden Shire Council area.

4.5. SUMMARY OF LICENCES REQUIRED BY LEGISLATION

The approvals and licence needed for the Proposal are summarised in Table 4-7. Any additional licences or approvals that may be required would be obtained prior to the commencement of relevant activities.

Table 4-7 Summary of approvals/licences/permits required.

Instrument	Licence or approval requirement
EP&A Act, Part 4	This Proposal requires consent from Council, to be determined by the Regional Planning Panel. This DA is seeking development consent, a permit from TfNSW and an EPL from the NSW EPA.
POEO Act, scheduled premises	The Proponent holds a current EPL licence for the North Ridge quarry. EPL no 2552. This licence would be varied by the Proponent.
***Roads Act 1993*, section 138**	Any works to public or classified roads requires consent under this Act from the road authority. Hilltops Council is the roads authority for public roads within the Jugiong area and TfNSW is the roads authority for Hume Highway. A section 138 permit would be needed from TfNSW for minor line-marking work and intersection upgrades.

4.6. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

ENVIRONMENT PROTECTOIN AUTHORITY

Ecologically Sustainable Development - ESD

- *Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including:*
  - *a) an assessment of a range of options available for use of the resource, including the benefits of each option to future generations;*
  - *b) proper valuation and pricing of environmental resources;*
  - *c) identification of who will bear the environmental costs of the Proposal.*

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic and environmental considerations in decision-making processes. In 1992, the Commonwealth and all State and Territory Governments endorsed the *National Strategy for Ecologically Sustainable Development*.

In NSW, the concept has been incorporated in legislation such as the EP&A Act and EP&A Regulation. For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act 1991* outline principles which can be used to achieve ESD. These principles are presented below along with a description of how the Proposal and this EIS have considered each principle.

a) The precautionary principle, namely, that 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 the application of the precautionary principle, public and private decisions should be guided by:

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii. an assessment of the risk-weighted consequences of various options.

The precautionary principle has been adopted in the assessment of expected impacts. All potential impacts have been considered and mitigated commensurate with risk. Where uncertainty exists, measures have been included to address the uncertainty. For this EIS, a worst-case assessment has been undertaken to remove uncertainty about the project.

b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Proposal would result in a change to the landscape. However, the potential impacts of the Proposal are proposed to be carefully managed and would be localised. The Proposal would not have significant impact on the health, diversity and productivity of the land surrounding the proposed quarry. The Proposal includes rehabilitation to return the site to a state capable of either rural land use or environmental regeneration.

c) Conservation of biological diversity and ecological integrity should be a fundamental consideration.

The impacts of the Proposal on biodiversity have been assessed in detail in section 6.3. The Proposal includes measures to minimise impact on biodiversity including avoidance of higher conservation value areas where possible and management measures to minimise, manage and offset residual impacts. The impacts are considered to have been reduced as much as possible in this context.

d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as: *i. polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,* *ii. the users of goods and services should pay prices based on the full lifecycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,* *iii. environmental goals, having been established, 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.*
Attributes of the development site such as existing native vegetation, soil and hydrology have been valued in terms of their broader contribution to the catchment and catchment processes. Pollution risks have been assessed and would place any cost of remediation solely upon the Proponent, refer to section 9 for details of the environmental framework and mitigation measures the Proponent is committing to, to avoid and minimise any pollution risk. The proposed excavation of high quality crushed basalt (virgin excavated material) has nil potential for contamination on or off site.

The aims, structure and content of this EIS have incorporated the principles of ESD. The mitigation measures described in section 8.2 set out an auditable environmental management commitment by the Proponent.

5. CONSULTATION

Stakeholder consultation is key to the planning and assessment process to assist in determining the relevant issues to be considered in the Project design and environmental impact assessment process. Consultation with relevant stakeholders including affected landholders, the surrounding community, community groups, government authorities, service provides, Aboriginal groups and other relevant stakeholders commenced during the early project planning phase and has continued through the preparation of the EIS.

BHQ has an established relationship with the surrounding community and other stakeholders through its ongoing operations since 1980's and has implemented a process for ongoing engagement regarding its operations.

The engagement process that has been undertaken as part of the environmental impact assessment and approval process provide the opportunity for the stakeholders to provide input into project planning, to identify stakeholder needs, concerns and opportunities, and to be involved in the environmental and asocial assessment process.

Details of agency consultation are outlined in section 5.1, with details of consultation with the Aboriginal community outlined in section 5.2 and the broader community outlined in section 5.3.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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.

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.

DEPARTMENT OF PRIMARY INDUSTRY

Adequate consultation with community

- *Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure.*
- *Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about; the Proposal, the likely impacts and suitable mitigation measures or compensation.*
- *Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with Council in relation to complaint issues.*

5.1. AGENCY CONSULTATION

Secretary's Environmental Assessment Requirements (SEARs)

A preliminary environmental assessment was prepared, and SEARs were requested. This was provided by DPE on 26 July 2016 (refer Appendix A). 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 of the Proposal.

The following sections provide a summary of the SEARs from the various agencies and cross reference where specific issues are addressed within this EIS. Additional consultation was undertaken with several of the agencies to clarify some of the issues raised in the SEARs or seek further advice. This additional consultation with agencies is also summarised below.

Department of Planning, Industry and Environment (DPIE)

Issue summary	Addressed in EIS

General requirements –
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.
 	
In particular, the EIS must include:
• *an executive 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;*
  ◦ *identification of the resource, including the amount, type, composition;*
  ◦ *the layout of the proposed works and components (including any existing infrastructure that would be used for the development);*
  ◦ *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;*
  ◦ *a detailed rehabilitation plan for the site;*
  ◦ *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;*
  ◦ *a list of any other approvals that must be obtained before the development may commence;*
  ◦ *the permissibility of the development, including identification of the land use zoning of the site;*
  ◦ *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;*
• *a conclusion justifying 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 Environmental Planning and Assessment Act 1979; and*
• *a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.*
	Section 1
	Section 3
	Section 4
	Section 6
	Section 9

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.* *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

Issue summary	Addressed in EIS
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 6.7.1
Blasting & 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 ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features;*	Section 6.7.1
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. 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 6.5
Water – *Including:* • *a detailed site water balance and an assessment of any volumetric water licensing requirements, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures;* • *identification of any licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000;* • *demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP);* • *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 activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts;* • *an assessment of any likely flooding impacts of the development;* • *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*	Section 6.3

Issue summary	Addressed in EIS
groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the Biodiversity Conservation Act 2016; and • *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* • *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 6.10 Section 6.11
Traffic & Transport – *Including:* • *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;*	Section 6.9
Land Resources – *including an assessment of:* • *potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate);* • *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* • *the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007;*	Section 6.2 Section 6.8
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 6.14
Hazards –	Section 6.13

Issue summary	Addressed in EIS
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;	
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 6.6
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 6.12
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* • *the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy, recognising that a rehabilitation bond will likely be required as a condition of any future development consent.*	Section 7

Biodiversity and Conservation Division (BCD)

Issue Summary	Addressed in EIS
General – *All components of the proposed development must be clearly described, including:* • *the location of the proposed development and its context in the locality* • *The rationale for the project.* • *the size, scale and type of the proposed development* • *the pre-construction, construction, operational, and, where relevant, rehabilitation phases of the proposed development, and the methods proposed to implement these phases,* • *plans and maps of the proposed development showing the locations of relevant phases and infrastructure* • *the staging and timing of the proposed development* • *the proposed development's relationship to any other Proposals and developments*	Section 3
Aboriginal Cultural Heritage – • *The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the Proposal. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating,*	Section 6.10

Issue Summary	Addressed in EIS
assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with Department regional officers. • *Where Aboriginal cultural heritage values or potential values are present, these are to be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR).* • *Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for Proponents 2010 (DECCW) where an ACHAR is required. The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.* • *Where harm to an Aboriginal object or declared Aboriginal place cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) will be required from the Department under the National Parks and Wildlife Act 1974. You must apply to the Department for an AHIP prior to commencing works that will directly or indirectly harm an Aboriginal object or a declared Aboriginal place.*	
Biodiversity – *The EIS must assess the impact of the proposed development on biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the Biodiversity Conservation Act 2016 (BC Act), as follows:* *a. The EIS must demonstrate and document how the proposed development exceeds, or does not exceed, the biodiversity offsets scheme threshold as set out in Section 7.4 of the BC Act 2016 and Clause 7.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation) by determining whether the proposed development involves:* *i. **The clearing of native vegetation exceeds the thresholds** listed under Clause 7.23 of the BC Regulation, or* *ii. The clearing of native vegetation, or other action, **on land included on the Biodiversity Values Map** published under Clause 7.23 of the BC Regulation (this map includes areas of outstanding biodiversity value, as declared under Section 3.1 of the BC Act).* *b. If the Proposal does not trigger any of the criteria in (a) above, then the EIS must determine whether the proposed development is likely to have a significant impact based on 'the test for determining whether proposed development likely to significant affect threatened species or ecological communities' in Section 7.3 of the BC Act.* *c. Where there is reasonable doubt regarding potential impacts, or where information is not available, then a significant impact upon biodiversity should be considered likely when applying the test in Section 7.3 of the BC Act. Where it is concluded that there is no significant impact, the EIS must justify how the conclusion has been reached.* *d. If the development exceeds the thresholds in (a) or (b), then the EIS must be accompanied by a biodiversity development assessment report (BDAR) prepared in accordance with Part 6 of the BC Act. That is, the Biodiversity Assessment Methodology applies.* ***Required Information*** *Where development is considered "likely to significantly impact on threatened species" and a Biodiversity Development Assessment Report is required, the following requirements apply:* • *Biodiversity impacts related to the Proposal are to be assessed in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in*	Section 6.3

Issue Summary	Addressed in EIS

the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method.
• *The BDAR must document the application of the avoid, minimise and offset hierarchy including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.*
• *The BDAR must include details of the measures proposed to address the offset obligation as follows:*
  ○ *The total number and classes of biodiversity credits required to be retired for the Proposal.*
  ○ *The number and classes of like-for-like biodiversity credits proposed to be retired.*
  ○ *The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules.*
  ○ *Any Proposal to fund a biodiversity conservation action.*
  ○ *Any Proposal to make a payment to the Biodiversity Conservation Fund*
• *If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.*
The BDAR must be prepared by a person accredited to apply the Biodiversity Assessment Method under s6.10 of the Biodiversity Conservation Act 2016.	

Water –
• *The EIS must map features relevant to water, including:*
  ○ *Rivers, streams, estuaries (as described in s4.2 of the Biodiversity Assessment Method).*
  ○ *Wetlands (as described in s4.2 of the Biodiversity Assessment Method).*
  ○ *Groundwater.*
  ○ *Groundwater dependent ecosystems.*
• *The EIS must describe background conditions for any water resource likely to be affected by the Proposal, including:*
  ○ *Existing surface and groundwater.*
  ○ *Hydrology*
  ○ *Water Quality Objectives (as endorsed by the NSW Government) including groundwater as appropriate that represent the community's uses and values for the receiving waters.*
  Indicators and trigger values/criteria for the identified environmental values in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and / or local objectives, criteria or targets endorsed by the NSW Government
  ○ *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (OEH/EPA, 2017).*
• *The EIS must assess the impacts of the Proposal on water quality, including:*
  ○ *The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the Proposal protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.*
  ○ *Identification of proposed monitoring of water quality.*
	Section 6.4

Issue Summary	Addressed in EIS
○ *Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan).* • *The EIS must assess the impact of the Proposal on hydrology, including:* ○ *Water balance including quantity, quality and source.* ○ *Effects upon rivers, wetlands, estuaries, marine waters and floodplain areas.* ○ *Effects upon water-dependent fauna and flora including groundwater dependent ecosystems.* ○ *Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).* ○ *Changes to environmental water availability, both regulated / licensed and unregulated / rules-based sources of such water.* ***Project specific requirements*** *Where the Proposal is large or high risk with a heightened potential to impact on water quality and hydrology, the EIS should include the following:* • *A description of existing water quality / hydrology based on suitable data (meaning data collection may be required) and must include:* ○ *Water chemistry.* ○ *A description of receiving water processes, circulation and mixing characteristics and hydrodynamic regimes.* ○ *Lake or estuary flushing characteristics.* ○ *Sensitive ecosystems or species conservation values.* ○ *Specific human uses and values (e.g. fishing, proximity to recreation areas).* ○ *A description of any impacts from existing industry or activities on water quality.* ○ *A description of the condition of the local catchment e.g. erosion, soils, vegetation cover.* ○ *An outline of baseline groundwater information, including, for example, depth to water table, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment.* ○ *Historic river flow data.* • *An assessment of the impacts of the Proposal on water quality and hydrology including:* ○ *Water circulation, current patterns, water chemistry and other appropriate characteristics such as clarity, temperature, nutrient and toxicants, and potential for erosion.* ○ *Changes to hydrology* ○ *Stream bank stability and impacts on macro invertebrates.* ○ *Water quality and hydrology modelling and / or monitoring, where necessary.* • *Proposed water quality monitoring in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004). The water quality and aquatic ecosystem monitoring program must include:* ○ *Adequate data for evaluating maintenance, or progress towards achieving, the relevant Water Quality Objectives.* ○ *Measurement of pollutants identified or expected to be present.*	
Flooding –	Section 6.4

Issue Summary	Addressed in EIS

• *The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:*
  ○ *Flood prone land (ie land susceptible to the probable maximum flood event).*
  ○ *Flood planning area, the area below the flood planning level.*
  ○ *Hydraulic categorisation (floodway and flood storage areas).*
  ○ *Flood hazard.*
• *The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 10% Annual Exceedance Probability (AEP), 1% AEP flood levels and the probable maximum flood, or an equivalent extreme event.*
• *The EIS must model the effect of the Proposal (including fill) on the current flood behaviour for a range of design events as identified above, and the 0.5% AEP and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.*
• *All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified in the EIS and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the Proposal should be detailed.*
• *Modelling in the EIS must consider and document:*
  ○ *Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.*
  ○ *The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood (PMF), or an equivalent extreme flood.*
  ○ *Impacts of the Proposal on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories.*
  ○ *Impacts of earthworks and stockpiles within the flood prone land up to the PMF level. The assessment should be based on understanding of cumulative flood impacts of construction and operational phases.*
  ○ *Relevant provisions of the NSW Floodplain Development Manual 2005.*
• *The EIS must assess the impacts on the Proposal on flood behaviour, including:*
  ○ *Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.*
  ○ *Consistency with Council floodplain risk management plans.*
  ○ *Consistency with any Rural Floodplain Management Plans.*
  ○ *Compatibility with the flood hazard of the land.*
  ○ *Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.*
  ○ *Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.*
  ○ *Whether there will be a direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.*
  ○ *Appropriate mitigation measures to offset potential flood risk arising from the Proposal. Any proposed mitigation work should be modelled and assessed on the overall catchment basis in order to ensure it fits its purpose and meets the criteria of the Council where it is located, and to ensure it has no adverse impact to surrounding areas.*
  ○ *Any impacts the Proposal may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.*	

Issue Summary	Addressed in EIS
○ *Whether the Proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.* ○ *Emergency management, evacuation and access, and contingency measures for the Proposal during both construction and operational phases considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.* ○ *Any impacts the Proposal may have on the social and economic costs to the community as a consequence of flooding.*	

NGH consulted with BCD in relation to the SEARs for flooding and flood impacts. A phone conversation with Allison Treweek for BCD, South East, Queanbeyan on 3rd February 2021 confirmed that the SEARs provided are standard. Clarification was received that justification of the Proposal operations and landscape features could be sufficient when addressing flooding and flood impacts. Consultation is provided in Appendix C.1.

NSW Department of Primary Industries (NSW DPI)

Issue Summary	Addressed in EIS
Land use – • *Detail that the quarry is consistent with strategic plans and zone requirements* • *Complete a Landuse Conflict Risk Assessment (LUCRA) to identify potential land use conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide.* • *Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors.* • *Consideration for impacts to agricultural resources and land.* • *Describe the current and potential Important Agriculture Land on the proposed development site and surrounding locality including the land capability and agricultural productivity.* • *Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated.* • *Consider possible cumulative effects to agricultural enterprises and landholders.* • *Detail the expected life span of the proposed development.* • *Develop Rehabilitation and Rehabilitation/Closure Plans that describes the design criteria of the final land use and landform along with the expected timeline for the rehabilitation program.* • *Outline monitoring and mitigation measures to be adopted for rehabilitation remedial actions.*	Section 6.2
Bushfire risk – • *Risk assessment level and mitigation plan developed to address bush fire risk.*	Section 6.13.2

Issue Summary	Addressed in EIS
Water – • *Estimated water demand and water availability should be clearly outlined in the Proposal. The source of water and any sanitisation methods to be detailed in the application.* • *Outline any impacts to water use from agriculture and mitigation measures if required.* • *Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession. A monitoring program should be developed.*	Section 6.4
Biodiversity – • *Include a biosecurity (pests and weeds) risk assessment outlining the likely plant, animal and community risks.* • *Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed and pest management plans.*	Section 6.3
Traffic and transport – • *Consideration of the route for movements needs to be taken into account so that impacts on sensitive receptors are minimised (eg noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves1 (TSR) and the movement of livestock or farm vehicles along / across the affected roads*	Section 6.9
Visual amenity – • *Amenity impacts are assessed and any necessary response to mitigate visual impacts is described and illustrated.*	Section 6.6
Consultation – • *Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure.* • *Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about; the Proposal, the likely impacts and suitable mitigation measures or compensation.*	Section 5
Environmental management – • *Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with Council in relation to complaint issues.* • *Contingency plans should be developed to enable the operation to deal with emergency situations. Commitment to the preparation of an Emergency Management plan that outlines procedures and responsibilities for responding to bushfire threats which might result from extreme climatic conditions.*	Section 8

Crown Lands

Issue Summary	Addressed in EIS
Activities on Crown Lands – *Where Crown Land is impacted by project activities it will be necessary for the applicant to seek an Extractive Industry Licence issued under the Crown Land Management Act 2016 prior to any work commencing on Crown land.* *The Proposal will directly impact Crown land including a Crown reserve (Lot 7002 DP 1031310) which is gazetted for trigonometrical purposes. It will be required to liaise with the Surveyor General regarding the proposed use of this trig reserve, which is also subject to an incomplete Aboriginal Land Claim (Claim No 11046) by the NSW Aboriginal Land Council. Concurrence must be provided by the Aboriginal Land Council (ALC), or the claim withdrawn, before the Proposal could proceed over the claim area.* *As the Proposal will directly impact on a Crown Road north of Lot 11 DP 133540, Crown Lands suggests that Bald Hill Quarry pursue the closure of the affected roads and seek an easement for access where not already in place.* *A tenure may be required to authorise the proposed use and occupation of the Crown land involved. This will be dependent upon the outcome of consultation with the Surveyor General and the Aboriginal Land Council Claimant.*	Section 6.2

BHQ has been in ongoing consultation with Crown Lands for the removal of the survey marker on the peak of Mt Bundarbo, approval access to crown reserve, Native Title and general land use. Ongoing consultation with the Surveyor General's office between June 2020 and March 2021, Daniel Sadler a senior surveyor, has occurred seeking approval to remove the permanent survey marker. Ongoing consultation with natural resource management project office, Gina Guinane, between September 2020 and March 2021 has occurred seeking clarification and information in regard to approval to access crown reserve, native title claims on the crown reserve and general land use.

NSW DPIE - Division of Resources and Geoscience

Issue Summary	Addressed in EIS
General – *All environmental reports (EIS or similar) accompanying Development Applications for extractive industry lodged under the Environmental Planning & Assessment Act 1979 should include a resource assessment which:* • *Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and* • *Documents the methods used to assess the resource and its suitability for the intended applications.*	3.2.4

NGH emailed the Geological Survey of NSW regarding the requirement in the agency consultation for the opportunity for early consultation in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.

Correspondence was received from Shayne Kneen on 1st February 2021 and again on 3rd February 2021 and provided in Appendix C.1.

WaterNSW

Issue Summary	Addressed in EIS
WaterNSW has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (EAR) and provides the following comments. The information provided indicates that the Proposal is for the to blast rock, extract and haul material for processing off site. Based on the information that has been provided the is no requirement for a licence or approval from WaterNSW. **Note: If there are changes to the Proposal and water is to be extracted at the sites, the applicant will need to seek further advice from WaterNSW.**	Section 6.4 Captured water in sediment basin would be reused on-site. No water is to be extracted from adjacent waterways or new groundwater resources.

NSW Environment Protection Authority (NSW EPA)

Issue Summary	Addressed in EIS
The Proposal – • *The objectives of the Proposal should be clearly stated and refer to:* *a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced;* *b) a life cycle approach to the production, use or disposal of products;* *c) the anticipated level of performance in meeting required environmental standards and cleaner production principles;* *d) the staging and timing of the Proposal and any plans for future expansion;* e) *the Proposal's relationship to any other industry or facility.* • *Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:* *a) relevant NSW government guidelines;* *b) industry guidelines;* *c) EISs for similar projects;* *d) relevant research and reference material;* *e) relevant preliminary studies or reports for the Proposal;* *f) consultation with stakeholders.* • *Provide a summary of the outcomes of the process including:* *a) all issues identified including local, regional and global impacts (e.g. increased/ decreased greenhouse emissions);* *b) key issues which will require a full analysis (including comprehensive baseline assessment);* *c) issues not needing full analysis though they may be addressed in the mitigation strategy;* d) *justification for the level of analysis proposed (the capacity of the Proposal to give rise to high concentrations of pollution compared with the ambient environment*	This document

Issue Summary	Addressed in EIS
or environmental outcomes is an important factor in setting the level of assessment). • Reasons should be included which justify undertaking the Proposal in the manner proposed, having regard to the potential environmental impacts.	
General – • *Outline the production process including:* *a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc)* *b) any life-cycle strategies for the products.* • *Outline cleaner production actions, including:* *a) measures to minimise waste (typically through addressing source reduction);* *b) Proposals for use or recycling of by-products;* *c) proposed disposal methods for solid and liquid waste;* *d) air management systems including all potential sources of air emissions, Proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points;* *e) water management system including all potential sources of water pollution, Proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge;* *f) soil contamination treatment and prevention systems.* • *Outline construction works including:* *a) actions to address any existing soil contamination;* *b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site);* *c) construction timetable and staging; hours of construction; proposed construction methods;* *d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures.* • *Include a site diagram showing the site layout and location of environmental controls.* • *Provide an overview of the affected environment to place the Proposal in its local and regional environmental context including:* *a) meteorological data (e.g. rainfall, temperature and evaporation, wind speed and direction);* *b) topography (landform element, slope type, gradient and length);* *c) surrounding land uses (potential synergies and conflicts);* *d) geomorphology (rates of landform change and current erosion and deposition processes);* ***e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils);*** *f) ecological information (water system habitat, vegetation, fauna);* *g) availability of services and the accessibility of the site for passenger and freight transport.*	This document

Issue Summary	Addressed in EIS

• *The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution.*
• *Identify gaps in information and data relevant to significant impacts of the Proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.*
• *Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.*
• *Provide a description of existing environmental conditions for any potential impacts.*
• *For any potential impacts relevant for the assessment of the Proposal provide a detailed analysis of the impacts of the Proposal on the environment including the cumulative impact of the Proposal on the receiving environment especially where there are sensitive receivers.*
• *Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts.*
• *The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.*
• *The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and rehabilitation if relevant.*
• *The level of assessment should be commensurate with the risk to the environment.*
• *Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the Proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.*
• *Proponents are expected to implement a 'reasonable level of performance' to minimise environmental impacts. The Proponent must indicate how the Proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change.*
• *Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.*
• *Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:*
  a) operational procedures to manage environmental impacts;
  b) monitoring procedures;
  c) training programs;
  d) community consultation;
  e) complaint mechanisms including site contacts;
  f) strategies to use monitoring information to improve performance;	

Issue Summary	Addressed in EIS
g) *strategies to achieve acceptable environmental impacts and to respond in event of exceedances.* • *Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).* • *Outline how the Proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the Proposal is capable of complying with statutory obligations under EPA licences or approvals (e.g. outline of an environmental management plan).* • *The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the Proposal. It should include two sections, one setting out the program for managing the Proposal and the other outlining the monitoring program with a feedback loop to the management program.*	
Air – • *Identify all sources or potential sources of air emissions from the development. Note: emissions can be classed as either:* - *point (e.g. emissions from stack or vent); or* - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).* • *Provide details of the project that are essential for predicting and assessing air impacts including:* *a) the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored;* *b) an outline of procedures for handling, transport, production and storage;* c) *the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.* • *Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.* • *Describe surrounding buildings that may effect plume dispersion.* • *Provide and analyse site representative data on following meteorological parameters:* *a) temperature and humidity;* *b) rainfall, evaporation and cloud cover;* *c) wind speed and direction;* *d) atmospheric stability class;* *e) katabatic air drainage;* f) *air-recirculation.* • *Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data. This description should include the following parameters:* *a) Dust deposition;* *b) Air particulates total suspended particles (TSP), PM10, PM2.5* c) *Odour;*	Section 6.5

Issue Summary	Addressed in EIS
• *Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.* • *Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA.* • *Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.* • *Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations.* • *For potentially odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate. Note: With dust and odour, it may be possible to use data from existing similar activities to generate emission rates.* • *Reference should be made to the following documents:* a) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2016);* b) *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2007);* c) *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006);* d) *Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006).* • *Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.*	
Noise and vibration – • *Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.* • *Specify the times of operation for all phases of the development and for all noise producing activities.* • *For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.* • *Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically, the location of any noise sensitive locations in relation to the site should be included on a map of the locality.* • *Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.* • *Determine the existing background (LA90) and ambient (LAeq) noise levels, as relevant, in accordance with the NSW Noise Policy for Industry.* • *Determine the existing road traffic noise levels in accordance with the NSW Road Noise Policy, where road traffic noise impacts may occur.*	Section 6.7

Issue Summary	Addressed in EIS
• *The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including:* *a) details of equipment used for the measurements;* *b) a brief description of where the equipment was positioned;* *c) a statement justifying the choice of monitoring site(s), including the procedure used to choose the site(s), having regards to Fact Sheets A and B of the NSW Noise Policy for Industry;* *d) details of the exact location of the monitoring site and a description of land uses in surrounding areas;* *e) a description of the dominant and background noise sources at the site;* *f) day, evening and night assessment background levels for each day of the monitoring period;* *g) the final Rating Background Level (RBL) value;* *h) graphs of the measured noise levels for each day should be provided;* i) *a record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring.* • *Determine the project noise trigger levels for the site. For each identified potentially affected receiver, this should include:* *a) determination of the project intrusive noise level for each identified potentially affected receiver;* *b) selection and justification of the appropriate amenity category for each identified potentially affected receiver;* *c) determination of the project amenity noise level for each receiver;* *d) determination of the appropriate maximum noise level event assessment (sleep disturbance) trigger level.* • *Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible effects on sleep. Determine expected noise level and noise character likely to be generated from noise sources during:* *a) site establishment;* *b) construction;* *c) operational phases;* *d) transport including traffic noise generated by the Proposal;* *e) other services.* • *Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).* • *Determine the noise levels likely to be received at the reasonably most affected location(s) (these may vary for different activities at each phase of the development).* • *The noise impact assessment report should include:* *a) a plan showing the assumed location of each noise source for each prediction scenario;* *b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site;* *c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc;* *d) d) methods used to predict noise impacts including identification of any noise models used;*	

Issue Summary	Addressed in EIS

e) the weather conditions considered for the noise predictions;
f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario;
g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived;
h) an assessment of the need to include modification factors as detailed in Fact Sheet C of the NSW Noise Policy for Industry.

- *Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional feasible and reasonable mitigation measures.*
- *The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.*
- *Where relevant noise/vibration levels cannot be met after application of all feasible and reasonable mitigation measures the residual level of noise impact needs to be quantified by identifying:*
  a) locations where the noise level exceeds the criteria and extent of exceedance;
  b) numbers of people (or areas) affected;
  c) times when criteria will be exceeded;
  d) likely impact on activities (speech, sleep, relaxation, listening, etc);
  e) change on ambient conditions;
  f) the result of any community consultation or negotiated agreement.
- *For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.*
- *Where blasting is intended an assessment in accordance with the Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment:*
  a) bench height, burden spacing, spacing burden ratio;
  b) blast hole diameter, inclination and spacing;
  c) *type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.*
- *Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.*
- *For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:*
  a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage;
  b) control of traffic (eg: limiting times of access or speed limitations);
  c) resurfacing of the road using a quiet surface;
  d) use of (additional) noise barriers or bunds;
  e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern;

Issue Summary	Addressed in EIS
f) *more stringent limits for noise emission from vehicles (i.e. using specially designed 'quite' trucks and/or trucks to use air bag suspension;* g) *driver education;* h) *appropriate truck routes;* i) *limit usage of exhaust brakes;* j) *use of premium muffles on trucks;* k) *reducing speed limits for trucks;* l) *ongoing community liaison and monitoring of complaints;* m) *phasing in the increased road use.*	
Water – • *Provide details of the project that are essential for predicting and assessing impacts to waters including:* a) *the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000);* b) *the management of discharges with potential for water impacts;* c) *drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the Proposal.* • *Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.* • *Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include 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.* • *Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website:* ***http://www.environment.nsw.gov.au/ieo/index.htm*** *should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.* • *Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the Proposal and for all conditions (e.g. a wet weather sampling* • *program is needed if runoff events may cause impacts). Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004) or be approved and analyses undertaken by accredited laboratories).* • *Provide site drainage details and surface runoff yield.* • *State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website****: http://www.environment.nsw.gov.au/ieo/index.htm****. The EIS should state the environmental values listed for the catchment and waterway type relevant to your*	Section 6.4

Issue Summary	Addressed in EIS
Proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice. • *State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 Guidelines for Fresh and Marine Water Quality (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available**, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.*** • *State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government/nswstrategy.htm).* • *Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.* • *Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, Proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:* a) *lake or estuary flushing characteristics;* b) *specific human uses (e.g. exact location of drinking water offtake);* c) *sensitive ecosystems or species conservation values;* d) *a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc;* e) *an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment;* f) *historic river flow data where available for the catchment.* • *No Proposal should breach clause 120 of the Protection of the Environment Operations Act 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).* • *Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.* • *Include a rationale, along with relevant calculations, supporting the prediction of the discharges.* • *Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the Proposal. Determine changes to hydrology (including*	

Issue Summary	Addressed in EIS
drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater). • *Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).* • *Identify any potential impacts on quality or quantity of groundwater describing their source.* • *Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.* • *Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.* • *Containment of spills and leaks shall be in accordance with EPA's guidelines section 'Bunding and Spill Management' at http://www.epa.nsw.gov.au/mao/bundingspill.htm and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.* • *The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the Proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:* *a) will the Proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and* *b) will the Proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.* • *Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the Proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment. Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.* • *Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through* • *application of a reasonable level of performance, using available technology, management practice and industry guidelines.* • *Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.* • *Reference should be made to: Managing Urban Stormwater: Soils and Construction (Landcom, 2004), Guidelines for Fresh and Marine Water Quality ANZECC 2018).* • *Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.* • *Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.*	

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• *Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.*
• *Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate.*
• *Describe hydrological impact mitigation measures including:*
  a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition);
  b) minimising runoff;
  c) minimising reductions or modifications to flow regimes;
  d) avoiding modifications to groundwater.
• *Describe groundwater impact mitigation measures including:*
  a) site selection;
  b) retention of native vegetation and revegetation;;
  c) artificial recharge;
  d) providing surface storages with impervious linings;
  e) monitoring program.
• *Describe geomorphological impact mitigation measures including:*
  a) site selection;
  b) erosion and sediment controls;
  c) minimising instream works;
  d) treating existing accelerated erosion and deposition;
  e) monitoring program.
• *Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004).*	

Soils and contamination –
• ***Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.***
• ***Provide any details that are needed to describe the existing situation in terms of soil types and properties and soil contamination.***
• ***Identify any likely impacts resulting from the construction or operation of the Proposal, including the likelihood of:***
  a) ***disturbing any existing contaminated soil;***
  b) ***contamination of soil by operation of the activity;***
  c) ***subsidence or instability;***
  d) ***soil erosion and sediment transport;***
  e) ***disturbing acid sulfate or potential acid sulfate soils.***
• ***Reference should be made to: Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011); Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).***
• ***Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the Proposal including:***
  a) ***erosion and sediment control measures;***
	Section 6.8

Issue Summary	Addressed in EIS
b) ***Proposals for site remediation – see Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998);*** c) ***Proposals for the management of these soils – see Acid Sulfate Soil Manual (Acid Sulfate Soil Advisory Committee 1998) and Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Advisory Committee 1998).***	
Waste and chemicals – *Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the EPA's Waste Classification Guidelines 2014 (as amended from time to time)* • *Provide details of liquid waste and non-liquid waste management at the facility, including:* a) *the transportation, assessment and handling of waste arriving at or generated at the site;* b) *any stockpiling of wastes or recovered materials at the site;* c) *any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site;* d) *the method for disposing of all wastes or recovered materials at the facility;* e) *the emissions arising from the handling, storage, processing and reprocessing of waste at the facility;* f) *the proposed controls for managing the environmental impacts of these activities.* • *Provide details of spoil disposal with particular attention to:* a) *the quantity of spoil material likely to be generated;* b) *proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil;* c) *the need to maximise reuse of spoil material in the construction industry;* d) *identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material;* e) *designation of transportation routes for transport of spoil.* • *Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.* • *Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.* • *Reference should be made to the guidelines: EPA's Waste Classification Guidelines 2014 (as amended from time to time)* • *Describe any existing waste or chemicals operations related to the Proposal.* • *Assess the adequacy of proposed measures to minimise natural resource consumption and minimise impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals.* • *Outline measures to minimise the consumption of natural resources.* • *Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.* • *Outline measures to support any approved regional or industry waste plans.*	Section 6.14
Ecologically sustainable development (ESD) –	Section 4.6

Issue Summary	Addressed in EIS
• *Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including:* *a) an assessment of a range of options available for use of the resource, including the benefits of each option to future generations;* *b) proper valuation and pricing of environmental resources;* c) *identification of who will bear the environmental costs of the Proposal.*	
Rehabilitation • *Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).*	Section 7
Consideration of alternatives – • *Consider the environmental consequences of adopting alternatives, including alternative:* *a) sites and site layouts;* *b) access modes and routes;* *c) materials handling and production processes;* *d) waste and water management;* *e) impact mitigation measures;* *f) energy sources.* • *Selection of the preferred option should be justified in terms of:* *a) ability to satisfy the objectives of the Proposal;* *b) relative environmental and other costs of each alternative;* *c) acceptability of environmental impacts and contribution to identified environmental objectives;* *d) acceptability of any environmental risks or uncertainties;* *e) reliability of proposed environmental impact mitigation measures;* f) *efficient use (including maximising re-use) of land, raw materials, energy and other resources.*	Section 2.4
Cumulative impacts – • *Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this Proposal will contribute.* • *Assess the impact of the Proposal against the long term air, noise and water quality objectives for the area or region.* • *Identify infrastructure requirements flowing from the Proposal (e.g. water and sewerage services, transport infrastructure upgrades).* • *Assess likely impacts from such additional infrastructure and measures reasonably available to the Proponent to contain such requirements or mitigate their impacts (e.g. travel demand management strategies).*	Section 6.15

NGH consulted with NSW EPA, Queanbeyan office, regarding confirmation that NGH was preparing the noise assessment. Initial correspondence was on 30th September 2020, with Janine Goodwin confirming NGH could prepare the noise and vibration assessment on 17th November 2020. NGH therefore completed the noise assessment, refer to the NSW EPA correspondence attached in Appendix C.1.

Hilltops Council

Issue Summary	Addressed in EIS
The proposed quarry is partly on Crown Land. The applicant must obtain owners consent from Crown Lands for the development. *The proposed quarry area is identified on the Harden Local Environmental Plan 2011 Natural Resources Map. A soil and land capability assessment must support the EIS that considers the specific requirements of the quarry, the likely pre and post quarry soil impacts and detail measures to address such impacts. The EIS is to address soil management, rehabilitation and give consideration to post quarrying agricultural suitability.* *The proposed quarry area is also identified on the Harden Local Environmental Plan 2011 Natural Resources Biodiversity Map. The EIS must detail the extent of any vegetation to be cleared on site. This is to include an assessment of the likely biodiversity impacts of the development, undertaken in accordance with the Biodiversity Assessment Method, and include a strategy to offset any impacts of the development in accordance with the Biodiversity Offset Scheme.* *Vehicular access to the development site will be via an existing private access to the Hume Highway which services other land uses (quarry and waste management facility). Any traffic impact assessment must detail traffic movements and impacts on the surrounding road network and consider the cumulative impact of these land uses.* *Council's Harden Contribution Plan for Other Developments applies to the land. Council is open to entering into a Planning Agreement with the Applicant for the ongoing road maintenance.* *With noting the concerns above, generally the EIS must contain reports which outline and give due consideration to:* • *Noise and vibration (including blasting frequency and methods)* • *Air quality (bust control)* • *Ecology (flora and fauna)* • *Aboriginal heritage* • *Traffic and haulage routes* • *Surface water and water balance (including water demand and supply)* • *Groundwater* • *Soils* *Such reports must take into consideration the cumulative impacts of the Proposal and surrounding developments, including the existing quarry and waste management facility.*	This document

BHQ consulted with Andrew Raines and Bill Vanry of Hilltops Council in February 2020 to determine the approval pathway. NGH consulted with Andrew Raines of Hilltops Council in relation to greenhouse gas (GHG) emissions and the requirement for photomontages for the visual impact assessment. It was determined during a phone call with Andrew Raines on 23rd October 2020 that NGH could address the GHG emissions assessment and that the visual impact assessment would require photos but not necessarily photomontages. Correspondence is included in Appendix C.1.

NSW Rural Fire Service (NSW RFS)

Issue Summary	Addressed in EIS
The NSW RFS has considered the information submitted and notes that the proposed development has the potential to increase the level of bush fire risk within the landscape and, the development may be impacted upon during a bush fire event. As such, the environmental assessment for the proposed extension of Bald Hill Quarry should address the following bush fire criteria: • *The aim and objectives of Planning for Bush Fire Protection 2019;* • *Identification of potential ignition sources during construction and operation of the development;* • *Storage of fuels and other hazardous materials;* • *Proposed bush fire protection measures for the development, including vegetation management and fire suppression capabilities;* • *Operational access for firefighting appliance to the site; and* • *Emergency and evacuation planning.*	Section 6.13

Transport for NSW (TfNSW)

Issue Summary	Addressed in EIS
From the brief information provided it is understood that the proposed development is for the establishment of a new extraction pit on the subject site located to the east of Jugiong. The subject site currently contains 2 quarry pits with one being operated as a landfill and the other as a quarry. The subject site has frontage to the Hume Highway, which is a classed as local road, within a 110 km/h speed zone. *It is understood that the proposed quarry is in addition to the existing quarry operation on the subject site but will be operated within the current approved extraction rates. The degree of traffic assessment required to support the Proposal will depend on the level of impact resulting from traffic generated by the proposed quarry, the rate of extraction of material and the standard of construction of, and current usage characteristics of, the public roads servicing the proposed quarry sites.* *TfNSW is interested in the characteristics of the traffic generated by the development and in the impact of the development on the safety and efficiency of the road network. A traffic impact assessment should outline measures to address and manage traffic related issues generated by the development. The documentation submitted should address the potential impacts on the road network associated with the development during the lifetime of the project, works required to the existing road infrastructure, the measures to be implemented to maintain the standard and safety of the road network, and the procedures to monitor and ensure compliance. A transport management plan may be required to outline measures to manage traffic related issues generated by the development.* *For guidance in the preparation of the TIA the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12 - Traffic Impacts of Development and Part 3 - Traffic Studies and Analysis and the "Guide to Traffic Generating Developments" prepared by the RTA and similar documentation. As a minimum the TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, peak traffic volumes, vehicle types, travel routes for vehicles accessing the site and provide recommendations for any*	Section 6.9

Issue Summary	Addressed in EIS
mitigation measures, such as intersection upgrades, considered necessary to address traffic related impacts. *TfNSW emphasises the need to appropriately consider and minimise the impacts of the development on the existing road network and maintain the level of safety, efficiency and maintenance along the existing road network. Any Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network, particularly intersections.*	

NGH and BHQ met with Maurice Morgan of TfNSW on 9th September 2020 to discuss the likely level of traffic impact assessment. Follow up correspondence with Maurice Morgan confirmed that a TIA would be required for the Proposal. Following an intersection audit of the Hume Highway and Old Hume Highway, TfNSW was consulted regarding the extent of proposed works for inclusion in this assessment.

NGH sent an email to Maurice Morgan of TfNSW on the 17 April 2021 to include the intersection upgrades to allow for the simultaneous two-way vehicle movement for a 19 m long articulated vehicle and allow B-Doubles to access the site. The email included details on the intersection upgrades and a statement that BHQ had recently revised the TIA to include this upgrade. NGH asked if there was any additional information required before submitting this EIS. A response from TfNSW concluded that the use of the intersection for B-Doubles was not approved due to safety concerns, not just for the site, but upstream and downstream of the intersection. As a result, the request for B-Doubles accessing the site has been removed.

Refer to Appendix C for the consultation correspondence.

5.2. ABORIGINAL COMMUNITY CONSULTATION

Engagement with the Aboriginal community included communication with NSW and Local Aboriginal Land Council (LALC). Initial communications with the NSW Aboriginal Land Council began in April 2020. Consultation with the Young LALC for this Proposal began in August 2020. Evidence of these communications is provided in Appendix C.

Due to the undetermined Land Rights Claim over the Crown Reserve, ongoing consultation will be undertaken with the Young LALC.

NGH was in consultation with the Young LALC for the duration of the Aboriginal Cultural Heritage Due Diligence assessment. Consultation included a signed agreement for the cultural heritage survey and for any comments on the draft Due Diligence report. Correspondence is provided in Appendix C.2.

5.3. BROADER COMMUNITY CONSULTATION

Due to the remote location of the Proposal, only surrounding landholders (Figure 5-1) have been consulted. BHQ have undertaken all community consultation. The Benangaroo landholder (R05) was consulted in April 2020 and that involved a discussion at the site. As the plans were refined further, discussions were undertaken with the landholder and their concerns noted and taken into account for the final design. The landholder has completed the application to purchase the road reserve within the project area. A more formal meeting was held providing the landholder with maps and items noted. The landholders of Birrema Park and Dalree (R01, R02, R06) were consulted in October 2020. The landholder at Ellerslie (R03) was consulted in March 2021.

Consultation was via door knocking and phone calls. The phone call was used where the landholder did not live at the property (landholder of R01, R02, R06). The consultation included discussion regarding the Proposal and access to the homestead to take photographs for the visual impact part of this EIS.

One objection was received from the neighbour that has a property adjacent to the Proposal (R02). However, this landholder does not reside on the property or in the area. This landholder has been opposed to BHQ operations since establishment. There are no other specific details of his objection of the proposed project and no formal complaints have been received for the existing projects.

Community comments have been addressed by meetings and verbal communication. There have been no formal responses except for meeting minutes taken to note and address concerns from the current landholder. Providing responses to affected members would be done via letter if any formal concerns are received.

Continued community and stakeholder engagement is undertaken via a community liaisons annual meeting with the closest neighbours in regard to the landfill. The current operations cumulatively, however, are discussed at these meetings. Consultation will be ongoing.

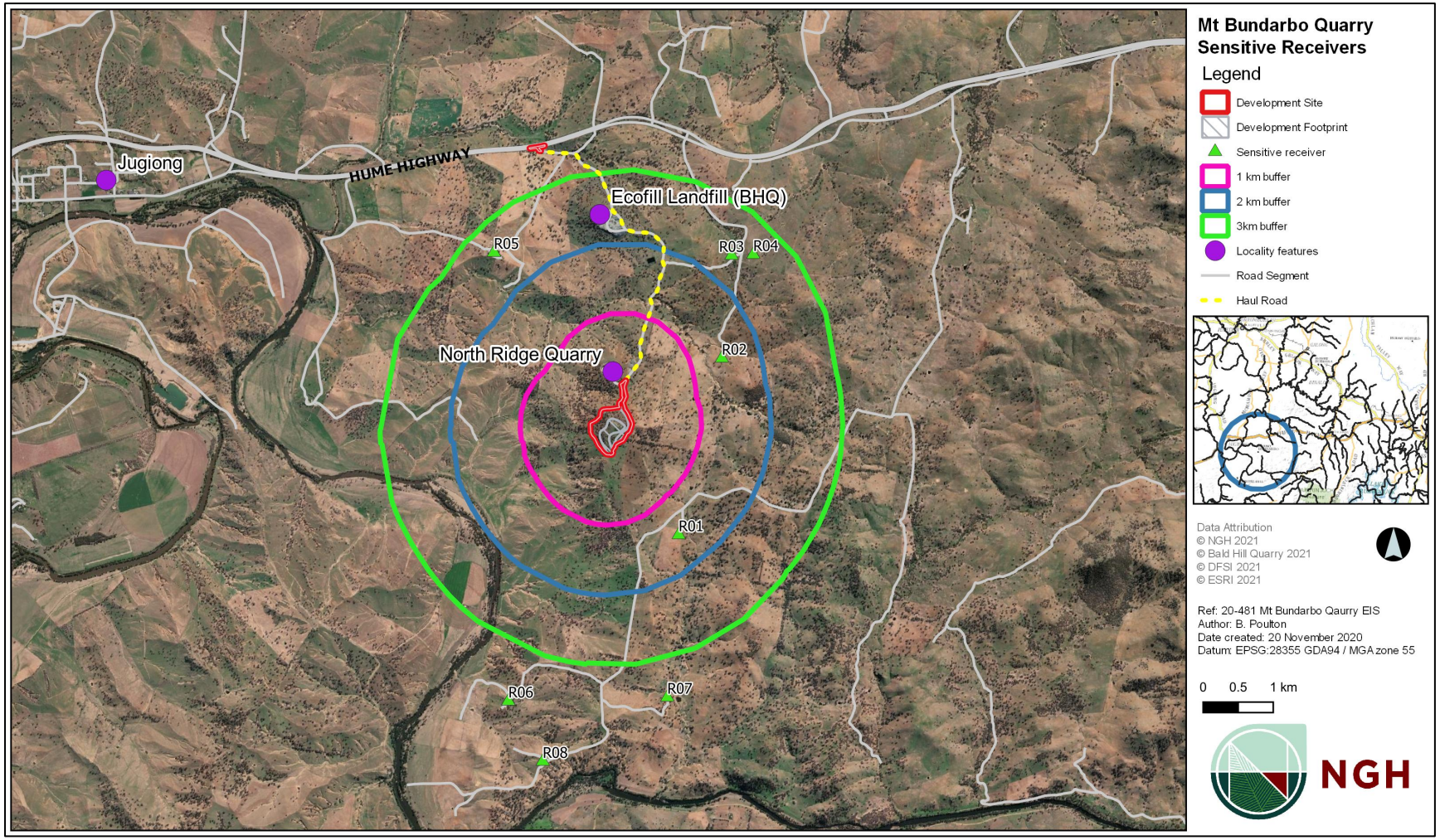


Figure 5-1 Sensitive receivers within proximity of the development site.

5.4. PUBLIC EXHIBITION AND NOTIFICATION

ISEPP Consultation for the Proposal, required under clause 16, is provided in Table 5-1.

Table 5-1 ISEPP consultation.

Is consultation with other agencies required under clause 16 of the Infrastructure SEPP?		
Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*?	☐ Yes	☒ No
Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*?	☐ Yes	☒ No
Are the works adjacent to a declared marine park under the *Marine Parks Act 1997*?	☐ Yes	☒ No
Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	☐ Yes	☒ No
Do the works involve the installation of a fixed or floating structure in or over navigable waters?	☐ Yes	☒ No
Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?	☐ Yes	☒ No
Is development that may increase the amount of artificial light in the night sky that is on land within the dark sky region?	☐ Yes	☒ No
Is development on defence communications facility buffer land?	☐ Yes	☒ No
Is development on land in a mine subsidence district?	☐ Yes	☒ No

6. ENVIRONMENTAL IMPACT ASSESSMENT

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *an executive 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;*
  - *identification of the resource, including the amount, type, composition;*
  - *the layout of the proposed works and components (including any existing infrastructure that would be used for the development);*
  - *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;*
  - *a detailed rehabilitation plan for the site;*
  - *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;*
  - *a list of any other approvals that must be obtained before the development may commence;*
  - *the permissibility of the development, including identification of the land use zoning of the site;*
  - *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;*
- *a suitable monitoring and reporting procedure to ensure that the total resource extracted by the development does not exceed 5 million tonnes;*
- *a conclusion justifying 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 Environmental Planning and Assessment Act 1979; and*
- *a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.*

The EIS must assess the potential impacts of the Proposal at all stages of the development, including the establishment, operation and rehabilitation of the development.

6.1. IMPACT ASSESSMENT APPROACH

Following the preparation of the request for SEARs, an impact assessment was undertaken to characterise the likely adverse environmental risks associated with the construction, operation and rehabilitation of the Proposal. The aim of the impact assessment was to ensure that all relevant risks were identified, investigated and mitigated as part of the EIS submission, relative to the degree of environmental risk they represented.

The environmental impact assessment below addresses all impacts likely to be attributed to the Proposal. This includes consideration of:

- Direct impacts - impacts directly attributable to the construction, operation, and rehabilitation phases such as:
  - Disturbances to cultural heritage, native vegetation, soil, water and air quality.
  - Noise and vibration generated by blasting, equipment and traffic movements.
  - Public safety, pollution risks and hazards.
- Indirect impacts – follow-on or cascading impacts such as:
  - Impacts on the local economy.
  - Impacts to visual amenity.
  - Potential to impact existing and future land uses.
- Cumulative impacts - the combined potential effects of different impact types as well as the potential interaction with other Proposals. For example:
  - The combined impact of construction noise, traffic and visual impacts for nearby residences.
  - The combined effects of the construction phase coinciding with other infrastructure works, including nearby quarry pits, that may be planned in the area.

Table 6-1 summarises the results of the impact assessment. Fourteen environmental impacts were investigated.

Table 6-1 Analysis of adverse environmental issues

Aspect	Outcomes	Unmitigated Impact	Mitigated Impact
Flora and Fauna	• Ground cover along the proposed haul road route to North Ridge Quarry is made up of a mixture of general pasture species, including many introduced grasses, herbs and forbs. No native species remain within the understorey and subsequently no threatened plants species were noted within the Project Site. Mt Bundarbo was assumed to have the same ground cover. • Fauna at North Ridge Quarry, which is considered similar to Mt Bundarbo are likely to have threatened species such as Turquoise Parrot (*Neophema pulchella*), Superb Parrot (*Polytelis swainsoni*) and Swift Parrot (*Lathamus discolour*) and their habitat.	High	Low
Visual	• Existing vegetation retained to retain visual character and natural screening. • Distance of the pit to sensitive receivers is beyond 1.5 km. Inherent visual impact is indiscernible. • Vegetated bunds would provide additional visual impact mitigation for receivers to the east.	Moderate	Low

Aspect	Outcomes	Unmitigated Impact	Mitigated Impact
Noise	• Quarry extraction would initially be completed via a “keyhole” which would allow considerable noise attenuation. • Controls such as noise mufflers would be applied on equipment where necessary. • Regular maintenance on site access roads and haul road would be undertaken. • Construction noise to nearby residences which are located 1.7km and greater from the Development site would be inaudible. • Construction mitigation measures implemented to minimise noise impacts on near neighbours.	Medium	Low
Land use	• Due to the small size of the development footprint, the impacts of the Proposal on regional agricultural productivity suggest minimal impact. • Grazing capacity would remain around the site during operation. • Income diversification can help farmers offset input costs for the portion of their land used solely for primary agriculture.	Medium	Low
Regional Geology	• According to the Cootamundra 1:250 000 Geological Sheet (SI55-11) the North Ridge Quarry is situated on a basalt plateau of Tertiary age, surrounded by granodiorite of the mid to late Silurian Young Granodiorite. A basalt volcanic plug has intruded the granodiorite country rock.	Low	Low
Quarry Site Geology	• The Mt Bundarbo rock deposit is a Tertiary basalt flow, one of four associated volcanic features aligned approximately north-south of which Mt Bundarbo is the most prominent.	Low	Low
Resource Assessment	• Drilling confirmed a resource quantity of 4Mt of basalt. • Materials testing of rock samples show a more consistent and higher quality basalt to that currently quarried at Bald Hill Quarry – North Ridge.	Low	Low
Soils	• Soils across Mt Bundarbo comprise of Lithosols, derived from underlying basalt. The greater extent of the Development site comprises of rock outcrops or sub-crop irregularly covered by a thin skeletal soil.	Medium	Low

Aspect	Outcomes	Unmitigated Impact	Mitigated Impact
	• Soils along haul road are shallow granite with a coarse textured A-horizon overlying silty clay sub-soils. • The soils are characteristically infertile and are moderately erodible when stripped of vegetation, suffering from sheet erosion and moderate gully erosion. • Mitigation measures would be put in place for minimising soil disturbance and re-vegetating all disturbed areas.		
Surface water	• Surface water resources are limited to Sawpit Creek and one farm dam adjacent to the haul road. • The Murrumbidgee River is located approximately 4km west of the Development site.	Medium	Low
Groundwater	• No registered groundwater wells are located within 2 km radius of the Development site. Regional groundwater bores are generally low yielding, extracting groundwater for stock and domestic purposes. Aquifers are typically limited to shallow granite, derived alluvium, and deeper fractured granite. • Proposed operations would not intercept groundwater.	Low	Low
Air Quality	• Application of watering trafficked areas, processing areas and blasting areas will contain dust to acceptable levels. • Blasting would be undertaken using best practice. • Loading trucks would be covered prior to dispatch. • Greenhouse gas emissions are expected to be minimal. There would be no increase in the daily processing or transporting of material beyond current operations.	Medium	Low
Transport	• Traffic impacts from dispatching product would be mitigated with safeguards, relating to restricting speeds on site access roads, and adhering to transport policy and use of trucks that are properly maintained.	Medium	Low
Hazards	• Fire preparation measures would be put in place in consultation with Planning for Bushfire Protection Guidelines (RFS 2019).	Medium	Low

Aspect	Outcomes	Unmitigated Impact	Mitigated Impact
Historic Heritage	• No registered heritage places would be impacted by the Proposal.	Low	Low
Aboriginal heritage	• The Due Diligence assessment site survey with the Young Local Aboriginal Land Council did not identify any Aboriginal cultural heritage objects or places in the development site. The likelihood for any to be present was found to be low.	Medium	Low
Socioeconomic	• The Proposal would maintain the existing workforce of the Bald Hill Quarry operations. • Bald Hill Quarry would continue to work with and support the local community.	Low	Low
Cumulative impacts	• Cumulative impacts may have a minor impact to SSD Proposals occurring within the LGA. • During construction and operation, key cumulative impacts may include additional stress on the grid, community complaints regarding visual amenity impacts, stress on local business for supply and demand, staff accommodation, noise impacts, air quality, waste management, traffic etc.	Medium	Low

In summary, the following environmental risks were considered to be key issues for detailed assessment and consideration of mitigation strategies within the EIS:

- Land Use.
- Biodiversity.
- Water use and quality (surface water and groundwater).
- Climate and air quality.
- Visual amenity
- Aboriginal heritage.
- Noise and vibration impacts.
- Traffic, transport, and road safety.

In addition, the following were also identified as being environmental assessment issues of lower risk: topography, geology and soils, historic heritage, socio-economic and community, hazards, resource use and waste generation, and cumulative impacts.

Biodiversity, Aboriginal heritage, traffic, and air quality impacts were investigated by specialists.

Visual impact and quantitative noise assessments are provided in sections 6.6 and 6.7, whereas the reports for biodiversity and Aboriginal heritage, Air Quality and Traffic are attached as Appendices D, E, F and G, respectively (also summarised in sections 6.3, 6.10, 6.5, 6.9). Land use has been assessed in section 6.2 and addresses guidance provided in *Primefact 1063: Infrastructure Proposals on rural land* (DPI 2013) and the *Land and soil capability assessment scheme* (OEH 2012).

6.2. LAND USE IMPACTS

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Land Resources - Including an assessment of:

- *potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate);*
- *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*
- *the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*

DEPARTMENT OF PRIMARY INDUSTRY

Site Suitable for development

- *Complete a Landuse Conflict Risk Assessment (LUCRA) to identify potential land use conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide.*
- *Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors.*

Consideration for impacts to agricultural resources and land

- *Describe the current and potential Important Agriculture Land on the proposed development site and surrounding locality including the land capability and agricultural productivity.*
- *Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated.*
- *Consider possible cumulative effects to agricultural enterprises and landholders.*
- *Detail the expected life span of the proposed development*

6.2.1. Existing environment

Surrounding land use and zoning

Surrounding land use is predominantly grazing agriculture with five rural dwellings located within 3 km of the site. The development site is zoned RU1 (primary production) as is all surrounding land (Figure 6-1). Key nearby features and land uses in the locale include:

- Quarry and landfill activities to the immediate north of the Development site.
- The Murrumbidgee River lies approximately 2.3 km to the south west.
- The Hume Highway is located approximately 4.1 km to the north.
- Jugiong Creek is located approximately 4.8 km to the north west.
- The Jugiong township is located approximately 8 km to the north west.
- Several rural dwellings
- Public road network consisting of both sealed and unsealed rural roads.
- Electricity connection and transmission infrastructure.

A map of the nearby sensitive features can be seen in Figure 5-1. There are no mineral titles and no mineral applications relevant to the proposed development site indicated in the Minview database (Figure 6-2). The subject land does not hold any exploration applications, assessment lease applications, assessment leases, mining or production applications, or mining or production leases (DPIE 2020).

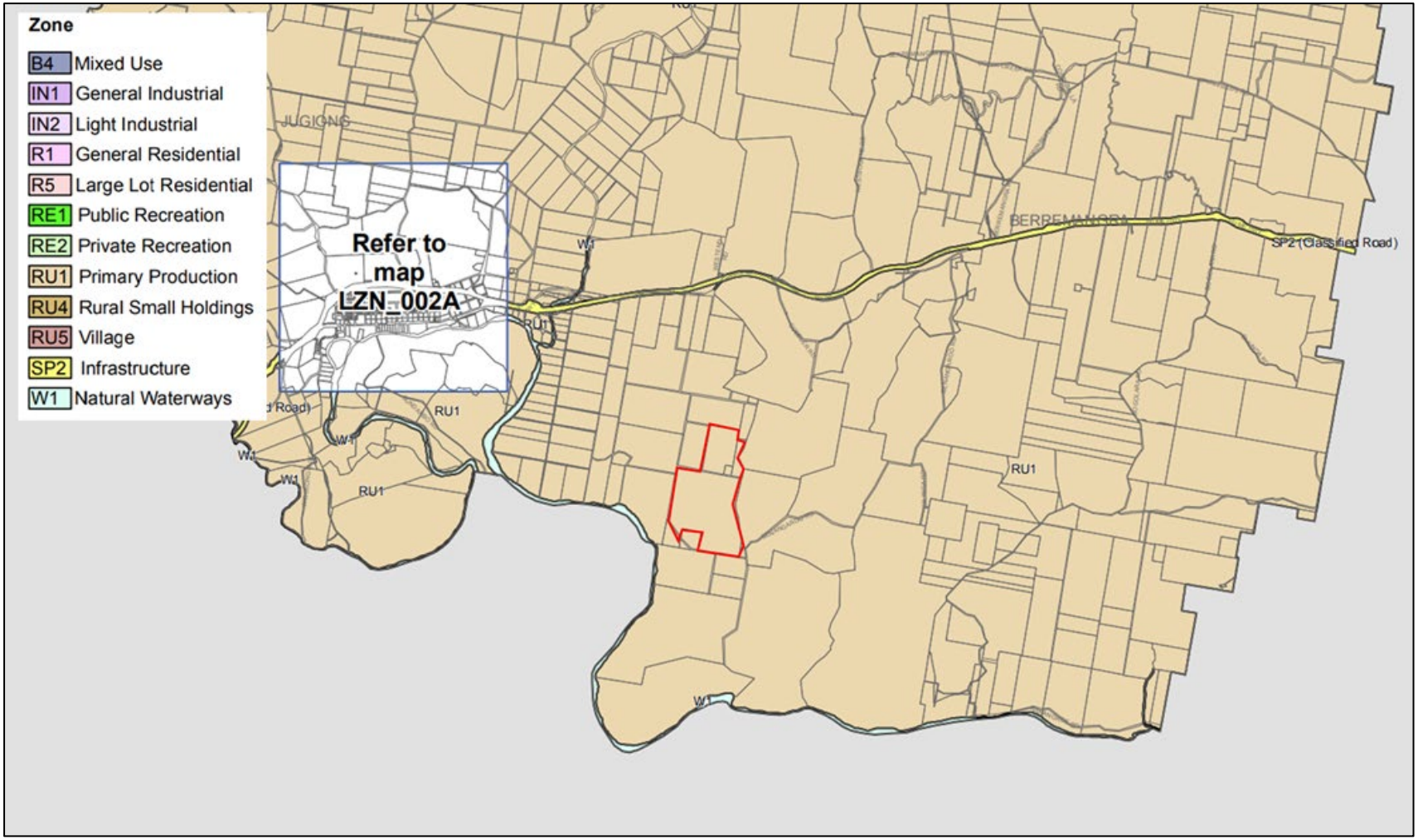


Figure 6-1 Planning zones surrounding the subject land (Harden Shire Council 2010), indicated by the red line

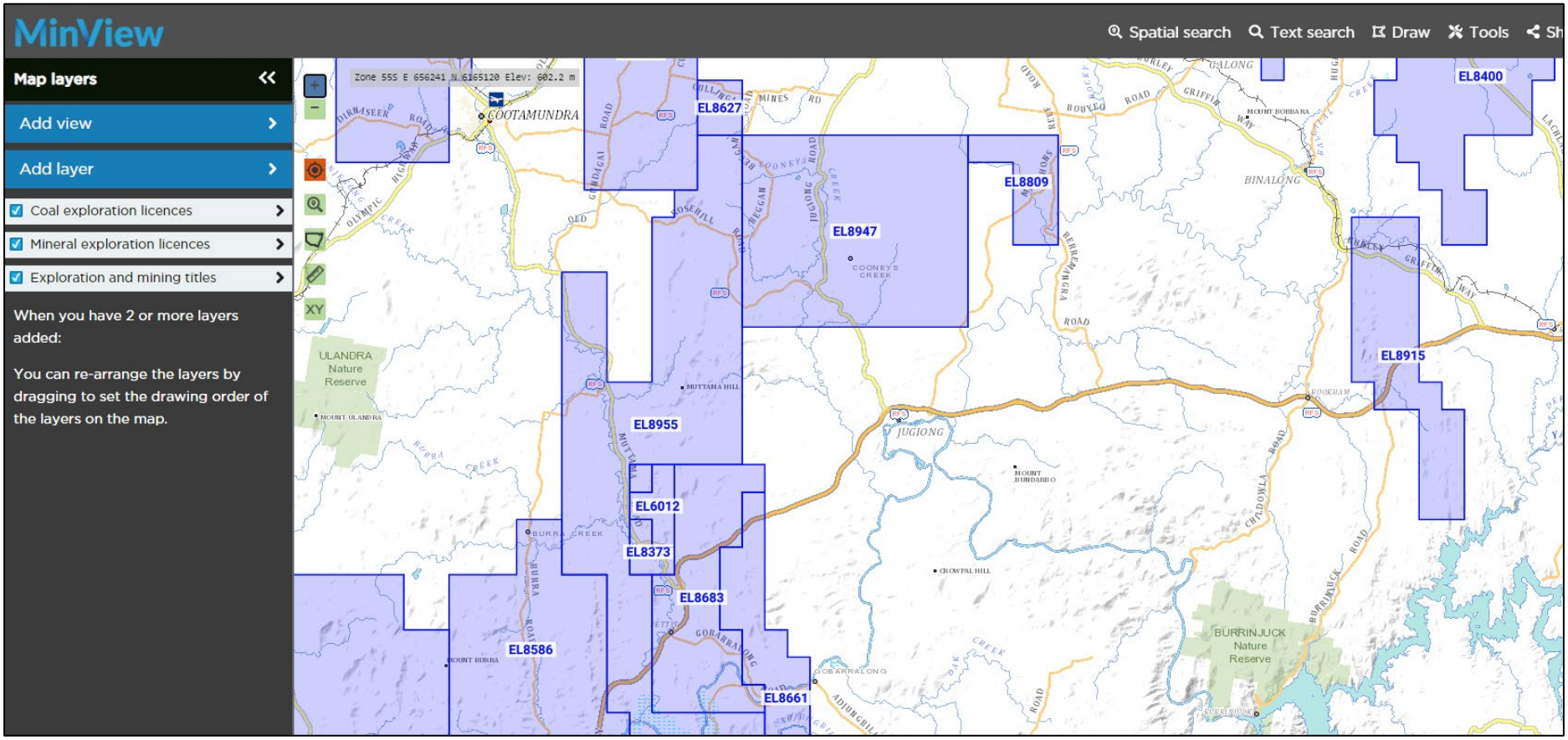


Figure 6-2 Exploration Licences for the development site and surrounding land (DPIE 2020)

Land capability and agricultural land

Land capability is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources (OEH 2012). The NSW land and soil capability assessment scheme (OEH 2012) describes and maps eight land and soil capability classes. The classes range from 1 (best, highest capability land) to 8 (worst, lowest capability land). The classification is based on the biophysical features of the land and soil (including landform position, slope gradient, drainage, climate, soil type and soil characteristics) and susceptibility to hazards. Hazards include water erosion, wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils and mass movement.

The Proposal is primarily located on land mapped in Capability Class 4 (Moderate to severe limitations), minimal areas along the boundary of the site and the haul access road are mapped as Class 6 (Very severe limitations). No land is mapped as Biostrategic Agricultural Land (BSAL) in the development site.

Table 6-2 provides an overview of Class 4 and Class 6 under the *Land and Soil Capability Assessment Scheme* (OEH 2012). Land capability across the site is mapped in Figure 6-3.

Table 6-2 Land and soil capability class 4 and 6 (OEH 2012)

Class	Broad category	Description
Class 4	Moderate capability land	Land has moderate to high limitations for high-impact land uses. Would restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
Class 6	Low capability land	Land has very high limitations for high-impact land uses. Land use is restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation

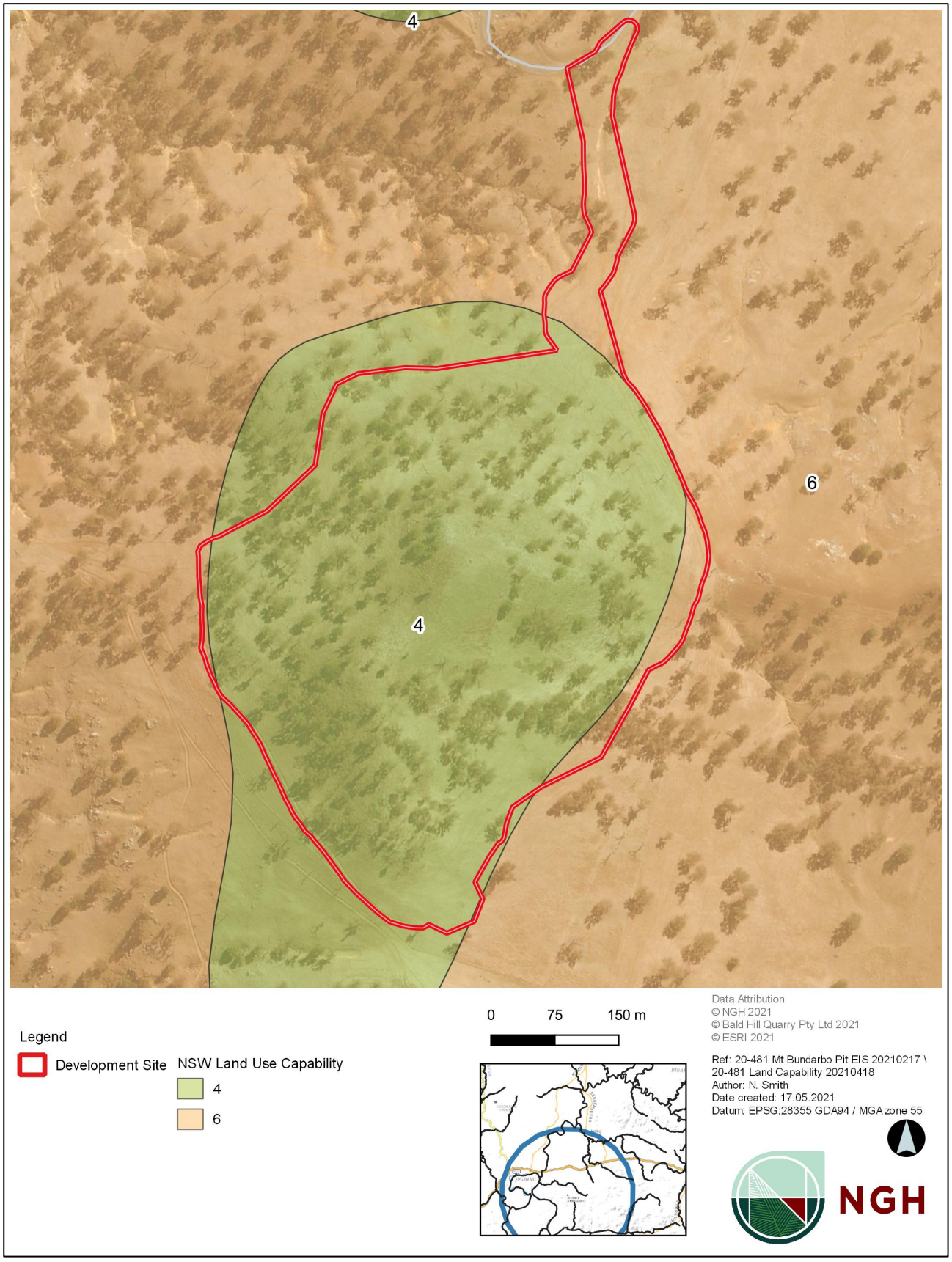


Figure 6-3 Soil and land capability mapping for the development site

6.2.2. Potential impacts

Land use conflict risk assessment

A land use conflict risk assessment (LUCRA) has been carried out in accordance with the Department of Primary Industries Land Use Conflict Risk Assessment Guide (DPI 2011). Given the proposed quarry is different to the surrounding land use activities, primarily agriculture, this assessment aims to identify and rank potential land use conflicts so that they may be adequately managed. Where expected conflicts are adequately managed, the rights of the existing and proposed land uses can be protected.

The risk ranking in Table 6-4 has been determined using the risk ranking matrix shown in Table 6-3, and in accordance with the probability table and measure consequence table in Department of Primary Industries Land Use Conflict Risk Assessment Guide (DPI 2011). The matrix ranks the risk of impacts according to the probability of occurrence and the consequence of the impact. Probability 'A' is described as 'almost certain' to probability 'E', which is described as 'rare'. The level of consequence starts at 1 – Severe to 5 – Negligible. The risk ranking from 1 to 25 is a result of the probability and consequence. For example, a risk ranking of 25 is the highest magnitude of risk (DPI 2011).

Table 6-3 Risk ranking matrix (Source: DPI, 2011)

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 6-4 Land use conflict risk assessment summary

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
Agricultural land use					
Increased erosion risk and contaminated surface water runoff	B3	17	Implementation of a Soil and Water Management Plan and an Erosion and Sediment Control Plan would minimise the potential impact.	D4	5
Dust	A3	20	Dust generated during the construction and operation stages to be managed. Water carts and road sealing to be utilised. Impact is non-serious. Drilling and blasting impacts are short term.	C5	4

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
Odour	B4	12	Vehicle emissions to comply with Australian standards. Distance to receptors provides adequate buffer.	D5	2
Fire/Bushfire	D1	19	Implementation of a Bushfire Management Plan would significantly reduce the probability of a mining operation starting a fire.	D3	9
Emissions	A3	20	Best practice measures to be introduced under the Operational Environmental Management Plan. Engine emissions to be in accordance with Australian standards.	B5	7
Clearing of native vegetation	B1	24	Initial clearing to be appropriately managed. Mitigation measures within this report to be followed. Rehabilitation will provide re-establishment in some areas.	C4	8
Increased traffic flow	A3	20	Traffic flow would not increase from the already operating nearby mine. Does not impact any public rural roads.	B5	7
Visual amenity	A3	20	Dust generation management strategies and no night work would minimise visual amenity impacts.	B5	7
Noise	B3	17	Noise generated during construction and operation would be minimised through the implementation of mitigation measures. Where regular maintenance practices are incorporated into operation, noise is not	C4	8

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
			expected to generate a land use conflict.		
Mining land use					
Resource extraction/exploration	D3	9	It is unlikely there would be an impact on existing resource extraction or exploration. This Proposal would be a progression of the nearby quarry activities as it is phased out and decommissioned in nearby pits.	D5	2
Landfill land use					
Landfill activities	D3	9	It is unlikely there would be an impact on existing landfill activities. This Proposal would be a progression of the nearby quarry activities as it is phased out and decommissioned in nearby pits with no new impacts presented.	D5	2

Construction and Operation Impacts

The range of scores in the mitigated risk rating were all low, demonstrating that the proposed construction and operation of the quarry will have minimal impact to the area. The lifespan of the quarry is expected to be around 20 years or when 4 million tonnes of material has been extracted (450,000 tonnes per year), as detailed in section 1.2.3.

The expected impact on surrounding land uses during construction is considered to be minimal. Given the temporary nature of the work and the implementation of mitigation strategies, the level of impact in relation to land use would be further reduced.

Once construction of the quarry commences, agricultural activities would cease in the areas involved in access and construction.

Due to the nature of construction and the location of the private haul road, disruption to local traffic during construction would be negligible. Any impact would be a temporary and could be managed in consultation with local landholders.

It is considered unlikely that traffic movements associated with Proposal activities would generate a land use conflict with movement of local livestock. The likelihood of conflict can be further minimised by consulting with local landholders.

The potential operational land use impact has been assessed in accordance with guidance provided in *Primefact 1063: Infrastructure Proposals on rural land* (DPI 2013).

AGRICULTURAL IMPACTS

The development of a quarry would potentially result in the following agricultural impacts:

- A reduction in the agricultural uses of the development site. Specifically, grazing agriculture would not be possible. However, grazing can continue around the development footprint and once the site is rehabilitated.
- Soil and Land Capability of the development footprint is Class 4 and Class 6, which includes land with moderate to severe limitations to agricultural activity.
- The property owner would be compensated by the Proponent/operator for hosting the pit through regular lease payments over the life of the quarry. This diversifies the owner's existing agricultural income that is not seasonal or climate dependent.
- Upon decommissioning, the quarry footprint would be rehabilitated.

RESOURCE LOSS AND FRAGMENTATION

The area impacted by the Proposal does not currently contain highly productive pastures due to the rocky terrain, shallow soil profile, weather exposure and weed growth. The Proposal would not impact on land identified by the NSW Government as Biophysical Strategic Agricultural Land (BSAL). The Proposal would not result in rural land fragmentation or alienation of agricultural land. As such the loss of this agricultural landscape would not present a significant impact to local agriculture or the local economy.

The Proposal has been designed to minimise the development footprint.

The Proposal would not result in rural land fragmentation or alienation of resource lands as defined under the Rural SEPP. It is considered that the Proposal would not generate any land use conflicts or have an impact on the nature of existing surrounding agricultural holdings due to the nature of the constraints of this landscape.

DISTURBANCE TO FARMING OPERATIONS AND LIVESTOCK

Adjacent farming operations are compatible with the Proposal. Noise from nearby farming practices over the day would not impact on the proposed quarry or vice versa. The proposed construction of the quarry would occur in daylight hours and would not conflict with adjacent farming activity. Any noise impacts would be minor and temporary.

Noise is expected as part of general quarry processes and includes constant machinery operation, truck movements, and blasting five to ten times annually. Blasting is considered the most significant noise impact on surrounding land users. Due to the short-term and infrequent nature of blasting, as well as proposed management measures including notifying nearby receptors, blasting is considered to present a negligible impact. Ongoing machinery and truck operation is not expected to increase from the existing operations to the north. Without increase in machinery operation, and plant and truck operation, no additional impacts are expected.

During construction and operation there may be slight disruption to local traffic. This would be limited to movements along the Hume Highway as the access road connects directly to the highway without intersecting any other rural roads. A slight disruption to traffic flow on the highway would not present a significant impact to nearby land users.

Traffic and on-site machinery movements have the capacity to generate dust and emissions. Dust generation would be the result of earthworks associated with removal of topsoil and overburden, and the creation of the haul road extension. The application of suitable erosion and sediment control measures is considered sufficient

to mitigate impacts during construction and operation. Plant and vehicles would be maintained to ensure emissions are minimal and minimise impacts to local air quality.

Changes in Biosecurity Risks – Pest, Diseases and Weed Risks

The Proposal would result in the increased movement of vehicles and people to the development site. The primary risk to biosecurity is the spread of weeds that may result from increased vehicle movements in and out of the development site. Weed seeds can be transported through and from the development site on the tyres and undercarriages of vehicles and on the clothing of staff. The risk of weed dispersal would primarily be mitigated by confining vehicle and machinery movements to formed access tracks during all phases of the Proposal.

Vehicle movements would be limited to the single haul road access between the Proposal and the North Ridge quarry. To assist in the management of weeds, a Weed Management Plan would be prepared for the construction, operation and rehabilitation phases, based on Hilltops Council and NSW DPI requirements. Management measures would focus on early identification of invasive weeds and effective management controls.

BHQ currently undertakes weed and pest management in conjunction with the Bald Hill Ecofill Landfill and North Ridge quarry developments, and in partnership with adjacent and involved landholders. Grazing would continue to occur within the development site during operation and following rehabilitation.

Water Quality

Run-off during construction has the potential to impact water quality of downgradient watercourses to the Proposal. Increased runoff from the site due to clearing of vegetation presents a significant erosion risk. Potential spills and leaks from onsite machinery and chemicals have the potential to run off site and contaminate surrounding areas. Mitigation measures such as appropriate erosion and sediment controls and spill response procedures would minimise potential impacts. As the depth of the pit increases, the impact to water quality from stormwater runoff would decrease.

During stage 1 of quarrying operations, a sediment basin would be used to collect and store runoff. Once stage 1 progresses to stage 2, the sediment basin would be filled and progressively rehabilitated over the life of the proposal. Due to the incremental depths and modified contours of the pit during operation, surface waters would not drain off site due to the enclosed nature of the pit. Surface waters would accumulate at the lowest point which is likely to be the base of the cut face. Any accumulated water within the pit would evaporate over time, be pumped from site or used on-site. Sediment and erosion controls currently in practice at the existing quarry and haul road would be adopted for the Proposal.

Surrounding Landholder Visual Impacts

Visual amenity would be impacted due to the nature of quarry activities; the removal of soil and rock at the crest of the mountain would be visible from distance due to the elevation of the Proposal. The retention of vegetation around the border of the development site would help alleviate visual impacts. A stockpile bund along the south eastern corner of the site would also help to alleviate visual impacts. This bund would be rehabilitated and blend into the landscape.

Dust generation could impact visual amenity in the area. However, dust suppression measures would be implemented to minimise dust impacts to air quality and visual amenity. Night-time lighting would be minimal due to the daylight operation of the quarry and is not expected to present a significant impact on visual amenity.

The topography of the landscape would change dramatically as a result of removing quarry material. Topography would change from a hillcrest to an excavated void, likely to be 55 m in depth with a slope equal to the existing slope. Existing woodland vegetation surrounding the development footprint would be maintained to provide natural vegetation screening to break views of the Proposal.

Mining Impacts

There are no mineral titles and no mineral applications relevant to the development site indicated in the Minview database (DPIE 2020).

Resource Impacts

The Proposal would require approximately 2 ha of gravel to surface the haul road extension. The availability of this resource is not declining or limited in the region and would be supplied by BHQ from the adjacent North Ridge quarry.

In view of the nature of the resources, all parts of the resource are used on site. Overburden from construction activities would be used to fill the sediment basin after stage 1 and used as part of the product for blending. The dust generated from processing the rock is used for the daily cover and capping material for the Bald Hill Ecofill Landfill. The Proposal is unlikely to place significant pressure on the availability of local or regional resources for other land uses in the area. It is estimated that approximately 30,000 L to 40,000 L of water would be required during construction, mostly for dust suppression when required. The precise amount of water used during construction would be heavily affected by prevailing weather conditions and the need for watering to suppress dust generation.

Potable water for the construction and operation of the Proposal is provided in the staff office and amenities building in the form of bottled water. Rainwater is captured onsite and used for staff amenities. The requirement for potable water would not place pressure on local drinking water supplies.

Summary of Construction and Operation Impacts

The range of scores in the LUCRA revised risk rating were low to moderate, demonstrating that the proposed construction of the quarry would have minimal impact to surrounding land uses. The expected impact on surrounding land uses during construction is considered to be minimal given the temporary nature of the work and with the implementation of mitigation measures. The expected impact on surrounding land uses during operation is considered to be minimal with the implementation of mitigation measures. Although the Proposal is not reversible, it would result in a small permanent loss (approximately 12 ha) of agricultural land.

Rehabilitation

Once the operational phase of the Proposal is complete and the site is decommissioned, vegetation can be re-established around the Development site and where feasible, within the pit. It is likely that the landowner would wish to keep the haul road for site access. The slope of the landscape would be replicated to match the existing landscape slope. Any water captured following closure would be captured within the pit and pumped into troughs or a small farm dam for stock watering.

Summary

The range of scores in the LUCRA revised risk rating were low to moderate, demonstrating that the proposed construction of the quarry would have minimal impact to surrounding land uses.

6.2.3. Safeguards and mitigation measures

Potential land use impacts would be managed through the development and implementation of proposed mitigation measures described in Table 6-5.

Table 6-5 Safeguards and mitigation measures for land use impacts

No.	Safeguards and mitigation measures	C	O	R
LU1	Consultation with adjacent landholders will be ongoing to manage interactions between the quarry and other properties.	**C**	**O**	
LU2	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) will be prepared as a subplan for the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP), implemented and monitored during the construction and operation of the Proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Runoff which has been captured on site should be managed to avoid any overflow. Captured waters should be reused where possible, evaporated or extracted from the site and disposed of elsewhere. • Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within stormwater paths and along roadsides during concentrated flows. • Ensure that machinery arrives and leaves site in a clean, washed condition, free of fluid leaks and not tracking soil to and from nearby areas. • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. • Areas of unexpected/unintended soil disturbance to be rehabilitated promptly and progressively during construction.	**C**	**O**	
LU3	A Rehabilitation Management Plan is to be prepared in consultation with NSW Department of Primary Industries and the landowner prior to decommissioning. The Rehabilitation Management Plan is to include: • Removal of gravel from internal access tracks where required, in consultation with landowner. • Indicators and standards to indicate successful rehabilitation of disturbed areas. These indicators and standards should be applied to rehabilitation activities once the quarry is decommissioned.			**R**
LU4	A Pest and Weed Management Plan would be prepared as part of the CEMP and OEMP to manage the occurrence of noxious weeds and pest species across the site during construction and operation. The plans must be prepared in accordance with Hilltops Council and NSW DPI requirements. Where possible integrate weed and pest management with adjoining landowners.	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
LU5	The Proponent would consult with GSNSW in relation to biodiversity offset areas or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral resources.	**C**		
LU6	Construction and operations personnel will drive carefully and below the designated speed limit of the haul road to minimise dust generation and disturbance to nearby farming enterprises.	**C**	**O**	
LU7	Grazing would continue within the development site and be used as an option to control weeds and grass growth, and to maintain agricultural production at the site.		**O**	
LU8	The Proponent would provide annual production data for the subject site to the NSW Division of Resources and Geoscience for the collection of construction material production data.		**O**	

C: Construction; O: Operation; R: Rehabilitation

6.3. BIODIVERSITY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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*
- *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.*

BIODIVERSITY CONSERVATION DIVISION

The EIS must assess the impact of the proposed development on biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act), as follows:

a. *The EIS must demonstrate and document how the proposed development exceeds, or does not exceed, the biodiversity offsets scheme threshold as set out in Section 7.4 of the BC Act 2016 and Clause 7.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation) by determining whether the proposed development involves:*

   i. ***The clearing of native vegetation exceeds the thresholds*** *listed under Clause 7.23 of the BC Regulation,* ***or***

   ii. *The clearing of native vegetation, or other action,* ***on land included on the Biodiversity Values Map*** *published under Clause 7.23 of the BC Regulation (this map includes areas of outstanding biodiversity value, as declared under Section 3.1 of the BC Act).*

b. *If the Proposal does not trigger any of the criteria in (a) above, then the EIS must determine whether the proposed development is likely to have a significant impact based on 'the test for determining whether proposed development likely to significant affect threatened species or ecological communities' in Section 7.3 of the BC Act.*

c. *Where there is reasonable doubt regarding potential impacts, or where information is not available, then a significant impact upon biodiversity should be considered likely when applying the test in Section 7.3 of the BC Act. Where it is concluded that there is no significant impact, the EIS must justify how the conclusion has been reached.*

d. *If the development exceeds the thresholds in (a) or (b), then the EIS must be accompanied by a biodiversity development assessment report (BDAR) prepared in accordance with Part 6 of the BC Act. That is, the Biodiversity Assessment Methodology applies.*

DEPARTMENT OF PRIMARY INDUSTRY

Biosecurity Standards met

- *Include a biosecurity (pests and weeds) risk assessment outlining the likely plant, animal and community risks.*
- *Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed and pest management plans.*

6.3.1. Approach

A specialist Biodiversity Development Assessment Report (BDAR) was prepared by NGH to investigate and assess the potential impacts of the proposal on biodiversity. The BDAR has been prepared in accordance with the *Biodiversity Assessment Methodology 2020* (BAM). The development site as defined in the BDAR is the survey area to which the BAM applies for the proposal and encompasses all areas surveyed in the assessment. The development site is about 29.57 ha. The proposal footprint includes the extraction area of the quarry, a new internal access track and an intersection upgrade required along the Hume Highway.

The aims of the report were to address the biodiversity matters raised in the SEARs and to address the requirements of the NSW *Biodiversity Conservation Act 2016* (BC Act). The BDAR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It also provides a 'credit requirement' in order that impacts that are not avoided are offset in accordance with the BC Act and BAM.

The full report is included in Appendix D and the report is summarised below.

6.3.2. Existing Environment

Landscape features

The proposal falls within the NSW South Western Slopes (SWS) IBRA Bioregion and Inland Slopes IBRA sub-region. The bioregion is a large area of foothills and ranges comprising the western fall of the Great Dividing Range to the edge of the Riverina Bioregion. The Lower Slopes (LS) sub-region is described as containing undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.

The site is located over the Coolac 1:50 000 Topographic Map (Sheets 8528-S) at an elevation range of approximately 470 m to 597 m AHD. The site landform is the crest and waning upper slopes of Mt Bundarbo. Numerous first order drainage lines start lower in the landscape towards the base of Mt Bundarbo, but none are present on site. The area drains into the Murrumbidgee River, either fed by small drainage lines or the nearby Sawpit and Kyleys Creek. The Murrumbidgee River lies approximately 2 km south west of the site.

Native vegetation in the landscape surrounding the development site is predominantly Western Slopes Grassy Woodlands and Western Slopes Grasslands. This vegetation provides moderate connectivity features across the landscape. 68.37% of native vegetation occurs in a 1500m buffer surrounding the development site. Evidence of clearing and pasture improvement occur in areas which have been utilised for grazing purposes.

No Areas of Outstanding Biodiversity Value (AOBV) occur within the development site.

Groundwater and surface water

Groundwater in the area forms part of the Lachlan Fold Belt MDB Groundwater source and is regulated by the *NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011* Water Sharing Plan. The Lachlan fold belt groundwater source covers an area of 16,722,000 ha consisting of Cambrian to Lower Carboniferous rock successions.

Sixteen registered groundwater bores are within 5 km of the site. No current groundwater levels were available for any of these sites at the time of reporting. The closest registered bore (GW025301) was drilled from 408 m AHD to 91.44 m with no groundwater encountered at the fresh/weathered rock interface. This bore is located approximately 1.5 km north east of the site. Groundwater at the site, if present, is likely to be more than 100 m below ground level.

The development site is located within the Murrumbidgee catchment with surface waters regulated under the Water-sharing Plan for the *Murrumbidgee Unregulated and Alluvial Water Sources 2012.* There are no run-on flows to the site due to its elevation in the landscape. Runoff waters flow in all directions via ephemeral waterways to the Murrumbidgee River. Sawpit Creek is located to the north of the Proposal. Kyleys Creek is located to the south-east. Sawpit and Kyleys Creeks are both ephemeral 3rd order streams under the Strahler Stream Classification System (DPI 2018), which drain into the Murrumbidgee River. The adjacent reach of the Murrumbidgee River is classified as a 9th order stream (DPI 2018).

The development site is located approximately 2.5 km north-east of the Central Murrumbidgee (Burrinjuck to Gogeldrie) Water Source, which generally flows west as part of the Murray-Darling Basin System. There are

no permanent water bodies, creeks, or springs on the subject site. There are no protected wetlands or water bodies within the subject site.

The closest drainage is located approximately 250 m south-west of the Proposal and is unnamed. There are approximately six man-made farm dams located along drainage lines to the south-east and east in proximity of the Proposal. The closest dam is approximately 850 m south-east.

Given that the Development site is at such a high elevation (650 m) and that only 45 m total height is expected to be lost during the works, it is considered unlikely that groundwater would be encountered during excavations and earthworks.

Native Vegetation

The development site has been utilised for livestock grazing for long periods of time. Remnant large old trees remain relatively uncleared providing moderate connectivity in the landscape. Evidence of previous clearing occurs scattered through the landscape in the form of low condition derived communities. The remaining woodland is highly modified and dominated by an exotic understorey. About 23.21 ha of native vegetation occurs within the development site. This is comprised of plant community types (PCTs):

- PCT 266 *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion* with areas of low condition derived grasslands.
- PCT 277 *Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion* occurs along the Hume Highway intersection.

Plant community type (PCT) 266 within the development site is part of a contiguous patch of vegetation, therefore no scattered trees occur within the development site.

Extent of native vegetation and PCTs in the development site are shown in Figure 6-4 to Figure 6-5.

Cleared areas (Non-indigenous vegetation)

Within the 1500m buffer around the development site, around 599.37 ha of land has been cleared of native vegetation. These cleared areas within the landscape are primarily utilised for agricultural grazing, local roads and the Hume Highway.



Figure 6-4 Extent of native vegetation in the development site



Figure 6-5 Extent of native vegetation in the development site

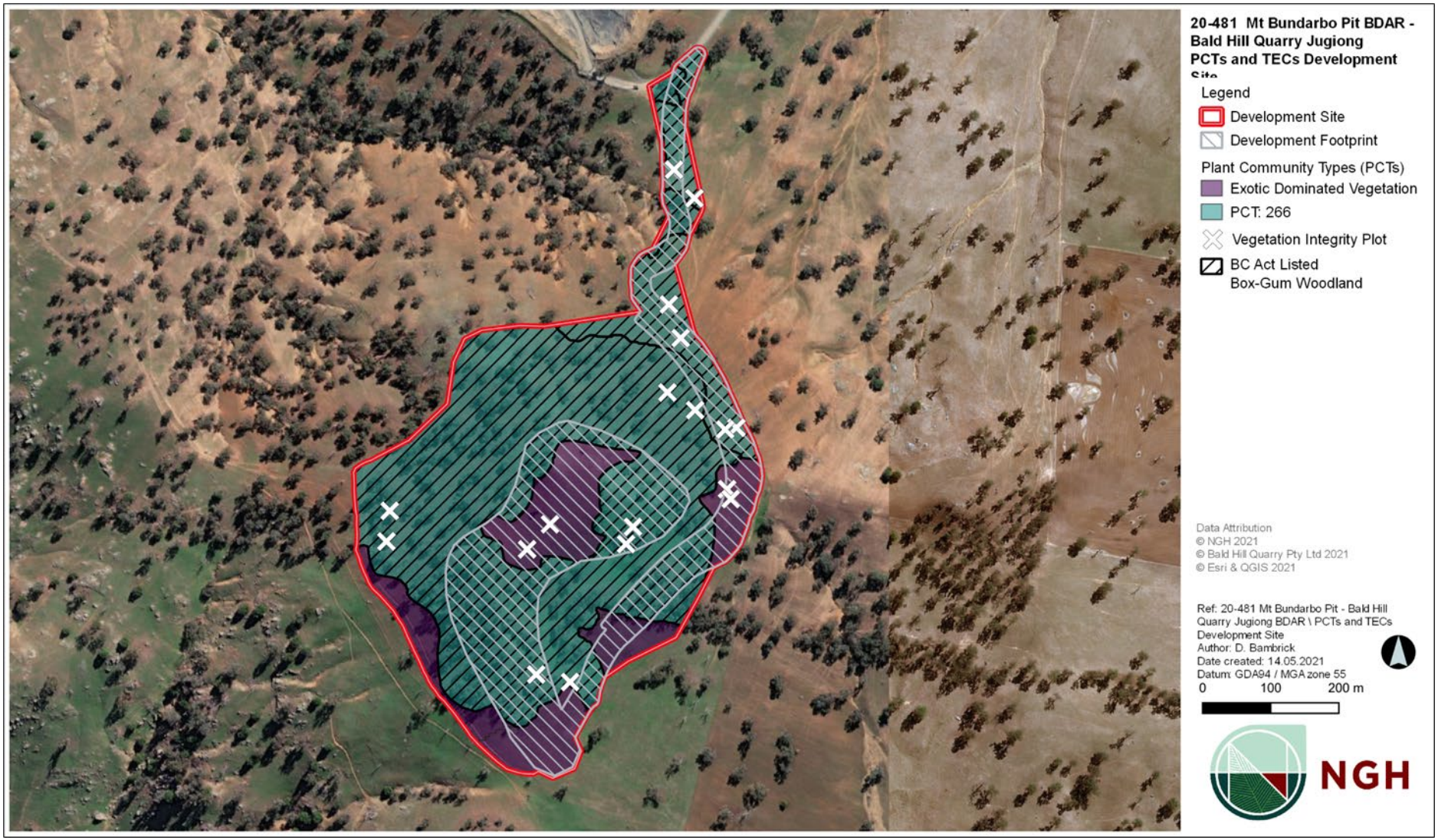


Figure 6-6 PCTs and threatened ecological communities in the development site



Figure 6-7 PCTs and threatened ecological communities in the development site

6.3.3. Site Surveys

Floristic Survey

An initial site survey was undertaken on the 25th – 27th August 2020. The entire development site was surveyed by two ecologists via vehicle and foot to determine the PCTs and zones present. Additional surveys were undertaken on the 2nd - 4th October 2020 and 2nd – 3rd December 2020. A BAM accredited ecologist was present for each of these surveys. A site survey was conducted on the 13th of April 2021 by an ecologist for the addition of the Hume Highway intersection.

Targeted Survey

Targeted surveys for Pink Tailed Legless Lizard, Grey-Headed Flying Fox, Squirrel Glider and Square-Tailed Kite were conducted between 6th-9th of October and 2nd-3rd of December. Targeted surveys for Koala, Brush-Tailed Wallaby, Bush Stone Curlew and Barking Owl were conducted between 25th-26th of August, 6th-9th of October and 2nd-3rd of December. Targeted surveys of Ausfelds Wattle and Little Eagle were conducted between 25th-26th of August and 6th-9th of October. Targeted surveys of Glossy Black-Cockatoo and Masked Owl were conducted between August 25th-26th. Targeted surveys of Yass Daisy, Silky Swainson-pea, Small Purple-pea, Tumut Grevilea and Superb Parrot were conducted between the 6th-9th of October. A targeted survey of *Euphrasia arguta* was conducted between 2nd-3rd of December.

6.3.4. Survey Results

No karsts, caves, crevices or cliffs occur within the development site. The development site is located on Mt Bundarbo, where basalt rock occurs. Partially buried rocks, boulders and shale occur alongside surface rocks. Rocky outcrops, partially buried rocks and exposed rock occur throughout the study area. There are two human made structures within the development site. These include the trigonometrical station and man-made rock stacks. Directly adjacent to the trigonometrical station is the original trigonometrical station base made of stacked rocks from the surrounding landscape. Rocks were stacked in approximate lines to represent the crown land boundary.

Threatened flora

No threatened flora were identified in the targeted surveys.

Threatened fauna

No threatened fauna were identified in the development site during the targeted surveys.

The Brush-tailed Phascogale was unable to be surveyed for during the assessment phase. Therefore, it is assumed this species is present on site in PCT 266 Vegetation Zone 1. The impact area (species polygon) covers 6.83 hectares generating 70 species credits (Table 6-6). No ecosystem credit species were excluded from the assessment; all are assumed to occur and contribute to ecosystem credits.

Table 6-6 Fauna Species Credits

Species Credit Species	Biodiversity risk weighting	Associated PCT	NSW Listing	National Listing	Area of habitat lost (ha)	Species Credits required

Fauna						
Brush-tailed phascogale *Phascogale tapoatafa*	2.0	PCT 266 – White Box grassy woodland	Vulnerable	Not listed	6.83 ha	70
					TOTAL	**70**

Table 6-7summarises all fauna species found on-site during targeted surveys.

Table 6-7 Fauna identified on-site through survey effort

Scientific Name	Common Name	Habitat
Birds		
Merops ornatus	Rainbow Bee-eater	Woodland
Coracina novaehollandiae	Black-faced Cuckoo Shrike	Woodland
Eolophus roseicapilla	Galah	Woodland
Anthochaera carunculata	Red Wattlebird	Woodland
Corvus coronoides	Australian Raven	Woodland
Corvus mellori	Little Raven	Woodland
Pardalotus striatus	Striated Pardalote	Woodland
Cracticus tibicen	Australian Magpie	Woodland
Colluricincla harmonica	Grey Shrikethrush	Woodland
Grallina cyanoleuca	Magpie-Lark	Woodland
Aquila audax	Wedgetail Eagle	Woodland
Psephotus haematonotus	Red-rumped Parrot	Woodland
Strepera graculina	Pied Currawong	Woodland

Scientific Name	Common Name	Habitat
Lichenostomus penicillatus	White-plumed Honeyeater	Woodland
Platycercus eximius	Eastern Rosella	Woodland
Malurus cyaneus	Superb Fairy Wren	Woodland
Ninox boobook	Suthern Boobook	Woodland
Falco cenchroides	Nankeen Kestrel	Woodland
Cacatua galerita	Sulphur-crested Cockatoo	Woodland
Cormobates leucophaea	White-throated Treecreeper	Woodland
Mammals		
Macropus robustus	Common Wallaroo	Woodland
Macropus giganteus	Eastern Grey Kangaroo	Woodland
Rattus rattus	Black Rat	Woodland
Vombatus ursinus	Common Wombat	Woodland
Lepus europaeus	European Hare	Woodland
Oryctolagus cuniculus	European Rabbit	Woodland
Trichosurus vulpecula	Brush-tailed Possum	Woodland
Pseudocheirus peregrinus	Ring-tailed Possum	Woodland
Reptiles		
Ctenotus robustus	Robust Ctenotus	Woodland

Threatened ecological communities

One threatened ecological community (TEC) was identified in the development site:

- *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*, (Box Gum Woodland)- Listed as Critically Endangered under the BC Act

The extent of the TEC is provided in Figure 6-6 and Figure 6-7. A site assessment confirmed that PCT 266 and PCT 277 do not contain sufficient perennial native vegetation cover (≥50%) to be considered part of the EPBC Act listed TEC.

6.3.5. Potential Impacts

Direct impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site. These cannot be entirely avoided. This would occur through direct impacts such as habitat clearance and installation and operational impacts as detailed in Table 6-8 Potential direct impacts to biodiversity during the construction and operational phases

Table 6-8 Potential direct impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. quarry infrastructure, compound sites, stockpile sites, access tracks)	• 6.83 ha of PCT 266 Exotic understorey • 2.08 ha of PCT 266 Derived Grassland • 6.83 ha of Brushtailed-Phascogale habitat.	Once	Construction	• Direct loss of native flora and fauna habitat • Potential over-clearing of habitat outside proposed development footprint • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Displacement of resident fauna	Unknown	Regular	Construction & Operation Phase: Long Term	• Direct loss of native fauna • Decline in local fauna populations
Injury or death of fauna	Unknown	Regular	Construction Phase: Long Term	• Direct loss of native fauna • Decline in local fauna populations
Removal of habitat features e.g. HBTs	130 HBTs	Regular	Construction Phase: Long Term	• Direct loss of native fauna habitat • Injury and mortality of fauna during clearing of habitat features
Existence of permanent quarry and road structure	Total of 11.3 ha	Regular	Construction Phase: Long-Term	• Modification of flora and fauna habitat

Nature of impact	Extent	Frequency	Duration and timing	Consequence
				• Reduced fauna movement across landscape due to fencing and quarry pit • Collision risk to all fauna (roads)

Indirect impacts

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise during construction or operation of the proposal. Table 6-9 Potential indirect impacts to biodiversity during the construction and operational phasesbelow details the type, extent, frequency, duration, threatened species and habitats likely to be affected and consequences of indirect impacts that may occur because of the proposal.

Table 6-9 Potential indirect impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Phase: Short-term	• Superb Parrot • Brush-tailed Phascogale	• Injury and mortality of fauna during clearing of fauna habitat and habitat trees; • Disturbance to stags, fallen timber; and • Increased edge effects.
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Reduction of connectivity between vegetation on both sides of the property. • Potential to reduce genetic diversity within fragmented populations
Reduced viability of adjacent habitat due to noise, dust, heat or light spill	Unknown	Rare	Operational Phase: Short-term	• Superb Parrot • Brush-tailed Phascogale	• May alter fauna activities and/or movements; • Loss of foraging or breeding habitat
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Degradation of community biodiversity and integrity; • Weed encroachment into surrounding creeks and drain lower native vegetation diversity and cover. • Weed encroachment changing ground storey cover
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction & Operational Phase: Long-term	• Superb Parrot • Brush-tailed Phascogale	• Loss of foraging habitat; • Exposure to predators when moving between segmented patches of vegetation.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Loss of breeding habitats	Unknown	Unknown	Construction Phase: Long-Term	• Superb Parrot • Brush-tailed Phascogale	• Loss of potential breeding habitat including fallen and hollow logs at height; • Loss of vegetation close to water: and • Increased pressure and competition for remaining HBT resources from native and exotic hollow dependent fauna
Earthworks and mobilisation of sediments	Unknown	Regular	Construction & Operational Phase: Long term	• Adjacent drainage lines	• Erosion and sediment deposition pollution on downstream habitats; and • Reduced water quality at the point of discharge into the creek
Removal and disturbance of rocks, including bush rock	Unknown	Regular	Construction & Operational Phase: Long term	• Adjacent rock areas and exposed rocks	• Loss of habitat including rock crevices, exposed rocks and protruding rocks. • No stockpiling of rocks or soil during construction and operation in adjacent vegetation or rock areas will reduce habitat loss
Increase in pest animal populations	Unknown	Regular	Construction & Operational Phase: Long term	• Superb Parrot • Brush-tailed Phascogale	• Impact these species if they come down to the ground to move from one location to another. • Increase in industrial development provides more harbour for rabbits, increase in Indian Myna populations developing in this area and competing for hollows, and opportunities for foxes.
Increase in predators	Unknown	Regular	Construction & Operational Phase: Long term	• Superb Parrot • Brush-tailed Phascogale	• Increase in the presence of pest animal populations if these species come down to the ground. • Increase in industrial development provides more harbour for pest animals such as rabbits.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Rubbish dumping	Unknown	Regular	Construction & Operational Phase: Long term	• TEC • Superb Parrot • Brush-tailed Phascogale • Adjacent drainage lines	• Degradation of creek lines introducing new pathogens, reducing vegetation quality, reducing water quality. • Indirect impacts on threatened fauna and TECs from rubbish dumping.

Prescribed impacts

The following prescribed impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities including rocks, human made structures and non-native vegetation;
- Impacts of the development on the connectivity of different areas of habitat of threatened species that facilitates the movement of these species across their range;
- Impacts of the development on movement of threatened species that maintains their life cycle;
- Impacts of vehicle strikes on species of animals or on animals that are part of a TEC.

Prescribed impacts are discussed in chapter 8.1.3 of the BDAR.

Serious and Irreversible impacts (SAII)

Under the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH 2017c), one threatened ecological community listed as a potential SAII entity would be impacted by the proposed quarry. This includes:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland

An assessment has been completed in section 9.2 of the BDAR in accordance with BAM 2020 and the principals set out in the BC Regulation to assist the determining authority in determining whether a SAII is possible.

Impacts to Matters of National Environmental Significance

No wetlands of international importance would be impacted by development with the nearest wetland of importance occurring 500-600km downstream of the development site.

No federally listed ecological communities are considered to occur within the development site.

Based on habitat assessment, no federally listed migratory species are considered likely to occur on the development site.

Based on habitat assessment, habitat value for federally listed threatened species the following species have suitable habitat and potential to occur in the development site:

- Superb Parrot *Polytelis swainsonii* – Vulnerable
- Large-eared Pied Bat *Chalinolobus dwyeri* – Vulnerable
- Corben's Long-eared Bat *Nyctophilus corbeni* – Vulnerable
- Koala *Phascolarctos cinereus*—Vulnerable
- Swift Parrot *Lathamus discolor*—Endangered
- Spotted tail Quoll *Dasyurus maculatus*—Endangered

An Assessment of Significance was completed for these species. A significant impact was considered unlikely for these species. The full assessment is provided in Appendix G of the BDAR.

No referral is considered necessary to the Federal Department of Environment and Energy (DoEE) for threatened species.

Impacts Requiring OffsetsEcosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

a) A vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community;
b) A vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community; or
c) A vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required for the proposal are documented in Table 6-10 PCT and vegetation zones that require offsets

Table 6-10 PCT and vegetation zones that require offsets

Zone ID	PCT ID	PCT name	Impact area (ha)	Vegetation integrity score	Ecosystem credits required
1	266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	6.83	20.4	70
				TOTAL:	**70**

Paddock Tree Credits

No paddock trees are present in proposal area.

Species Credits

An offset is required for the threatened species impacted by the development that require species credits. This species was unable to be surveyed for and are assumed to occur within the development site. The species credits required are documented in Table 6-11

Table 6-11 Species credit species that require offsets

Species Credit	Biodiversity risk weighting	Area of habitat lost (ha)	Species credits required
Fauna			
Brush-tailed phascogale *Phascogale tapoatafa*	2.0	6.83 ha	70

Offsets required under the EPBC Act

No species or TECs listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

Groundwater Dependent Ecosystems (GDES)

High and moderate potential for aquatic Groundwater Dependant Ecosystems (GDE) is shown along the Murrumbidgee River south west and north of the Proposal, respectively (Figure 6-3). There is low potential for terrestrial GDE across the site (Figure 6-4). Given that the Development site is at such a high elevation (650

m) and that only 45 m total height is expected to be lost during the works, it is considered unlikely that groundwater would be encountered during excavations and earthworks.

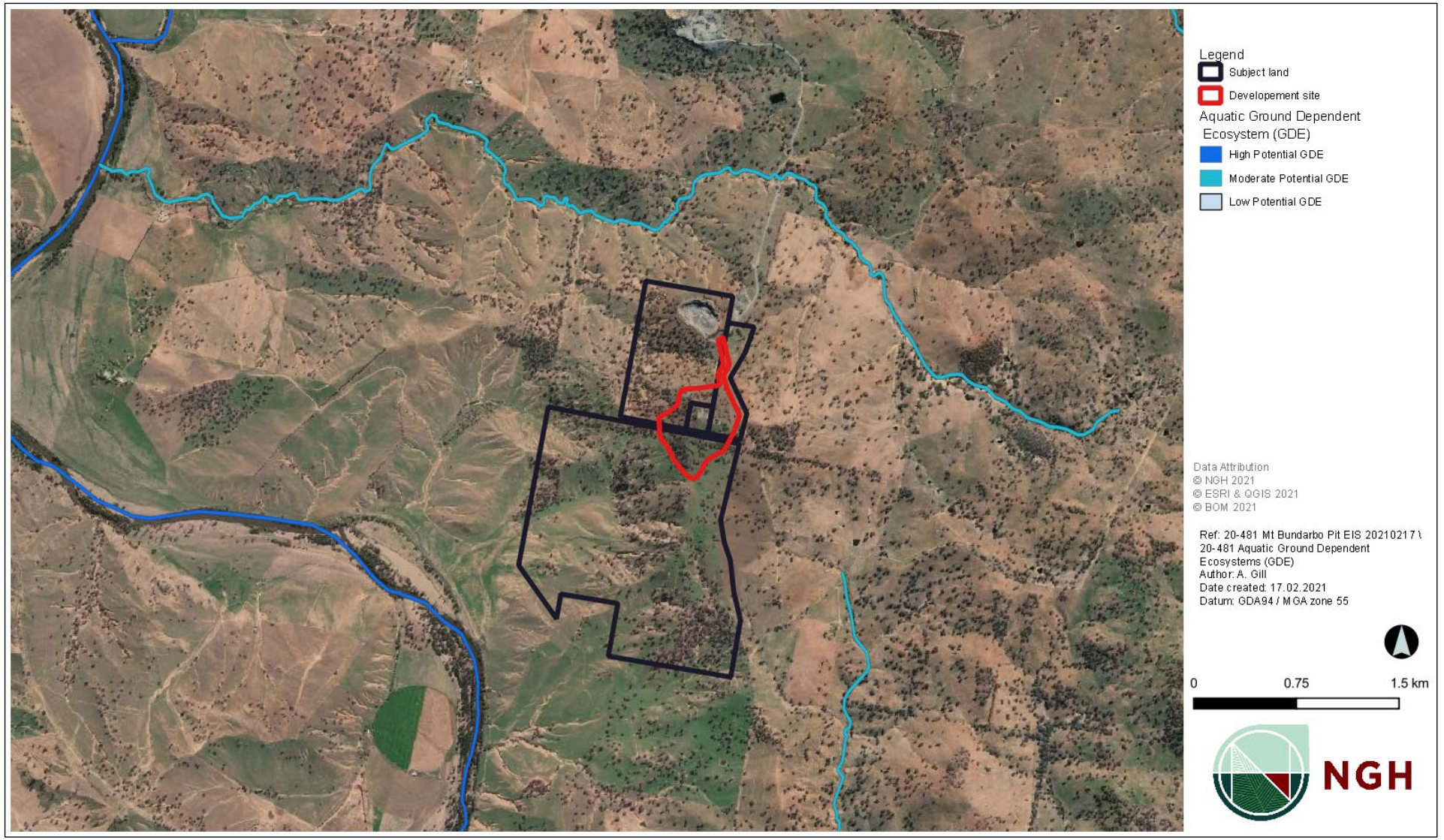


Figure 6-3 Aquatic Groundwater Dependent Ecosystems (GDES)

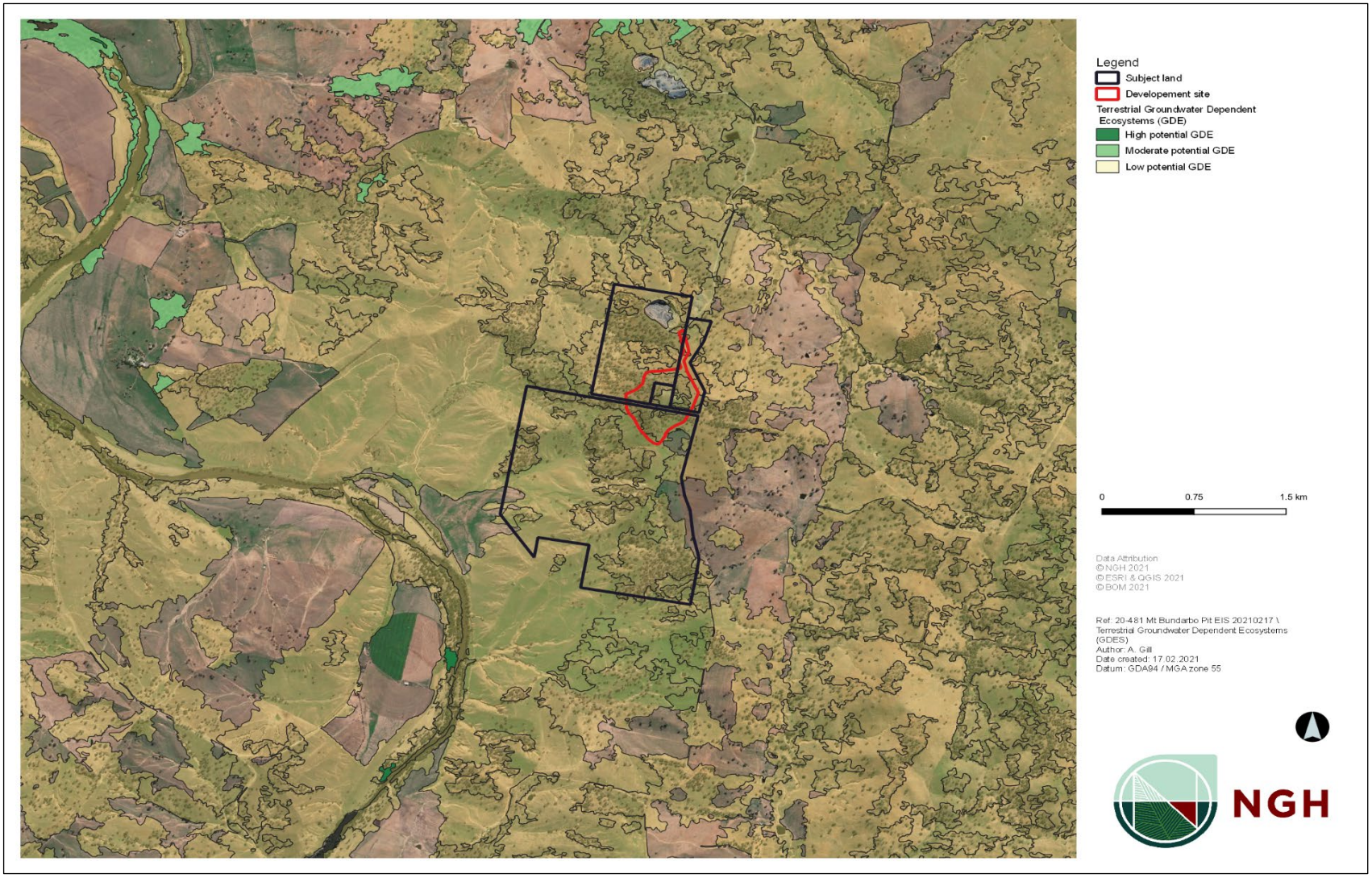


Figure 6-4 Terrestrial Groundwater Dependent Ecosystems (GDES)

6.3.6. Safeguards and mitigation

Table 6-12: Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Time works to avoid critical life cycle events	• If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur (see below) • vegetation clearance should be planned outside of the breeding season of the Brush-tailed Phascogale (April-June) and Superb Parrot (Sept to November).	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted.
Implement clearing protocols during tree clearing works, including pre-clearing surveys, and staged clearing, the presence of a trained ecological or wildlife handler	• Ecologist to conduct a pre-clearing survey and pre-clearing checklist no more than 7 days prior to tree clearing. • If nesting/roosting fauna are observed during the pre-clearing survey, an ecologist or trained wildlife handler would be present during the felling of the tree to either relocate said fauna or take to nearest veterinary hospital or wildlife carer. • Pre-clearing checklist • Tree clearing procedure	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Relocate habitat features (fallen timber, hollow logs) from within the development site	• Tree-clearing procedure including relocation of habitat features to adjacent areas of Zone 2 (derived grassland) for habitat enhancement	Construction	Regular	Contractor	Low	None
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees to be retained; • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance; and • Where trees are to be retained, an adequate protection zone (TPZ) will be provided around each tree for the duration of construction, where possible. Details for calculating TPZs are provided within *Australian Standard 4970-2009 – Protection of trees on development site*.	Construction	Regular	Contractor	Low	None
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	• Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	Construction	Regular	Contractor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	• Avoid night works; and • Direct lights away from vegetation.	Construction/Operation	Regular	Contractor	Low	None
Adaptive dust monitoring programs to control air quality	• Daily monitoring of dust generated by construction activities; and • Construction would cease if dust observed being blown from site until control measures were implemented; and • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.	Construction	Regularly	Contractor	Moderate	Sedimentation in nearby ephemeral waterways and dams.
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	• Machinery would be cleaned prior to entering the site to ensure that weed seeds and propagules are not imported to the site. • Weeds shall be managed according to the requirements of the Biosecurity Act; in that they are to be disposed of at a licenced waste management facility or similar. Weeds are not to be mulched and repurposed for any landscaping use. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported.	Construction, Operation	Regular	Contractor	Moderate	Weed encroachment

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	• Site induction; and • Toolbox talks.	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed
Injury and mortality of fauna entering the proposal site during construction and road strike risk	• If fauna are encountered during construction, allow fauna to leave an area without intervention as much as possible. • The project manager and/or environment manager should ensure the contact details of the animal rescue agency/wildlife care group or vet are provided to the site manager, displayed in the site office and included in the Construction Environmental Management Plan (CEMP) or other relevant management plans for the project.	Construction	Regular	Contractor	Moderate	Local decrease in fauna populations.
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	• An erosion and sediment control plan would be prepared in conjunction with the final design and implemented; and • Spill management procedures would be implemented.	Construction	Regular	Contractor	Moderate	Impacts may occur to waterway if erosion and sedimentation control plan not implemented
Staff training and site briefing to communicate impacts of traffic strikes on native fauna	• Awareness training during site inductions regarding enforcing site speed limits; and	Construction and Operation	Regular	Contractor	Moderate	Fauna strikes from vehicles resulting in decrease of local fauna populations.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	• Site speed limits to be enforced to minimise fauna strike.					
SAII Box-Gum Woodland						
Clearing and rehabilitation protocols to ensure the protection of SAII entities.	• Complete a Construction Environmental Management Plan (CEMP) to include the following: ○ Ensure construction site has exclusion fencing to ensure no accidental vegetation removal occurs in the adjacent box-gum woodland. ○ Ensure no stockpiling or storage of equipment, soil or rubbish occurs in the adjacent box-gum woodland. ○ As part of a site induction, inform construction staff these areas are exclusion zones and therefore not to be disturbed. ○ Place logs from trees that are to be removed in the development	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts

	site in the Woodland areas to be retained.
	• Complete a Rehabilitation Plan for the Woodland areas to manage:
	  ○ Weed control.
	  ○ Replanting or regeneration
	  ○ Re-location of hollows from tree removal
	  ○ Location of nest boxes
	• Location of logs.					

General						
Implementation of management plans.	• Preparation and implementation of a Biodiversity Management Plan (BMP). Including fauna and flora management and relevant procedures and protocols. • Preparation and implementation of Construction Environment Management Plan (CEMP). • Preparation and implementation of Rehabilitation Plan (RP).	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed

6.4. WATER USE, QUALITY (SURFACE AND GROUNDWATER) AND HYDROLOGY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Water – Including:

- *a detailed site water balance and an assessment of any volumetric water licensing requirements, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures;*
- *identification of any licensing requirements or other approvals required under the Water Act 1912 and/or Water Management Act 2000;*
- *demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP);*
- *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 activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts;*
- *an assessment of any likely flooding impacts of the development;*
- *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;*

BIODIVERSITY CONSERVATION DIVISION

Water

- *The EIS must map features relevant to water, including:*
  - *Rivers, streams, estuaries (as described in s4.2 of the Biodiversity Assessment Method).*
  - *Wetlands (as described in s4.2 of the Biodiversity Assessment Method). o Groundwater.*
  - *Groundwater dependent ecosystems.*
- *The EIS must describe background conditions for any water resource likely to be affected by the Proposal, including:*
  - *Existing surface and groundwater.*
  - *Hydrology*
  - *Water Quality Objectives (as endorsed by the NSW Government) including groundwater as appropriate that represent the community's uses and values for the receiving waters.*

    Indicators and trigger values/criteria for the identified environmental values in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and / or local objectives, criteria or targets endorsed by the NSW Government
  - Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions *(OEH/EPA, 2017).*
- *The EIS must assess the impacts of the Proposal on water quality, including:*
  - *The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the Proposal protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.*
  - *Identification of proposed monitoring of water quality.*

- *Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan).*

- *The EIS must assess the impact of the Proposal on hydrology, including:*
  - *Water balance including quantity, quality and source.*
  - *Effects upon rivers, wetlands, estuaries, marine waters and floodplain areas.*
  - *Effects upon water-dependent fauna and flora including groundwater dependent ecosystems.*
  - *Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).*
  - *Changes to environmental water availability, both regulated / licensed and unregulated / rules-based sources of such water.*

Project specific requirements

Where the Proposal is large or high risk with a heightened potential to impact on water quality and hydrology, the EIS should include the following:

- *A description of existing water quality / hydrology based on suitable data (meaning data collection may be required) and must include:*
  - *Water chemistry.*
  - *A description of receiving water processes, circulation and mixing characteristics and hydrodynamic regimes.*
  - *Lake or estuary flushing characteristics. o Sensitive ecosystems or species conservation values. o Specific human uses and values (e.g. fishing, proximity to recreation areas).*
  - *A description of any impacts from existing industry or activities on water quality.*
  - *A description of the condition of the local catchment e.g. erosion, soils, vegetation cover.*
  - *An outline of baseline groundwater information, including, for example, depth to water table, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment.*
  - *Historic river flow data.*
- *An assessment of the impacts of the Proposal on water quality and hydrology including:*
  - *Water circulation, current patterns, water chemistry and other appropriate characteristics such as clarity, temperature, nutrient and toxicants, and potential for erosion.*
  - *Changes to hydrology*
  - *Stream bank stability and impacts on macro invertebrates.*
  - *Water quality and hydrology modelling and / or monitoring, where necessary.*
- *Proposed water quality monitoring in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004). The water quality and aquatic ecosystem monitoring program must include:*
  - *Adequate data for evaluating maintenance, or progress towards achieving, the relevant Water Quality Objectives.*
  - *Measurement of pollutants identified or expected to be present.*

Flooding

- *The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:*
  - *Flood prone land (ie land susceptible to the probable maximum flood event).*
  - *Flood planning area, the area below the flood planning level. o Hydraulic categorisation (floodway and flood storage areas).*
  - *Flood hazard.*
- *The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 10% Annual Exceedance Probability (AEP), 1% AEP flood levels and the probable maximum flood, or an equivalent extreme event.*
- *The EIS must model the effect of the Proposal (including fill) on the current flood behaviour for a range of design events as identified above, and the 0.5% AEP and 0.2% AEP year flood events as proxies for*

assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

- *All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified in the EIS and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the Proposal should be detailed.*
- *Modelling in the EIS must consider and document:*
    - *Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.*
    - *The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood (PMF), or an equivalent extreme flood.*
    - *Impacts of the Proposal on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories.*
    - *Impacts of earthworks and stockpiles within the flood prone land up to the PMF level. The assessment should be based on understanding of cumulative flood impacts of construction and operational phases.*
    - *Relevant provisions of the NSW Floodplain Development Manual 2005.*
- *The EIS must assess the impacts on the Proposal on flood behaviour, including:*
    - *Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.*
    - *Consistency with Council floodplain risk management plans. o Consistency with any Rural Floodplain Management Plans. o Compatibility with the flood hazard of the land.*
    - *Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.*
    - *Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.*
    - *Whether there will be a direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.*
    - *Appropriate mitigation measures to offset potential flood risk arising from the Proposal. Any proposed mitigation work should be modelled and assessed on the overall catchment basis in order to ensure it fits its purpose and meets the criteria of the Council where it is located, and to ensure it has no adverse impact to surrounding areas.*
    - *Any impacts the Proposal may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.*
    - *Whether the Proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.*
    - *Emergency management, evacuation and access, and contingency measures for the Proposal during both construction and operational phases considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.*
    - *Any impacts the Proposal may have on the social and economic costs to the community as a consequence of flooding.*

DEPARTMENT OF PRIMARY INDUSTRY

Suitable and secure water supply

- *Estimated water demand and water availability should be clearly outlined in the Proposal. The source of water and any sanitisation methods to be detailed in the application.*
- *Outline any impacts to water use from agriculture and mitigation measures if required.*

Surface & Groundwater protected

- *Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession. A monitoring program should be developed.*

ENVIRONMENT PROTECTOIN AGENCY

General

- *water management system including all potential sources of water pollution, Proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge;*

Water

- *Provide details of the project that are essential for predicting and assessing impacts to waters including:*
  - *(a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000);*
  - *(b) the management of discharges with potential for water impacts;*
  - *(c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the Proposal.*
- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.
- *Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include 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.*

The quality of water resources is closely linked to the surrounding environment and land use. Poor water quality has a negative impact on public health, the health of our ecosystems, recreational activities, farming and other activities. Water balance is described by the total amount of water used during construction and operation. Measures of water usage help evaluate the level of demand from industrial, agricultural, and domestic users.

6.4.1. Existing Environment

The Development site is located within the Murrumbidgee Catchment area of the greater Southern Tablelands region of NSW. The catchment covers an area of 84,000 km^2, which represents 8 % of the Murray-Darling Basin in NSW, with the main water source supplied from the Murrumbidgee River. The Murrumbidgee River is the third longest river in the Murray-Darling Basin and in Australia, extending for 1,485 km from the Kosciusko National Park to the alluvial flood plains at the western end of the valley.

The Murrumbidgee Catchment supports around 550,000 people with water, including Canberra, Queanbeyan, Wagga Wagga and many regional cities and towns. The land use in the catchment is dominated by agriculture, dryland cropping and horticulture and is one of the largest areas for irrigated agriculture.

Surface water

The development site is located within the Murrumbidgee catchment with surface waters regulated under the Water-sharing Plan for the *Murrumbidgee Unregulated and Alluvial Water Sources 2012.* There are no run-on flows to the site due to its elevation in the landscape. Runoff waters flow in all directions via ephemeral waterways to the Murrumbidgee River. Sawpit Creek is located to the north of the Proposal. Kyleys Creek is

located to the south-east. Sawpit and Kyleys Creeks are both ephemeral 3rd order streams under the Strahler Stream Classification System (DPI 2018), which drain into the Murrumbidgee River. The adjacent reach of the Murrumbidgee River is classified as a 9th order stream (DPI 2018).

The development site is located approximately 2.5 km north-east of the Central Murrumbidgee (Burrinjuck to Gogeldrie) Water Source, which generally flows west as part of the Murray-Darling Basin System. There are no permanent water bodies, creeks, or springs on the subject site. There are no protected wetlands or water bodies within the subject site.

The closest drainage is located approximately 250 m south-west of the Proposal and is unnamed. There are approximately six man-made farm dams located along drainage lines to the south-east and east in proximity to the Proposal. The closest dam is approximately 850 m south-east. The surface hydrology is provided in Figure 6-8.

Surface water quality of the Murrumbidgee River upstream and downstream of the site has been assessed from the available WaterNSW monitoring stations with data current as of 15 January 2020. The upstream station (410068) is located ~13.7 km south east of the site and the downstream station (410195) is located ~21.5 km to the south west. Electrical Conductivity (EC) ranges from 234.0 uS/cm at the upstream station to 166.1 uS/cm at the downstream station, classed as fresh water (0-500) from the BOM regional water information website (BOM 2021). Temperature increases from 13.9 to 19.4 between the two stations.

A water quality technical report for the Murrumbidgee surface water resource plan area (SW9) was completed in February 2020 by NSW Department of Planning, Industry and Environment (DPIE). In summary of the results, the water quality condition within the Murrumbidgee water resource planning area (WRPA) varies from poor to excellent. The water quality data used in the report was compiled from 26 routine water quality monitoring stations located within the Murrumbidgee WRPA. Data is compiled monthly by the State Water Quality Assessment and Monitoring Program (SWAMP) since 2017 and remains current. Monitoring stations 410068 and 410195 are inclusive of this monitoring program.

The issues occurring within the catchment are the result of a combination of factors, such as disruption from Burrinjuck and Blowering Dams, catchment conditions and land use change. The report outlines that sediment is a major transport mechanism for many pollutants and should be managed to improve water quality.

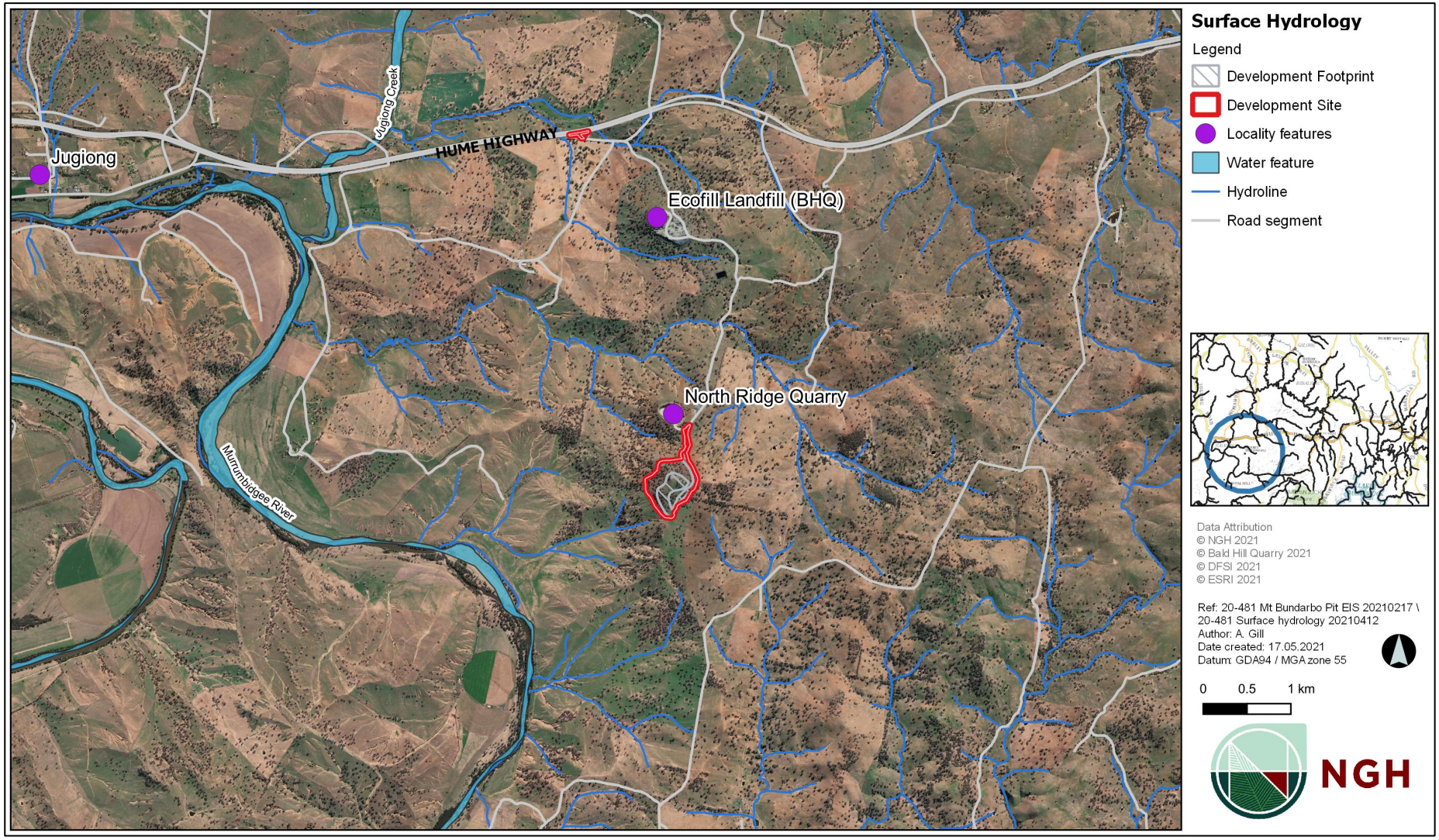


Figure 6-8 Surface hydrology surrounding the Proposal

Water Quality Objectives

The Murrumbidgee River and Lake George Water Quality and River Flow Objectives are used to develop plans and actions affecting the water quality and river health. Five regions are defined within the catchment, with broadly different characteristics. The Proposal is located within the Mid Murrumbidgee (2) region, (refer to Figure 6-9) adjacent to the Murrumbidgee River with Water Quality Objectives of Major Regulated Rivers, refer to details below:

"These are rivers from which large volumes of water are diverted for irrigation by large dams. Flows during the irrigation season are supplemented by release of water stored from high flows, resulting in unnaturally high-water levels in summer. These flows lack natural patterns of variability and sometimes change rapidly. River flow is substantially reduced during non- or low-irrigation seasons. At any time of year in periods which would normally have high or very high flow, flows may be substantially reduced by the trapping of water in a large dam."

The Water Quality Objectives for Major Regulated Rivers are for the protection of:

- Aquatic ecosystems
- Visual amenity
- Secondary contact recreation
- Primary contact recreation
- Livestock water supply
- Irrigation water supply
- Homestead water supply
- Drinking water at point of supply-Disinfection only
- Drinking water at point of supply-Clarification and disinfection
- Drinking water at point of supply-Groundwater
- Aquatic foods (cooked)

The nearby community water usage would be drinking water at supply of groundwater. These Water Quality Objectives are to comprise community based environmental values and associated national criteria (ANZECC 2000 Guidelines) to provide state-wide context. The local water quality varies naturally with various factors, therefore trigger values have been locally refined whilst still protecting the environmental value and driving local protection or improvement of the water quality. Refer to Table 6-13for the key indicators for raw water (groundwater) drinking water supply within the Murrumbidgee Catchment.

Table 6-13 Groundwater drinking water key indicators

Indicator	Numerical criteria (trigger values)
Blue-green Algae	Recommend twice weekly inspections during danger period for storages with history of algal blooms. >500 algal cells/mL - increase monitoring. < 2000 algal cells/mL - water may be used for potable supply. >2000 algal cells/mL - immediate action indicated; seek expert advice. >6500 algal cells/mL - seek advice from health authority. >15 000 algal cells/mL - may not be used for potable supply except with full water treatment, which incorporates filtration and activated carbon. Source: Australian Drinking Water Guidelines (NHMRC & NRMMC 2004).
Turbidity	Site-specific determinant

Indicator	Numerical criteria (trigger values)
Salinity	<1500 µS/cm > 800 µS/cm causes a deterioration in taste.
Faecal Coliforms	0 faecal coliforms per 100 mL (0/100 mL)
Total Coliforms	95% of samples should be 0 coliforms/ 100 mL throughout the year. Up to 10 coliform organisms may be accepted occasionally in 100 mL. Coliform organisms should not be detected in 100 mL in any two consecutive samples.
Dissolved Oxygen	> 6.5 mg/L (> 80% saturation)
pH	6.5-8.5
Chemical Contaminants	See ANZECC 2000 guidelines, section 6.2.2.

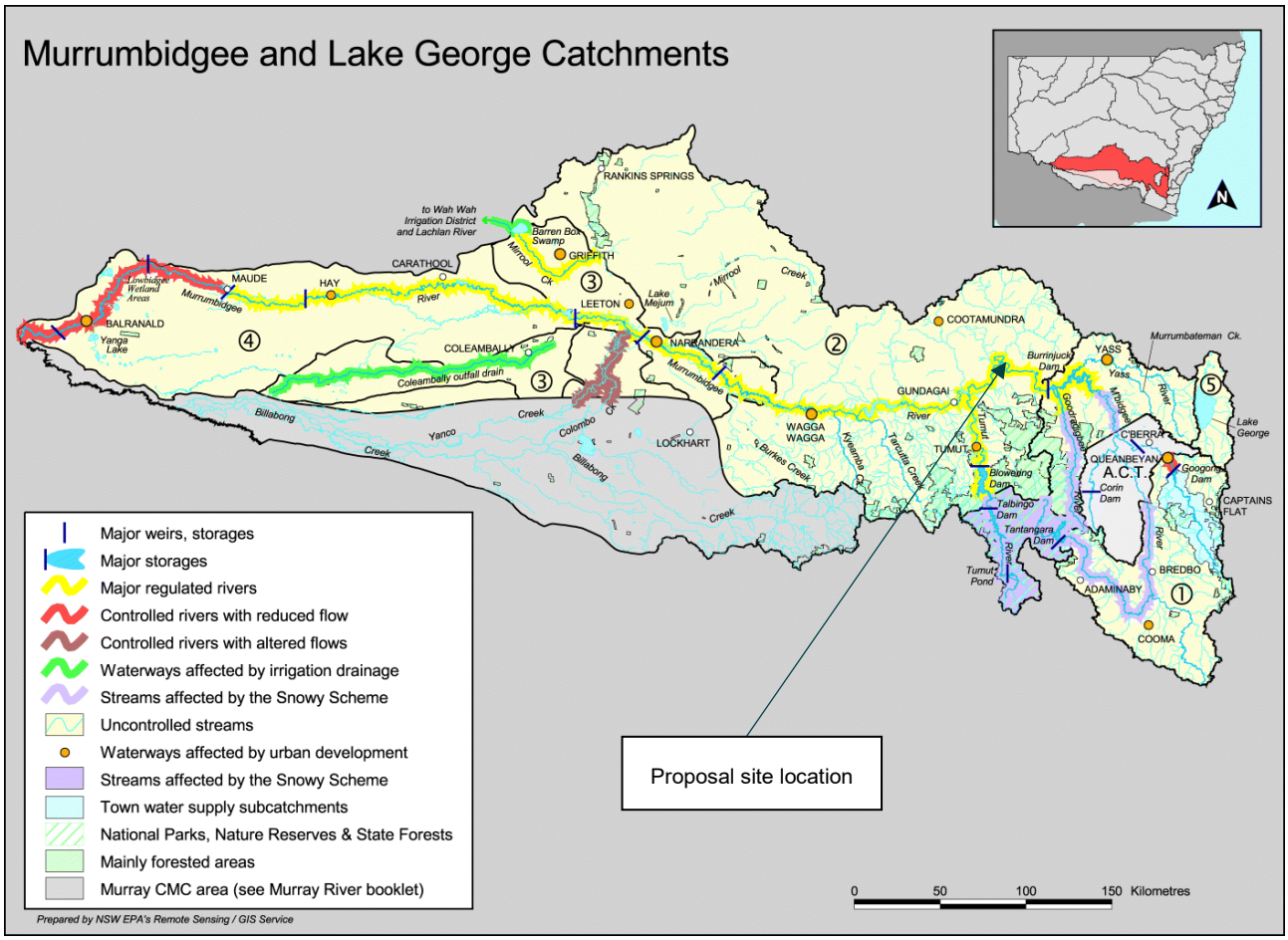


Figure 6-9 Murrumbidgee and Lake George Catchments, sourced environment.nsw.gov accessed 15/02/2021

Flooding

No flood modelling has been undertaken as part of this EIS. The site has not been mapped as flood prone land in the Harden LEP (2011). Flood risk to the development site is negligible due to the elevation of the site in the catchment and no run-on from adjacent areas.

The existing flood environment in the Jugiong Floodplain Risk Management Study and Plan (Final) 2011, reports that Jugiong is liable to flooding from the Murrumbidgee River and has been observed with large flood events multiple times. The flood liability for Jugiong is complicated by the upstream Burrinjuck Dam. The peak flood levels for various historical and design events for Bundarbo Road are attached in Table 6-14.

Table 6-14 Peak Flood Levels for Various Historical and Design events for Bundarbo Road

Event	1925	1974	1% AEP	0.5% AEP	0.2% AEP	PMF
Flood level (mAHD)	251.2	249.5	251.8	253.1	255.1	265.6

Bundarbo Road is located parallel to the Murrumbidgee River, located at 240 m AHD and approximately 2 km south west of the Development site. The peak of Mount Bundarbo (the Development site) is located at 580 m AHD. Increased effects of climate change should not affect the Development site, considering the 340 m elevation difference.

Groundwater

Groundwater in the area forms part of the Lachlan Fold Belt MDB Groundwater source and is regulated by the *NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011* Water Sharing Plan. The Lachlan fold belt groundwater source covers an area of 16,722,000 ha consisting of Cambrian to Lower Carboniferous rock successions.

Sixteen registered groundwater bores are within 5 km of the site. No current groundwater levels were available for any of these sites at the time of reporting. The closest registered bore (GW025301) was drilled from 408 m AHD to 91.44 m with no groundwater encountered at the fresh/weathered rock interface. This bore is located approximately 1.5 km north east of the site. Groundwater at the site, if present, is likely to be more than 100 m below ground level. Refer to Figure 6-10 for registered groundwater boreholes nearby the Development site.

Northridge quarry excavations are currently 70 m BGL, no groundwater seepage has been observed, this is comparative to Mt Bundarbo as the excavations would be shallower (55 m BGL from peak of 615 m). Drilling has occurred at the development site through the basalt capping to the underlying granite bedrock; no groundwater seepage was observed during this investigation. Refer to Appendix B.

Five groundwater bores are currently monitored on the existing quarry and landfill site under the Environmental Protection Licence (EPL) No: 2552. These bores are monitored on a quarterly basis for a range of parameters. Groundwater salinity in the locale is highly variable with readings of Total Dissolved Solids (TDS) ranging from 1088 mg\L to 4042 mg\L within 5 km of the site. General groundwater quality is identified as marginal suitability for domestic, stock and irrigation water use with between 1,500 to 3,000 mg/L of total dissolved solids (Green et al. 2011).

Groundwater in the wider locale is likely to be highly influenced by the Murrumbidgee River system with flow expected to be in a westerly direction. There are low potential terrestrial Groundwater Dependent Ecosystems (GDEs) throughout the development footprint (BOM 2020). There are no aquatic GDEs within the development site. However, there are moderate potential aquatic GDEs along Sawpit Creek and Kyleys Creek.

Bald Hill Quarry has a shallow bore located approximately 500 m north of the Bald Hill Quarry – Stage 1 pit, alongside the access road. The bore is used to supply water to the office and operations for the existing quarry.

The Water Access Licence (WAL number 28736) has an annual cap on extraction of 10 ML, which is under the NSW Murray Darling Basin Fractured Rock Groundwater Sources Water Sharing Plan.

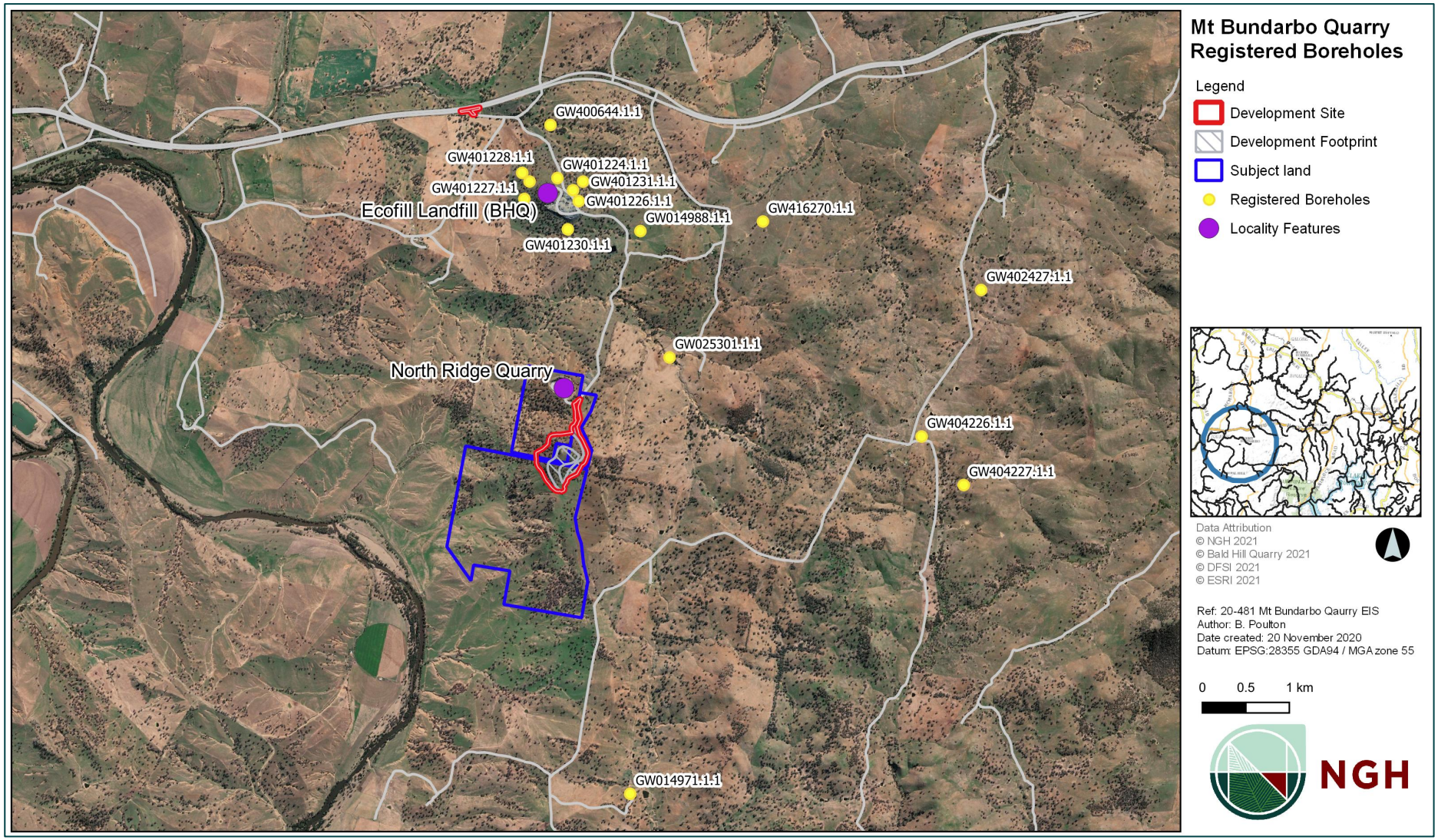


Figure 6-10 Nearby Registered Groundwater Boreholes

6.4.2. Potential Impacts

Construction

Water Use

Water demand for the Proposal during construction would be relatively small and predominantly used for dust suppression. It is expected that water re-use on site would use 30,000 L to 40,000 L during the construction period. Water demand may increase during the construction phase of the Proposal over a three-month period dependent on the weather conditions. A large component of this is non-potable water for dust suppression and would be sourced from the North Ridge Quarry or Mt Bundarbo Quarry pits or the licensed groundwater bore when required (WAL 28736). Water for staff and staff amenities is provided at the existing amenities and site office located at the Bald Hill Ecofill Landfill (refer Figure 1-4). Amenities are supplied with rainwater and bottled water is provided for staff.

Surface Water Quality

Earthworks are required during establishment of the site and include the construction of the haul road extension, removal of the overburden and its use for the construction of the external batters of the pit. Erosion and sediment controls would also be part of the construction earthwork process. Prior to commencement of mining operations, the shallow topsoils on site would have to be removed.

The removal of topsoil has the potential to present an increase in surface runoff and erosion risk during construction. The removal and reuse of topsoil would be incremental throughout the construction phase. The elevation and slope of the subject site also has the potential to amplify any erosion risk.

Due to the incremental depths and modified contours of the pit, once construction meets a certain point, surface waters would not drain off site, due to the enclosed nature of the pit, and would accumulate at its lowest point. The cut face of the pit is usually the lowest point after around one year and would be used to collect wastewater detained on site. Any accumulated water within the pit would evaporate over time or be pumped out and re-used onsite for dust suppression. A detailed site water balance would be provided in the supplementary Soil and Water Management Plan (SWMP).

The use of fuels and other chemicals onsite poses a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can impact water quality. When mobilised, such as in heavy rain events, contaminants may spread via local drainage lines, affecting much larger areas including aquatic habitat. Overall, these risks are low and considered readily manageable.

No discharge of water into natural waterbodies is expected to take place from the Proposal.

Details of erosion and sediment controls are provided in section 6.8.3.

Groundwater

Due to the lack of groundwater in the locale and below the subject site, impacts to groundwater and groundwater dependant ecosystems are considered negligible during the construction process and should pose no constraints upon the subject site.

Groundwater to supplement captured runoff for activities such as dust suppression during construction would be from the existing BHQ well with WAL 28736.

Operation

Water Use

During operation, site water demands would be negligible and water disposal methods would replicate the process used by the adjacent North Ridge quarry. Water disposal methods would include reuse for dust suppression on roads, processing plant and amenities. It is expected that 5,000 L to 10,000 L of water per day or 10 ML per year would be used by the Proposal during operation. A large component of this is non-potable water for dust suppression and would be sourced from the North Ridge Quarry or Mt Bundarbo Quarry pits or the licensed groundwater bore when required (WAL 28736). Rainwater is used for staff amenities, collected in tanks receiving runoff from the buildings. Potable water for staff is supplied as bottled water.

Surface Water Quality

All processing areas would drain towards onsite water bodies due to the enclosed nature of the pit. No discharge of processing waters from the site shall occur under normal conditions and impact upon the regional surface water regime. Erosion risks along access roads are expected over time but should have mitigation measures in place to keep impact to a minimum.

The use of fuels and other chemicals onsite poses a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can impact water quality. When mobilised, such as in heavy rain events, contaminants may spread via local drainage lines, affecting much larger areas including aquatic habitat. Overall, these risks are low and considered readily manageable.

The operational site water balance would be detailed in the SWMP. The site water balance would detail water uses, water sources, water infrastructure, water applications and any additional proposed mitigation measures.

Any discharges of water and wastewater management measures during the operation phase of the Proposal should be conducted in line with measures outlined in the SWMP. The proposed water management systems, water monitoring programs and other mitigation measures would also be detailed in the SWMP. There are existing wastewater protocols in place at the existing quarry; it is unclear whether these facilities will be used or if similar infrastructure will be built as part of the proposed quarry.

Erosion risk, especially from runoff entering neighbouring properties would be minimal during the construction phase. This would be due to the enclosed nature of the pit and centripetal drainage pattern. All on-site runoff would be intercepted by stormwater devices and transferred to holding dams. No additional erosion risks on surrounding land would be presented from ongoing use of the proposed quarry. Vegetation should be maintained wherever possible to limit erosion risk.

Bunding down-gradient, along the eastern side of the pit would ensure runoff does not leave the development site and is directed into the dam or sediment basin. Details of erosion and sediment controls are provided in section 6.8.3.

Groundwater

Although groundwater is limited, levels across the site and in the vicinity of the excavation areas would remain within the current seasonal range of variation during operation. The existing groundwater flow directions and quality are likely to remain unchanged during and after development at the site. Groundwater and groundwater dependant ecosystems are not considered to pose constraint on the subject site.

Groundwater to supplement captured runoff for activities such as dust suppression and processing during operation would be from the existing BHQ well with WAL 28736.

Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (OEH/EPA, 2017)

The Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (OEH/EPA, 2017) has been developed in direct response to increasing development and a lack of integrated management of urban development, waterway health and the community's expectations in the state's waterways. Impacts from increased loads of pollutants in waterways can reduce the aquatic biodiversity and health of our waterways. Refer to Table 6-15 for the steps undertaken as part of this framework to make decisions to determine management responses for the Proposal that meet the waterway health outcomes.

Table 6-15 Framework Steps

Steps	Outcomes
1. Establish context	• The Proposal is industrial development. • No waterway type is present in proximity to the development site. The closest drainage is located approximately 250 m south-west of the Proposal and is unnamed. There are approximately six man-made farm dams located along drainage lines to the south-east and east in proximity to the Proposal. The closest dam is approximately 850 m south-east. Murrumbidgee River is located 2 km south-west from the development site. • Waterway quality objectives are outlined above in section 6.4.1.
2. Effects-based assessment	• Will the Proposal change the current health of the waterway? No, the closest waterway is the Murrumbidgee River, located 2 km south west from the development site.
3. Compare against waterway objectives	• Allowing the nearest waterways (Murrumbidgee River) to be affected up to the numerical criterion in the trigger values should be avoided where possible. • Precautionary approach where uncertainty in environmental outcomes of the Proposal should be adopted.
4. Strategic impact assessment	• The risks associated with the impacts of the Proposal on the waterway are low, based on feasibility of achieving the intended outcomes of each management response. Management responses are to be developed based on Steps 2 to 4 of the Framework.
Are the risks acceptable?	Yes
5. Design and Implementation	• Detailed planning is to identify specific controls or treatment measures to achieve the intended management responses.

Flooding

The Proposal area is not prone to flood inundation from the Murrumbidgee River or surrounding ephemeral streams. The Murrumbidgee River is located at 240 m AHD and the peak of Mount Bundarbo is located at 580 m AHD. The Murrumbidgee River is situated approximately 2 km south west of the site, with numerous first order drainage lines beginning at the base of Mount Bundarbo feeding into the Murrumbidgee River. As the landform of the development site is a crest, there is no run-on from nearby and upslope land as the elevation of the Proposal is located within the highest topography within the surrounding areas.

During operation, the topography of Mount Bundarbo would dramatically change. However, due to the enclosed nature of the proposed pit, no additional runoff is expected from the site that would impact regional flood behaviour on properties, assets, and infrastructure. In the unlikely event of storm water flooding, where water may pool from heavy rainfall events, the quarry pit would likely remain stable with the implementation of benching quarry walls and pumping excess water. Excess water would be pumped with a submerged pump and pipe. The requirements of the EIS assessment for flooding are outlined in Table 6-16 below.

Mitigation measures to manage any associated impacts during the operational phase of the Proposal are provided in section 6.4.3.

Table 6-16 Identification of flood hazards and mitigation measures for the development

Impact	Assessed by this EIS
Any impacts the Proposal may have on the social and economic costs to the community as a consequence of flooding.	Five sensitive receivers (rural residences) are located within 3 km of the proposed quarry boundary (Figure 5-1). The nearest receiver is a farmstead located about 1450 m north-east of the quarry boundary. Flooding impacts from the Proposal to nearby sensitive receivers are unlikely.
The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood (PMF), or an equivalent extreme flood.	Height of landscape, no modelling for this section of the river. The Jugiong flood modelling height of 265.6 m AHD.
Impacts of the Proposal on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories.	No impacts to flood behaviour resulting in detrimental changes are expected from the Proposal. Redirection of flow would remain the same outside of the development footprint, with 100% of rainfall captured within the development footprint.
Impacts of earthworks and stockpiles within the flood prone land up to the PMF level. The assessment should be based on understanding of cumulative flood impacts of construction and operational phases.	No earthworks or stockpiles are proposed within the flood prone zone including land up to the PMF level.
Relevant provisions of the NSW Floodplain Development Manual 2005.	Not applicable.
Whether there will be detrimental increases in the potential flood affectation of other properties, assets, and infrastructure.	The development is unlikely to adversely impact flood behaviour and will not increase potential flood affection of other property, assets, and infrastructure. In the unlikely event of flooding, the quarry pit would likely remain stable. Flood water would be re-directed

Impact	Assessed by this EIS
	via pumps to retention/evaporation ponds for reuse onsite.
Consistency with Council floodplain risk management plans. Consistency with any Rural Floodplain Management Plans. Compatibility with the flood hazard of the land.	There is no rural flood management plan for Hilltops Council. Flood management plans have been commissioned for the townships of Young, Boorowa and Jugiong. The Proposal would adopt the floodplain risk mitigation outlined in the Jugiong Floodplain Management Study and Plan, August 2011.
Compatibility with the hydraulic functions of flow conveyance in floodways' and storage in flood storage areas of the land.	Flooding caused by heavy rainfall events within the quarry pit would be captured within low-lying areas and pumped into retention/evaporation ponds for re-use onsite where required. If captured rainwater is not obstructing pit operations, it is left to evaporate in the pit.
Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.	The nature of the infrastructure of the Proposal would be unlikely to impact inundation of any floodplain environment.
Whether there will be a direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.	Mitigation measures to reduce soil erosion and sedimentation are addressed in section 6.8.4
Appropriate mitigation measures to offset potential flood risk arising from the Proposal. Any proposed mitigation work should be modelled and assessed on the overall catchment basis in order to ensure it fits its purpose and meets the criteria of the Council where it is located, and to ensure it has no adverse impact to surrounding areas.	Onsite water pumps would be used to off-set potential flooding that would occur from heavy rainfall within the quarry pit to retention/evaporation ponds. No flood modelling has been undertaken for this EIS based on the topography of the Development site.
Any impacts the Proposal may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.	The development site is not located within a high-risk flood prone area; it is unlikely there would be any impacts upon existing community emergency management arrangements for flooding. Therefore, consultation is not required with Council or the SES.
Whether the Proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.	Staff amenities building would be located away from floodways and flood storage zones. A flood evacuation procedure would be in place for staff on site for a flooding event and embedded within emergency management procedures.
Emergency management, evacuation and access, and contingency measures for the Proposal during both construction and operational phases considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.	Emergency management procedures would be prepared in consultation with Council and SES.

Groundwater Dependent Ecosystems

Nearby GDEs are not likely to be impacted by the Proposal. Refer to section 6.3 for further detail on GDEs.

Site Water Balance

The size of the development site is 29.57 ha, with a development footprint of 12.96 ha. Due to the incremental depths and modified contours of the pit once construction meets a certain point surface waters would not drain off site due to the enclosed nature of the pit and would accumulate at its lowest point. The cut face of the pit is usually the lowest point after around one year and would be used to collect wastewater detained on site. Any accumulated water within the pit would evaporate over time or be collected in retention dams for re-use onsite and/or disposed off-site.

A site water balance has been calculated for the development site (development footprint and haul road) once in operation (Appendix I). The fraction impervious value and runoff coefficient C was extracted from the Wagga Wagga City Council Engineering Guidelines for Subdivisions and Development Standards (WWCC 2019) as this information was not available for Hilltops Council. The engineering guidelines were developed from work involving Wagga Wagga, Griffith, Albury, Wodonga, and other Councils. The conservative runoff coefficients that have been used are presented in Table 6-17.

Table 6-17 Runoff coefficients

Feature	Fraction impervious	Runoff coefficient – C
Development footprint (rock)	0.85	0.04 (1 year period return)
Road	0.85	0.04 (1 year period return)

The values for fraction impervious, extracted from the engineering guidelines (WWCC 2019), have been selected based on the ground surface of the development footprint. Since the Proposal is for quarrying rock material (not soil), the impervious fraction would be consistent with that of a road surface.

Water balance calculations used the design rainfall event for a 63.2% Annual Exceedance Probability (AEP) for a 24-hour period. The latest 2016 rainfall Intensity Frequency Duration (IFD) data was obtained from the Bureau of Meteorology (BOM). The IFD Design Rainfall Depth for the Proposal (-34.848054, 148.41473) for a 63.2% AEP with a 24-hour duration is 48.5 mm. This is a conservative figure when compared to the annual average daily decile 5 (median) rainfall statistic of 23.7 mm sourced from the Young Airport Automatic Weather Station (site number 073138, 34.25°S, 148.25°E), which has a continuous record for 27 years. Table 6-18presents the land size, precipitation volume for the design rainfall event and runoff for each feature.

Table 6-18 Site water balance for the operational phase of the proposed Mt Bundarbo Quarry using a design rainfall event of 63.2% AEP 24-hour duration

Feature	Fraction impervious	Size (m^2)	63.2% AEP 24-hour duration (m^3)	Runoff (m^3)	Comment
Mt Bundarbo Quarry – development footprint	0.85	80,000	3,440	15,493	It is expected that 100% of precipitation within the

Feature	Fraction impervious	Size (m^2)	63.2% AEP 24-hour duration (m^3)	Runoff (m^3)	Comment
					development footprint would be captured within the pit, managed by evaporation, and or diverted into retention ponds via pumps.
Haul road	0.85	48,705	2,094	9,432	Associated drainage would be required to divert stormwater.
Total		**128,705**	**5,534**	**24,925**	

A total of 5.534 Megalitres (ML) of rainfall falls within the boundary of the development footprint (quarry and haul road) during a 63.2% AEP for a 24-hour duration. Of this volume of rainfall, 100% of the 5.534 ML is runoff (captured within the quarry pit) due to the impervious nature of the compaction of the gravel roads and rock material within the quarry pit.

6.4.3. Safeguards and Mitigation Measures

Activities with potential for adverse soil impacts would be managed through the development and implementation of management strategies, as detailed below (Table 6-19).

Table 6-19 Safeguards and mitigation measures for surface and groundwater

No.	Safeguards and mitigation measures	C	O	R
WA1	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) will be prepared, implemented and monitored during the construction and rehabilitation of the Proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Runoff which has been captured on site to be managed to avoid any overflow. Captured waters will be evaporated or extracted from the site and disposed of elsewhere	**Prior to and during construction**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	• Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within stormwater paths and along roadsides during concentrated flows. • Ensure that machinery arrives and leaves site in a clean, washed condition, free of fluid leaks and not tracking soil to and from nearby areas • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. • Areas of unexpected/unintended soil disturbance will be rehabilitated promptly and progressively during construction.			
WA2	Best practice management measures to be employed where applicable to reduce the risk of erosion and sedimentation control: • Preserve and stabilise disturbed areas, drainageways and steep slopes. • Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. • Provide access and general construction controls.	**C**	**O**	
WA3	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook* if the chemicals are liquids. • In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	
WA4	A protocol shall be developed in relation to discovering buried contaminants within the development site (e.g. pesticide containers, if any). It will include stop work, remediation and disposal requirements. If significant contamination is found on site during construction or operation activities, it must be reported in line with *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites*	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	(OEH, 2011). Further action shall be undertaken when necessary in line with the *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).*			
WA5	Any area temporarily used during construction (laydown and trailer complex areas) to be restored to original condition or re-vegetated with native plants where possible.	**C**		
WA6	A Spill Response Management Plan will be prepared, implemented and monitored during the construction and operation of the Proposal.	**C**	**O**	
WA7	Vehicles, plant and equipment will be maintained to minimise leakages during construction and operation of the Proposal.	**C**	**O**	

C: Construction; O: Operation; R: Rehabilitation

6.5. CLIMATE AND AIR QUALITY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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. 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;

ENVIRONMENT PROTECTION AUTHORITY

Air

- *Identify all sources or potential sources of air emissions from the development. Note: emissions can be classed as either:*
  - *point (e.g. emissions from stack or vent); or*
  - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*
- *Provide details of the project that are essential for predicting and assessing air impacts including:*
  - *a) the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored;*
  - *b) an outline of procedures for handling, transport, production and storage;*
  - *c) the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.*

Existing Environment

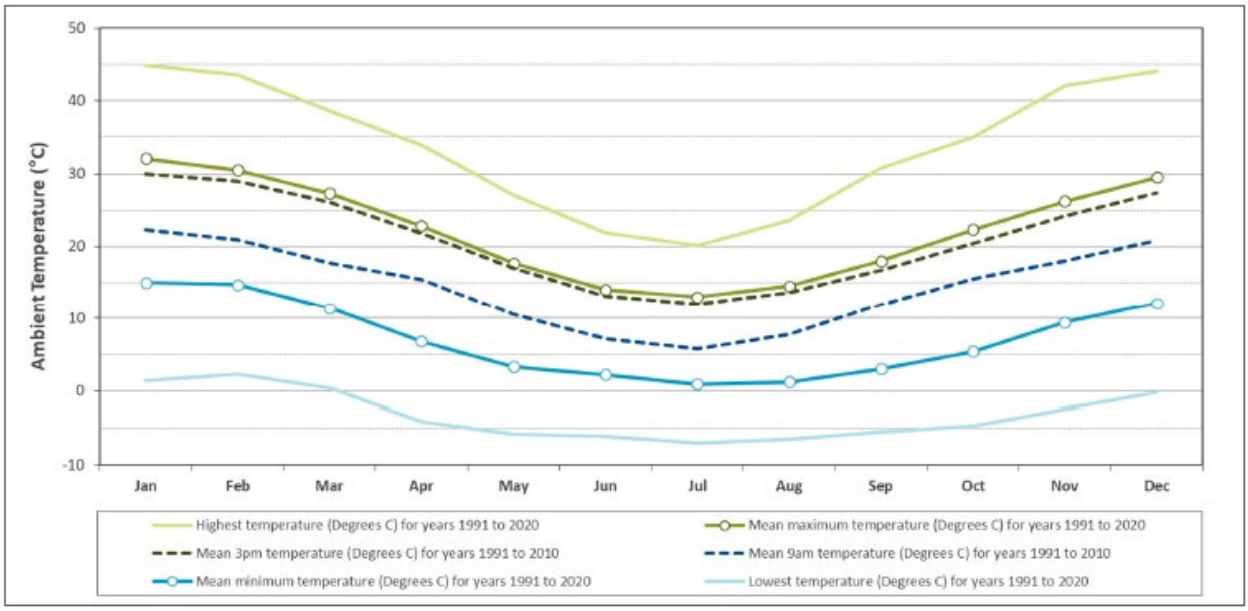
The Development site falls 7.5 km south east of Jugiong, within the Hilltops Council LGA. The land surrounding the Proposal generally falls away from the site, approximately 200 m to the north and south, 300 m to the west and 11 m to the east. Surrounding land use is predominantly grazing agriculture with five rural dwellings located within 3 km of the site. A landfill, operational quarry, haul road, hard rock processing plant and soil stockpiling site are the other disturbing land uses in proximity to the Proposal.

An Air Quality Impact Assessment was prepared for the Proposal by SLR (2021) and is provided as Appendix F.

Climate

The Hilltops Council LGA is part of the NSW South Western Slopes Bioregion and Inland Slopes subregion. This bioregion is dominated by a sub-humid climate that generally experiences hot summers and cool wet winters (OEH 2016). Temperature statistics for the nearest weather station at Young Airport between 1991 and 2020 are summarised in Figure 6-11. Mean maximum temperatures of 32.1 °C were recorded in Summer and mean minimum temperatures of 13 °C were recorded in Winter, between 1991 and 2020 (AQIA 2021).

Figure 6-11 Mean long term temperature trends for Young Airport between 1991-2020 (SLR 2021)



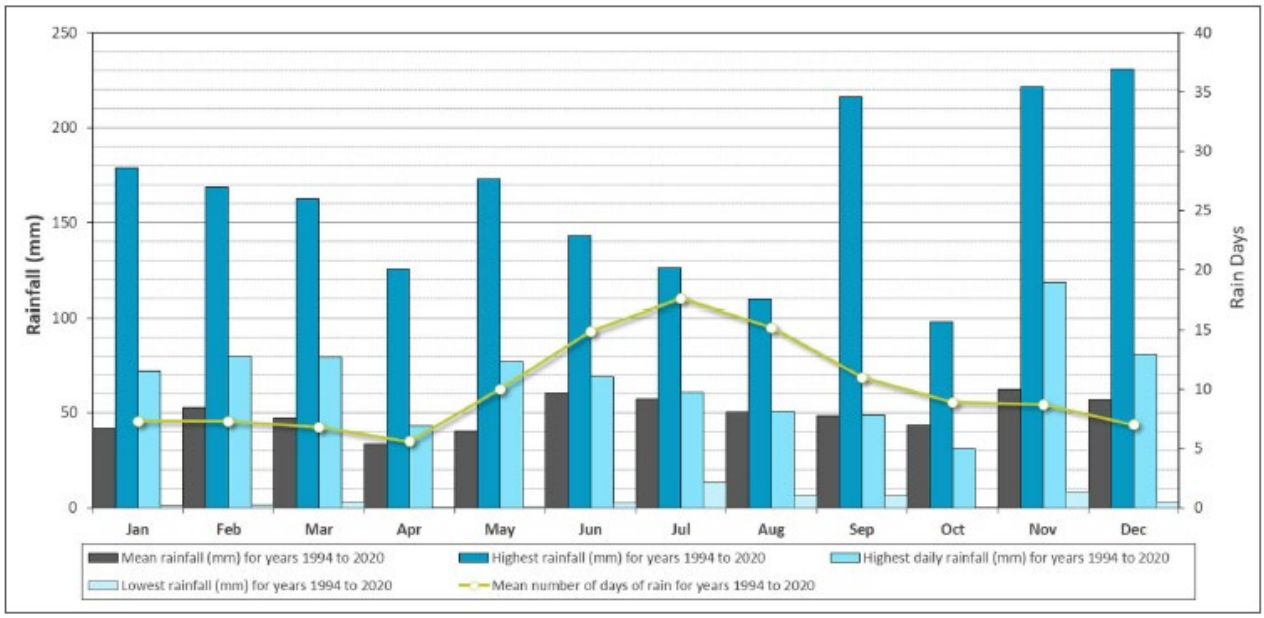


Figure 6-12 Mean long term monthly rainfall data for Young Airport between 1994-2020 (SLR 2021)

Rainfall statistics for Young Airport for the years 1994 to 2020 are summarised in Figure 6-12. Mean annual rainfall is 589 millimetres (mm), with the average monthly minimum occurring in April (33 mm) and the average monthly maximum occurring in November (62 mm) (SLR 2021).

The approximate annual (1800 mm, or 0.21 mm/h) and seasonal (800 mm, or 0.37 mm/h) average evaporation rates for the area in which the project is situated indicate that more manual watering would be required in the summer months to achieve adequate dust control (SLR 2021).

Humidity statistics for Young Airport between 2015 and 2019 are summarised in Figure 6-13. In winter, humidity ranges from 90% in the morning to 63% in the afternoon (SLR, 2021). During summer, humidity levels range from 54% in the morning to 31% in the afternoon (SLR 2021).

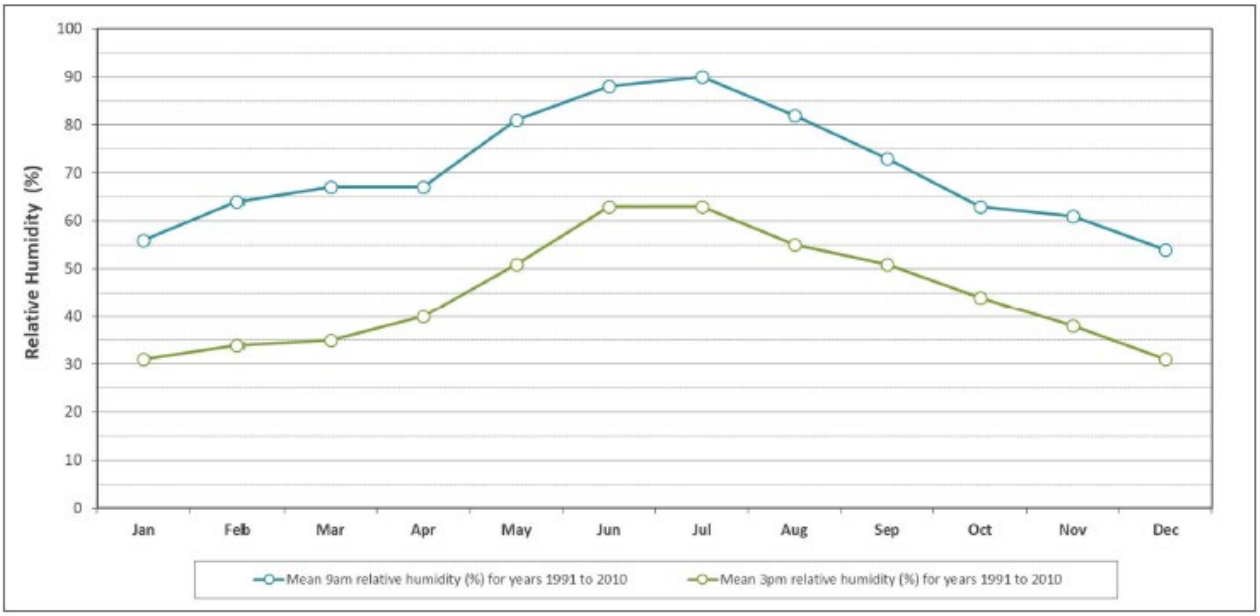


Figure 6-13 Humidity data for Young Airport between 2015 – 2019 (SLR 2021).

Annual and seasonal wind roses for Young Airport between 2015 and 2019 were assessed. Winds from the south-southwest are predominant throughout the year, with very few winds from the northeast (SLR 2021). The BoM (2021) recorded minimum mean wind runs of 172 km and maximum mean wind runs of 263 km at Young Airport between 2003 and 2020.

Local air quality

Air in the locale of the development site is generally expected to be of a good quality and typical of that found in a rural NSW setting.

Sources of air pollution within the area of the development site include:

- Vehicle emissions and dust generation.
- Agricultural activities including sowing, lime application, burning of paddocks or earth moving.
- Existing quarry and landfill activities including crushing, blasting, carting, loading, etc.

A search of the National Pollutant Inventory (Australian Government 2021) identified two substance emissions facilities located within the Harden LGA (which is now amalgamated with the Hilltops Council LGA):

- Graymont Galong Mine, Galong.
- Windridge facility 1780, Young.

Yass Valley, Gundagai and Cootamundra LGA are close to the development site which would reduce the local air quality with areas of condensed development. Graymont Galong Mine in Galong is the closest facility to the

site, approximately 33 km north east. The distance between the registered facilities to the development site provides no risk of cumulative effects in the locale.

The existing environment is located within agricultural rural land, with odours generated from bio-solids, animal manure, compost and hay making.

Background concentrations

Background dust generation is likely to be highly influenced by climatic and seasonal conditions as well as random events such as dust storms and bushfires. Dust generation is likely to be higher towards the end of the summer months due to the drier conditions and the state of ground cover.

Dust monitoring has been previously conducted by BHQ at the existing quarry and landfill site to the immediate north of the development site. The only average monthly exceedance was noted at location L7 (Northwest of existing landfill) with a reading of 4.2 g/m^2/month, above the criteria of 4 g/m^2/month. The monthly minimum deposition rate of 1.1 g/m^2/month was considered suitable as an adopted background concentration in the area for the site (SLR 2021).

There is no PM_{10} (Particulate matter with a <10µm diameter), $PM_{2.5}$ (Particulate matter with a <2.5µm diameter), RCS (Respirable Crystalline Silica) or TSP (Total Suspended Particulate) monitoring conducted at the development site or the existing quarry and landfill. The adopted background concentrations and reasoning for each of these parameters from the SLR assessment (SLR 2021) is as follows:

- Annual PM_{10} – **21µg/m^3**: derived from 1-hour monitoring in 2017 at Wagga Wagga North Air Quality Monitoring Station (AQMS).
- Annual $PM_{2.5}$ – **8.1µg/m^3**: derived from 1-hour monitoring in 2017 at Wagga Wagga North AQMS.
- TSP – **41µg/m^3**: assumed to be twice the amount of PM_{10} described above.
- RCS – **0.3µg/m^3**: assumed to be the amount of $PM_{2.5}$ described above multiplied by a factor of 0.03.

Climate Change

Climate change refers to the warming temperatures and altered climatic conditions associated with the increased concentration of GHGs in the atmosphere. GHG's include carbon dioxide, methane and water vapour. Climate change projections for Australia include more frequent and hotter hot days and fewer frost days, rainfall decline in southern Australia and more extreme weather events including intense rainfall, more severe drought and harsher fires (CSIRO 2015).

6.5.1. Potential impacts

Climate can act to influence the impacts of construction and rehabilitation on the environment. For example, hot, dry or windy conditions can exacerbate adverse air quality impacts, while prolonged rainfall can increase soil compaction impacts (Dean and Green 2017). For these reasons, the specific climatic conditions of the site are considered in the assessment of impacts.

Construction

The proposed quarry would be an extension of the existing BHQ. The proposed quarry activities would increase as the existing BHQ activities decrease. As such, no new impacts on air quality, different to that already experienced by nearby receptors, is expected as part of the proposed works. Dust generation would accompany clearing, excavation, and other earthworks as well as the movement of trucks and work vehicles along the unsealed access road during construction of the quarry and upgrade of the haul road intersection. Dust and emissions can be a nuisance, interfere with visibility when driving or lead to adverse health impacts when exposure is severe or prolonged (Dean and Green 2017).

There were several activities identified in the AQIA (SLR 2021) that might contribute to dust generation during construction of the development. There is also a risk that unsealed access tracks may create dust during windy

conditions. However, the access tracks would be regularly maintained, sealed where necessary and dust suppression applied when required. Dust creation is expected to be limited to short-term unsealed roads and unsealed roads within the development site. As such, a noticeable increase in dust creation is considered unlikely. Table 6-20shows the predicted dust generation from vehicles and plant during construction.

Table 6-20 Predicted dust generation during construction of the Proposal

	Emission Rate (kg/hr)		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Wheel Generated Dust			
Light vehicles on all haul routes	1.07	0.38	0.11
Grader on all haul roads	0.71	0.25	0.07
Loader(s) to fixed crusher	0.17	0.08	0.02
Wind Erosion			
Loader(s) for removal of overburden and stockpiling	0.08	0.04	0.01

Five rural dwellings (refer to Figure 6-17) are located within 3 km of the development site. There is sufficient distance between these dwellings and the development site, which would reduce the potential impacts. Existing mature vegetation occurs between residences and the development site, which acts as a natural buffer for airborne particulates. The elevation of the site in the landscape would also reduce air quality impacts at sensitive receivers.

The existing odours of the site would override any odours generated from the Proposal.

Operation

Several pollutants, such as nitrogen oxides, sulphur dioxide, carbon monoxide and Volatile Organic Compounds (VOCs), are released during the operation of onsite quarry plant and equipment. Pollutants released from the combustion of fuels are unlikely to compromise air quality goals at the nearby site receptors given the scale and nature of the Proposal (SLR 2021). The emissions for the currently active pit at North Ridge were also included. The operational capacity of the Mt Bundarbo quarry would increase as the existing North Ridge capacity decreases. Therefore, no impacts on air quality, other than that already experienced by nearby receptors, is expected as part of the proposed works.

Similar to the construction phase, during operation the existing odours of the site would override any odours generated from the Proposal.

Dust generation would accompany movement of trucks and work vehicles along the unsealed access road during construction and operation of the quarry. Dust and emissions can be a nuisance, interfere with visibility when driving or lead to adverse health impacts when exposure is severe or prolonged (Dean and Green 2017). Periodic blasting is expected to have an impact on air quality and is expected to take place between two to five times each year, dependent on quarry progression. Blasting creates a large short-term release of dust and rock emission as well as a by-product emission from the explosive chemical used.

Five rural dwellings are located within 3 km of the development site and would be subject to consideration of adverse air quality impacts. The large distances between these dwellings and the Proposal would help mitigate

potential impacts. Existing mature vegetation occurs between residences and the development site acting as a natural buffer for airborne particulates. The elevation of the site in the landscape would also spread air quality impacts and reduce severity. Long-term dust deposition rates on nearby areas to the site were modelled to be below the adopted NSW EA criterion, except for some 24-hour modelled properties. Given the conservative nature adopted for modelling purposes, air quality impacts are likely to be minimal in response to the development. Air quality impacts are not considered to present a constraint on the proposed development (SLR 2021).

Odours generated from the construction and operation of the Proposal would be minimal and limited to minor diesel emissions and earthy dust generation odours during wind events.

Operational impacts on local, regional, and global generation of GHG emissions are considered likely. GHG would be generated from the Proposal operation activities such as:

- Emissions associated with operations, such as electricity and fuel utilisation, transportation of materials to processing batch facilities and sales
- Emissions from consumption of explosives
- Emissions from chemicals processed during mining operations
- Emissions embodied in reagents
- Emissions from solid and liquid wastes
- Carbon uptake from land-use change
- Vegetation clearing

GHG emission sources listed in the Australian Government are included in Table 6-21.

Table 6-21 Sources of Greenhouse Gas Emissions

Gas	Main Source
Carbon Dioxide (CO_2)	Coal, oil, natural gas.
Methane (CH_4)	Coal mine fugitive gas, landfill.
Nitrous Oxide (N_2O)	Manure, fertiliser.
Hydrofluorocarbons (HFCs)	Synthetic gases used in refrigeration and air-conditioning.
Perfluorocarbons (PFCs)	By-products of aluminium refining.
Sulfur hexafluoride (SF_6)	Synthetic gas used in high voltage equipment.

According to NSW Department of Planning, Industry and Environment (DPIE), transport accounts for the second largest GHG emissions in NSW, equating at 22% followed by stationary energy at 51%. Transport (including operation of machinery) is likely to be the largest source of GHG emissions during operation from fuel combustion contributing to climate change; this includes minor additions to heavy vehicle movements along the extension of the haul road. Explosive events are likely to generate GHG emissions however would occur five to ten times per year. Land use change and vegetation clearing would also be a contributor to GHG emissions. However, the landscape would be revegetated during the rehabilitation phase of the project. All these minor additions to GHG emissions can be reduced with the mitigation measures outlined in Table 6-22.

The existing quarry processing facility can only be operated at one time, therefore no additional GHG emissions would be generated from this Proposal.

6.5.2. Safeguards and mitigation measures

Air quality impacts would be addressed via the mitigation strategies in Table 6-22.

Table 6-22 Safeguards and mitigation measures for climate and air quality impacts

No.	Safeguards and mitigation measures	C	O	R
AQ1	General transport controls include: • All loads leaving the site will be covered with a vehicle fitted tarpaulin system. • A speed limit of 40km/hr will be adopted on all unsealed roads across the site. • Water cart spraying will be utilised on all unsealed roads at a rate of >2L/m^2/hr where practical. • Wheel washing bay will be considered at the meeting point of sealed and unsealed roads.	**C**	**O**	
AQ2	Dust suppression controls at crusher, screening and dumping areas include: • Periodical water spraying. • Minimising dust generating activities during periods of excessive wind. • Reduction of rate of activity in response to excessive dust generation.		**O**	
AQ3	Dust suppression controls for quarry activities including blasting, drilling, stripping of overburden and on-site dumping to include: • Periodical water spraying. • Minimising dust generating activities during periods of excessive wind. • Reduction of rate of activity in response to excessive dust generation. • Locating and relocating high impact activities to less sensitive on-site areas where possible.		**O**	
AQ4	Stockpiles and exposed areas of soil and rock will be contained through wetting or covering with an appropriate seal if left for periods of time.	**C**	**O**	
AQ5	Monitor local weather conditions and manage the site if any conditions will exacerbate air quality (e.g. wind).	**C**	**O**	
AQ6	Fires and material burning are prohibited on the development site.	**C**	**O**	
AQ7	The single transportation route to the development site will be utilised to maximise use of sealed roads.	**C**	**O**	
AQ8	Vegetation skirting the site to be retained. Exposed areas that are not part of active operational areas will be revegetated as soon as practically possible.	**C**	**O**	
AQ9	Using technologies to optimise blast patterns for consistent energy distribution and reducing the explosive overconsumption.	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
AQ10	All pumps and machinery are to use appropriately sized and high energy efficient motors to reduce the carbon footprint.	**C**	**O**	**R**
AQ11	Time switches and sensor lights are to be used across the Development site to maximise energy efficiency to reduce the carbon footprint.	**C**	**O**	**R**
AQ12	Variable speed drivers (VSD) are to be used on electric motors to maximise energy efficiency to reduce the carbon footprint.	**C**	**O**	**R**
AQ13	Fuel economy and energy consumption of vehicles are to be considered before purchasing new vehicles and machinery; regular servicing is to be undertaken.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.6. VISUAL AMENITY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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.

DEPARTMENT OF PRIMARY INDUSTRY

Visual amenity achieved

- *Amenity impacts are assessed and any necessary response to mitigate visual impacts is described and illustrated.*

6.6.1. Approach

The Visual impact assessment (VIA) was completed by NGH in the following stages:

1. Background investigations and mapping, including identifying Land Character Units (LCUs), defining where infrastructure may be visible in the landscape, and identifying key viewpoints such as major travel routes, residences and built-up areas.
2. Field survey including reconnaissance, ground truthing and photography, and understanding the likely sensitivity of LCUs within the landscape.
3. Consultation, including understanding community values and documenting community perception.
4. Impact assessment, describing the potential impact on visual amenity during construction and operation of the Proposal.
5. Visual impact mitigation measures were developed in consultation with near neighbours including significant vegetation buffers and screening for people who would have a view of the residence.

The impact assessment methodology used in this VIA for operational impacts is based on the Bureau of Land Management (BLM) Visual Resource Management System, developed by the BLM, US Department of the Interior (n.d.). The BLM developed a systematic process to analyse the visual impact of proposed developments. The basic philosophy states that the degree to which a development affects the visual landscape depends on the visual contrast imposed by the project. Key steps undertaken to assess the visual impact are as follows:

- Define Landscape Management Zones (LMZ) for the representative viewpoints, based on:
  - The scenic quality of the Proposal area's LCU.
  - The expected sensitivity at representative viewpoints.
  - The proximity of each representative viewpoint.
- Evaluate the degree of contrast the quarry would generate at representative viewpoints in consideration of the management objectives of the relevant LMZ.
- Determine the acceptability of the contrast with the management objectives of the relevant LMZ; this is the resultant visual impact, rated as high, medium or low.

Mt Bundarbo, shown in Figure 6-15, sits higher in the undulating landscape at 560 m than the surrounding area with the crest of the hill clearly visible from all directions, particularly from the southwest, which loses altitude rapidly towards the Murrumbidgee River. Mt Bundarbo is also clearly visible from the southeast but would be screened partially by ridge lines which run directly south and east. Mt Bundarbo occurs as the highest crest of a saddle formation with the existing North Ridge Quarry (480 m), which screens views of the development site directly to the north.

For the purpose of this VIA, visual elements of the Proposal include the quarry face which would occupy the crest and southern side of Mt Bundarbo and the extended haulage road which would connect Mt Bundarbo to the North Ridge Quarry. Moving heavy vehicles are also assessed in this VIA.



Figure 6-14 The landscape surrounding the existing North Ridge Quarry

Community values

Community consultation specific to the assessment of visual impacts for the Proposal was conducted for near neighbours within a 3 km radius of the development site. During October 2020, adjoining landholders were visited in person by BHQ including 3 uninvolved residences within a 2 km radius of the Proposal and a further 3 residences within 3 km. A further three uninvolved residences are located more than 4 km south of the development site. Aspects of the Proposal were discussed with the residents of each dwelling including visual impacts. Further details on consultation with adjoining residents are provided in section 5.3.

Landscape character

LCUs take into account topography, vegetation, land use, and other distinct landscape features. They are a way to summarise differences in the receiving environment that may affect the visual impact of the proposed quarry at different locations.

Four LCUs were identified within Jugiong and the surrounding areas:

- Rural (including agricultural lands).
- Residential (viewpoints near residences).
- Industrial (major roads, quarries, landfill, electrical and other built infrastructure).
- Commercial (businesses, town centre).

The scenic quality was rated in each LCU as follows:

- A high scenic quality rating describes areas with outstanding, unusual or diverse features.
- A moderate scenic quality rating applies to areas with the features and variety normally present in the character type.
- A low scenic quality rating is given to areas lacking features and variety.

The four LCUs identified are characterised in Table 6-23in terms of their scenic quality.

Table 6-23 Key features of LCUs within Jugiong and surrounds

Rural LCU
Rural and agricultural lands within the study area are used predominantly for grazing with some rotational cropping of grains, cereals and pulses in flatter lower lying parts of the landscape. The development site is positioned above the surrounding landscape at approximately 560 m, however several ridgelines limit visibility across the landscape. Expansive views within this LCU are generally limited given the undulating relief and screening provided by vegetation. Secondary sealed and unsealed roads including Cobbler Road, Benangaroo Road and several unnamed access tracks are the main vantage points from which to view agricultural areas. From the road corridors, agricultural land can be viewed openly. Substantial remnant native vegetation screens views of agricultural land from roadways. In addition to sections of road, livestock fences are visible that reinforce rectilinear shapes and are common in rural landscapes. Surrounding blocks are made up of primary production land uses, with residences within this landscape being sparsely distributed but more concentrated towards the Jugiong townsite to the northwest. Residences are commonly associated with some additional vegetation plantings. Other infrastructure includes agricultural sheds, grain silos and water tanks. **Scenic quality is considered moderate. Built elements are production-related and include linear fences, powerlines, roads, agricultural buildings and rural homes. Forms are typically uniform, of undulating elevation and linear. This LCU is common and the dominant LCU in the study area. The proposed quarry is located within this LCU.**
Residential LCU
Residential areas of Jugiong and surrounds include viewpoints from the road near residents' homes. Much like the Rural LCU, the area is relatively flat to undulating with expansive views generally limited given the undulating relief and screening provided by vegetation. Views of the Proposal from the area of concentrated residential dwellings located towards Jugiong are obscured by distance, though Mt Bundarbo would be clearly visible from certain vantage points Residents are broadly and unevenly distributed over the landscape, with properties commonly associated with additional vegetation planting and screening. Two residences, R1 and R2, are located within 2 km of the Proposal with clear views of the Proposal due to its elevated position. A further three residents, R3, R4 and R5, are located within 3 km of the Proposal. R7, R8 and R9 are located more than 4 km south of the development site. Again, due to the elevated position of the development site, views are considered likely at vantage points with a clear line of site, free from trees and build infrastructure. **Scenic quality is considered moderate. Views vary in colour and form, and the proportion of large lot agriculture and smaller lot residential vary between residences, normal in this character type. Built elements include linear fences, powerlines, roads, farm dams, agricultural buildings and rural homes. This LCU is common in the study area.**

Industrial LCU
Industrial areas within the study area include the Hume Highway and the Bald Hill Landfill/North Ridge Quarry haulage road which represent the only sealed roads within 3 km of the development site. Key features in the Industrial LCU include the existing Bald Hill Landfill, North Ridge Quarry and the regular movement of heavy haulage vehicles. A large waterworks facility is also located directly west of the Jugiong townsite on the Murrumbidgee River. **Scenic quality is considered low, with features matching the land use. Substantial screening is present in the form of vegetation across grazed paddocks and along creek lines, however, key industrial features are located at elevated positions in the landscape. This LCU is common in the study area, with the development site located approximately 3.5 km south of Hume Highway.**
Commercial LCU
Commercial lands within the study area include primarily the Jugiong central business district, made up of one church, a pub, a service station and tourist attractions like the Long Track Pantry etc. The development site is located at an elevated position which declines to approximately 260m above sea level to the Jugiong townsite, without any ridge lines between them. As such Mt Bundarbo is visible from Jugiong despite being located approximately 7.5 km away, therefore Jugiong townsite in included in the VIA. **Views of the Proposal from Jugiong are distant and partially screened with mature native vegetation and built structures breaking up or blocking views of the Proposal from most locations within the Jugiong townsite.**

Representative viewpoints

The BLM methodology requires identification of representative viewpoints in the study area. These may be travel routes such as roads, waterways and recreational tracks, residential areas, tourist facilities, houses and farmland.

Ten representative viewpoints were identified using the BLM methodology and within the Zone of Visual Influence (ZVI) and are mapped in Figure 6-16.

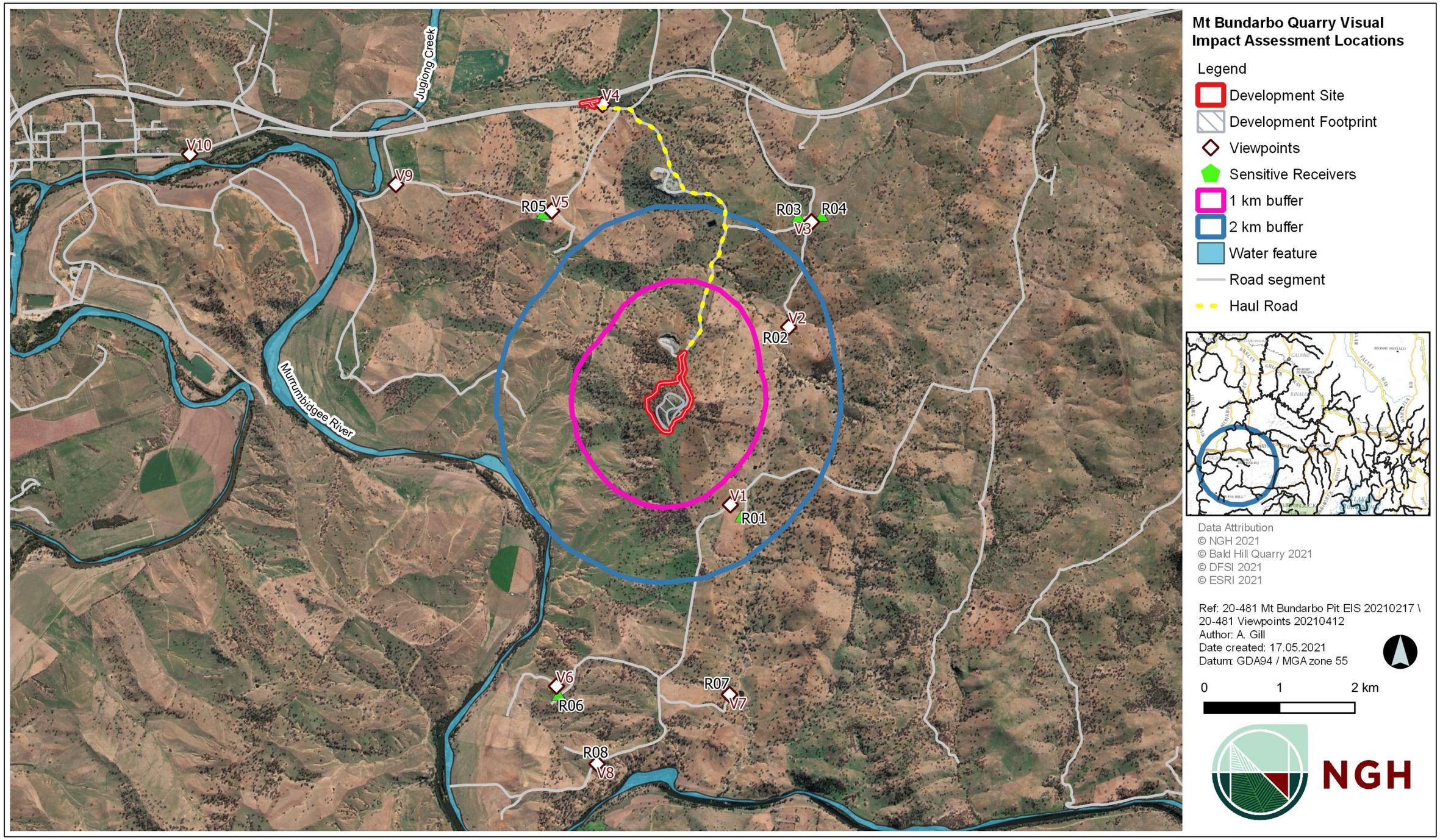


Figure 6-15 Visual impact assessment locations

Visual sensitivity

The predicted sensitivity of each viewpoint can be determined considering its proximity to the development site and factors such as use, scenic quality and regional significance.

Criteria for proximity are as follows:

- Foreground 0 – 1 km.
- Middle ground 1 – 2 km.
- Background More than 2 km.

Criteria for scenic quality are as follows:

- High sensitivity:
  - high use routes or areas.
  - routes or areas of national or state significance.
  - areas with high scenic quality.
- Moderate sensitivity:
  - moderate use routes or areas.
  - routes or areas of regional or local significance.
  - areas with moderate scenic quality.
- Low sensitivity:
  - low use routes or areas.
  - routes or areas of low local significance.
  - areas with low scenic quality.

Considering the sensitivity of local viewpoints, the following assessments were made:

- **Rural viewpoints** were assessed as generally having a moderate to low scenic quality given the surrounding agricultural activities. Rural views are located on moderate to low routes, or areas only accessed by local traffic. As motorists use local roads, views increase as vehicles approach the development site. View durations are generally short as vehicle speeds are up to 100 km/hr, and the expected number of local vehicles on these local roads is considered to be low to moderate. Regional and local significance is low, with scenic quality being moderate.
- **Residential viewpoints** were assessed as generally having a moderate to high sensitivity. If there is a view of the quarry, the view duration could be expected to be high from a residence.
- **Industrial viewpoints** were assessed as having low sensitivity and include Hume Highway, the Bald Hill Landfill, North Ridge Quarry and the Jugiong waterworks. Any views from the Hume Highway would be fleeting due to vehicle speed, hard to discern and fragmented by existing roadside vegetation. Built structure is more commonly functional than aesthetic in these settings.
- **Commercial viewpoints** from the Jugiong townsite were assessed as having moderate to low sensitivity given the functional nature of this land use and close proximity to high density development including busy local roads and powerlines.

The sensitivity of each viewpoint is provided in Table 6-24.

Table 6-24 Representative viewpoints and assessed proximity, scenic quality and sensitivity

ID	LCU	Distance to site	Scenic quality	Sensitivity
V1	Residential	Middle ground	Moderate	High

ID	LCU	Distance to site	Scenic quality	Sensitivity
V2	Residential	Middle ground	Moderate	High
V3	Residential	Background	Moderate	Moderate
V4	Industrial	Background	Low	Low
V5	Residential	Background	Moderate	Moderate
V6	Residential	Background	Moderate	Moderate
V7	Residential	Background	Moderate	Moderate
V8	Residential	Background	Moderate	Moderate
V9	Rural	Background	Moderate	Low
V10	Commercial	Background	Moderate	Moderate

Definition of landscape management zones

Visual LMZs were assigned to each representative viewpoint. The zones were derived by combining scenic quality (from the LCUs described in Table 6-24), viewer sensitivity and the distance to the proposed quarry. Combined they produce a three-tiered management hierarchy: A – C, as shown in Table 6-25.

Table 6-25 Visual Landscape Management Zone decision matrix

	Proximity / sensitivity							
Scenic quality		**Foreground High**	**Middle ground High**	**Background High**	**Foreground Moderate**	**Middle ground Moderate**	**Background Moderate**	**Foreground Low**
	High	A	A	A	A	B	B	B
	Moderate	A	B	B	B	B	C	C
	Low	B	B	B	B	C	C	C

Each zone has associated objectives to guide management of visual change and to help evaluate proposed project impacts. These are shown in Table 6-26.

Table 6-26 Visual Landscape Management Zone management objectives

Management priority	Management objectives
A	Maximise retention of existing visual amenity. Landscapes are least able to absorb change. Developments may lead to a major change.

Management priority	Management objectives
B	Maintain existing visual amenity, where possible. Protect dominant visual features. Developments may be allowed to be visually apparent.
C	Less importance for retaining existing visual amenity. Landscapes can absorb change. Developments may be allowed to dominate but should reflect existing forms and colours where possible.

The management priority for each viewpoint is shown in Table 6-27.

Table 6-27 Visual landscape management priorities for representative viewpoints

ID	Receivers represented by this viewpoint	LCU	Management priority
V1	R1/Benangaroo Road	Residential	B
V2	R2/Cobbler Road	Residential	B
V3	R3/R4/Cobbler Road	Residential	C
V4	Hume Highway	Industrial	C
V5	R5/Audley Road	Residential	C
V6	R6	Residential	C
V7	R7	Residential	C
V8	R8	Residential	C
V9	Audley Road	Rural	C
V10	Riverside Drive	Commercial	C

6.6.2. Potential impacts

A VIA for the operational quarry has been conducted considering:

- The specific elements of the Proposal including the quarry face, haulage road and upgrade of the haul road intersection.
- The potential for the quarry to be viewed from representative viewpoints.
- The degree of contrast the proposed quarry would have within the identified LMZ. LMZs were assigned to viewpoints based on the results of the field work, and the contrast at that viewpoint was evaluated, as described below.
- The potential impact from dust.

Evaluation criteria

The ratings for the degree of contrast created by the quarry at each viewpoint have the following definitions (U.S. Department of the Interior, n.d.):

- High contrast: the Proposal would be dominant within the landscape and generally not overlooked by the observer; the visual change would not be absorbed.
- Medium contrast: the proposed activity would be moderately dominant and noticed; the visual change would be partially absorbed.
- Low contrast: the proposed activity would be seen but would not attract attention; the visual change would be well absorbed.
- Indistinct: contrast would not be seen or would not attract attention; the visual change would be imperceptible.

To determine if the objectives for the VLM zone are met, the contrast rating for the viewpoint is compared with the relevant management objectives to give a visual impact level. The visual impact level is consequently defined as:

- High impact: contrast is greater than what is acceptable.
- Medium impact: contrast is acceptable.
- Low impact: visual contrast is little or not perceived and is acceptable.

For high impact viewpoints, mitigation must be considered. Mitigation for moderately impacted receivers is considered on a case by case basis, generally in consultation with the affected individuals. No mitigation is warranted for low impacts.

Evaluation results

Table 6-28 evaluates the expected level of visual impact from eight representative viewpoints, representing six residences and public viewpoints surrounding the development site. The furthest of these (V10) represents the Jugiong townsite on Riverside Drive near the cemetery, approximately 7.5 km northwest of the Proposal. The nearest is V1 on Benangaroo Road located approximately 1.3 km southwest of the development site and approximately 250 m closer to the development site than R1. The private views shown have only been provided where residents of these premises have consented to these views being shown in this EIS.

Visual amenity impacts caused by the upgrade of the haul road intersection are considered negligible considering the proposed upgrades are only minor additions of road widening of an existing road intersection.

Table 6-28 Visual impacts at representative viewpoints and their associated receivers



VIEWPOINT 1 (R1/Benangaroo Road)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 1 is located approximately 1250 m southeast of the development site on Benangaroo Road and approximately 25 m northwest of R1. Mt Bundarbo is clearly visible from the road, but the undulating topography obscures partial views of the development site. The planned quarry operations would impact the crest and southern face of Mt Bundarbo facing this viewpoint. Mature trees between the Benangaroo Road and the development site also provide effective screening. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Middle ground	
Sensitivity	High	
LMZ objective	B	
Contrast	Moderate	
Inherent visual impact	LOW	
Residual visual impact	LOW	



VIEWPOINT 2 (R2/Cobbler Road)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 2, representing views from R2, is located approximately 1600 m northeast of the development site. It is currently a vacant property. Mt Bundarbo is clearly visible from this location with few obstacles
Scenic quality	Moderate	
Proximity	Middle ground	

Sensitivity	High	except for a few mature paddock trees between the residence and the development site. The planned quarry operations would impact the crest and southern face of Mt Bundarbo facing this viewpoint. The degree of contrast from the quarry operations would be noticeable, with a portion of Mt Bundarbo transformed from yellows and greens to a stark while/grey. The quarry, however, would not be the dominant feature of the background. Existing screening vegetation would absorb some of the contrast to the current rural landscape but additional screening closer to R2 would reduce the likely contract further. **As no one currently resides in R2, no mitigation is required.**
LMZ objective	B	
Contrast	Moderate	
Inherent visual impact	LOW	
Residual visual impact	LOW	



VIEWPOINT 3 (R3/R4 Cobbler Road)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 3 is located between R3 and R4 on Cobbler Road approximately 2.4 km northeast of the development site. From this location, Mt Bundarbo isn't visible but due to the undulating landscape may be partly visible from parts of R3 and R4 properties. However, the north western face of Mt Bundarbo would not be utilised for the quarry and therefore would retain its existing features. A limited portion of the haulage road may be visible from either or both of these receivers but would not be intrusive considering the 2.4 km distance and screening by mature trees. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Indiscernible	
Inherent visual impact	INDISCERNIBLE	
Residual visual impact	INDISCERNIBLE	



VIEWPOINT 4 (Hume Highway)		
Summary of viewpoint		Viewpoint description / impact
LCU	Industrial	Viewpoint 4 is located on Hume Highway facing south towards the development site. Due to the undulating topography of the area, Mt Bundarbo is only visible form Hume Highway intermittently. Additionally, the quarry face would be located on the crest and southern side of the hill and would be indiscernible from the north side of the development site. **No mitigation is required.**
Scenic quality	Low	
Proximity	Background	
Sensitivity	Low	
LMZ objective	C	
Contrast	Moderate	
Inherent visual impact	INDISCERNIBLE	
Residual visual impact	INDISCERNIBLE	



VIEWPOINT 5 (R5/Audley Road)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	
Scenic quality	Moderate	

Proximity	Background	Viewpoint 5 is located approximately 2.7 km north east of the development site. The view from the R5 residence has a direct line of site to Mt Bundarbo, however the proposed quarry area is located on the crest and south facing side of Mt Bundarbo presenting limited views of quarry operations from the north western side of the hill. Existing native vegetation on Mt Bundarbo would effectively screen the haulage road from this viewpoint. **No mitigation is required.**
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Moderate	
Inherent visual impact	LOW	
Residual visual impact	LOW	



VIEWPOINT 6 (R6)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 6 is located approximately 3.7 km southwest of the development site. The view of Mt Bundarbo is limited from the R6 residence; however, a small portion of the proposed quarry face would be visible but partially obscured by the undulating landscape and the >3 km distance. The development site represents a very small portion of the background vista from this residence and would be hardly noticeable. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Low	
Inherent visual impact	INDISCERNIBLE	
Residual visual impact	INDISCERNIBLE	

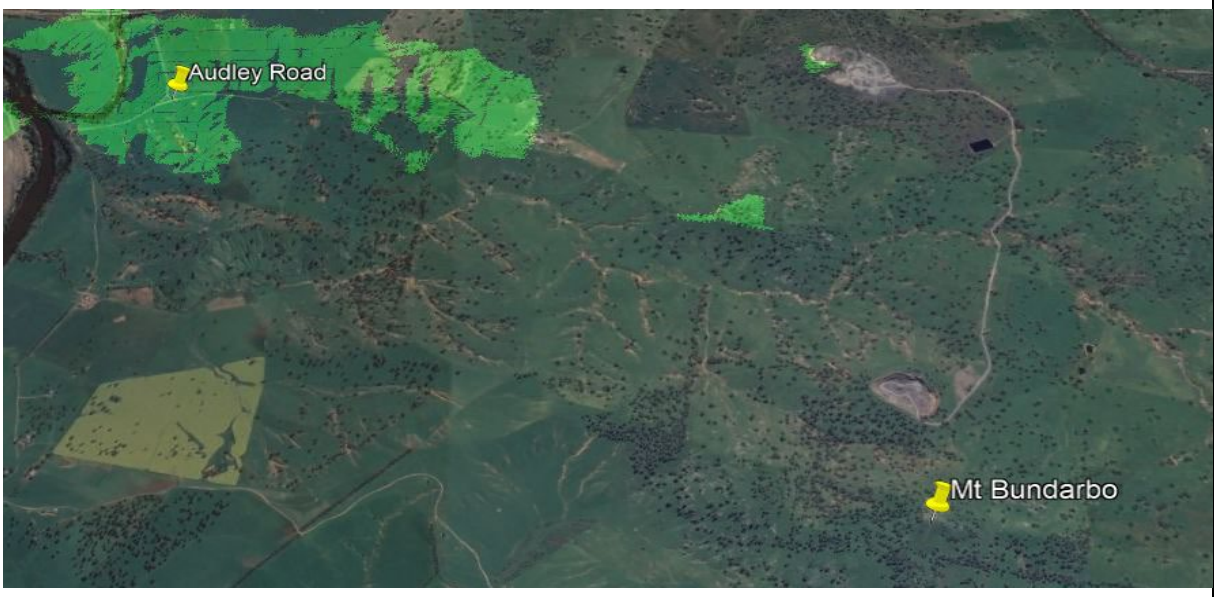


VIEWPOINT 7 (R7)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 7 is located approximately 3.6 km southeast of the development site. Mt Bundarbo is clearly visible from the R7 residence and the proposed quarry location would be noticeable due to the colour difference between the subsurface soil and existing vegetation. Due to the >3 km distance, however, the proposed quarry would not dominate the background vista and would be largely screened by mature trees between Mt Bundarbo and the R7 residence. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Low	
Inherent visual impact	LOW	
Residual visual impact	LOW	



VIEWPOINT 8 (R8)		
Summary of viewpoint		Viewpoint description / impact
LCU	Residential	Viewpoint 8 is representative of views from R8, which is located approximately 4.4 km south of the development site. Due to the topography of the landscape, several other hilltops lie between the development site and the R8 residence, though a small portion of Mt Bundarbo may be visible in the distance, indistinguishable from the other ridge lines. A partial view of the proposed quarry would appear as
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Low	
Inherent visual impact	INDISCERNIBLE	

Residual visual impact	INDISCERNIBLE	a tiny grey dot amongst the vegetated hilly background. **No mitigation required.**



VIEWPOINT 9 (Audley Road)		
Summary of viewpoint		Viewpoint description / impact
LCU	Rural	Viewpoint 9 is representative of public views at the Audley intersection 4.8 km northwest of the development site. Due to the topography of the landscape and distance to Mt Bundarbo, the proposed quarry would not be visible from this location. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Indiscernible	
Inherent visual impact	INDISCERNIBLE	
Residual visual impact	INDISCERNIBLE	



VIEWPOINT 10 (Riverside Drive)	
Summary of viewpoint	Viewpoint description / impact

LCU	Commercial	The elevated position of Mt Bundarbo, steady decline in altitude towards Jugiong and lack of ridgelines between the two indicate that the development site might be visible from town despite the distance of approximately 7.5 km. Viewpoint 10 represents public views from Riverside Drive on the southwestern edge of Jugiong, just in front of the public cemetery. Vegetation growing along Murrumbidgee River bordering the town to the south completely screens views of the ridge lines to the southeast including Mt Bundarbo from the low lying townsite. The development site is not visible from this location. **No mitigation is required.**
Scenic quality	Moderate	
Proximity	Background	
Sensitivity	Moderate	
LMZ objective	C	
Contrast	Indiscernible	
Inherent visual impact	INDISCERNIBLE	
Residual visual impact	INDISCERNIBLE	

6.6.3. Results Summary

Low impact to indiscernible views– no mitigation

All 10 viewpoints are assessed as having low visual impact from the proposed quarry. The development site is completely invisible from six of these locations. No mitigation is required for the Proposal.

However, benching on the western edges of the pit as it progresses, coupled with the soil bund located along the south-eastern boundary of the pit, add visual screening of the Proposal. The bund has dimensions 50 – 70 m long, three metres wide and three to four metres high. The bund would be vegetated, adding to the existing character of the landscape and increasing screening for sensitive receivers.

6.6.4. Potential cumulative impacts

Adverse cumulative impacts occur when the infrastructure or activities at the quarry site exacerbate the negative impacts of other infrastructure or activities occurring nearby. As the visual impact of the Proposal is so low, contributing only a very small portion of background views where the Proposal would be visible at all, it is unlikely that the Proposal would contribute to cumulative visual impacts for residences within 5 km of the development site. Views from all viewpoints would remain dominated by agricultural land use and remnant native woodland.

6.6.5. Safeguards and Mitigation Measures

Table 6-29 Safeguards and mitigation measures for visual impacts

No.	Safeguards and mitigation measures	C	O	R
VA1	Dust to be controlled in response to visual cues. Refer to section 6.5.	**C**	**O**	
VA2	Night lighting will be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component	**C**	**O**	**R**

No.	Safeguards and mitigation measures	C	O	R
	locations). Lighting to be directed away from roads and residents so as not to cause light spill that may be hazardous to drivers. • Comply with all relevant standards, codes of practice and policies. • Light spill is light that falls outside the area that is intended to be lit and can contribute to glare and waste energy. Spill light above the horizontal plane also contributes to artificial skyglow. All light fittings should be located, aimed or shielded to avoid spill. Measures to prevent spill include: o Installing light fittings with an opaque cover and flat glass, mounted horizontally on both axes. o Mounting lights under part of a building (including awnings, verandahs or roofs) so light is blocked above the horizontal plane. o Design buildings to internalise lights. • Wherever possible, light should be directed downwards. Mitigation measures include: o Installing direction fittings, such as floodlights or spotlights. o Use higher mounting heights that allow lower main beam angles that are closer to the vertical. o Lighting of all-night operations need to be downward facing of a peach colour and shielded. • Operational light from the Proposal must be directed downwards, or inwards towards the work area. • Light fittings that are specifically designed to minimise light shining near to or above the horizontal plane should be used. • Energy efficient globes include LEDs and high-pressure sodium. • Where floodlights are required, wherever possible use fittings with asymmetric beams that permit horizontal glazing. These are to be kept at or near parallel to the surface being lit, usually the ground and should prevent light spill. An asymmetric beam also allows the light fitting to be mounted on the edge of an area and avoids the need for fittings to be tilted upwards. Flat glass light fittings should be installed with the glass horizontal to make efficient use of the brightest part of the beam and to eliminate light spill.			
V3	Bunding along the eastern boundary of the pit will be maintained and revegetated to screen views from sensitive receivers and maintain landscape character.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.7. NOISE AND VIBRATION IMPACTS

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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;*

Blasting & 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 ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features;*

ENVIRONMENT PROTECTION AUTHORITY

Noise and vibration

- *Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.*
- *Specify the times of operation for all phases of the development and for all noise producing activities.*
- *For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.*

6.7.1. Policy Setting

Approach

The construction and operation of the quarry has the potential to affect the community due to noise and vibration. A quantitative noise assessment has been prepared for both the construction and operation of the quarry in accordance with the NSW EPA *Noise Policy for Industry* 2017 (NPI) and the NSW EPA *Interim Construction Noise Guideline* 2009 (ICNG). An operational noise impact assessment has been prepared in accordance with the *NSW Road Noise Policy.* The Transport for NSW (TfNSW) NSW Construction Noise Estimator Tool (CNET) (TfNSW, 2016) was used to quantify noise impacts from the construction and operation of the quarry.

The construction of the quarry includes the construction of the access road extension and the removal and storage of quarry overburden material. The road construction would include the removal of vegetation, topsoil and unsuitable natural soils. This would be followed by the placement and compaction of road pavement materials suitable for the movement of heavy vehicles. The removal of quarry overburden material would include excavating and placing vegetation and topsoil material adjacent to the quarry. A quantitative noise assessment has been completed for construction and the impacts discussed below.

The new quarry would not result in additional traffic movements. The current limitation on production is crushing volumes or tonnages and these would remain unchanged. Consequently, the volume of quarried material leaving the site would remain unchanged. Equally the number of vehicles leaving the site would largely remain unchanged from previous assessments. Consequently, changes to road traffic noise from

the new quarry are not expected. The new quarry would operate in a similar way to the existing quarry but in a new location. Noise would be generated from the winning, extraction, crushing and haulage of materials. These activities are quantitatively assessed, and the impacts discussed below.

The methodology implemented to assess the noise and vibration impact included:

- Identification of sensitive receivers and rating background noise levels (RBLs).
- Identification of the construction Noise Management Levels (NMLs).
- Identification of the operational Project Noise Trigger Levels (PNTLs)
- Identification of blasting overpressure and ground vibration levels
- Identification of the noise and vibration impacts from construction and operation.
- Identification of feasible and reasonable additional mitigation and monitoring measures.

The assessment also considered the impacts of blasting during operations from ground vibration and overpressure. The blasting impact assessment relied on:

- Australian and New Zealand Environment Council — Technical Basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC 1990).
- Australian Standard 2187.2 Explosives – Storage, transport and use Part 2: Use of explosives.
- Australian and New Zealand Environment Council Technical Basis for Guidelines to Minimise Annoyance Due to the Blasting Overpressure and Ground Vibration (1990).

All sensitive receivers likely to be impacted by the development must be identified and included in the assessment. The output of the assessment can be found in the sections below and Appendix H.

Construction Noise

The ICNG provides a framework for assessing and managing the impacts from construction noise. The ICNG recommends that construction noise should be no more than 10 dB(A) above the RBL during standard working hours and no more than 5dB(A) above the RBL outside standard working hours when measured at sensitive receivers. Where sensitive receivers experience noise levels greater than 75dB(A) when measured at the receiver they are deemed to be highly noise affected. Based on the adopted RBLs for the study area and the ICNG, construction Noise Management Levels (NML) at sensitive receivers have been calculated (Table 6-30).

Table 6-30 NMLs for the quarry construction

Time of day	RBLs dB(A)	NML = RBL + allowance	NML dB(A)
Standard Working Hours (Monday - Friday 7am - 6pm, Saturday 8 am to 6 pm, Sunday & public holidays no audible works.	40	= RBL + 10	50
Outside standard working hours **(evening/night)**	35/30	= RBL + 5	40/35
Highly noise affected	N/A	N/A	75

The impact of calculated construction noise at the sensitive receivers will be compared to the NML above to determine the impact of construction noise.

Operational Noise

The NPI allows noise impacts from the operation of an industrial development to be evaluated and managed consistently and transparently. The NPI specifies noise criteria to protect the community from excessive noise. The NPI guides the calculation of project noise trigger levels (PNTLs). Those trigger levels rely on the calculation of:

- Project Intrusive noise trigger levels (PINTLs).
- Project Amenity noise trigger level (PANTL).

The equivalent continuous (energy-average) A-weighted level of noise (LAeq descriptor) is used for measuring and describing intrusive noise levels and amenity noise levels. The NPI describes the process for determining the project intrusive noise levels (PINTLs) for an industrial noise source. Generally, the operational intrusiveness noise level is acceptable if the LAeq descriptor, measured over a 15-minute period, does not exceed the Rating Background Level (RBL) by more than 5dB(A). The PINLs are calculated by adding 5dB(A) to the RBL for each time period (Table 6-31).

Table 6-31 Project Intrusive noise levels (PINTLs) for the proposed quarry

Time of day	RBL dB(A)	PINTL = RBL + allowance	PINTL dB(A)
Day (Monday - Friday 7am - 6pm, Saturday to Sunday & public holidays 8 am to 6pm)	40	= RBL + 5	45
Evening (6pm to 10pm)	35	= RBL + 5	40
Night (Monday - Friday 10pm - 7am, Saturday to Sunday & public holidays 10pm to 8am)	30	= RBL + 5	35

The NPI describes a process for determining the project amenity noise trigger levels (PANTLs). This aims to limit continuing increases in noise levels from industrial development. The recommended amenity noise levels aim to protect against noise impacts such as speech interference, community annoyance and sleep disturbance. The PANTL represents the objective for noise from a single industrial development at a receiver. Industrial noise during operation should not normally exceed the acceptable noise levels for rural residential properties (Table 6-32). The NPI calculates the PANTLs for industrial developments as the recommended amenity noise level minus 5 dB (A) (Table 6-27).

Table 6-32 Project amenity noise trigger levels (PANTLs) for the proposed quarry

Receiver Type	Noise amenity area	Time of day	Noise Level dB (A) L_{Aq}	
			Recommended amenity noise level	Project amenity noise levels
Residence	Rural	Day	50	45
		Evening	45	40
		Night	40	35

The PINTLs are lower than the PANTLs and as such represent a more conservative trigger. Accordingly, the PINTLs are adopted as the PNTLs for the assessment of noise impacts associated with the operation of the quarry (Table 6-33).

Table 6-33 Project noise trigger levels (PNTLs) for the quarry operation

Time of day	PNTL dB(A)
Day (Monday - Friday 7am - 6pm, Saturday to Sunday & public holidays 8 am to 6pm)	45
Evening (6pm to 10pm)	40
Night (Monday - Friday 10pm - 7am, Saturday to Sunday & public holidays 10pm to 8am)	35

Blasting Noise and Vibration

The Australian and New Zealand Environment Council: Technical Basis for Guidelines to Minimise Annoyance Due to the Blasting Overpressure and Ground Vibration (1990) describes a range of criteria that can be used to reduce annoyance associated with blasting. The guideline lists four key criteria:

- Airblast overpressure level.
- Ground vibration peak particle velocity.
- Time of blasting.
- Frequency of blasting.

The guideline recommends the maximum level for airblast overpressure when measured at a sensitive receiver is 115dBL (Linear Peak). This level can be exceeded 5% of the time over a twelve-month period but should not exceed 120 dBL at any time. These criteria were adopted and should be monitored at the closest residence.

The guideline also recommends that a maximum vibration level of 5 mm/s for peak particle velocity (PPV) be adopted to reduce annoyance. This level can be exceeded 5% of the time over a twelve-month period but should not exceed 10 mm/s PPV. These criteria were also adopted and should be monitored at the closest residence.

Annoyance levels due to vibration are much lower than the vibration levels recommended for minimising damage to structures and buildings. The Australian Standard 2187.2 Explosives – Storage, transport and use Part 2: Use of explosives refers to the British Standard BS 7385-2 for a range of vibration limits to avoid structural damage. Table 6-34 provides the recommended limits for cosmetic damage.

Table 6-34 Vibration Limits for cosmetic damage

Type of building	Peak component particle velocity in the frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structure. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

6.7.2. Existing Environment

Noise sources from land use adjacent to the Development site would generally consist of livestock grazing, cultivation, harvesting of fodder and road traffic from the Hume Highway. Noise generating equipment would include livestock, tractors, quad bikes, light vehicles and heavy vehicles. These land uses characterise the background noise within the area. Noise levels from farm activities would likely be concentrated at peak times within given seasons. Hume Highway road traffic noise is generated from the 10,000 plus vehicles per day including 40% heavy vehicles (NSW Live Traffic - Coolac). Blasting already takes place at the existing quarry four times per year. The proposed quarry would blast five to ten times a year.

Background Noise Levels

Background noise monitoring was not conducted for the Proposal. The land zone around the study area is RU1 Primary Production under the Harden LEP 2011. As noted above, noise sources would be generally limited to seasonal farming activities and local road traffic. The NPI describes typical background noise levels for land use in Table 2.3 of the NPI. Land Zoned RU1 has a daytime RBL of <40 dB(A), an evening RBL of <35 dB(A) and a night RBL of <30 dB(A). Given the influence of road traffic noise from the Hume Highway, an RBL of 40 dB (A) for daytime and 35 dB (A) for evening and 30 dB (A) for night periods was adopted for the noise assessment.

Sensitive Receivers

Five sensitive receivers (rural residences) are located within 3 km of the proposed quarry boundary (Figure 6-17). The nearest receiver is a farmstead located about 1450 m north-east of the quarry boundary. All five receivers have been included in this assessment.

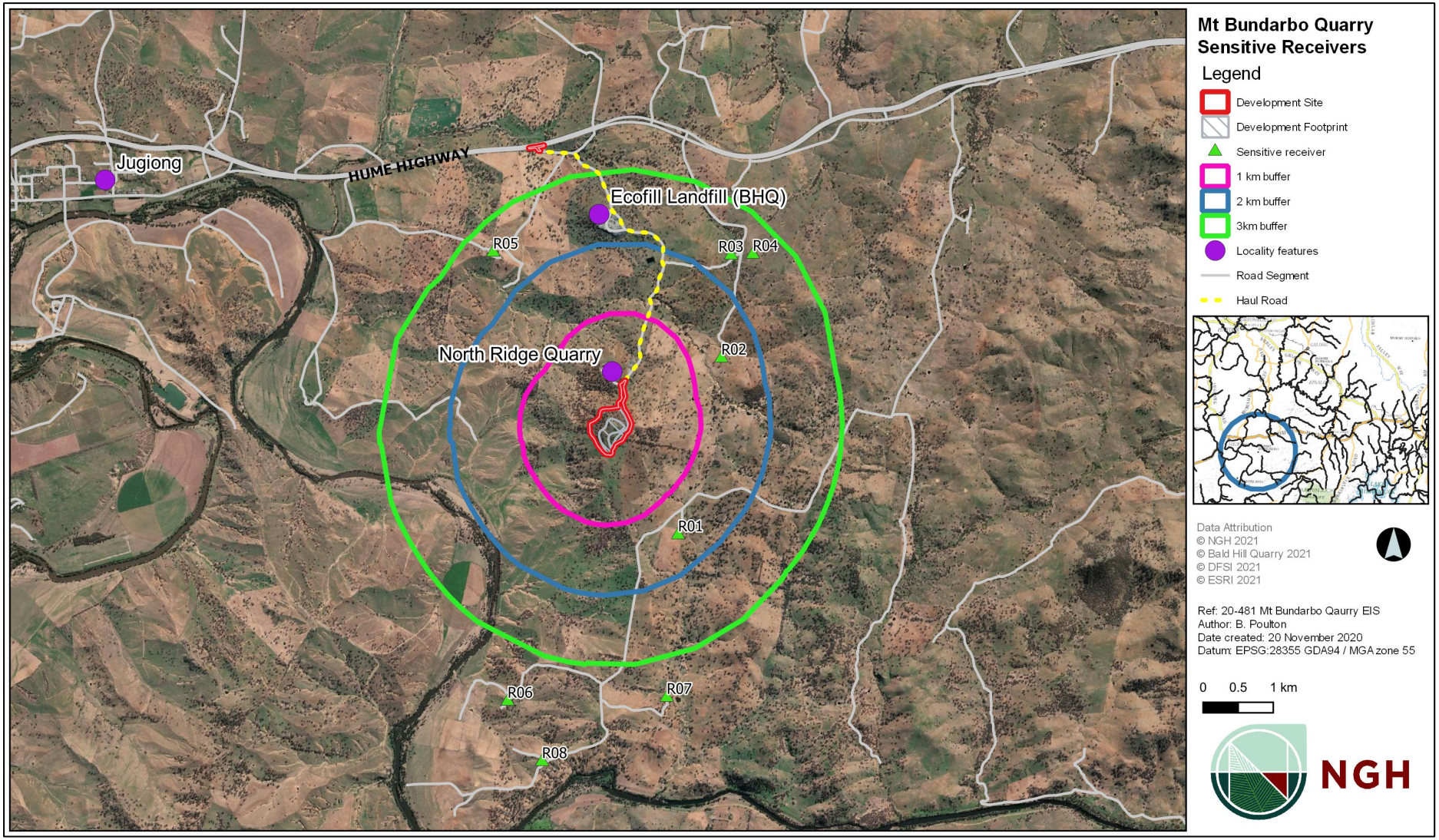


Figure 6-16 Sensitive receivers within 3 km of Mt Bundarbo Quarry

6.7.3. Construction Noise Assessment

Construction Noise Sources

Noise from the construction of the quarry would be generated by:

- Stripping of topsoil.
- Placement and compaction of road building materials.
- Stripping and placement of overburden.

The activities above use equipment with known sound power levels (Table 6-35) that can be used to calculate noise impacts.

Table 6-35 Construction equipment sound levels

Equipment	Sound power level (dB (A))	Sound pressure level (dB) at 7 m
Truck and dog trailer	106	81
Grader	110	85
Water cart	108	83
Roller	107	82
Dozer	116	91
Dump truck	108	

Construction Noise Assessment

The predicted construction noise for the work was calculated using the CNET. The construction noise predictions are based on noise attenuation with distance from the source. They do not consider weather conditions or any obstacles such as landforms between the source and the receiver, which may influence the level of noise perceived at the receiver.

Noise levels have been calculated for one construction scenario:

- Placement and compaction of access road materials.

The assessment predicts the 'worst case scenario' and assumes that all relevant plant and machinery are operating continuously and concurrently. It is expected that most equipment will be operating closest to the receivers when the road is being constructed. As such this represents a worst case scenario for construction noise.

Placement and compaction of access road materials.

The plant operating for the placement and compaction of road materials is provided in Table 6-36. The predicted noise levels for residences within 3 km is provided in Table 6-37.

Table 6-36 Equipment for access pavement construction

Equipment	No. of units	Sound pressure level (dB (A)) at 7 m
Truck and dog trailer	2	81
Grader	1	85
Water cart	1	83
Roller	1	82

Table 6-37 Predicted noise levels for receivers during access pavement construction

Receiver No.	Distance (m) from quarry	NML Day/Evening/Night	Predicted Noise Level dB(A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise effected	NMLs exceedance (dB(A))	Recommended additional mitigation measures
R01	1513	45/40/35	26	0	Nil
R02	1450	45/40/35	27	0	Nil
R03	2385	45/40/35	5	0	Nil
R04	2606	45/40/35	5	0	Nil
R05	2605	45/40/35	5	0	Nil

Based on the calculated noise levels for the construction of the road there would be no exceedances of the NMLs.

An estimation of noise was also made based on the combined impact of road construction, existing quarry operations and compaction of waste at the land fill. The plant used for the calculation included four trucks (>20t), two rollers, two graders, two water carts, one rock crusher, 1 compactor and two frontend loaders. All plant were assumed to be operating simultaneously. The noise levels calculated for the nearest receiver R02 (1450m) was predicted to be 35dB(A). Based on this calculation there would be no exceedance of the NMLs from the combined operation of the facility and construction noise for the new quarry.

Old Hume Highway Intersection Upgrade

A 40 m section of the Old Hume Highway intersection with the Hume Highway would require upgrading to enable a heavy vehicle to enter the site at the same time as a heavy vehicle exits the site. The footprint of works would be less than 800 m^2. The additional section of pavement is located on the eastern side of the Old Hume Highway intersection as vehicles exit the Hume Highway left onto the Old Hume Highway. Road upgrade activities would increase the width of this section of the Old Hume Highway intersection from approximately 10 m sealed pavement to an approximately 13 m sealed pavement, allowing for two heavy vehicles to pass concurrently.

The noise associated with the plant for the proposed upgrade works would be unlikely to exceed the existing traffic noise generated by the more than 10,000 vehicles that use the Hume Highway each day (Appendix G). The closest receiver to the works is over 600 m to the north, on the opposite side of the Hume Highway. The next closest receiver is located 1.5 km to the south-west of the proposed road works. The works are expected to take less than three weeks.

A quantitative noise assessment is unnecessary for this work due to the surrounding noise environment and the expected timing of works.

6.7.4. Operational Noise Impact Assessment

Blasting activities (excluding drilling and charging) are five to ten times a year during the following hours:

- Monday to Friday 9 am to 5 pm.
- Saturday 8am to 6pm.
- No blasting on Sundays or public holidays.

Operational Noise Sources

Noise from the operation of the quarry would be generated by:

- Onsite vehicle movement.
- Material Loading.
- Emergency repairs (e.g. changing a tyre, repairing faulty equipment).
- Operation of mobile crushing plant and stockpiling.
- Blasting.

The proposed activities above use readily available equipment. As such, typical sound power levels associated with that equipment are provided in Table 6-38 below.

Table 6-38 Operational equipment sound levels

Equipment	Sound power level dB (A)	Sound pressure level dB(A) at 7 m
Truck and dog trailer	106	81
Dump truck	108	83
Front end loader	113	88

Equipment	Sound power level dB (A)	Sound pressure level dB(A) at 7 m
Rock crusher	118	93
Excavator	110	85
Grader	110	85
Water cart	108	83

Operational Noise Assessment.

The predicted operational noise levels for the work were calculated using the CNET. The operational noise predictions are based on noise attenuation with distance from the source. They do not consider weather conditions or any obstacles such as landforms between the source, which can influence the level of noise perceived.

Noise levels have been calculated for two operational scenarios:

- Loading.
- Operation of mobile crushing plant and stockpiling.

The assessment predicts the 'worst case scenario' and assumes that all relevant plant and machinery are operating continuously and concurrently.

Scenario 1 – Loading.

The plant operating in Scenario 1 is provided in Table 6-39. The predicted noise levels under Scenario 1 for residences within 3 km is provided in Table 6-40.

Table 6-39 Operation equipment for scenario 1

Equipment	No.	Sound pressure level dB (A) at 7 m
Truck and dog trailer	1	81
Front end loader	1	88

Table 6-40 Predicted noise levels for receivers during scenario 1

Receiver No.	Distance (m) from quarry	NML Day/Evening/Night	Predicted Noise Level dB(A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise effected	NMLs Exceedance dB(A)	Recommended additional mitigation measures
R01	1513	45/40/35	25	0	Nil
R02	1450	45/40/35	26	0	Nil
R03	2385	45/40/35	4	0	Nil
R04	2606	45/40/35	4	0	Nil
R05	2605	45/40/35	4	0	Nil

It is predicted that no noise exceedance above the project NML would occur for the five receivers located within 3 km of the quarry (Table 6-40). Therefore, no additional mitigation measures are considered necessary.

Scenario 2 - Operation of mobile crushing plant and stockpiling.

The plant operating in scenario 2 is provided in Table 6-41. The predicted noise levels for residences within 3 km is provided in Table 6-42.

Table 6-41 Operation equipment for scenario 2

Equipment	No.	Sound pressure level dB (A) at 7 m
Rock crusher	1	93
Front end loader	1	88

Table 6-42 Predicted noise levels for receivers during scenario 2

Receiver No.	Distance from quarry (m)	NML Day/Evening/Night	Predicted Noise Level dB(A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise effected	NMLs Exceedance dB(A)	Recommended additional mitigation measures
R01	1513	45/40/35	31	0	Nil
R02	1450	45/40/35	31	0	Nil
R03	2385	45/40/35	9	0	Nil
R04	2606	45/40/35	9	0	Nil
R05	2605	45/40/35	9	0	Nil

It is predicted no noise exceedances above the project NML would occur for the five receivers located within 3 km of the quarry (Table 6-42). Therefore, no additional mitigation measures are considered necessary.

An assessment was also conducted for both scenario 1 and 2 to hypothetically occur simultaneously. The distance from the nearest receptor R02 was used for the calculation. The predicted noise level from the operation at R02 was calculation as 32 dB(A). This is 1 dB(A) above the highest predicted level for individual scenarios and well below the adopted noise criteria. This highlights the low level of noise impacts at receivers from the proposed quarry activities. The outputs from the noise calculator can be seen in Appendix H.

Blasting Noise and Vibration Assessment

The maximum blast charge from previous records at the existing quarry was used as a conservative estimate for modelling future blast activities at the Development site. The maximum instantaneous charge (MIC) modelled was found to be 106.9 kg.

Blast pressure can be calculated based on a number of factors including the size of the blast charge and the distance from the blast. The formula for calculating the blast overpressure is provided in AS2187.2 at section J7.2 and is described as:

$$P = K_a \left(\frac{R}{Q^{1/3}} \right)^a$$

P = pressure, in kilopascals, Q = explosives charge mass, in kilograms, R = distance from charge, in metres

Ka = site constant and a = site exponent.

The blast overpressure in kilopascals can then be converted into a sound level rating, expressed in decibels. This was done using the online calculator (http://www.sengpielaudio.com/calculator-soundlevel.htm). The following table (Table 6-43) describes the overpressure and sound level calculated at distance.

Table 6-43 Calculated overpressure and sound level from the blast

Receiver No.	Distance from Blast (m)	Overpressure (Pa)	Sound Level (dB(A))
R01	1513	2.29	101
R02	1450	2.43	102
R03	2385	1.18	95
R04	2606	1.04	94
R05	2605	1.04	94

Based on the calculations above, the sound level at all receivers would be less than the maximum limit of 115 dB(A) for blasting. With regards to the project NML, the noise level at all receivers would exceed the NML by about 60 dB(A) during the modelled blast event. Measures to mitigate this impact are listed in6.7.5.

Ground vibration may be estimated using the following equation provided in AS2187.2 at Section J7.3(1):

$$V = 1140\left(\frac{R}{Q^{1/2}}\right)^{-1.6}$$

V = ground vibration as vector peak particle velocity (PPV), in millimetres per second

R = distance between charge and point of measurement, in metres

Q = maximum instantaneous charge (effective charge mass per delay), in kilograms

Table 6-44provides the calculated levels of vibration at the five receiver locations as follows.

Table 6-44 Calculated vibration from the blast

Receiver No.	Distance from Blast (m)	PPV (mm/s)
R01	1513	0.39
R02	1450	0.42
R03	2385	0.19

Receiver No.	Distance from Blast (m)	PPV (mm/s)
R04	2606	0.16
R05	2605	0.16

Based on calculations above, the PPV level at all receivers would be less than the limit of 5mm/s PPV. Sensitive receivers and buildings are unlikely to be susceptible to damage or annoyance from blast vibration. Peak vector sum velocity was recorded during blasts at the existing quarry, which is expected to be similar to future blasts at the Development site. The maximum recording was 3.04 mm/s, all other readings were below 1.00 mm\s, similar to the calculations shown in Table 6-44.

6.7.5. Safeguards and Mitigation Measures

Table 6-45 Safeguards and mitigation measures for Noise and Vibration Impacts

No.	Mitigation Strategy	C	O	R
NV1	The Operational Environmental Management Plan (OEMP) will include a section on Noise and Vibration Management (NVM) to manage noise and vibration emission from the site. The NVM section will include the following, as necessary: • Notification procedures for the sensitive receivers identified in this report. • Complaints handling procedure and point of contact. • Noise monitoring program and implementation procedure. • Record of blasting dates, blast charges and locations. • Complaints registered (if not already included in the OEMP). • Map of on-site noise barriers/berms.	**C**	**O**	**R**
NV2	The blasting and extraction are restricted to the hours of construction. Audible work will be during standard working hours: • Monday to Friday 7 am to 6 pm. • Saturday 8 am to 6 pm. • No blasting work on Sundays and public holidays.	**C**	**O**	**R**
NV3	Avoid dropping extracted material from excessive height into carry vehicles.	**C**	**O**	**R**
NV4	Keep noise generating equipment well maintained and lubricated.	**C**	**O**	**R**
NV5	Plant and equipment to be operated in a quiet and efficient manner, including: • Turning off plant and equipment that is not being used.	**C**	**O**	**R**

No.	Mitigation Strategy	C	O	R
	• Ensuring plant is regularly maintained. • Repairing or replacing equipment that becomes noisy.			
NV6	All staff on-site to be informed, through toolbox meetings, training and education, of procedures to operate plant and equipment in a quiet and efficient manner.	**C**	**O**	**R**
NV7	Adjoining landowners to be notified of any blast 7 days prior to the blast event. Livestock to be relocated away from blasts as necessary.	**C**	**O**	**R**
NV8	Blasting activities (excluding drilling and charging) are five to ten times a year during the following hours: • Monday to Friday 9 am to 5 pm. • Saturday 8 am to 6 pm. • No blasting on Sundays or public holidays.	**C**	**O**	**R**
NV9	Noise and vibration monitoring and validation of the initial blast for the new quarry is to occur at the nearest sensitive receiver to confirm noise and vibration levels.	**C**	**O**	**R**
NV10	Blast monitoring will be in accordance with the monitoring requirements for blasting activities outlined in the Australian and New Zealand Environment Council Technical Basis for Guidelines to Minimise Annoyance Due to the Blasting Overpressure and Ground Vibration (1990).	**C**	**O**	**R**
NV11	The quarry operator is to keep a record of all complaints made in relation to noise arising from quarry operations. The record must include the following detail: • The date and time of the complaint. • The method by which the complaint was made. • Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect. • The nature of the complaint. • The action taken by the quarry operator in relation to the complaint, including any follow-up contact with the complainant. • If no action was taken by the licensee, the reasons why no action was taken.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.8. TOPOGRAPHY, GEOLOGY AND SOILS

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

General

- *Outline cleaner production actions, including soil contamination treatment and prevention systems.*
- *Outline construction works including:*

a) actions to address any existing soil contamination.

b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site).

c) construction timetable and staging; hours of construction; proposed construction methods.

d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures.

- *Include a site diagram showing the site layout and location of environmental controls.*
- *potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate);*
- *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*
- *soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils);*
- *A description of the condition of the local catchment e.g. erosion, soils, vegetation cover.*

ENVIRONMENT PROTECTION AUTHORITY

Soils and contamination –

- *Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.*
- *Provide any details that are needed to describe the existing situation in terms of soil types and properties and soil contamination.*
- *Identify any likely impacts resulting from the construction or operation of the Proposal, including the likelihood of:*

a) disturbing any existing contaminated soil;

b) contamination of soil by operation of the activity;

c) subsidence or instability;

d) soil erosion and sediment transport;

e) disturbing acid sulfate or potential acid sulfate soils.

- *Reference should be made to: Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011); Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).*
- *Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the Proposal including:*

a) erosion and sediment control measures;

b) Proposals for site remediation – see Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998);

c) Proposals for the management of these soils – see Acid Sulfate Soil Manual (Acid Sulfate Soil Advisory Committee 1998) and Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Advisory Committee 1998

6.8.1. Approach

A desktop survey was undertaken by NGH to evaluate soil characteristics of the development site and surrounding nearby landscape. eSPADE profiles from nearby areas were investigated, however, the closest profiles were approximately 3 km away and around 50 m lower in the landscape. The Soil landscapes of Central and Eastern NSW (NSW Government 2020) mapping was used to characterise the landscape, soil and likely limitations exhibited at the subject site.

6.8.2. Existing Environment

The site is currently the crest and upper slopes of Mt Bundarbo, which has a peak elevation of around 597 m AHD. Surrounding topography is moderately steep to steep hilly terrain. The site surface comprises predominantly granite boulders and grasses in varying ratios.

Topography and geology

The site is located over the Coolac 1:50 000 Topographic Map (Sheets 8528-S) at an elevation range of approximately 470 m to 597 m AHD. The site landform is the crest and waning upper slopes of Mt Bundarbo. Numerous first order drainage lines start lower in the landscape towards the base of Mt Bundarbo, but none are present on site. The area drains into the Murrumbidgee River, either fed by small drainage lines or the nearby Sawpit and Kyleys Creek. The Murrumbidgee River lies approximately 2 km south west of the site.

Soils have formed on parent materials consisting of Tertiary olivine basalt. The basalt plateau caps are associated with Silurian granodiorite of the broader Young Formation. This formation has been eroded and dissected to leave an undulating plateau surface. Minerology includes muscovite, quartz, feldspar, biotite and cordierite. Granites are likely I-type granites from igneous processes with S-type granites derived from metasedimentary processes to be less prolific. Further east is Mid-Silurian Volcanics comprising mainly dacite, rhyodacite, tuffaceous sandstone and shale.

The Nanangroe (nn) soil landscape was identified to cover the top of Mount Bundarbo and subsequently most of the subject site based off the Soil landscapes of Central and Eastern NSW (NSW Government 2018) mapping. This landscape is characterised by undulating plateau surface of low hills and rises formed on Tertiary basalt. Elevations generally range from 520 to 649 m; local relief is approximately 30 to 60 m with a modal slope of 3–10%. Vegetation is comprised of extensively to totally cleared Eucalypt woodlands.

The Rathden (rd) soil landscape was identified to surround the area mapped as Nanangroe landscape and the subject site. The Rathden landscape is characterised by undulating to rolling low hills and hills formed on Silurian granodiorite. Elevation ranges from 260 to 519 m, local relief is 60 to 220 m with a modal slope of 10 to 32 %.

Soil

Soil landscape mapping identified Chromosols and Dermosols were more likely to be present on upper slopes and hillcrests in the area, similar to site conditions. Australian Soil Classification (ASC) mapping identified Ferrosols to comprise the soil type. Nearby eSPADE profiles identified Rudosols (ASC) and Lithosols (Great Soil Groups) to comprise the surface geology. Soils are derived from the underlying basalt.

The Atlas of Australian soils (ASRIS 2000) identified the site as residing in a ‘Mu1’ soil landscape, described as follows:

> *"Undulating to rolling country with some rounded slopes, broken by ridges and knolls dotted with tors: chief soils are neutral leached red earths (Gn2.15) and hard neutral red soils (Dr2.22) and (Dr2.62), generally as follows: (i) undulating to rolling areas of (Gn2.15) and occasionally (Gn2.16), with (Gn2.25) and (Dy3.42) on mid and lower slopes and (Dy3.43) in valleys--ironstone gravels are present in some areas of the last three soils; (ii) rolling areas of (Dr2.22), (Dr2.42), (Dy3.22), and (Dy3.42); and (iii) ridges and knolls of (Dr2.22), (Dr2.62), and possibly other (D) soils with some areas of siliceous sands (Uc1.2) and tors. Soil dominance varies locally throughout the unit between (i), (ii), and (iii). Data are limited".*

Potential contamination

A search of the NSW EPA contaminated land public record (NSW EPA 2020) was undertaken for contaminated sites within the Hilltops council local government area (LGA) on 10 December 2020. The search did not return any results for the site or Jugiong locale. The closest listed site was in Harden, approximately 35km to the north.

No previous activities other than potentially minor grazing is likely to have previously taken place on site. No mining or excavations have been previously undertaken on the site. There is a low risk that contamination associated with broadscale agricultural activities could be present in the development site due to slope and the site not being arable land. No potentially contaminating activities have been identified on site.

Limitations

Both the Rathden and Nanangroe soil landscapes are erosional landscapes and have numerous potential associated limitations. The digital soil maps for key soil properties over New South Wales, version 1.2 (NSW Government 2018) was used to refine limitations identified from the soil landscape. Limitations include:

- Engineering hazards
- Sheet and gully erosion hazards.
- Steep slopes.
- Rocky outcrops.
- Shallow soils.
- Low wet bearing strength.
- High erodibility.
- Hard setting surfaces.
- High subsoil plasticity.
- Alkalinity hazard.

Acid Sulphate Soils (ASS) are not considered to be present on site. The CSIRO Atlas of Australian Acid Sulphate Soils was consulted, and the site was identified in an area that has an extremely low probability of occurrence for ASS.

Naturally Occurring Asbestos (NOA) is likely to occur within the Hilltops LGA (NSW Government 2021). However, Mt Bundarbo and the Proposal footprint are not mapped in an area with potential for NOA to occur.

6.8.3. Potential Impacts

Construction

Construction of the proposal is expected to take three months. Earthworks required during construction include construction of access roads, removal and stockpiling of topsoil and overburden and creation of a sediment basin (refer to Figure 6-18 and Figure 6-19).

Pit development is a staged process. Topsoil and overburden would be removed in stages. The area impacted for stage 1 includes the approximately 2,954 m^2 for the pit, which would become the sediment basin for stage 2 onwards, approximately 287 m^2/ha for the dam and approximately 1 ha for the haul road. Topsoils would be removed and stockpiled separately to the overburden. Excavated subsoils would be stockpiled and contained to avoid potential dispersion and sediment transfer. The stockpile site would be located at the south-eastern toe of stage 1 pit development. ‘

These activities would remove the existing groundcover and disturb soils, potentially increasing their susceptibility to erosion and subsequent sedimentation in areas offsite. Soil compaction would occur as the extension to the haul road is created. This would reduce soil permeability thereby increasing run off and the potential for concentrated flows.

The areas of disturbance would be confined to the pit footprint, haul road, haul road intersection upgrades and the sediment basin. Groundcover would be retained as far as possible prior to, during and post-construction.

Overall, the risk of erosion is considered low. With limited topographic relief, runoff is considered to be readily manageable and unlikely to cause substantial erosion or lead to substantial sediment loads entering any natural waterways.

The use of fuels and other chemicals onsite poses a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can alter soil health, affecting its ability to support plant growth. When mobilised, such as in a rain event or flooding, the substances may spread via local drainage lines, affecting much larger areas including aquatic habitat. Overall, these risks are low and considered readily manageable.

As NOA is not likely to occur within the development site, it is unlikely that the minor earthworks required during construction would impact on any NOA.

It is unlikely that erosion would occur due to the enclosed nature of the pit once established, but whilst in the construction phase there is potential for erosion to take place over a short period of time. Due to the incremental depths of the pit, surface water is unlikely to leave the quarry working area, except for within very early stages of site establishment. Any surface water within the pit would evaporate over time or be pumped and reused onsite for dust suppression.

Soils on site and in adjacent areas are very fertile, these soils are not arable in their current location. When soils are removed from site during establishment consideration should be given to an appropriate disposal or re-use site.

Overall, the main risk during establishment is from erosion; erosion was identified as a risk based on the desktop assessment, site elevation and slope.

Operation

The operational phase of the Proposal is expected to last approximately 20 years. Due to the removal of topsoils during site establishment there would be minimal impact to soil once the quarry is operational. These impacts would be likely confined to the edges of the site and access roads.

Operational maintenance activities and vehicles would be largely confined to the formalised access tracks, minimising impacts to soils. Runoff from these areas could lead to increased soil erosion along drainage lines and gullies down the sides of peaks. Roads are likely to be built from the underlying rock material, drain internally towards the centre of the pit and be consistently compacted by moving earthmoving machinery.

As NOA is not likely to occur within the development site, it is unlikely that pit development would impact on any NOA during operation.

The overall geotechnical stability of the site is not expected to be impacted from the proposed operation of the facility.

There would remain a risk of soil contamination in the event of a chemical spill (fuels, lubricants, herbicides). However, any spill is likely to remain on site and not be able to penetrate the underlying rock. Clean-up of any spill should be relatively easy and no further downgradient impact would be likely.

Erosion and Sediment Control

The guideline for statutory requirements and erosion and sediment control strategies is the *Managing Urban Stormwater: Soils and Construction Volume 2E Mines and Quarries* (DECC 2008). Management objectives of erosion and sediment control strategies are to ensure no pollution to surface water or nearby water tributaries. The aim would be to firstly minimise erosion and then capture sediments from disturbed areas.

Prior to the operation of stage 1, a small dam would be constructed west of the stockpile area. A sediment fence would be installed along the toe of the stockpile (Figure 6-18) on the down-gradient side (south-east). Following the first blast and subsequent winning of material, the remaining void would become the sediment basin. The small dam at the south-eastern extent would be filled in with a portion of the overburden and rehabilitated.

As water is used for daily quarry operations, it is unlikely the dam or sediment basin would fill enough that there would be a threat to the surrounding environment from dirty water discharge. However, to ensure that this would not occur, the dam / sediment basin would be inspected monthly. Accumulated sediment depth would be measured to ensure sufficient storage capacity remains.

Remaining soil would be used as bunding for erosion and sediment control and visual impact screening. The bund dimensions would be approximately 50-70 m in length, three metres wide and a height of three to four metres. The bund would prevent stormwater runoff moving down-gradient. The bunding would be progressively rehabilitated with vegetation.

The haul road would be created predominantly on an existing track. Three culverts would be located along the haul road during development to divert overland flow in drainage depressions beneath the road and avoid erosion of the road pavement (Figure 6-19). Rock armouring would be an appropriate option at the down-gradient outlets of the culverts to dissipate flow energy and control scouring potential of the soils around the outlet pipe. Further investigation would be included in the ESCP.

Four diversion banks would be located along the northern portion of the haul road around the drainage line. Three of these are located on the western side of the road to divert up-gradient run-on from the hillslope away from the road pavement and towards the drainage line. One diversion bank would be located on the eastern side of the haul road. Dependent on the gradient of the diversion banks, channel linings and / or level spreaders could be appropriate options to reduce flow velocities and scour potential. These erosion control measures would be investigated further for the ESCP.

Road batters would be stabilised with groundcover. Methods of stabilisation include planted vegetation / perennial grasses, turf, seeding, soil binder applications, mulch and topsoil mixes, hydroseeding, straw

mulching, erosion control blankets and compost blankets. The most appropriate method would be investigated prior to haul road construction and detailed in the ESCP.

A contour bank would be located up-gradient to the west of the haul road (Figure 6-19 and follow the haul road for approximately 566 m. The contour bank would be approximately three metres wide. The contour bank would be created from excavated spoil to intercept runoff and divert it away from the haul road. Runoff would be diverted to a grassed area in the paddock where the threat of erosion is reduced.

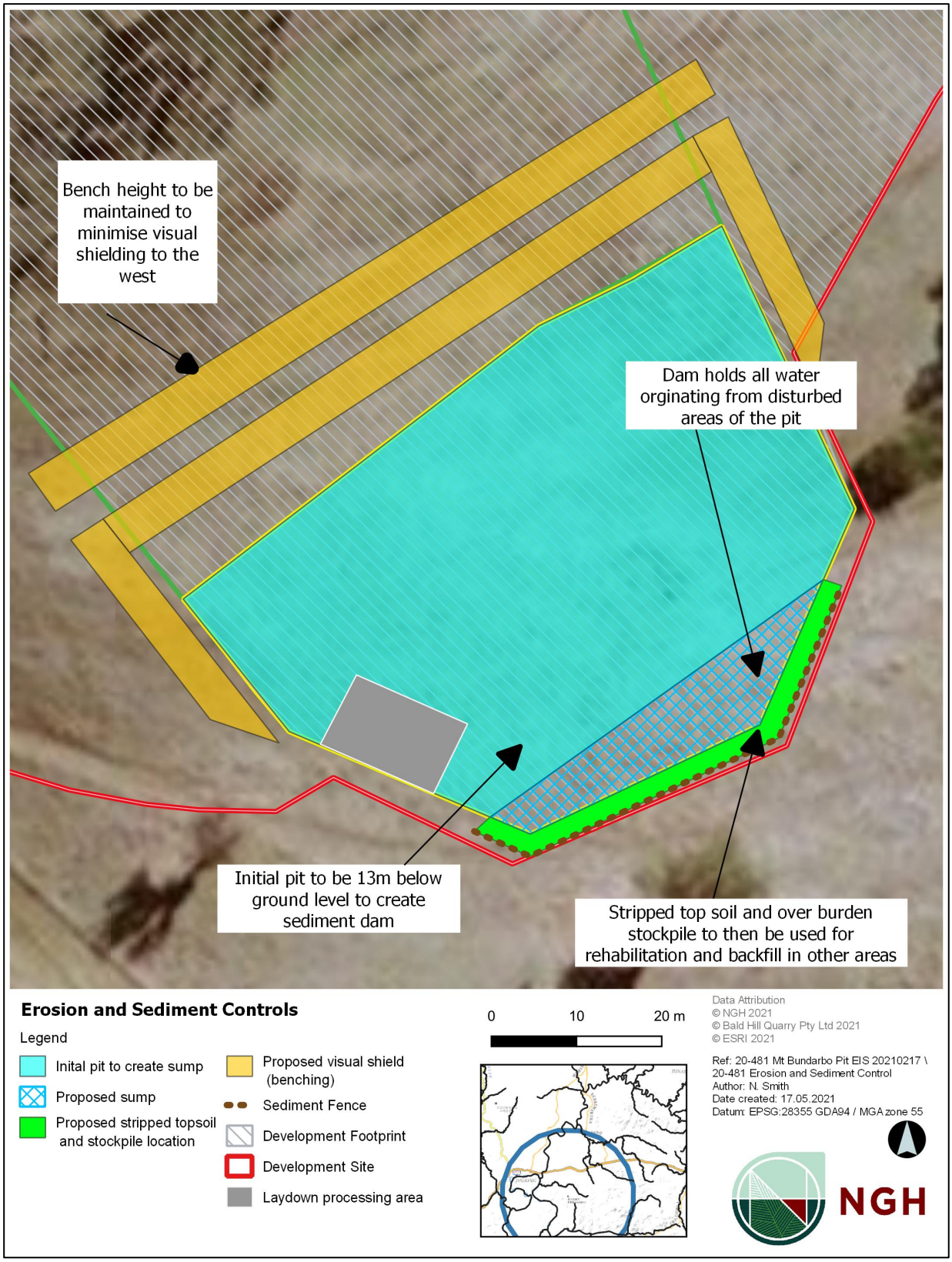


Figure 6-17 Erosion and sediment controls for stage 1 pit development

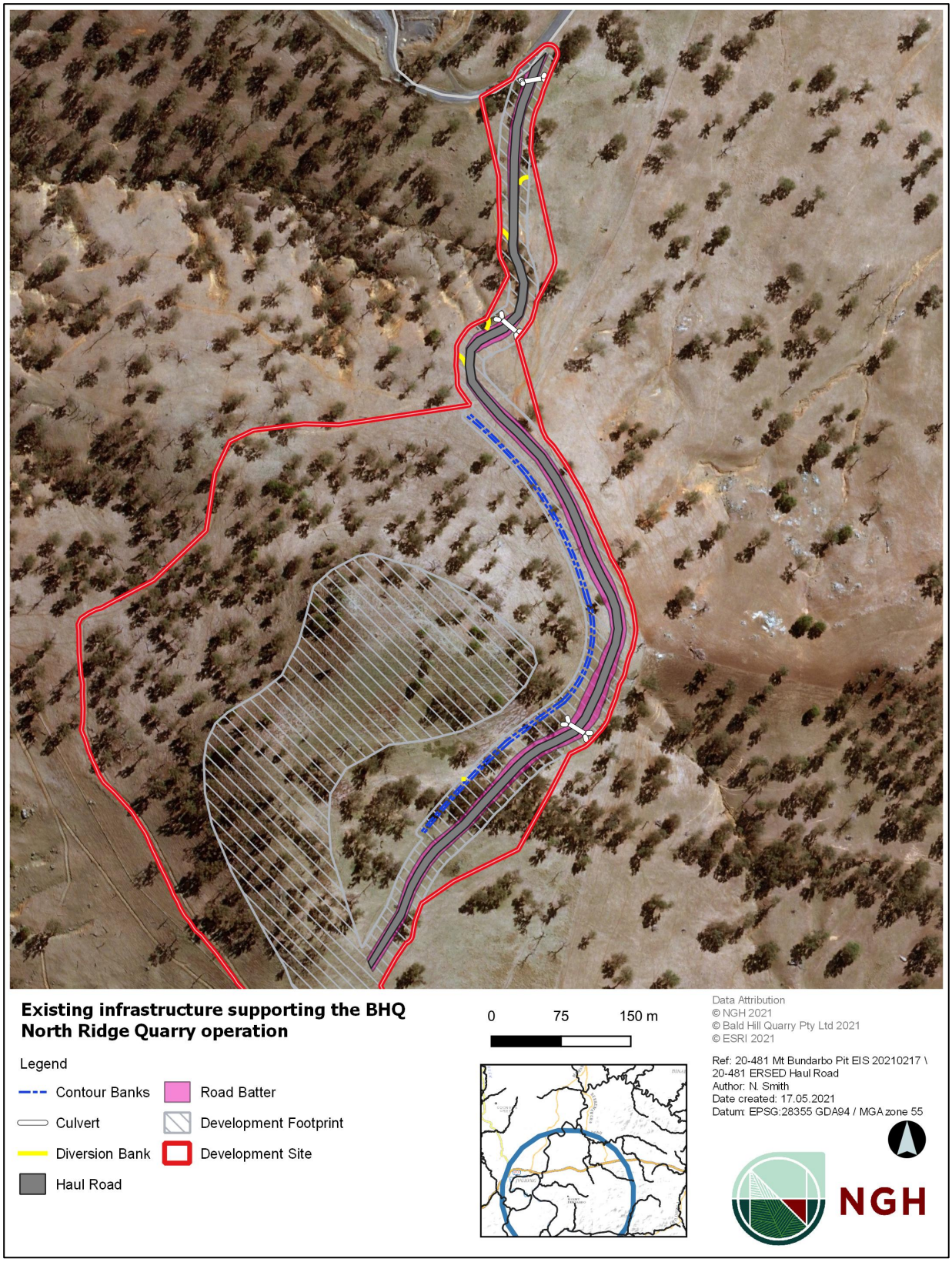


Figure 6-18 Proposed erosion and sediment controls along the haul road

6.8.4. Safeguards and Mitigation Measures

Activities with potential for adverse soil impacts would be managed through the development and implementation of sediment control plans and spill controls, as detailed below (Table 6-46).

Table 6-46 Safeguards and mitigation measures for soil impacts.

No.	Safeguards and mitigation measures	C	O	R
SO1	Clearly mark out areas of operation for construction and stripping purposes	**C**		
SO2	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) would be prepared as a sub plan in the CEMP and OEMP, implemented and monitored during the construction and operation of the Proposal, in accordance with Landcom (2004) and DECC (2008), to minimise soil (and water) impacts. Refer to section 6.2.3 for details on what to include in the SWMP and ESCP.	**C**	**O**	
SO3	Best practice management measures to be employed where applicable to reduce the risk of erosion and sedimentation control: • Preserve and stabilise disturbed areas, drainageways and steep slopes. • Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. • Provide access and general construction controls.	**C**	**O**	
SO4	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook* if the chemicals are liquids. • In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	
SO5	A comprehensive Fire Management and Emergency Response (FMER) will be developed for the site and specifically address foreseeable on-site and off-site emergency incidents. The FMER will be contained within the BHQ Emergency Response Plan and will detail appropriate risk control measures that need to be implemented to safely mitigate potential risk to soil, health and	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	safety of firefighters and first responders in the case of a hazardous spill.			
SO6	A Fire Management and Emergency Response will be developed and implemented during construction, operation and rehabilitation to prevent contaminants affecting adjacent surrounding environments. The FMER will include spill and contamination responses to: • Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation).	**C**	**O**	
SO7	A protocol will be developed in relation to discovering buried contaminants within the development site (e.g., pesticide containers, if any). It would include stop work, remediation and disposal requirements. If significant contamination is found on site during construction or operation activities, it must be reported in line with *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011)*. Further action should be undertaken when necessary in line with the *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* (EPA 2015).	**C**	**O**	
SO8	Dust and noise controls shall be implemented during construction of the facility to ensure minimal impact to nearby receptors and ecosystems. Measures can include but are not limited to dust gauge monitoring, dust suppression techniques, ensuring machinery meets noise regulations etc.	**C**		
SO9	Any area temporarily used during construction (laydown and trailer complex areas) will be restored to original condition or re-vegetated with native plants where possible.	**C**		

C: Construction; O: Operation; R: Rehabilitation

6.9. TRAFFIC, TRANSPORT AND ROAD SAFETY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Including:

- *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;*

DEPARTMENT OF PRIMARY INDUSTRY

Suitable traffic movements

- *Consideration of the route for movements needs to be taken into account so that impacts on sensitive receptors are minimised (eg noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves1 (TSR) and the movement of livestock or farm vehicles along / across the affected roads*

TRANSPORT FOR NSW

The documentation submitted should address the potential impacts on the road network associated with the development during the lifetime of the project, works required to the existing road infrastructure, the measures to be implemented to maintain the standard and safety of the road network, and the procedures to monitor and ensure compliance. A transport management plan may be required to outline measures to manage traffic related issues generated by the development.

For guidance in the preparation of the TIA the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12 - Traffic Impacts of Development and Part 3 - Traffic Studies and Analysis and the "Guide to Traffic Generating Developments" prepared by the RTA and similar documentation. As a minimum the TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, peak traffic volumes, vehicle types, travel routes for vehicles accessing the site and provide recommendations for any mitigation measures, such as intersection upgrades, considered necessary to address traffic related impacts.

TfNSW emphasises the need to appropriately consider and minimise the impacts of the development on the existing road network and maintain the level of safety, efficiency and maintenance along the existing road network. Any Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network, particularly intersections.

6.9.1. Existing Environment

Regional Road Network

Hume Highway is a State Road under the care and management of Transport for New South Wales (TfNSW). It runs in a northeast-southwest alignment from Sydney to Melbourne and forms one of

Australia's major intercity national highways. Within the vicinity of the site, it has a sealed carriageway providing two lanes of traffic in each direction which are separated by a wide grassed median. It has a speed limit of 110 km/hr adjacent to the site and is rated to accommodate heavy vehicle movements as identified within the TfNSW Restricted Access Vehicle Map (TfNSW 2021).

Local Road Network

The access road to the site extends south from the Hume Highway, and has a width of approximately 10 m accommodating two-way vehicle movement. It has a sealed carriageway width for 1.5 km to the weighbridge of the Bald Hill Ecofill Landfill and has a gravel surface extending to the North Ridge Quarry.

The intersection of Hume Highway with the access road is priority controlled with 'Give Way' signage and line marking provided for drivers exiting the access road. Turning movements from Hume Highway are facilitated by localised widening for vehicles turning left and right into the access road. The additional sealed area provides effective lane widths of approximately 5.0 m and extends for 200 m for left turning vehicles and 165 m for right turning vehicles. The turn lanes are currently not line marked.

A network of Crown paper roads exist in the locality of the Proposal including one which runs through the development footprint shown in Figure 1-2. Landowner 1 has submitted an application to purchase and close the paper road. Currently, no response has been received.

Traffic Volumes

Traffic volume data has been collected from the TfNSW Traffic Volume Viewer. The closest available survey location was 2.11 km north of Paynes Road near Bookham, which recorded 10,063 vehicles per day in both directions. The vehicle movements include 5,044 northbound vehicles and 5,019 southbound vehicles, with 36% of traffic being heavy vehicles.

6.9.2. Potential Impacts

Construction and Rehabilitation

Associated Noise and Dust

The increase in traffic during construction and rehabilitation may increase noise and dust in the local area. However, the majority of vehicles would be traveling at low speed. Impacts from dust generated from the proposed activity, including that associated with increased traffic are considered in section 6.5.1.

The increase in traffic and heavy vehicle movement during construction and rehabilitation would result in a minor increase in noise as a result of the proposed works. Hume Highway is located approximately 3.6 km north of the development site and already experiences moderate levels of traffic including heavy vehicles.

Damage to Road Infrastructure

Bald Hill Road is already sealed. The Proponent would manage construction impacts on Bald Hill Road with a Traffic Management Plan. This may require periodic road improvements and lane closures to preserve traffic flow.

Operation

Traffic Generation

A maximum of 12 staff are anticipated to be on-site at any time which is not proposed to change as part of the Proposal. Accordingly, the quarry is expected to generate 12 light vehicle movements during the morning and evening peaks associated with staff arriving and departing the site, respectively.

Truck and dog vehicles would primarily be used to transport the quarry material, with the Mt Bundarbo Quarry expected to generate up to 184 vehicle movements per day as part of the Proposal. The truck movements would commence at 7:00am and be completed by 4:00pm in order to allow time for the last load to be delivered to the relevant destination.

It is also noted that deliveries such as fuel would be generated by the quarries which would be undertaken by smaller MRV/HRVs and would generate approximately two vehicle movements per day outside of peak times.

The Mt Bundarbo Quarry is expected to generate an increase in traffic of 6 truck movements during the morning peak hour and 50 truck movements per day.

Local Road Network

Material from the quarry would be utilised for road upgrades/maintenance and construction projects within the surrounding area, resulting in the traffic movements being distributed on the surrounding road network. All vehicles would access and exit the site via Hume Highway to the east or west and are then able to access the wider area.

Hume Highway currently accommodates approximately 10,063 vehicles per day. Therefore, the proposed increase of 50 vehicle movements per day and 6 vehicles during the peak hour (approximately one vehicle every 10 minutes) can be readily accommodated on the road network and would be less than the daily variation in traffic volumes.

Site Access

Access to the site is proposed to continue to be provided via the existing connection with Hume Highway. Turning movements from Hume Highway are currently facilitated by localised widening for vehicles turning left and right into the access road which provides effective lane widths of approximately 5.0 m. The widening extends for 200 m for left turning vehicles and 165 m for right turning vehicles. The widening has been based on a previous design for the intersection which provides an Auxiliary Left Turn (AUL) and a Channelised Right Turn (CHR) treatment in accordance with the Austroads Guidelines. The design for the turn facilities is provided in Appendix G.

The intersection upgrade includes road widening along the haul road to allow for suitable access by the design vehicle; accordingly, the intersection is proposed to be upgraded to allow for the simultaneous two-way vehicle movement for a 19 m long articulated vehicle

Increased Collision Risk

The increased collision risk relates primarily to traffic entering and exiting Bald Hill Road from the Hume Highway. This relates to both oncoming traffic and traffic following vehicles that are turning off Hume Highway.

Based on a 110 km/hr speed limit, a safe intersection sight distance of 248 m and a reaction time of 2 seconds is required in accordance with the Austroads (2009) *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*. At the Bald Hill Road / Hume Highway intersection, sufficient sight distance is affordable for turning vehicles. Accordingly, the sight distance at the access is considered acceptable.

Damage to Road Infrastructure

The increase in traffic and heavy vehicle movement could impact the condition of roads on the haulage network. Along Hume Highway, the impact is expected to be negligible due to the existing capacity of the road network. However, the impact of turning traffic at the Bald Hill Road intersection would likely require monitoring to ensure that the road is maintained in an adequate condition.

Associated Noise and Dust

The principal control upon noise generated during extraction within the Mt Bundarbo Quarry relates to the design of the quarry, whereby the quarry would be developed initially via a "keyhole" which would allow considerable noise attenuation, the same as North Ridge Quarry. Hume Highway is located approximately 3.6 km north of the development site and already experiences moderate levels of traffic including heavy vehicles. Noise from operational activities associated with the Proposal would generally be inaudible at surrounding residences. However, there are two sensitive receivers located within 2 km of the proposed pit at 1.8 km north-east and 1.7 km south-east. A detailed noise assessment for the Proposal is provided in section 6.7.1.

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6.9.1. Potential cumulative impacts

Traffic information has been provided by the Applicant for the landfill and the existing North Ridge Quarry which is provided below along with the anticipated vehicle movements of the Mt Bundarbo Quarry. Based on the information provided, it is anticipated that the site could generate up to 160 heavy and 24 light vehicle movements per day. Table 6-47 summarises the traffic movements generated by the site. Combined, the three projects are expected to generate approximately 184 vehicle movements per day and 32 vehicle movements during the morning peak hour. The evening peak hour would only generate vehicle movements associated with staff as the last truck movements depart the site prior to the evening peak.

Table 6-47 Traffic generation per day

Vehicle type	Daily (vehicles per day)				Peak hour (vehicles per hour)			
	Landfill	North Ridge	Mt Bundarbo	Total	Landfill	North Ridge	Mt Bundarbo	Total
Light vehicle	8	16	-	24	4	8	-	12
MRV/HRV	-	2	-	2	-	-	-	-
Truck and Dog/Semi-Trailer	20	88	50	158	3	11	6	20
Total	28	106	50	184	7	19	6	32

6.9.2. Safeguards and mitigation measures

Safeguards for traffic, transport and associated safety impacts are listed in Table 6-48. A Traffic Management Plan already exists for the current landfill and quarry operations and was updated in April 2021.

Table 6-48 Safeguards and mitigation measures for traffic, transport and safety impacts

No.	Safeguards and mitigation measures	C	O	R
TT1	The turn facilities are currently not line marked; line marking will be provided as part of the Proposal in accordance with the previously approved design provided within Appendix G.	**Design**		

C: Construction; O: Operation; R: Rehabilitation

6.10. ABORIGINAL HERITAGE

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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*
- *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 [of the SEARs]*

BIODIVERSITY AND CONSERVATION DIVISION

The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the Proposal. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with Department regional officers.

Where Aboriginal cultural heritage values or potential values are present, these are to be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR).

Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for Proponents 2010 (DECCW) where an ACHAR is required. The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.

Where harm to an Aboriginal object or declared Aboriginal place cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) will be required from the Department under the National Parks and Wildlife Act 1974. You must apply to the Department for an AHIP prior to commencing works that will directly or indirectly harm an Aboriginal object or a declared Aboriginal place.

6.10.1. Existing Environment

NGH was commissioned by Bald Hill Quarry Pty Ltd (BHQ) to undertake a Due Diligence (DD) assessment of the Aboriginal cultural values associated with the Development site and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded. A visual inspection of the Development site was undertaken on 11 November 2020 by two qualified NGH archaeologists and two representatives of the Young LALC. No evidence of quarrying or Aboriginal objects were identified.

An extensive search in the AHIMS database was undertaken over a 16 km x 16 km radius centred on the Development site. The results yielded a total of 90 Aboriginal sites recorded within the search area and no Aboriginal Places. No previously registered AHIMS sites are located within or adjacent to the Development site.

Mt Bundarbo, which is the focus of the proposed works, is a basalt peak overlooking the Murrumbidgee River which is located approximately 2 km south-west of the Development site. The Development site includes the crests and saddle features of Mt Bundarbo. These undisturbed features are considered to have higher potential to contain Aboriginal sites in accordance with the Due Diligence Code of Practice and archaeological modelling for the area. Mt Bundarbo itself is also a fine-grained olivine basalt deposit with outcropping that may have also been used as a source of material. The desktop assessment therefore indicated that there are landscapes present within the Development site that have potential to

contain Aboriginal objects and a site inspection by archaeologist with representatives from the Young Local Aboriginal Lands Council (LALC) was required.

6.10.2. Potential impacts

Construction and Operation

As no Aboriginal sites or areas of archaeological potential were identified in the northern portion of the Development site, as assessed in this report, no further heritage assessment is required within this area and works can proceed with caution. An Unexpected Finds Protocol (UFP) would be prepared and followed should there be an inadvertent discovery of Aboriginal objects during construction and operation.

Bald Hill Quarry Pty Ltd is reminded that it is an offence under the *NSW National Parks and Wildlife Act 1974* to disturb, damage or destroy any Aboriginal object without a valid Aboriginal Heritage Impact Permit (AHIP).

Recommendations for safeguards and mitigation methods have been provided as part of the Due Diligence, refer to Appendix E.

6.10.3. Safeguards and Mitigation Measures

Table 6-49 Safeguards and mitigation measures for visual impacts

No.	Safeguards and mitigation measures	C	O	R
AH1	Works within the Development site may proceed with caution.	**C**	**O**	**R**
AH2	Any proposed activity outside of the current assessment area shall also be subject to an Aboriginal heritage assessment.	**C**	**O**	**R**
AH3	If any items suspected of being Aboriginal in origin are discovered during works, all work in the immediate vicinity must stop and Heritage NSW must be notified. The find will need to be assessed and if found to be an Aboriginal object an Aboriginal Heritage Impact Permit (AHIP) may be required.	**C**	**O**	**R**
AH4	In the unlikely event that human remains are identified during works, all work must cease in the immediate vicinity and the area must be cordoned off. The Proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene or possible Aboriginal remains. If the remains are thought to be Aboriginal, Heritage NSW must be notified.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.11. HISTORIC HERITAGE

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

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 [of the SEARs].

A desktop search was completed for historical heritage in October 2020, which concluded that there are no registered heritage sites within or near the development site.

6.11.1. Approach

A search of listed items (under the Heritage Act, the Australian Heritage Database and those listed by local Councils and State Government agencies) was completed for the Hilltops LGA on 22 October 2020.

A desktop study was undertaken to identify any historic heritage (non-indigenous) items or places in proximity to the study area, with a particular focus on the development site. The Hilltops LGA (formerly Harden LGA) was used in the search as the development site is situated within the Hilltops Shire. Heritage databases searched as part of this assessment included:

- The NSW State Heritage Inventory (SHI) (includes items on the State Heritage Register and items listed by state agencies and local government) to identify any items currently listed within or adjacent to the development site. The area searched was the Hilltops LGA.
- The Australian Heritage Database (includes items on the National and Commonwealth Heritage Lists) to identify any items that are currently listed within or adjacent to the development site.
- The Environmental Heritage (Schedule 5) of the Harden LEP 2011 for locally listed heritage items that are within or adjacent to the development site.

A general site inspection was also undertaken, with no items of historical heritage identified.

6.11.2. Results

A summary of the results of the heritage searches are illustrated in Table 6-50. Details of listed items are provided below.

Table 6-50 Summary of heritage listings in the Hilltops LGA

Name of register	Number of listings
World Heritage List	**0**
National Heritage List	**17**
Commonwealth Heritage List	**4**
NSW State Heritage Register	**3**
State Agency Heritage Register	**10**
Harden LEP 2011	**102**

State Heritage Register

A search of the NSW heritage Register on 22 October 2020 for the former Harden LGA identified 3 items under the Heritage Act and 112 items listed under the Greater Hume LEP and by state agencies. None of the items listed in the State Heritage Search were located within 3 km of the development site.

NSW State Agency Heritage Register (Section 170)

A search of the NSW State Agency Heritage Register for the former Harden LGA indicated nine listings. These include:

- Demondrille Creek Bridge, Burley Griffin Way.
- Demondrille, Railway Relics, Young Road, Demondrille.
- Galong Railway Precinct, Galong.
- Harden Railway Precinct, Station Street, Harden.
- Harden Fire Station, 150 Albury Street, Harden.
- Murrumburrah-Harden District Hospital, Swift, Lucan, Scott Streets, Harden.
- Jugiong Public School - Buildings B00A and B00E, Stapylton Street, Jugiong.
- Murrumburrah Public School - Buildings B00A, B00B and B00D, Albury Street, Murrumburrah.
- Wombat Public School - Building B00C and Well, 46 Rose Street, Wombat.

The above items are listed by State Agencies under s.170 of the Heritage Act. None of the above items are located within or in close proximity of the development site.

Local Heritage Schedule

A search of the Harden Local Environmental Plan 2011 was completed on 22 October 2020, which found seven items of local significance in proximity to the development site (Table 6-51). None of these items would be impacted by the Proposal, with the closest site being approximately 6.7 km from the development site.

Table 6-51 Local Environmental Plan heritage listings

	Heritage Item	Status	Impact
I29	**Reedy Creek homestead, Old Hume Highway**	Registered - Local	None
I58	**Jugiong Cemetery, Larmer Street**	Registered - Local	None
I59	**Police station and lock up, Jugiong Road**	Registered - Local	None
I60	**Former stables ruin, Jugiong Road**	Registered - Local	None
I61	**Jugiong Cemetery, Riverside Drive**	Registered - Local	None
I62	**Pise ruin, Riverside Drive**	Registered - Local	None
I63	**Jugiong Public School, Staplyton Street**	Registered - Local	None

No items of historic heritage significance would be impacted by the Proposal. The closest site is approximately 6.7 km north east from the development site. All the historic heritage places identified in these searches are shown in Figure 6-20.

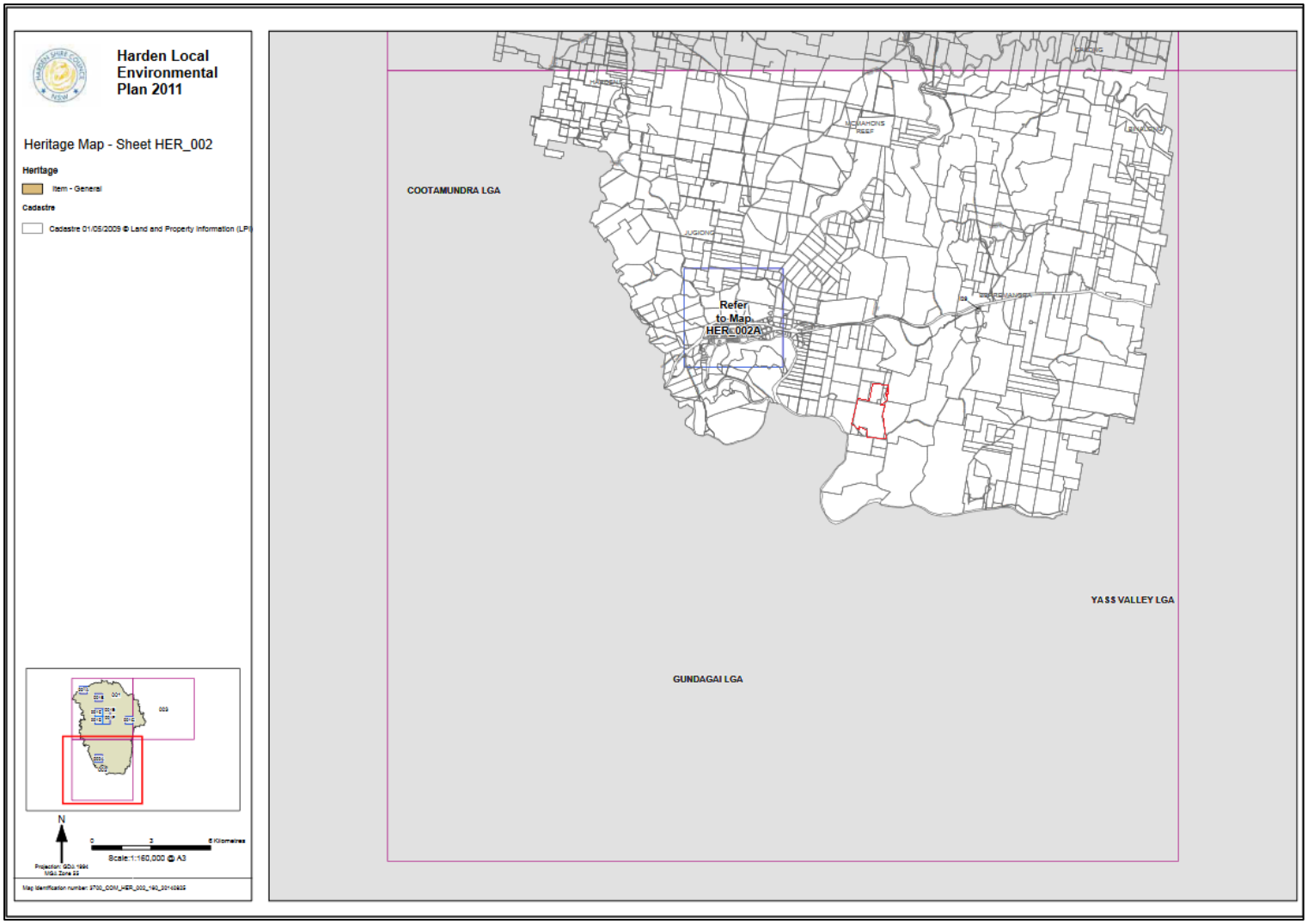


Figure 6-19 Harden LEP (2011) Heritage Map results for the Mt Bundarbo Quarry. *Red boundary indicates the proposed Quarry*

6.11.3. Potential Impacts

Heritage items identified from the desktop study are outlined above. Most of these items are found in Jugiong and other towns and villages. The closest site is approximately 6.7 km north-east of the development site.

The Proposal is not considered likely to have a significant impact on heritage values in accordance with the Heritage Act, the EP&A Act, and the EPBC Act.

6.11.4. Safeguards and Mitigation Measures

Safeguards to protect historical heritage are listed in Table 6-52.

Table 6-52 Safeguards and mitigation measures for historic heritage

No.	Safeguards and mitigation measures	C	O	R
HH1	Should an item of historic heritage be identified, the Heritage Division (DPIE) shall be contacted prior to further work being carried out in the vicinity.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.12. SOCIO-ECONOMIC AND COMMUNITY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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.

6.12.1. Background

Socio-economic profile

The Hilltops LGA was formed in May 2016 by the amalgamation of Young, Harden and Boorowa councils. Hilltops Council is located in the Southern Tablelands of New South Wales, about 140 km north-west of Canberra and 350 km south-west of Sydney. The LGA has a total land area of 7,140 km^2 and a population of approximately 18,750. Hilltops Council has three main townships: Young, Boorowa and Harden – Murrumburrah.

The village of Jugiong is located at the southern tip of the Hilltops LGA on the Murrumbidgee River just off the Hume Highway, 90 minutes from Canberra and 20 minutes from Gundagai. It is said that Jugiong is a local Aboriginal word meaning "valley of the crows". Main features of the Jugiong townsite include the Sir George Tavern (built in 1845), monument to Sergeant Parry (a policeman murdered in a main coach holdup in 1864) and the Long Track Pantry.

The mining industry makes the second highest contribution to Hilltops' gross regional product (GRP) after retail. Growth opportunities for the mining industry lie in increased mining extraction and value-adding, however employment growth is projected to remain low due to the limited employment demand within the industry (PSA Consulting Australia, 2019).

Hilltops exports large amounts of agricultural and mining products both interstate and internationally. The use of transport for freight is a vital input to value-adding and mining extraction growth opportunities. Key opportunities to improving the transportation of freight network include re-opening the Cowra Railway Lines and fixing/widening roads between Hilltops and surrounding major cities (PSA Consulting Australia, 2019).

Bald Hill Quarry and Community

BHQ has supplied and continues to supply high quality construction material for local and state significant projects. The continued operation and increase in annual production would continue to provide security of supply during peak demands (future major projects) as well as meeting the local demand of material from local councils. Additional benefits of the Proposal include:

- Maximising the operating life of an existing facility, thereby avoiding/delaying the need to develop a greenfield site.
- Quarry positioning away from major population centres and incompatible land uses and has substantial existing setback distances from neighbours.
- Its location to the Hume highway and regional road networks.
- No requirement for additional disturbance processing, workshops or stockpiling.
- Continued employment of existing quarry personnel, plus additional employment associated with increased production.
- Continued contribution to the commonwealth and state governments through taxes.
- Continued existing s94 development contributions made to Hilltops Council for existing operations and the life of the Proposal.

Benefits of the Proposal for local community include:

- Continued employment of existing BHQ staff.
- If approved, the Proposal would continue to provide 12-14 full time employees including the landfill and office staff. If a large project is awarded, staff numbers could increase to approximately 20.
- Employment of 20 subcontractors for haulage of material to projects.

Community Engagement

BHQ focuses on community and environmental concerns both during and after its quarrying operations. The company is committed to developing and maintaining long-term relationships with all stakeholders by communicating openly, honestly and in a transparent manner.

BHQ currently engages with the community through open days, face to face meetings and an annual community liaison meeting. An information and complaints line for Jugiong regional landfill and quarry is provided at the front gate, website and in the yellow pages. The information line can be used for the community to lodge complaints or concerns about the operation. BHQ has a procedure in place to collect, monitor, evaluate and action any community feedback. Any complaints are recorded in the complaints register in order to be monitored and evaluated. Each complaint or information received from the community is followed up in a timely manner.

6.12.2. Potential impacts

Construction

The Proposal would have very limited impact on the socio -economic aspects with the surrounding area due to the remote location, distance to sensitive receivers over 3 km away and utilising the current workforce. There may be opportunities for additional contractors during construction.

Operation

The proposed extension of BHQ operations would result in considerable economic benefits at local, regional and even state level. The main economic benefit of the Proposal is related to the security of supply of construction materials for local and regional construction markets. Local economic benefits include continued employment opportunities for staff at the Proposal and subsequent flow on effects to the local economy.

Potential social issues primarily relate to visual amenity and the quality of life in the surrounding locality. Noise, air and visual assessments have been undertaken as part of this EIS to outline the potential issues to the surrounding sensitive receivers.

The Proposal is unlikely to cause negative impacts on the local economy. BHQ and its employees would benefit a range of local and regional economies through direct spending of wages and employing contactors, consultants, trades people, transport operators and other associated service providers.

6.12.3. Safeguards and mitigation measures

Table 6-53 Safeguards and mitigation measures for socioeconomic and community impacts

No.	Safeguards and mitigation measures	C	O	R
SE1	A Community and Stakeholder Engagement Plan (CSEP) will be developed as a subplan in the CEMP and OEMP, and will be	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	implemented during construction to manage impacts to community stakeholders, including but not limited to: • Protocols to keep the community updated about the progress of the project and project benefits. • Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.). • Protocols to respond to any complaints received.			
SE2	Liaise with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.	**C**	**O**	

C: Construction; O: Operation; R: Rehabilitation

6.13. HAZARDS

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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;

DEPARTMENT OF PRIMARY INDUSTRY

Bushfire risk identified and managed

- *Risk assessment level and mitigation plan developed to address bush fire risk.*

Contingency and Environmental Management Plan developed

- *Contingency plans should be developed to enable the operation to deal with emergency situations. Commitment to the preparation of an Emergency Management plan that outlines procedures and responsibilities for responding to bushfire threats which might result from extreme climatic conditions.*

NSW RURAL FIRE SERVICE

The environmental assessment for the proposed extension of Bald Hill Quarry should address the following bush fire criteria:

- *The aim and objectives of Planning for Bush Fire Protection 2019;*
- *Identification of potential ignition sources during construction and operation of the development;*
- *Storage of fuels and other hazardous materials;*
- *Proposed bush fire protection measures for the development, including vegetation management and fire suppression capabilities;*
- *Operational access for fire fighting appliance to the site; and*
- *Emergency and evacuation planning.*

6.13.1. Hazardous materials and development

Hazards onsite will be managed in accordance with the Bald Hill Quarry's Integrated Health, Safety and Environment Management System and Mine Safety Management Plan (MSMP), and within guidelines in accordance with the N*ew South Wales Work Health and Safety Act 2011* (WH&S Act), the *Work Health and Safety Regulation 2017* and relevant Australian Standards.

BHQ aims to eliminate all injuries, occupational illnesses, and preventable vehicular incidents. The company seeks to achieve this by:

- Identifying and reducing the risks of all types of work activities that have the potential to produce personal injury or occupational illness.
- Ensuring that everyone (including visitors and contractors) complies with appropriate legal and workplace requirements relating to safety and health.
- Establishing measurable objectives and targets for safety and health to ensure continuous improvement aimed at elimination of work-related illness and injury.
- Providing instruction, training, and supervision to improve individuals' understanding of workplace hazards, including safe work practices and emergency procedures.
- Involving individuals in safety and health matters within the workplace, and consulting with them in ways to recognise, evaluate and control workplace hazards via the risk management process.
- Communicating safety and health information to all employees, contractors, labour hire employees and visitors to the workplace.
- Effectively implementing the Work, Health and Safety (WHS) Policy.

Preliminary Risk Screening

State Environmental Planning Policy No 33 Hazardous and Offensive Development (SEPP 33) requires a preliminary risk screening of a proposed development to determine the need for a preliminary hazard analysis (PHA). The preliminary screening involves identification and assessment of the storage of dangerous goods classes that have the potential for significant off-site impacts. If, at the proposed location, and in the presence of controls, the risk level exceeds the acceptable criteria for impacts on the surrounding land use, the development is classified as 'hazardous' or 'offensive' industry and may not be permissible within most land use zones in NSW.

SEPP 33 screening procedure considers the quantity of dangerous goods stored or transported, the frequency of transportation movements, and in some cases the distance of the materials from the site boundary. The guidelines require goods to be classified according to the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

A development which exceeds the screening thresholds in the guidelines would be considered potentially hazardous and a PHA would be required. For quantities that fall below the stated thresholds, the SEPP indicates that there is unlikely to be a significant off-site risk, in the absence of other risk factors.

HIPAP No. 6 – Guidelines for Hazard Analysis (DoP 2011) and Multi-level Risk Assessment (DoP 2011) notes that a PHA should identify and assess all hazards that have the potential for off-site impact. The expectation is that the hazards would be analysed to determine the consequence to people, property and the environment and the potential for hazards to occur. It is also noted that BHQ MSMP (Section 15 – hazardous chemicals) meets the requirements.

Dangerous goods stored and used at Bald Hill Quarry Jugiong site at the existing landfill, workshop, and processing plant area already occur and are not considered as part of this assessment. Hazardous materials that would occur as part of this Proposal would be the storage of fuels within bunded container within the quarry pit.

The project is not considered to be a potentially hazardous development with respect to the storage, use or transportation of hazardous substances. Therefore, in accordance with SEPP 33, a PHA is not required, and no further risk analysis or assessment is required.

6.13.2. Bushfire

Existing Environment

Bushfire Threat Assessment

A bushfire threat assessment involves assessing the vegetation formations and the slope of the land to determine the appropriate Asset Protection Zones (APZs) required in accordance with the methods in Planning for Bushfire Protection (PBP) (RFS 2019). It is noted that PBP (RFS 2019) was developed to provide a guide to the necessary planning considerations when developing areas for residential use which are likely to be affected by bushfire. While the requirements do not specifically apply to this Proposal, the methods provided for calculating APZs from PBP (RFS 2019) have been used as a general guide in this assessment.

Vegetation Formations

Vegetation formations play a key role in bushfire behaviour; woodland and forest vegetation formations represent large fuel loads due to the presence of understorey vegetation, leaf litter and, for forest vegetation, the connection of the trees within the canopy. The majority of the existing active quarry areas within the site are surrounded by open grassland and woodland vegetation formations. The proposed infrastructure area is located 3 km north of the proposal, and this area supports sparse and disjointed woodland vegetation to the east and northeast.

Slope Analysis

Slope plays an important role in the rate a bushfire can spread. As a bushfire spreads it preheats the fuel source through radiation and convection, and as a consequence of this heat transfer, fire accelerates when travelling uphill and will decelerate when travelling downhill.

The slope across the site varies significantly, with the exception of the steep slopes created by the proposed quarry operations and a gully which runs from east to west, north of the proposed site and northwest to southeast to the south of the proposed site. The slope of the proposed quarry site is around 45 degrees, with the topography across the remainder of the project area varying between five and 20 degree slopes. The current infrastructure area lies within an area of varying slope; the land slopes up to the north 5 to 20 degrees to the north of the proposed quarry and it is also surrounded by a range of gullies.

Asset Protection Zones

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. While PBP (RFS 2019) has been developed for residential development, the method for the development of an APZ provided by PBP (RFS 2019) can be used as a guide for all developments which may be affected by bushfire.

There will be no infrastructure established as part of this proposal. The mobile equipment will all be placed on bare disturbed unvegetated ground negating the requirements to set APZ.

Clearance of vegetation within the approved disturbance area and hazard reduction measures within the surrounding vegetation would be continually maintained throughout the life of the Proposal. Hazard reduction measures would continue to be assessed on an annual basis by the Quarry Manager in consultation with the local RFS and designed to minimise impacts on biodiversity.

6.13.3. Potential fire impacts

The majority of the development site would be cleared of the existing vegetation. The surrounding area is subject to previous quarrying activities. The surrounding area is not identified as bushfire prone land (RFS 2021). However, the risk still exists due to the remote location and remnant vegetation, which represents a potentially significant fuel load capable of sustaining and promoting the spread of bushfire.

As such, the potential risks to the extraction operations from bushfire attack are assessed from the point of view of emergency evacuation and management in the case of a bushfire emergency and the potential for the operations to cause a bushfire for example, from the operation of machinery.

Bushfire Management

The project represents the continuation of existing quarry operations and expansion towards the south of the current operations.

The existing bushfire management measures on site include:

- Maintained access road.
- Water cart.
- Fire extinguishers on all plant and equipment, in site offices and workshops.
- Firefighting truck.
- Hose reel in the landfill shed.

The Proponent intends to continue to implement existing bushfire management measures currently in place at the site in consultation with the local Rural Fire Service.

6.13.4. Safeguards and Mitigation Measures

Table 6-54 Safeguards and mitigation measures for hazard impacts

No.	Safeguards and mitigation measures	C	O	R
HA01	Update the BHQ Bushfire Emergency Response Plan as part of the Mine Safety Management Plan (MSMP) and Emergency Management Plan. The updated plan will be prepared in consultation with the local Rural Fire Service and details of the plan would be provided in the updated CEMP and OEMP for the project.	**C**	**O**	**R**
HA02	Dangerous or hazardous materials will be transported, stored, and handled in accordance with *AS1940-2004: The storage and handling of flammable and combustible liquids*, and the ADG Code where relevant. All potential pollutants kept on-site will be stored in accordance with relevant HAZMAT requirements and bunded.	**C**	**O**	**R**
HA03	All design and engineering will be undertaken by qualified competent persons with the support of specialists as required.		**Design**	
HA04	All electrical equipment will be designed in accordance with relevant codes and industry best practice standards in Australia.		**Design**	
HA05	All chemicals and fuels used on-site must be stored and handled in accordance with: o The requirements of all relevant Australian Standards; and o The NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook* if the chemicals are liquids. In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	**R**
HA06	Water for use in firefighting will be provided by the site water management system, to ensure there is sufficient water available on site for bushfire fighting purposes.	**C**	**O**	**R**
HA07	The haul road on the site provides access across the site for fire fighting vehicles. Water for use in firefighting will be provided by an extraction groundwater bore onsite. Firefighting equipment including fire extinguishers and hose reel (landfill shed only) will continue to be provided at all infrastructure areas and mobile equipment will be maintained in accordance with Australian Standards and WH&S guidelines.	**C**	**O**	**R**

No.	Safeguards and mitigation measures	C	O	R
HA08	BHQ has a long history of safe operation of the Jugiong Quarry and implementation of appropriate measures on site for managing bushfire risk. BHQ will continue to implement the appropriate measures to reduce the risk of fire ignition and the spread of bushfires across the site in consultation with RFS.	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.14. RESOURCE USE AND WASTE GENERATION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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.

ENVIRONMENTAL PROTECTION AUTHORITY

General

- *Outline the production process including:*
  a) *the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc)*
  b) *any life-cycle strategies for the products.*
- *Outline cleaner production actions, including:*
  a) *measures to minimise waste (typically through addressing source reduction);*
  b) *Proposals for use or recycling of by-products;*
  c) *proposed disposal methods for solid and liquid waste;*
  d) *air management systems including all potential sources of air emissions, Proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points;*

Waste and chemicals

- *Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the EPA's Waste Classification Guidelines 2014 (as amended from time to time)*
- *Provide details of liquid waste and non-liquid waste management at the facility, including:*
  a) *the transportation, assessment and handling of waste arriving at or generated at the site;*
  b) *any stockpiling of wastes or recovered materials at the site;*
  c) *any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site;*
  d) *the method for disposing of all wastes or recovered materials at the facility;*
  e) *the emissions arising from the handling, storage, processing and reprocessing of waste at the facility;*
  f) *the proposed controls for managing the environmental impacts of these activities.*
- *Provide details of spoil disposal with particular attention to:*
  a) *the quantity of spoil material likely to be generated;*
  b) *proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil;*
  c) *the need to maximise reuse of spoil material in the construction industry;*
  d) *identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material;*
  e) *designation of transportation routes for transport of spoil.*
- *Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.*
- *Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.*
- *Reference should be made to the guidelines: EPA's Waste Classification Guidelines 2014 (as amended from time to time)*

6.14.1. Policy Position

Resource use

Key resources and estimated quantities (pending the completion of the detailed project design) required to construct the Proposal include those listed in section 3.3.

Waste generation

Legal requirements for the management of waste are established under the POEO Act and the Protection of the Environment Operations (Waste) Regulation 2005. Unlawful transportation and deposition of waste is an offence under Section 143 of the POEO Act. Littering is an offence under Section 145 of the POEO Act.

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The Proposal's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption.
- Resource recovery (including reuse, reprocessing, recycling and energy recovery).
- Disposal.

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development.

Canberra Region Joint Organisation – Waste and Resource Recovery

Hilltops Council is a member of the Canberra Region Joint Organisation (CBRJO). The CBRJO Waste and Resource Recovery Group has developed a *Regional Waste Strategy 2018 – 2023* (RWS) (EPA, 2018) and the *Regional Waste Strategy Action Plan 2018 – 2023* (RWSAP) (EPA, 2018). These documents are in line with the NSW Government's 2011 plan, *NSW 2021: A plan to make NSW number one* and the EPA's *Waste Avoidance and Resource Recovery 2014–21 Strategy (WARR Strategy).*

The themes of the RWSAP are:

1. Avoid and reduce waste generation
2. Increase recycling
3. Divert more waste from landfill
4. Manage problem wastes better
5. Reduce litter
6. Reduce illegal dumping
7. Develop regional collaboration and advocacy

Waste management for the Proposal aligns with the themes and objectives of the RWSAP.

Waste Generation

Construction

During construction and rehabilitation, resources used would be associated with:

- Site establishment.
- Maintenance activities.
- Use of machinery and vehicles.

Construction activities that would produce wastes include:

- Excavation of topsoils, overburden and vegetation clearing.
- Used oils and grease from plant and equipment maintenance.

Topsoil and overburden would be reused on site. Topsoil would be used during rehabilitation activities. Overburden would be reused to fill the sediment basin following stage 1 of pit operations and for blending with the product.

Water would be required during construction for activities including watering of roads, topsoil stockpiles and in the site office and amenities compound. Water use is considered in section 6.4.

In accordance with definitions in the POEO Act and associated waste classification guidelines, most waste generated during the construction phase would be classified as building and demolition waste within the class general solid waste (non-putrescible). Ancillary facilities in the site compound would also produce sanitary wastes classified as general solid waste (putrescible) in accordance with the POEO Act.

Waste management facilities near the development site, including waste accepted at each location, are detailed in Table 6-55 below.

Table 6-55 Waste facilities near the Development site

Waste facility	Waste accepted	Location
Bald Hill Ecofill Landfill	• Mixed solid waste. • Tyres. • Asbestos waste. • Green waste. • Building and demolition wastes.	5423 Hume Highway, Jugiong
Jugiong Waste Transfer Station	• Household waste (mixed solid waste). • Recycling (including comingled recycling, DrumMuster and waste motor oils).	Jugiong Road, Jugiong
Victoria St Transfer Station and Material Recovery Facility	• Mixed solid waste. • Whitegoods. • Tyres. • Green waste. • Recycling (including scrap metal, paper, plastics, glass, aluminium, e-waste, waste oils and DrumMuster).	Victoria St, Young NSW
Redhill Rd Landfill Facility	• Inert and non-organic materials only, (including concrete and rubble, building materials, furniture, plastics and fabrics).	Redhill Road, Young
Boorowa Waste Management Facility	• Mixed solid waste. • Whitegoods. • Tyres. • Green waste. • Recycling facilities (including scrap metal, paper, plastics, glass, aluminium, e-waste, waste oils, and DrumMuster).	Tip Road, Boorowa

Waste facility	Waste accepted	Location
Murrumburrah Waste Transfer Station	• Mixed solid waste. • Whitegoods. • Tyres • Green waste • Recycling facilities (including scrap metal, paper, plastics, glass, aluminium, e-waste, waste oils, and DrumMuster)	Araluen Road, Murrumburrah
Galong Transfer Station	• Household waste (mixed solid waste) • Recycling (including comingled recycling, DrumMuster and waste motor oils)	McMahon St, Galong

Operation

During operation, the solid waste streams would be associated with maintenance activities and presence of employees. Some materials, such as fuels, lubricants and metals may require replacement over the operational life of the Proposal.

Water would be required during operation for activities including watering of roads, topsoil stockpiles, operations and in the site office and amenities compound. Water use is considered in section 6.4.

Ongoing quarry operations are not expected to produce a significant amount of waste. The majority of the waste produced would result from staff on site (food waste, septic waste, etc).

Repair or replacement of infrastructure components at the processing plant would result in some waste generation. However, these activities would occur very infrequently and there would be a high potential for recycling or reuse of any waste.

6.14.2. Potential impacts

Construction and rehabilitation

While increasing scarcity of resources and environmental impacts are emerging from the use of non-renewable resources, the supply of the materials required for the Proposal are not currently limited or restricted. In the volumes required, and the Proposal is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable given the benefits of offsetting fossil fuel electricity generation.

Water would be required during construction for activities including watering of roads and in the site office and amenities. Water use is considered in section 6.4.

Most of the Proposal components are reusable or recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

Rehabilitation of the site is described in section 3.5.

Vegetation Waste

Vegetation waste would be generated during construction activities. Trees with hollow limbs and suitable timber would be used as large woody debris and hollow logs, creating habitat on adjoining land. Remaining vegetation would be mulched and reused on site.

Rehabilitation

Rehabilitation of the site would involve the recycling or reuse of materials including:

- Gravel from the road base if the landholder negotiates for it to be removed.
- Remaining overburden.
- Metals and building materials from the rock processing plant.

Items that cannot be recycled or reused would be disposed of in accordance with applicable regulations and to appropriate facilities.

Operation

While increasing scarcity of resources and environmental impacts are emerging from the use of non-renewable resources, the supply of the materials required for the Proposal is not currently limited or restricted. In the volumes required, the Proposal is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable given the benefits of offsetting fossil fuel electricity generation.

Water would be required during operation for activities including watering of roads and in the site office and amenities. Water use is considered in Section 6.4.

If replacement materials are required during operations, recycling of old materials would be prioritised, followed by disposal as a last resort.

Spoil

The majority of the material extracted from the quarry would be suitable for sale. It is anticipated that the volume of spoil would increase with each stage of pit development. Excavated spoil material would be separated and stockpiled on site with appropriate erosion and sediment controls implemented.

All spoil would be assessed for suitability to be re-used onsite in accordance with best waste management practices. Spoil would be blended with the product that is suitable for sale and or used as backfill in the sediment basin during staging of the quarry pit. Dust generated during operation of the quarry would be captured and used as a capping layer at Bald Hill Ecofill Landfill.

Given the remote location and previous activities on the site, it is considered unlikely any spoil material would be contaminated. Any spoil material with suspected contamination would be classified and disposed offsite to an appropriately licensed waste management facility.

Any contaminated material that required offsite disposal will be tracked via GPS from loading onsite to unloading at the licensed waste management facility. All material requiring offsite disposal would be transported via the Hume Highway.

Hazardous Materials

The handling, storage and disposal of hazardous material is not applicable to the Proposal. No hazardous material would be stored onsite. However, as with the current BHQ quarry and landfilling operations, any hazardous waste would be removed by approved contractors and disposed of at a licensed facility.

Waste Management

Where possible, recyclable materials would be sourced where required. Recycling bins are provided on site, along with general rubbish bins at the existing office building, workshop and staff amenities. General waste would be disposed of at the adjacent Bald Hill Ecofill Landfill. Recyclable material would be sent to an appropriate recycling facility.

Environmental Balance

The inflow and outflow of materials during construction and operation is provided in Table 6-56.

Table 6-56 Environmental balance for quarry construction and operation

Activity	Material Inflow	Material Outflow	Timing		
Clearing vegetation	Fuel for plant.	Vegetation - Vegetation either used for habitat in adjacent areas or for mulching and reuse on site for rehabilitation or erosion controls. Plant emissions to air.	**C**	**O**	**R**
Removing topsoil and overburden	Fuel for plant.	Topsoil and overburden – stockpiled and reused for rehabilitation, bunding for erosion control and visual amenity mitigation, rehabilitation. Plant emission to air.	**C**	**O**	**R**
Material winning and crushing in pit	Fuel for plant and explosives.	All material crushed on-site and then taken to existing processing plant for blending and sale. All material is used. Plant emission to air.		**O**	
Stormwater runoff capture	Water for dust suppression and processing.	Water captured in the dam (stage 1) or sediment basin (stages 2-6) would be reused for on-site dust suppression where required. It would also be used for material processing. It could also be used for stock watering for the adjacent farm.	**C**	**O**	
Material processing	Water, fine material, crushed rock.	As dust is captured during the processing of material at the existing processing plant, the dust is reused for the cover for the landfill operation. Emissions to air.		**O**	
Material transport	Fuel for plant and heavy vehicles.	Transport of material from pit to processing plant, and processing plant to sale.		**O**	

Activity	Material Inflow	Material Outflow	Timing		
		Emissions to air.			

C: Construction; O: Operation; R: Rehabilitation

6.14.3. Safeguards and Mitigation Measures

Resource and waste generation risks are proposed to be addressed via the mitigation measures in Table 6-57.

Table 6-57 Safeguards and mitigation measures for resource use and waste generation

No.	Safeguards and mitigation measures	C	O	R
WM1	A Waste Management Plan (WMP) will be developed as a subplan in the CEMP and OEMP and implemented during construction, operation, and rehabilitation to minimise wastes. It will include but not be limited to: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Spoil would be blended with the product that is suitable for sale and/or used as backfill in the sediment basin during staging of the quarry pit. Dust generated during operation of the quarry would be captured and used as a capping layer at Bald Hill Ecofill Landfill. • General waste would be disposed of at the adjacent Bald Hill Ecofill Landfill. • Quantification and classification of all waste streams. • Provision for recycling management onsite. • Provision of toilet facilities for onsite workers and how sullage will be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	**C**	**O**	**R**

C: Construction; O: Operation; R: Rehabilitation

6.15. CUMULATIVE IMPACTS

Cumulative impacts relate to the combined effect of similar or different impacts on a particular value or residence and may occur concurrently or sequentially. For these purposes, cumulative impacts are associated with other known or foreseeable developments occurring in proximity to the Proposal. The incremental effects of the Proposal on existing background conditions in the study area have been taken into account in the preceding assessment sections.

6.15.1. Existing environment

The proposed Mt Bundarbo Quarry would contribute to overall infrastructure development in the region.

A review of the State Significant Development (SSD) register for the Hilltops Council LGA was conducted on 08 December 2020 to consider the potential for cumulative impacts locally and across the LGA.

A number of State Significant Developments have been applied for within the surrounding LGAs. Major projects listed on the Major Projects Register within the Hilltops LGA include:

- Bald Hill Quarry & Landfill (Part 4) – Determination
- Bald Hill Quarry & Landfill (Mod 1 – Removal of Consent Condition) – Determination
- Bald Hill Quarry & Landfill (Mod 2 – Increase Annual Landfill Tonnage) – Determination
- Bald Hill Quarry & Landfill (Mod 3 – Temporary limit increase of Bushfire waste) – Determination
- Bango Wind Farm (State Significant Development) – Determination
- Bango Wind Farm – Bango Wind (Mod 1) – Determination
- Galong Lime Kiln Harden (Part 4) – Determination
- Galong Lime Kiln Harden (Mod 1 – Sunday Construction Work Hours) – Determination
- Galong Lime Kiln Harden (Mod 3 – Administrative Change) – Determination
- Galong Lime Kiln Harden (Mod 2 – To Increase LPG Storage Capacity) – Determination
- Hydrodec Waste Facility (Part 3A) – Determination
- Rye Park Wind Farm (State Significant Development) – Determination
- Rye Park Wind Farm (Mod 1 – Tip Height Increase) – Assessment
- Wyangala Dam Wall Raising (State Significant Infrastructure) – Prepare EIS
- Yass Valley Wind Farm (State Significant Development)– Determination
- Yass Valley Wind Farm (Mod 1) - Determination
- Young High School Library and Joint-use Community Facility (State Significant Development) – Determination
- Young High School Library and Joint-use Community Facility (Modification 1 – Timing of Conditions B33 and B34) – Assessment
- Young – Wagga Wagga Gas Pipeline (Stage 1 State Significant Infrastructure) – Determination
- Young – Wagga Wagga Gas Pipeline (Stage 2 State Significant Infrastructure) – Determination
- Young – Wellington Gas Pipeline (Part 3A) – Determination

Cumulative impacts may have a minor impact to SSD Proposals occurring within the LGAs. Mechanisms to consult with local industry are, however, included in section 5 and Appendix C, and would assist to manage cumulative impacts should additional developments become relevant to the Proposal.

During construction and operation, key cumulative impacts may include additional stress on the grid, community complaints regarding visual amenity impacts, stress on local business for supply and demand, staff accommodation, noise impacts, air quality, waste management, traffic etc.

6.15.2. Potential impacts

Potential cumulative impacts are primarily associated with the following:

- Biodiversity impacts.
- Visual and landscape character impacts.
- Noise impacts
- Traffic impacts.
- Pressure on local facilities, goods and services.
- Local agricultural impacts.

Biodiversity impacts

The clearing of native vegetation, which is a key threatening process at both the State and Commonwealth level, is considered a major factor in the loss of biological diversity. At least 61 % of native vegetation in NSW has been removed since European settlement and the removal of vegetation at the Proposal is contributing to this process. The cumulative impact of similar projects, particularly where EECs are involved, can be considerable given that many poorly-conserved vegetation communities have a substantial portion of their extent represented on private land. Small losses of vegetative communities may be insignificant at a local level but may accumulate over time to cause a significant reduction in the extent of remnant patches. A SAII assessment was prepared for the White Box – Yellow Box – Blakely's Red Gum Woodland TEC under the BC Act and is available in the BDAR (Appendix D). The communities within the development site do not meet the criteria for the federally listed CEEC, due to having a very degraded understory dominated by exotic annual grasses.

Cumulative impacts are considered best addressed by avoiding and minimising. Where avoidance is not possible the impact of each contributing project is assessed on a case-by-case basis. Long term mechanisms like offsetting through the BAM are structured to address the ongoing impacts of multiple projects in a cohesive manner. For the Proposal, offsetting of biodiversity impacts has been considered and is addressed in the BDAR (refer to Appendix D).

The Proposal has been designed to avoid and minimise impacts to biodiversity, and mitigation measures are provided in section 6.3.6. There are no other mitigation measures required to address cumulative biodiversity impacts.

Visual and landscape character impacts

The visibility of the facility (the operational view) may generate a cumulative impact with the existing quarry on the subject land. Mt Bundarbo, shown in Figure 3-2, sits higher in the undulating landscape at 560m than the surrounding area with the crest of the hill clearly visible from all directions, particularly from the southwest, which loses altitude rapidly towards the Murrumbidgee River. Mt Bundarbo is also clearly visible from the south east but would be screened partially by ridge lines which run directly south and east. Mt Bundarbo occurs as the highest crest of a saddle formation with the existing North Ridge Quarry (480 m), which screens views of the development site directly to the north.

For the purpose of this VIA, visual elements of the Proposal include the quarry face, which would occupy the crest and southern side of Mt Bundarbo, and the extended haulage road, which would connect Mt Bundarbo to the North Ridge Quarry. Moving heavy vehicles are also assessed in the VIA. The mitigation measures recommended in this report (section 6.6.5) would act to reduce the cumulative impacts.

Generally, it is unlikely that the Proposal would contribute to cumulative visual impacts for residences within 5 km of the development site. Views from all viewpoints would remain dominated by agricultural land use and remnant native woodland. Cumulative impacts are considered to be minimised due to the low number of similar developments and separation in the locality.

Noise impacts

Noise impacts through the use of plant, machinery and vehicles and blasting would be heightened if the construction of other developments is undertaken concurrently with operations of the quarry and are located within close proximity to the quarry. This impact would be unavoidable to a certain extent due to the ongoing nature of quarry operations. As no other developments are located within close proximity to the quarry, cumulative impacts are therefore unlikely to occur (refer to Figure 1-1).

The noise assessment has concluded that there would be no noise exceedances above the management level for operational equipment. Explosive use overblast sound levels at all receivers would be less than the maximum limit of 115 dB(A) for blasting.

The mitigation measures to minimise noise more generally are provided in section 6.7.5.

Traffic impacts

During construction and operation, the Proposal is expected to generate an additional 12 light vehicles per day. Truck and dog vehicles would primarily be used to transport the quarry material, with the Mt Bundarbo Quarry expected to generate approximately 50 truck movements per day. The truck movements would commence at 7:00am and be completed by 4:00pm in order to allow time for the last load to be delivered to the relevant destination.

It is also noted that deliveries such as fuel would be generated by the quarries which would be undertaken by smaller MRV/HRVs and would generate approximately 2 vehicle movements per day outside of peak times.

The Mt Bundarbo Quarry is expected to generate an increase in traffic of 6 truck movements during the morning peak hour and 50 truck movements per day.

However, processed material would not exceed the volume currently processed at the existing processing plant. Therefore, cumulative traffic impacts during operation would be unlikely to occur along the freight transport route, primarily on the Hume Highway.

Cumulative traffic impacts are considered unlikely or would be short term, however, should other SSDs undergo peak construction periods simultaneously, it is possible that particular roads would experience increased traffic flow from both projects.

Accommodation impacts

Hilltops LGA and surrounding areas provide many visitor accommodations. It is possible that, in conjunction with other major projects, shortages of accommodation could occur during the construction stage. The Proponent would engage with local accommodation providers and Hilltops Council if necessary to provide additional short term and temporary accommodation at these businesses. The Proponent would also consult with Hilltops Council to co-ordinate construction schedules to minimise conflict with any local festivals or activities. Scheduling staff ‘rostered days off’ could help alleviate accommodation pressures by allowing itinerant workers to return home.

It is considered that the demand for health care and other services would also be dispersed throughout the surrounding towns to coincide with where workers are staying.

Pressure on local facilities, goods and services

There is potential that the possible concurrent construction of the Proposal with other SSD or local development would increase pressures on local community services including accommodation. However, there is also a potential for positive cumulative economic effects from the construction of multiple

developments in the area. Socio-economic benefits in relation to developments in the region would be a continuous ongoing benefit for the community with increased jobs and economic input into local business.

The Proposal would not result in significant impacts to local businesses, residents and road users, subject to the range of identified mitigation measures. Due to the number of local communities in the area, any cumulative impacts on local services are likely to be spread between communities. There is sufficient residual capacity within the existing communities. It is unlikely that there would be negative cumulative impacts to local facilities, goods and services.

Local agriculture impacts

Approximately 12.96 ha of grazing land would be used for the Proposal. The Proposal would not permanently fragment primary production land, as rehabilitation would occur. The haul road would likely remain for landowner access following quarry closure. Benches and bunds would be revegetated where practical and the dams would remain for stock watering.

The land would not be used for agricultural purposes for the life of the quarry and until rehabilitation is complete. This impact has been considered in section 6.2. Removal of agricultural land is considered to be reversible to an extent at the end of the life of the Proposal, with the exception of the change to the landform and geology.

The continued need for quarried material has the potential to increase the cumulative impacts affecting land use change and local agriculture in the region, however, mining and extraction land uses are supported in the region (refer to consideration of the NSW *South East and Tablelands Regional Plan 2036* (the regional plan) (DPE, 2017) and *Hilltops 2040, Hilltops Council Local Strategic Planning Statement 2020-2040* (LSPS) (Hilltops Council, 2020) in section 2.1. The regional plan and LSPS outlines the strategic need for the extractive industries in the region. The LSPS also addresses the significant area of the LGA that is rural production lands and states:

Hilltops is dominated by rural production lands and as a result they make up approximately eighty-five percent of Hilltops landscapes. They have a huge impact on Hilltops economy and the scope and scale of activities found within towns and villages across the area.

As such, the removal of a minor portion of agricultural land for the purposes of extractive industry in the Hilltops LGA is not likely to significantly reduce the agricultural output of the locality.

PRODUCTIVE LAND PRESERVED FOR FUTURE GENERATIONS

The Proposal would result in a change to the landscape and reduction in productive land. The quarry site would be returned to land with capability for agricultural use following rehabilitation, providing for a return of productive land for future generations.

6.15.3. Safeguards and Mitigation Measures

The cumulative impacts identified for the Proposal are considered to be best managed by dealing with each component individually. No additional safeguards are proposed.

7. CLOSURE AND REHABILITATION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

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*
- *the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy, recognising that a rehabilitation bond will likely be required as a condition of any future development consent.*

DEPARTMENT OF PRIMARY INDUSTRY

Land stewardship met

- *Develop Rehabilitation and Decommissioning/Closure Plans that describes the design criteria of the final land use and landform along with the expected timeline for the rehabilitation program.*
- *Outline monitoring and mitigation measures to be adopted for rehabilitation remedial actions.*

ENVIRONMENT PROTECTION AUTHORITY

Rehabilitation

- *Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).*

7.1. PROPOSED FINAL LAND USE

At completion of extraction and rehabilitation there is a range of options for proposed final land use. There could be a potential for a landfill if required and approved. The surrounding land use is agriculture. Stabilisation of the site to return it to the agricultural landscape includes the potential for stock watering, diverting water captured in the remaining pit to surrounding farm dams. All disturbed areas such as processing or laydown areas would be rehabilitated, and roads likely left for access for the landholders.

However, as part of the preparation of the detailed Quarry Closure Plan, BHQ would consult with the landholders to investigate other potential sustainable and economically productive land uses post-closure in consideration with the local and regional land use strategies that may have further evolved towards the end of life of the quarry.

Annually, over the life of the quarry, an amount of money would be calculated to be set aside as a bond for the future rehabilitation. The bond would be deposited in a bond account to ensure there are sufficient financial resources available to implement the proposed rehabilitation strategy.

7.2. CLOSURE AND REHABILITATION OBJECTIVES

Rehabilitation of the proposed quarry pit would be undertaken in accordance with the following objectives:

- Provide a safe and stable landform compatible with the intended final land use.
- Comply with relevant regulatory requirements and attain regulatory consensus on the successful closure and rehabilitation of the project area.
- Reduce the need for long term monitoring and maintenance by achieving effective rehabilitation.
- Provide a sustainable plant cover through rehabilitation of disturbed areas.
- Minimise the area of the exposed ground which would reduce sediment-laden runoff.

- Provide stock watering points where practicable.

7.3. CLOSURE AND REHABILITATION CRITERIA

Closure criteria would be utilised to demonstrate achievement of rehabilitation objectives. The preliminary closure and rehabilitation criteria for the project are outlined in Table 7-1.

Table 7-1 Preliminary closure and rehabilitation criteria

Aspect	Preliminary Closure Criteria
Decommissioning	• All surface infrastructure that does not have a potential future use associated with post mining land use will be removed.
Landform	• Rehabilitated slopes will be stabilised. • Ensure no significant erosion is present that would constitute a safety hazard, impact on surface water quality or compromise the capability of supporting the end land use. • Ensure contour banks are stable with no evidence of overtopping or significant scouring resulting from runoff. • Ensure the topsoil is free of any hazardous materials. • Ensure any contamination will be appropriately remediated so that guideline criteria for land use are met.
Soil	• Topsoil or a suitable alternative to be available when required. • Topsoil will be spread uniformly over the rehabilitated surface to encourage and support plant growth.
Water	• Ensure the water quality of surface water runoff from the site does not impact existing downstream surface water quality.
Native Vegetation	• Ensure the flora assemblages used for revegetation reflect the endemic native vegetation communities. • Ensure there is no significant weed infestation within the quarry footprint.
Bushfire Hazard	• Ensure appropriate bushfire hazard controls have been implemented.
Ongoing Public Safety	• Appropriate mechanisms are established to control access and manage public safety post closure.

The preliminary closure criteria will be reviewed and revised throughout the life of the Proposal and further refined following the commencement of rehabilitation activities and with consideration of any stakeholder consultation.

7.4. FINAL LANDFORM

7.4.1. Quarry Pit

Wherever possible, rehabilitation would be completed progressively as part of ongoing development of the quarry. Rehabilitation of areas disturbed during the establishment and construction phase for the Proposal would occur generally within two to three months of completion of earthworks. This approach would minimise the visual impact of the project from surrounding areas and stabilise the surfaces, thereby reducing the potential for erosion.

The quarry pit would be left as an open cut pit with 10 m high batters separated by 5 m wide berms. These would be progressively rehabilitated once work around them is completed. However, it is noted that opportunities for progressive rehabilitation within the pit would be limited as there are few berms shaped to final profile during the staged quarry development. As the final wall is left and the pit progresses down, scattered wood would be left on the berms to create habitat and collect fine sediment and organics for soil development. It is not practical to place soil and trees or shrubs on the berms.

The southern portions of the pit would be backfilled with overburden to reduce the area of open pit remaining in the landscape. This area would be ripped, stabilised, covered with organic material or topsoil prior to planting with tubestock or direct seeding with endemic native species or as agreed by the landholder.

A range of bunds would remain around the southern part of the development footprint. These are constructed to reduce potential visual and noise impacts from the Proposal from surrounding landholders and would be revegetated.

A safety bund would be located at the top of the pit to prevent stock or native animals entering the pit. A ramp would be left if required by the landholder to access the pit once filled with water. However, in general the pit would be left with the bund or fence to prevent access and potential incident or death to persons or animals.

There could be potential for the pit to become a landfill following closure. This land use would be decided closer to closure and if there is demand for a landfill from surrounding local government areas. If the final void were considered as a waste facility, the proposed land use would be subject to separate approvals and stakeholder engagement.

A schematic of the final landform has been provided in Figure 7-1.

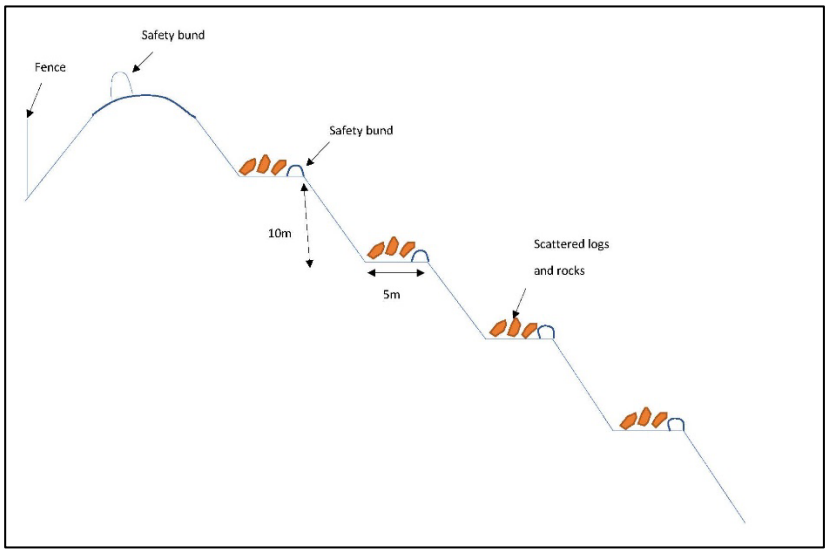


Figure 7-1 Schematic of the final landform of the pit following closure

7.4.2. Laydown and Processing Area at Bundarbo

All infrastructure would be removed from the laydown and processing areas. If disturbed areas are not required by the landholder, they would be rehabilitated. Rehabilitation of the laydown and processing area at the Proposal would be ripped, shaped, stabilised, covered with topsoil, organic material/scatter wood, crusher dust and revegetated.

7.4.3. Haul Road

It is likely the haul road would remain for landholder access to their property. If sections of the road are not required by the landholder, the road would be ripped, reshaped, stabilised and direct seeded with fast growing species of grasses. A range of shrubs and trees could be planted if agreed and approved by the landholder.

7.4.4. Sediment Basin

The sediment basin would be decommissioned and backfilled following completion of stage 1, progressively over life of proposal. This area would be stabilised and revegetated to control potential runoff and subsequent erosion and sedimentation. However, the landholder has the option for the dam to be left for watering stock. If the landholder requests for the basin to remain as a dam, the maintenance of this dam would then be the responsibility of the landholder once the site is decommissioned, rehabilitated and returned to the landowner.

Prior to the end of the operational life of the Proposal, the Proponent would finalise a detailed Quarry Closure Plan three years prior to the cessation of quarrying activities. Any works requested on the disturbed areas by landholders would also be undertaken to return the disturbed area to a standard to commensurate with its ongoing use. Rehabilitation works could involve selected ripping, topsoiling and stabilisation with grasses, and shrubs and trees where feasible.

7.4.5. Rehabilitation Vegetation

Native trees and shrubs endemic to the area that would be used for revegetation are included in Table 7-2 and have been allocated for use in the rehabilitation of the Northridge quarry.

Table 7-2 Native shrubs and trees for quarry rehabilitation

Species	
Scientific Name	**Common Name**
Eucalyptus albens	White Box
E. melliodora	Yellow Box
E. macrorhyncha	Red Stringybark
E. mannifera	Brittle Gum

Species	
Scientific Name	**Common Name**
E. rossii	Scribbly Gum
E. blakelyi	Blakely's Red Gum
E. bridgesiana (along creeks and base of valleys)	Apple Box
E. dives	Broad-leaved Peppermint
Acacia dealbata	Silver Wattle
A. mearnsii	Black Wattle
A. implexa	Hickory Wattle
Leptospermum multicaule	Tea Tree
Pomaderris angustifolia	Pomaderris
Bursaria lasiophylla	Blackthorn

Indicative hydroseeding pasture mix is provided in Table 7-3. Proposed fertiliser would include Starter 15 and Mo Super. The quantities required for both spring and summer would be 300 kg/ha of Starter 15 and 200 kg/ha of Mo Super.

Table 7-3 Proposed hydroseeding pasture mix

Seed Type	Spring Sowing (kg/ha)	Autumn Sowing (kg/ha)
Ryecorn	20	20
Victorian Perennial Ryegrass	6	6
Cocksfoot	8	8
Phalaris	6	6

White Clover*	2	2
Red Clover*	4	2
Sub Clover*	4	6

* All clover seed would be lime pelleted and inoculated.

7.5. SAFEGUARDS AND MITIGATION MEASURES

Quarry closure and rehabilitation would be managed through the development and implementation of proposed mitigation measures described in Table 7-4.

Table 7-4 Safeguards and mitigation measures for closure and rehabilitation

No.	Safeguards and mitigation measures	C	O	R
CR1	Consultation with adjacent landholders will be ongoing to determine the areas and degree of rehabilitation for aspects of the Proposal following closure.		**O**	

CR2	Development of the detailed Quarry Closure Plan, just prior to closure. The Quarry Closure Plan will include:
	• Purpose and objectives of the Plan.
	• Rehabilitation Management Plan.
	  ○ Rehabilitation and revegetation.
	  ○ Topsoil management.
	  ○ Surface preparation.
	  ○ Scheduling of works.
	  ○ Final landform.
	  ○ Weed control.
	  ○ Rehabilitation maintenance.
	  ○ Rehabilitation monitoring.
	• Final Void Management.
	  ○ Void design criteria and specifications.
	  ○ Void slope stability.
	  ○ Control of surface inflow.
	  ○ Monitoring and management.
	  ○ Final void rehabilitation.
	• Quarry Closure and Decommissioning.
	  ○ Closure methodology – decommissioning of infrastructure, plant, buildings, roadways and hardstands.
	  ○ Dams, diversions and surface water features.
	  ○ Post mine land use.
			O	**R**

8. ENVIRONMENTAL MANAGEMENT

8.1. ENVIRONMENTAL FRAMEWORK

The environmental risks associated with the Proposal would be managed by implementing a project-specific suite of mitigation measures detailed in sections 6.2 to 6.15 and summarised below.

All commitments and environmental safeguards would be managed through the implementation of a Construction Environmental Management Plan (CEMP), an Operation Environmental Management Plan (OEMP) and a detailed Quarry Closure Plan. These plans would be prepared sequentially, prior to each stage of works.

These plans would detail the environmental management responsibilities of specific staff roles, reporting requirements, monitoring requirements, environmental targets and objectives, auditing and review timetables, emergency responses, induction and training, complaint response procedures and adaptive management mechanisms to encourage continuous improvement.

8.2. CONSOLIDATED MITIGATION MEASURES

The mitigation measures contained in this report comprise Proposal-specific safeguards, recommendations from specialist assessment reports and reference to a range of best practice guidelines and regulatory requirements. The measures are to be incorporated in Proposal plans and designs, contract specifications and the Construction Environmental Management Plan, Operation Environmental Management Plan and Quarry Closure Plan as appropriate. The mitigation measures are consolidated below. Where measures are relevant to more than one environmental aspect, they are cited only once under the most relevant aspect, to avoid duplication.

A summary of the safeguards and mitigation measures contained within this EIS are listed collectively in Table 8-1.

Table 8-1 Safeguards and mitigation measures summary

No.	Safeguards and mitigation measures	C	O	R
Land Use				
LU1	Consultation with adjacent landholders will be ongoing to manage interactions between the quarry and other properties.	**C**	**O**	
LU2	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) will be prepared, implemented and monitored during the construction and operation of the Proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Runoff which has been captured on site should be managed to avoid any overflow. Captured waters should be reused where possible, evaporated or extracted from the site and disposed of elsewhere. • Regularly inspect erosion and sediment controls, particularly following rainfall.	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	• Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within stormwater paths and along roadsides during concentrated flows. • Ensure that machinery arrives and leaves site in a clean, washed condition, free of fluid leaks and not tracking soil to and from nearby areas. • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. • Areas of unexpected/unintended soil disturbance to be rehabilitated promptly and progressively during construction.			
LU3	Detailed rehabilitation would be a section of the OEMP and would be prepared in consultation with NSW Department of Primary Industries and the landowner prior to decommissioning. The Rehabilitation section is to include: • Removal of gravel from internal access tracks where required, in consultation with landowner.Indicators and standards to indicate successful rehabilitation of disturbed areas. These indicators and standards should be applied to rehabilitation activities once the quarry is decommissioned.			**R**
LU4	A Pest and Weed Management Plan would be prepared as part of the CEMP and OEMP to manage the occurrence of noxious weeds and pest species across the site during construction and operation. The plans must be prepared in accordance with Hilltops Council and NSW DPI requirements. Where possible integrate weed and pest management with adjoining landowners.	**C**	**O**	
LU5	The Proponent would consult with GSNSW in relation to biodiversity offset areas or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral resources.	**C**		
LU6	Construction and operations personnel will drive carefully and below the designated speed limit of the haul road to minimise dust generation and disturbance to nearby farming enterprises.	**C**	**O**	
LU7	Grazing would continue within the development site and be used as an option to control weeds and grass growth, and to maintain agricultural production at the site.		**O**	
LU8	The Proponent would provide annual production data for the subject site to the NSW Division of Resources and Geoscience for the collection of construction material production data.		**O**	
Biodiversity				
BD1	Time works to avoid critical life cycle events:	**C**		

No.	Safeguards and mitigation measures	C	O	R
	• If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur (see below) • vegetation clearance should be planned outside of the breeding season of the Brush-tailed Phascogale (April-June) and Superb Parrot (Sept to November).			
BD2	Implement clearing protocols during tree clearing works, including pre-clearing surveys, and staged clearing, the presence of a trained ecological or wildlife handler: • Ecologist to conduct a pre-clearing survey and pre-clearing checklist no more than 7 days prior to tree clearing • If nesting/roosting fauna are observed during the pre-clearing survey, an ecologist or trained wildlife handler would be present during the felling of the tree to either relocate said fauna or take to nearest veterinary hospital or wildlife carer. • Pre-clearing checklist • Tree clearing procedure • Tree-clearing procedure including relocation of habitat features to adjacent areas of Zone 2 (derived grassland) for habitat enhancement	**C**		
BD3	Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed: • Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees to be retained; • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance; and • Where trees are to be retained, an adequate protection zone (TPZ) will be provided around each tree for the duration of construction, where possible. Details for calculating TPZs are provided within Australian Standard 4970-2009 – Protection of trees on development site.	**C**		
BD4	Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise: • Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	**C**		
BD5	Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill: • Avoid night works; and • Direct lights away from vegetation.	**C**	**O**	
BD6	Adaptive dust monitoring programs to control air quality: • Daily monitoring of dust generated by construction activities; and	**C**		

No.	Safeguards and mitigation measures	C	O	R
	• Construction would cease if dust observed being blown from site until control measures were implemented; and • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.			
BD7	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas: • Machinery would be cleaned prior to entering the site to ensure that weed seeds and propagules are not imported to the site. • Weeds shall be managed according to the requirements of the Biosecurity Act; in that they are to be disposed of at a licenced waste management facility or similar. Weeds are not to be mulched and repurposed for any landscaping use. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported.	**C**	**O**	
BD8	Staff training and site briefing to communicate environmental features to be protected and measures to be implemented: • Site induction; and • Toolbox talks.	**C**		
BD9	Injury and mortality of fauna entering the proposal site during construction and road strike risk: • If fauna are encountered during construction, allow fauna to leave an area without intervention as much as possible. • The project manager and/or environment manager should ensure the contact details of the animal rescue agency/wildlife care group or vet are provided to the site manager, displayed in the site office and included in the Construction Environmental Management Plan (CEMP) or other relevant management plans for the project.	**C**		
BD10	Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment: • An erosion and sediment control plan would be prepared in conjunction with the final design and implemented; and • Spill management procedures would be implemented.	**C**		
BD11	Staff training and site briefing to communicate impacts of traffic strikes on native fauna: • Awareness training during site inductions regarding enforcing site speed limits; and • Site speed limits to be enforced to minimise fauna strike.	**C**	**O**	
BD12	Clearing and rehabilitation protocols to ensure the protection of SAII entities: • Complete a Construction Environmental Management Plan (CEMP) to include the following:	**C**		

No.	Safeguards and mitigation measures	C	O	R
	○ Ensure construction site has exclusion fencing to ensure no accidental vegetation removal occurs in the adjacent box-gum woodland. ○ Ensure no stockpiling or storage of equipment, soil or rubbish occurs in the adjacent box-gum woodland. ○ As part of a site induction, inform construction staff these areas are exclusion zones and therefore not to be disturbed. ○ Place logs from trees that are to be removed in the development site in the Woodland areas to be retained. • Complete a Rehabilitation Plan for the Woodland areas to manage: ○ Weed control. ○ Replanting or regeneration ○ Re-location of hollows from tree removal ○ Location of nest boxes • Location of logs.			
BD13	Implementation of management plans: • Preparation and implementation of a Biodiversity Management Plan (BMP). Including fauna and flora management and relevant procedures and protocols. • Preparation and implementation of Construction Environment Management Plan (CEMP). • Preparation and implementation of Rehabilitation Plan (RP).	**C**		
Water Use, Quality and Hydrology				

No.	Safeguards and mitigation measures	C	O	R
WA1	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) will be prepared, implemented and monitored during the construction and rehabilitation of the Proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Runoff which has been captured on site to be managed to avoid any overflow. Captured waters will be evaporated or extracted from the site and disposed of elsewhere • Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within stormwater paths and along roadsides during concentrated flows. • Ensure that machinery arrives and leaves site in a clean, washed condition, free of fluid leaks and not tracking soil to and from nearby areas • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. Areas of unexpected/unintended soil disturbance will be rehabilitated promptly and progressively during construction.	**Prior to and during construction**	**O**	
WA2	Best practice management measures to be employed where applicable to reduce the risk of erosion and sedimentation control: • Preserve and stabilise disturbed areas, drainageways and steep slopes. • Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. Provide access and general construction controls.	**C**	**O**	
WA3	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids.	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.			
WA4	A protocol shall be developed in relation to discovering buried contaminants within the development site (e.g. pesticide containers, if any). It will include stop work, remediation and disposal requirements.			
	If significant contamination is found on site during construction or operation activities, it must be reported in line with Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011). Further action shall be undertaken when necessary in line with the Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).	**C**	**O**	
WA5	Any area temporarily used during construction (laydown and trailer complex areas) to be restored to original condition or re-vegetated with native plants where possible.	**C**		
WA6	A Spill Response Management Plan will be prepared, implemented and monitored during the construction and operation of the Proposal.	**C**	**O**	
WA7	Vehicles, plant and equipment will be maintained to minimise leakages during construction and operation of the Proposal.	**C**	**O**	
Air Quality				
AQ1	General transport controls include: • All loads leaving the site will be covered with a vehicle fitted tarpaulin system. • A speed limit of 40 km/hr will be adopted on all unsealed roads across the site. • Water cart spraying will be utilised on all unsealed roads at a rate of >2L/m2/hr where practical • Wheel washing bay will be considered at the meeting point of sealed and unsealed roads.	**C**	**O**	
AQ2	Dust suppression controls at crusher, screening and dumping areas include: • Periodical water spraying. • Minimising dust generating activities during periods of excessive wind. Reduction of rate of activity in response to excessive dust generation.		**O**	
AQ3	Dust suppression controls for quarry activities including blasting, drilling, stripping of overburden and on-site dumping to include: • Periodical water spraying. • Minimising dust generating activities during periods of excessive wind. • Reduction of rate of activity in response to excessive dust generation. Locating and relocating high impact activities to less sensitive on-site areas where possible.		**O**	

No.	Safeguards and mitigation measures	C	O	R
AQ4	Stockpiles and exposed areas of soil and rock will be contained through wetting or covering with an appropriate seal if left for periods of time.	**C**	**O**	
AQ5	Monitor local weather conditions and manage the site if any conditions will exacerbate air quality (e.g. wind).	**C**	**O**	
AQ6	Fires and material burning are prohibited on the development site.	**C**	**O**	
AQ7	The single transportation route to the development site will be utilised to maximise use of sealed roads.	**C**	**O**	
AQ8	Vegetation skirting the site to be retained. Exposed areas that are not part of active operational areas will be revegetated as soon as practically possible.	**C**	**O**	
AQ9	Using technologies to optimise blast patterns for consistent energy distribution and reducing the explosive overconsumption.	**C**	**O**	
AQ10	All pumps and machinery are to use appropriately sized and high energy efficient motors to reduce the carbon footprint.	**C**	**O**	**R**
AQ11	Time switches and sensor lights are to be used across the Development site to maximise energy efficiency to reduce the carbon footprint.	**C**	**O**	**R**
AQ12	Variable speed drivers (VSD) are to be used on electric motors to maximise energy efficiency to reduce the carbon footprint.	**C**	**O**	**R**
AQ13	Fuel economy and energy consumption of vehicles are to be considered before purchasing new vehicles and machinery, regular servicing is to be undertaken.	**C**	**O**	**R**
Visual Amenity				
VA1	Dust to be controlled in response to visual cues. Refer to section 6.5.	**C**	**O**	
VA2	Night lighting will be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations). Lighting to be directed away from roads and residents so as not to cause light spill that may be hazardous to drivers. • Comply with all relevant standards, codes of practice and policies. • Light spill is light that falls outside the area that is intended to be lit and can contribute to glare and waste energy. Spill light above the horizontal plane also contributes to artificial skyglow. All light fittings should be located, aimed or shielded to avoid spill. Measures to prevent spill include: o Installing light fittings with an opaque cover and flat glass, mounted horizontally on both axes. o Mounting lights under part of a building (including awnings, verandahs or roofs) so light is blocked above the horizontal plane.	**C**	**O**	**R**

No.	Safeguards and mitigation measures	C	O	R
	○ Design buildings to internalise lights. • Wherever possible, light should be directed downwards. Mitigation measures include: ○ Installing direction fittings, such as floodlights or spotlights. ○ Use higher mounting heights that allow lower main beam angles that are closer to the vertical. ○ Lighting of all-night operations need to be downward facing, of a peach colour and shielded. • Operational light from the Proposal must be directed downwards, or inwards towards the work area. • Light fittings that are specifically designed to minimise light shining near to or above the horizontal plane should be used. • Energy efficient globes include LEDs and high-pressure sodium. Where floodlights are required, wherever possible use fittings with asymmetric beams that permit horizontal glazing. These are to be kept at or near parallel to the surface being lit, usually the ground, and should prevent light spill. An asymmetric beam also allows the light fitting to be mounted on the edge of an area and avoids the need for fittings to be tilted upwards. Flat glass light fittings should be installed with the glass horizontal to make efficient use of the brightest part of the beam and to eliminate light spill.			
V3	Bunding along the eastern boundary of the pit will be maintained and revegetated to screen views from sensitive receivers and maintain landscape character.	**C**	**O**	**R**
Noise and Vibration Impacts				
NV1	The Operational Environmental Management Plan (OEMP) will include a section on Noise and Vibration Management (NVM) to manage noise and vibration emission from the site. The NVM section will include the following, as necessary: • Notification procedures for the sensitive receivers identified in this report. • Complaints handling procedure and point of contact. • Noise monitoring program and implementation procedure. • Record of blasting dates, blast charges and locations. • Complaints registered (if not already included in the OEMP). • Map of on-site noise barriers/berms.	**C**	**O**	**R**
NV2	The blasting and extraction are restricted to the hours of operation. Audible work will be during standard working hours: • Monday to Friday 7am to 6pm. • Saturday and Sunday 8am to 6pm.	**C**	**O**	**R**

No.	Safeguards and mitigation measures	C	O	R
	No blasting work on Sundays and public holidays.			
NV3	Avoid dropping extracted material from excessive height into carry vehicles.	**C**	**O**	**R**
NV4	Keep noise generating equipment well maintained and lubricated.	**C**	**O**	**R**
NV5	Plant and equipment to be operated in a quiet and efficient manner, including: • Turning off plant and equipment that is not being used. • Ensuring plant is regularly maintained. Repairing or replacing equipment that becomes noisy.	**C**	**O**	**R**
NV6	All staff on-site to be informed, through toolbox meetings, training and education, of procedures to operate plant and equipment in a quiet and efficient manner.	**C**	**O**	**R**
NV7	Adjoining landowners to be notified of any blast 7 days prior to the blast event. Livestock to be relocated away from blasts as necessary.	**C**	**O**	**R**
NV8	Blasting activities (excluding drilling and charging) are five to ten times a year during the following hours: • Monday to Friday 9 am to 5 pm. • Saturday and Sunday 8am to 6pm. No blasting on Sundays or public holidays.	**C**	**O**	**R**
NV9	Noise and vibration monitoring and validation of the initial blast for the new quarry is to occur at the nearest sensitive receiver to confirm noise and vibration levels.	**C**	**O**	**R**
NV10	Blast monitoring will be in accordance with the monitoring requirements for blasting activities outlined in the Australian and New Zealand Environment Council Technical Basis for Guidelines to Minimise Annoyance Due to the Blasting Overpressure and Ground Vibration (1990).	**C**	**O**	**R**
NV11	The quarry operator is to keep a record of all complaints made in relation to noise arising from quarry operations. The record must include the following detail: • The date and time of the complaint. • The method by which the complaint was made. • Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect. • The nature of the complaint. • The action taken by the quarry operator in relation to the complaint, including any follow-up contact with the complainant. If no action was taken by the licensee, the reasons why no action was taken.	**C**	**O**	**R**
Topography, Geology and Soils				

No.	Safeguards and mitigation measures	C	O	R
SO1	Clearly mark out areas of operation for construction and stripping purposes	**C**		
SO2	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) would be prepared as a sub plan in the CEMP and OEMP, implemented and monitored during the construction and operation of the Proposal, in accordance with Landcom (2004) and DECC (2008), to minimise soil (and water) impacts. Refer to section 6.2.3 for details on what to include in the SWMP and ESCP.	**C**	**O**	
SO3	Best practice management measures to be employed where applicable to reduce the risk of erosion and sedimentation control: • Preserve and stabilise disturbed areas, drainageways and steep slopes. • Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. • Provide access and general construction controls.	**C**	**O**	
SO4	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids. • In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	
SO5	A comprehensive Fire Management and Emergency Response (FMER) will be developed for the site and specifically address foreseeable on-site and off-site emergency incidents. The FMER will be contained within the BHQ Emergency Response Plan and will detail appropriate risk control measures that need to be implemented to safely mitigate potential risk to soil, health and safety of firefighters and first responders in the case of a hazardous spill.	**C**	**O**	
SO6	A Fire Management and Emergency Response will be developed and implemented during construction, operation and rehabilitation to prevent contaminants affecting adjacent surrounding environments. The FMER will include spill and contamination responses to: • Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation).	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
SO7	A protocol will be developed in relation to discovering buried contaminants within the development site (e.g., pesticide containers, if any). It would include stop work, remediation and disposal requirements.			
	If significant contamination is found on site during construction or operation activities, it must be reported in line with Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011). Further action should be undertaken when necessary in line with the Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).	**C**	**O**	
SO8	Dust and noise controls shall be implemented during construction of the facility to ensure minimal impact to nearby receptors and ecosystems. Measures can include but are not limited to dust gauge monitoring, dust suppression techniques, ensuring machinery meets noise regulations etc.	**C**		
SO9	Any area temporarily used during construction (laydown and trailer complex areas) will be restored to original condition or re-vegetated with native plants where possible.	**C**		
Traffic, Transport and Road Safety				
TT1	The turn facilities are currently not line marked; line marking will be provided as part of the Proposal in accordance with the previously approved design provided within Appendix G.	**Design**		
Aboriginal Heritage				
AH1	Works within the Development site may proceed with caution.	**C**	**O**	**R**
AH2	Any proposed activity outside of the current assessment area shall also be subject to an Aboriginal heritage assessment.	**C**	**O**	**R**
AH3	If any items suspected of being Aboriginal in origin are discovered during works, all work in the immediate vicinity must stop and Heritage NSW must be notified. The find will need to be assessed and if found to be an Aboriginal object an Aboriginal Heritage Impact Permit (AHIP) may be required.	**C**	**O**	**R**
AH4	In the unlikely event that human remains are identified during works, all work must cease in the immediate vicinity and the area must be cordoned off. The Proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of a crime scene, or possible Aboriginal remains. If the remains are thought to be Aboriginal, Heritage NSW must be notified.	**C**	**O**	**R**
Historic Heritage				
HH1	Should an item of historic heritage be identified, the Heritage Division (DPIE) will be contacted prior to further work being carried out in the vicinity.	**C**	**O**	**R**
Socio-economic and Community				
SE1	A Community and Stakeholder Engagement Plan (CSEP) will be prepared as a subplan in the CEMP and OEMP and will be	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	R
	implemented during construction to manage impacts to community stakeholders, including but not limited to: • Protocols to keep the community updated about the progress of the project and project benefits. • Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.). • Protocols to respond to any complaints received.			
SE2	Liaise with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.	**C**	**O**	
Hazards				
HA01	Update the BHQ Bushfire Emergency Response Plan as part of the Mine Safety Management Plan (MSMP) and Emergency Response Management Plan. The updated plan will be prepared in consultation with the local Rural Fire Service and details of the plan would be provided in the updated CEMP and OEMP Environmental Management Plan (EMP) for the project.			
HA02	Dangerous or hazardous materials will be transported, stored, and handled in accordance with AS1940-2004: The storage and handling of flammable and combustible liquids, and the ADG Code where relevant. All potential pollutants kept on-site will be stored in accordance with relevant HAZMAT requirements and bunded.		**C**	
HA03	All design and engineering will be undertaken by qualified competent persons with the support of specialists as required.		**Design**	
HA04	All electrical equipment will be designed in accordance with relevant codes and industry best practice standards in Australia.		**Design**	
HA05	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards; and • The NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids. In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	**R**
HA06	Water for use in firefighting will be provided by the site water management system, to ensure there is sufficient water available on site for bushfire fighting purposes.	**C**	**O**	**R**
HA07	The haul road on the site provides access across the site for fire fighting vehicles. Water for use in firefighting will be provided by an extraction groundwater bore onsite. Firefighting equipment including fire extinguishers and hose reel (landfill shed only) will continue to be provided at all infrastructure areas and mobile equipment will be maintained in accordance with Australian Standards and WH&S guidelines.	**C**	**O**	**R**
HA08	BHQ has a long history of safe operation of the Jugiong Quarry and implementation of appropriate measures on site for managing bushfire risk. BHQ will continue to implement the	**C**	**O**	**R**

No.	Safeguards and mitigation measures	C	O	R
	appropriate measure to reduce the risk of fire ignition and the spread of bushfires across the site in consultation with RFS.			
Resource Use and Waste Generation				
WM1	A Waste Management Plan (WMP) will be developed as a subplan in the CEMP and OEMP and implemented during construction, operation, and rehabilitation to minimise wastes. It will include but not be limited to: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Spoil would be blended with the product that is suitable for sale and/or used as backfill in the sediment basin during staging of the quarry pit. Dust generated during operation of the quarry would be captured and used as a capping layer at Bald Hill Ecofill Landfill. • General waste would be disposed of at the adjacent Bald Hill Ecofill Landfill. • Quantification and classification of all waste streams. • Provision for recycling management onsite. • Provision of toilet facilities for onsite workers and how sullage will be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	**C**	**O**	**R**
Closure and Rehabilitation				
CR1	Consultation with adjacent landholders would be ongoing to determine the areas and degree of rehabilitation for aspects of the Proposal following closure.		**O**	

CR2	Development of the detailed Quarry Closure Plan, just prior to closure. The Quarry Closure Plan would include:
	• Purpose and objectives of the Plan.
	• Rehabilitation Management Plan.
	  ○ Rehabilitation and revegetation.
	  ○ Topsoil management.
	  ○ Surface preparation.
	  ○ Scheduling of works.
	  ○ Final landform.
	  ○ Weed control.
	  ○ Rehabilitation maintenance.
	  ○ Rehabilitation monitoring.
	• Final Void Management.
	  ○ Void design criteria and specifications.
	  ○ Void slope stability.
	  ○ Control of surface inflow.
	  ○ Monitoring and management.
	  ○ Final void rehabilitation.
			O	**R**

No.	Safeguards and mitigation measures	C	O	R
	• Quarry Closure and Decommissioning. o Closure methodology – decommissioning of infrastructure, plant, buildings, roadways and hardstands. o Dams, diversions and surface water features. o Post mine land use.			

C: Construction; O: Operation; R: Rehabilitation

9. CONCLUSION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *a conclusion justifying 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 Environmental Planning and Assessment Act 1979;*

9.1.1. Need and Benefits

The proposed Mt Bundarbo Quarry would involve the construction and operation of a quarry near Jugiong, south eastern NSW. The 29.57 ha development site is located on freehold rural land with a portion located on Crown Lands, approximately 7.5 km southeast of Jugiong in the Hilltops LGA. The development footprint of the Proposal is approximately 12.96 ha with a pit footprint of approximately 8 ha.

The Proposal would contribute to the supply and use of the extracted material locally or within the region. It would continue the supply of locally sourced hard rock as the resource capacity of the adjacent North Ridge quarry is depleting. The Proposal would provide ongoing supply and certainty.

Local social and economic benefits that would be associated with the construction and operation of the Proposal include:

- Increased visitation to towns and localities for services including food and accommodation, resulting in shared economic benefits.
- Support of local employment and regional development and economic opportunities.
- Potentially reduce road kilometres to development sites in the region, and in turn potentially reduce greenhouse gas emissions that contribute to climate change, by providing a resource that can be locally sourced and is well located to access major roads and train lines minimising travel.

Characteristics of the Proposal that make it suitable for a quarry are identified and justified, specifically for land use and compatibility with surrounding land uses, strategic need, the resource need, and the low environmental constraints and minimised impacts to the community and environment. The investigation and laboratory testing of the resource indicate there is approximately 3 – 4 million tonnes of resource. Material testing indicates a medium to high strength Olivine Basalt.

No alternative sites were investigated. The location of the quarry is defined by the underlying geology. Also, existing infrastructure such as the landfill, North Ridge Quarry and rock processing plant are already located in proximity to the Proposal.

9.1.2. Environmental Assessment and Mitigation of Impacts

NGH, with input from specialists as required, has prepared this EIS on behalf of the Proponent, Bald Hill Quarry Pty Ltd. This EIS has assessed the broader Proposal and development site where infrastructure may be located. Overall, the proposed quarry would represent a further contribution of rock aggregate to the local region for use in the development of infrastructure projects. It is considered compatible with existing land uses and would be rehabilitated following closure and returned to agricultural use.

The precautionary principle has been adopted in the assessment of expected impacts. The aims, structure and content of this EIS have incorporated the principles of ESD. The mitigation measures described in this EIS set out an auditable environmental management commitment by the Proponent.

The key environmental risks have been investigated through detailed specialist investigations. These included:

- Land use – While the agricultural output from the existing farmland would be reduced by the operation of the proposed quarry, this would form a very small reduction in the agricultural output of the Jugiong area. Although the Proposal is not reversible, it would result in a small permanent loss (approximately 12 ha) of agricultural land.
- Biodiversity impacts – the BDAR concluded that that no significant impacts to threatened species and ecological communities would result from development of the proposal. No referrals under the EPBC or BC Act are considered to be required. An offset requirement has been calculated for the project and would ensure an in-perpetuity commitment to account for the small area of native vegetation that the proposal cannot avoid.
- Water use and water quality – Water would be sourced on-site; captured stormwater runoff would be used or if required, water from the BHQ groundwater bore, which has an annual licence allocation of 10 ML. During construction, water would be used primarily for dust suppression. During operation, quantities of water required would be for dust suppression and for use in processing. Captured rainwater on-site is currently used for staff amenities and bottled water is provided for staff in the staff office. Minimal impacts to water quality are expected with the correct use of erosion controls during construction and the maintenance of groundcover during operation. The Proposal is not prone to flood inundation and would have no impact on flooding in the area.
- Climate and air quality – the AQIA predicts that the operational quarry is likely to cause no or minor additional exceedances of the 24-hour average PM_{10} criterion and no exceedances of the $PM_{2.5}$ criterion. Annual PM_{10}, $PM_{2.5}$, RCS, TSP and dust deposition criteria are predicted to be met at all receptors. Mitigation measures to reduce dust during construction and operation include the use of water carts for dust suppression, covering loads and stockpiles, and a stop works during adverse weather.
- Visual amenity - the VIA concluded that the operational quarry would have a very low visual impact on the majority of people living in or travelling through the landscape surrounding the Proposal. Remnant native vegetation would soften views of the proposal and act as natural screening. A bund along the eastern boundary of the site would act as an erosion control. However, it would be revegetated and remain during operation and rehabilitation as a screen.
- Aboriginal heritage impacts – the Aboriginal Heritage survey and assessment found that no operational impact to Aboriginal cultural heritage would occur from the Proposal. A mitigation measure would be imposed that if any items suspected of being Aboriginal in origin are discovered during works, all work in the immediate vicinity must stop and Heritage NSW must be notified. The find will need to be assessed and if found to be an Aboriginal object an Aboriginal Heritage Impact Permit (AHIP) may be required.
- Noise and vibration impacts – it is predicted that no noise exceedance above the project Noise Management Level (NML) would occur for the five receivers located within 3 km of the Proposal. Mitigation measures would further manage noise impacts to sensitive receivers.
- Traffic, transport and road safety – the traffic assessment concluded that the existing road network would be able to accommodate the minor additional traffic during construction and operation. Line marking of existing turning treatments on the Hume Highway would be required. The results of an intersection audit identified that an additional area of pavement would be required at the Old Hume Highway intersection with the Hume Highway to accommodate two heavy vehicles turning at the same time. The intersection upgrade has been included in this EIS.

Management measures have been developed to address environmental impacts and risks to these and other physical, social and environmental impact areas. Key management strategies centre on the development of management plans and protocols to minimise impacts and manage identified risks. The management measures account for uncertainty and are precautionary where required. The impacts and risks identified are considered highly manageable with the effective implementation of the measures stipulated in this EIS and are consistent with the objectives of the *Environmental Planning and Assessment Act 1979*.

The objects of the EP&A Act have been considered throughout this environmental assessment, including natural resources and competing land uses. The Proposal aims to support local industry and the regional economy through the establishment of a new quarry, benefiting from existing quarry infrastructure and reducing the overall net impact of the Proposal. The Proposal would provide for the considered management of an essential natural resource. The Proposal has been located and designed so that it would avoid environmentally sensitive land and clearing of native vegetation as much as possible. For these reasons it is considered that the Proposal is consistent with the objectives of the EP&A Act.

9.1.3. Ability to be Approved

- The development site is highly appropriate for a quarry.
- The Proposal is consistent with local, State and Federal planning provisions.
- The development site has been selected to avoid or minimise environmental impacts where possible through an iterative constraints' investigation/design process.
- The development footprint has been designed to avoid or minimise impacts to vegetation and habitat. No Aboriginal artefacts were identified on-site.
- Visual impacts have been reduced through screening by a vegetated bund.
- Land use conflicts and hazard risks are considered manageable and acceptable.

The residual impacts are considered justifiable and acceptable in the context of the Proposal's benefits.

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APPENDIX A SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Planning and Assessments
Energy, Resources and Compliance
Contact: Joel Herbert
Phone: 8289 6614
Email: Joel.herbert@planning.nsw.gov.au

Belinda Fourie
Bald Hill Quarry Pty Ltd
5423 Hume Highway
JUGIONG NSW 2726

Via email: safety@baldhillquarry.com.au

27/05/2020

Dear Ms Fourie

Planning Secretary's Environmental Assessment Requirements
Mt Bundarbo Pit Quarry (EAR 1441)

I refer to your request for the Planning Secretary's Environmental Assessment Requirements (SEARs) for the above development, which is designated local development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Please find attached a copy of the SEARs for the Environmental Impact Statement (EIS) for the proposed development. These requirements have been prepared in consultation with relevant government agencies based on the information your company has provided to date. The agencies' comments are attached for your information (see Attachment 2). You must have regard to these comments in the preparation of the EIS.

In your request for SEARs, you have also indicated that the proposal is classified as integrated development under section 4.46 of the EP&A Act as it requires additional statutory authorisations. You are encouraged to consult with the relevant agencies with respect to licence/approval requirements. If further integrated approvals are required, you must undertake your own consultation with the relevant public authorities, and address their requirements in the EIS.

The Department wishes to emphasise the importance of effective and genuine community consultation during the preparation of the EIS. This process should provide the community with a clear understanding of the proposal and its potential impacts and include active engagement with the community regarding key issues of concern. The development application (DA) for the proposed development must be accompanied by clear evidence of the consent to the lodgement of the DA of all owners of land directly subject to the DA.

Please contact the consent authority at least two weeks before you propose to submit your DA. This will enable the consent authority to:

- confirm the applicable fees; and
- determine the number of copies (hard-copy and digital) of the EIS that will be required for reviewing purposes.

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will also require separate approval under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Commonwealth Department of the Environment and Energy to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 111).

You should contact the Mine Safety branch of the NSW Resources Regulator in regard to this and other matters relating to compliance with the *Work Health and Safety (Mines and Petroleum Sites) Act 2013.*

If you have any enquiries about these requirements, please contact Joel Herbert on the details listed above.

Yours sincerely,

Matthew Sprott
Director
Resource Assessments
as delegate for the Planning Secretary

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000.*

Designated Development

EAR Number	EAR 1433
Proposal	Extraction and processing of up to 300,000 tonnes of hard rock per annum over a 20 year period
Location	5423 Hume Highway, Jugiong, NSW 2726 (Lot 148 DP753592, Lot 9 DP439146, Lot 7002 DP1031310)
Applicant	Bald Hill Quarry Pty Ltd
Date of Issue	27 May 2020
Date of Expiry	27 May 2022
General Requirements	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.* In particular, the EIS must include: • an executive 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; - identification of the resource, including the amount, type, composition; - the layout of the proposed works and components (including any existing infrastructure that would be used for the development); - 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; - a detailed rehabilitation plan for the site; - 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; - a list of any other approvals that must be obtained before the development may commence; - the permissibility of the development, including identification of the land use zoning of the site; - 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; • a suitable monitoring and reporting procedure to ensure that the total resource extracted by the development does not exceed 5 million tonnes; • a conclusion justifying 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 *Environmental Planning and Assessment Act 1979*; and • a signed declaration from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.
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. 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.

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; • **Blasting & 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 ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features; • **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*. 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; • **Water** – including: - a detailed site water balance and an assessment of any volumetric water licensing requirements, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply infrastructure and water storage structures; - identification of any licensing requirements or other approvals required under the *Water Act 1912* and/or *Water Management Act 2000*; - demonstration that water for the construction and operation of the development can be obtained from an appropriately authorised and reliable supply in accordance with the operating rules of any relevant Water Sharing Plan (WSP) - 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 activities that could cause erosion or sedimentation issues, and the proposed measures to prevent or control these impacts; - an assessment of any likely flooding impacts of the development; - 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; • **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 - 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 - 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; • **Traffic & Transport** – including: - 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: - potential impacts on soils and land capability (including potential erosion and land contamination) and the proposed mitigation, management and remedial measures (as appropriate); - 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 - the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*; • **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; • **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; • **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; • **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 • **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 - the measures that would be undertaken to ensure sufficient financial resources are available to implement the proposed rehabilitation strategy, recognising that a rehabilitation bond will likely be required as a condition of any future development consent.
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-industries-quarries-eis-guideline-1996-10.ashx. In addition, the EIS must assess the development against the *Harden Local Environmental Plan 2011* and any relevant development control plans/strategies.

ATTACHMENT 1

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:
http://www.planning.nsw.gov.au
http://www.bookshop.nsw.gov.au
http://www.publications.gov.au

Environmental Planning Instruments, Policies, Guidelines & Plans

Environmental Planning Instruments - General	
	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
	State Environmental Planning Policy (State and Regional Development) 2011
	State Environmental Planning Policy (Infrastructure) 2007
	Harden Local Environmental Plan 2011
Risk Assessment	
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
Land	
	State Environmental Planning Policy No. 55 – Remediation of Land
	Agricultural Land Classification (DPI)
	Rural Land Capability Mapping (OEH)
	Soil and Landscape Issues in Environmental Impact Assessment (NOW)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC)
	Guidelines for Consultants Reporting on Contaminated Sites (EPA)
	Agricultural Issues for Extractive Industry Development (DPI)
Water	
Groundwater	NSW Aquifer Interference Policy 2012 (NOW)
	NSW State Groundwater Policy Framework Document (NOW)
	NSW State Groundwater Quality Protection Policy (NOW)
	NSW State Groundwater Quantity Management Policy (NOW)
	Australian Groundwater Modelling Guidelines 2012 (Commonwealth)
	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	Guidelines for the Assessment & Management of Groundwater Contamination (EPA)
Surface Water	NSW State Rivers and Estuary Policy (NOW)
	NSW Government Water Quality and River Flow Objectives (EPA)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom) and associated Volume 2E: Mines and Quarries (DECC)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control (EPA)
	Technical Guidelines: Bunding & Spill Management (EPA)
	A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
	NSW Guidelines for Controlled Activities (NOW)
	Guidelines for Controlled Activities on Waterfront Land 2018 (NRAR) (Waterfront land only)
Flooding	Floodplain Development Manual (OEH)
	Floodplain Risk Management Guideline (OEH)

Biodiversity	
	Biodiversity Assessment Method (OEH 2017)
	Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH 2017)
	Ancillary rules: Biodiversity conservation actions
	Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying variation rules
	NSW Guide to Surveying Threatened Plants (OEH 2016)
	Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECC 2009)
	Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC 2004)
	Threatened Species Assessment Guideline – The Assessment of Significance (DECC 2007)
	OEH principles for the use of biodiversity offsets in NSW
	NSW State Groundwater Dependent Ecosystem Policy (NOW)
Heritage	
	The Burra Charter (The Australia ICOMOS charter for places of cultural significance)
	Guide to investigation, assessing and reporting on Aboriginal cultural heritage in NSW (OEH) 2011
	Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH)
	Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (OEH)
	Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH)
	NSW Heritage Manual (OEH)
	Statements of Heritage Impact (OEH)
Noise & Blasting	
	NSW Noise Policy for Industry (EPA)
	Interim Construction Noise Guideline (EPA)
	NSW Road Noise Policy (EPA)
	Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC)
Air	
	Protection of the Environment Operations (Clean Air) Regulation 2002
	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA)
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA)
	Assessment and Management of Odour from Stationary Sources in NSW (DEC)
	National Greenhouse Accounts Factors (Commonwealth)
Transport	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RMS) & relevant Austroads Standards
Hazards	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Hazardous and Offensive Development Application Guidelines – Applying SEPP 33
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
	Planning for Bushfire Protection 2006 (RFS)
Resource	
	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 (JORC)
Waste	
	Waste Classification Guidelines (EPA)
	Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes 1999 (EPA)
Rehabilitation	
	Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth)
	Strategic Framework for Mine Closure (ANZMEC-MCA)

ATTACHMENT 2

AGENCIES' CORRESPONDENCE

Planning, Industry & Environment

Joel Herbert
Environmental Assessment Officer
Energy and Resource Assessments
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150
Locked Bag 5022, Parramatta NSW 2124
Joel.Herbert@planning.nsw.gov.au
25/03/2020

Our ref: DOC20/247607

Your ref: EAR ID No. 1441

Dear Mr Herbert

Request for Input-Mt Bundarbo Quarry EAR ID No. 1441

Request of Environmental Assessment Requirements

I refer to your request for our input for the preparation of an Environmental Impact Statement (EIS) for the above designated development located in the Hilltops local government area. The Biodiversity & Conservation Division (BCD) have provided a list of Environmental Assessment Requirements (EAR's) in Attachment 1 for this project that relate to Biodiversity and Aboriginal cultural heritage and Guidance material in Attachment 2.

The EIS should assess the ecological impacts associated with the proposed works in accordance with the *Biodiversity Conservation Act 2016*. We also recommend that this project's impacts have been appropriately addressed in accordance with the avoid, minimise and offset hierarchy established in the Department's offsetting principles and relevant legislation**.**

The EIS must assess impacts to Aboriginal cultural heritage values in accordance with relevant legislative requirements. If assessment indicates that Aboriginal objects are to be harmed by the project, an Aboriginal Heritage Impact Permit (AHIP) will be required from the Department under the *National Parks and Wildlife Act 1974*.

Yours sincerely,

ALLISON TREWEEK

Senior Team Leader – Planning

South East, Biodiversity and Conservation

Enclosure: Attachment 1 – Recommended Environmental Assessment Requirements (EARs) for Mt Bundarbo Quarry EAR ID No. Attachment 2 – Guidance material

Attachment 1

Recommended Environmental Assessment Requirements (EARs) for the proposed Mt Bundarbo Quarry EAR ID No. 1441

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Recommended Environmental Assessment Requirements (EARs) for the proposed Mt Bundarbo Quarry EAR ID No. 1441

1. The Proposal

All components of the proposed development must be clearly described, including:

- the location of the proposed development and its context in the locality
- The rationale for the project.
- the size, scale and type of the proposed development
- the pre-construction, construction, operational, and, where relevant, decommissioning phases of the proposed development, and the methods proposed to implement these phases,
- plans and maps of the proposed development showing the locations of relevant phases and infrastructure
- the staging and timing of the proposed development
- the proposed development's relationship to any other proposals and developments

2. Environmental Impacts of the Proposal

The proponent must consider, assess, quantify and report on the likely environmental impacts of the proposal if applicable, particularly:

- Aboriginal cultural heritage
- Biodiversity
- Flooding, floodplain issues and coastal erosion
- Cumulative impacts

The Environmental Assessment Requirements should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines and reference material is presented in **Attachment 2**. Appropriate justification should be provided in instances where the matters below are not addressed.

3. Aboriginal Cultural Heritage

- The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the proposal. This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with Department regional officers.

- Where Aboriginal cultural heritage values or potential values are present, these are to be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR). The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to the Department.

  Note: *An assessment under the Due Diligence process is not an Aboriginal Cultural Heritage Assessment Report.*

- Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW) where an ACHAR is required. The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.

  Note: Consultation is not only required when an AHIP will be required, but also when test excavations are carried out under the Code of Practice. These may not always require an AHIP but will trigger the need for an ACHAR.

- Where harm to an Aboriginal object or declared Aboriginal place cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) will be required from the Department under the *National Parks and Wildlife Act 1974*. You must apply to the Department for an AHIP prior to commencing works that will directly or indirectly harm an Aboriginal object or a declared Aboriginal place.

  Note: Designated development where an AHIP is required should also be considered as an integrated development application (IDA). In these circumstances, the Department will issue General Terms of Approval (GTAs) to the consent authority to be included in conditions of development consent. The Department GTAs will address Aboriginal cultural heritage matters required to be addressed as part of an AHIP application. The matters outlined in the GTAs will be required to be assessed as part of an AHIP after development consent has been granted. The Department requires a valid development consent to accompany an AHIP application.

- The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the development to formulate appropriate measures to manage unforeseen impacts.

- The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate protocols to manage the impacts to this material in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010).

4. Biodiversity

The EIS must assess the impact of the proposed development on biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act), as follows:

a. The EIS must demonstrate and document how the proposed development exceeds, or does not exceed, the biodiversity offsets scheme threshold as set out in Section 7.4 of the BC Act 2016 and Clause 7.1 of the *Biodiversity Conservation Regulation 2017* (BC Regulation) by determining whether the proposed development involves:

   i. **The clearing of native vegetation exceeds the thresholds** listed under Clause 7.23 of the BC Regulation, **or**

   ii. The clearing of native vegetation, or other action, **on land included on the Biodiversity Values Map** published under Clause 7.23 of the BC Regulation (this map includes areas of outstanding biodiversity value, as declared under Section 3.1 of the BC Act).

b. If the proposal does not trigger any of the criteria in (a) above, then the EIS must determine whether the proposed development is likely to have a significant impact based on 'the test for determining whether proposed development likely to significant affect threatened species or ecological communities' in Section 7.3 of the BC Act.

c. Where there is reasonable doubt regarding potential impacts, or where information is not available, then a significant impact upon biodiversity should be considered likely when applying the test in Section 7.3 of the BC Act. Where it is concluded that there is no significant impact, the EIS must justify how the conclusion has been reached.

d. If the development exceeds the thresholds in (a) or (b), then the EIS must be accompanied by a biodiversity development assessment report (BDAR) prepared in accordance with Part 6 of the BC Act. That is, the Biodiversity Assessment Methodology applies.

Required Information

Where development is considered "likely to significantly impact on threatened species" and a Biodiversity Development Assessment Report is required, the following requirements apply:

- Biodiversity impacts related to the proposal are to be assessed in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development

Assessment Report (BDAR). The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s6.12), *Biodiversity Conservation Regulation 2017* (s6.8) and Biodiversity Assessment Method.

- The BDAR must document the application of the avoid, minimise and offset hierarchy including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.
- The BDAR must include details of the measures proposed to address the offset obligation as follows:
    - The total number and classes of biodiversity credits required to be retired for the proposal.
    - The number and classes of like-for-like biodiversity credits proposed to be retired.
    - The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules.
    - Any proposal to fund a biodiversity conservation action.
    - Any proposal to make a payment to the Biodiversity Conservation Fund

- If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.

The BDAR must be prepared by a person accredited to apply the Biodiversity Assessment Method under s6.10 of the *Biodiversity Conservation Act 2016*.

5. Water

- The EIS must map features relevant to water, including:

    - Rivers, streams, estuaries (as described in s4.2 of the Biodiversity Assessment Method).
    - Wetlands (as described in s4.2 of the Biodiversity Assessment Method).
    - Groundwater.
    - Groundwater dependent ecosystems.

- The EIS must describe background conditions for any water resource likely to be affected by the proposal, including:

    - Existing surface and groundwater.
    - Hydrology
    - Water Quality Objectives (as endorsed by the NSW Government) including groundwater as appropriate that represent the community's uses and values for the receiving waters.

      Indicators and trigger values/criteria for the identified environmental values in accordance with the ANZECC (2000) *Guidelines for Fresh and Marine Water Quality* and / or local objectives, criteria or targets endorsed by the NSW Government

- *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions* (OEH/EPA, 2017).

- The EIS must assess the impacts of the proposal on water quality, including:

  - The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the proposal protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.
  - Identification of proposed monitoring of water quality.
  - Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan).

- The EIS must assess the impact of the proposal on hydrology, including:

  - Water balance including quantity, quality and source.
  - Effects upon rivers, wetlands, estuaries, marine waters and floodplain areas.
  - Effects upon water-dependent fauna and flora including groundwater dependent ecosystems.
  - Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).
  - Changes to environmental water availability, both regulated / licensed and unregulated / rules-based sources of such water.

Project specific requirements

Where the proposal is large or high risk with a heightened potential to impact on water quality and hydrology, the EIS should include the following:

- A description of existing water quality / hydrology based on suitable data (meaning data collection may be required) and must include:

  - Water chemistry.
  - A description of receiving water processes, circulation and mixing characteristics and hydrodynamic regimes.
  - Lake or estuary flushing characteristics.
  - Sensitive ecosystems or species conservation values.
  - Specific human uses and values (e.g. fishing, proximity to recreation areas).
  - A description of any impacts from existing industry or activities on water quality.
  - A description of the condition of the local catchment e.g. erosion, soils, vegetation cover.

- An outline of baseline groundwater information, including, for example, depth to water table, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment.
- Historic river flow data.

- An assessment of the impacts of the proposal on water quality and hydrology including:

  - Water circulation, current patterns, water chemistry and other appropriate characteristics such as clarity, temperature, nutrient and toxicants, and potential for erosion.
  - Changes to hydrology
  - Stream bank stability and impacts on macro invertebrates.
  - Water quality and hydrology modelling and / or monitoring, where necessary.

- Proposed water quality monitoring in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004). The water quality and aquatic ecosystem monitoring program must include:

  - Adequate data for evaluating maintenance, or progress towards achieving, the relevant Water Quality Objectives.
  - Measurement of pollutants identified or expected to be present.

6. **Flooding**

- The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:

  - Flood prone land (ie land susceptible to the probable maximum flood event).
  - Flood planning area, the area below the flood planning level.
  - Hydraulic categorisation (floodway and flood storage areas).
  - Flood hazard.

- The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 10% Annual Exceedance Probability (AEP), 1% AEP flood levels and the probable maximum flood, or an equivalent extreme event.

- The EIS must model the effect of the proposal (including fill) on the current flood behaviour for a range of design events as identified above, and the 0.5% AEP and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

- All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified in the EIS and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the proposal should be detailed.

- Modelling in the EIS must consider and document:

  - Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.
  - The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood (PMF), or an equivalent extreme flood.
  - Impacts of the proposal on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories.
  - Impacts of earthworks and stockpiles within the flood prone land up to the PMF level. The assessment should be based on understanding of cumulative flood impacts of construction and operational phases.
  - Relevant provisions of the NSW Floodplain Development Manual 2005.

- The EIS must assess the impacts on the proposal on flood behaviour, including:

  - Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
  - Consistency with Council floodplain risk management plans.
  - Consistency with any Rural Floodplain Management Plans.
  - Compatibility with the flood hazard of the land.
  - Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
  - Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
  - Whether there will be a direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
  - Appropriate mitigation measures to offset potential flood risk arising from the proposal. Any proposed mitigation work should be modelled and assessed on the overall catchment basis in order to ensure it fits its purpose and meets the criteria of the Council where it is located, and to ensure it has no adverse impact to surrounding areas.
  - Any impacts the proposal may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.
  - Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.
  - Emergency management, evacuation and access, and contingency measures for the proposal during both construction and operational phases considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.
  - Any impacts the proposal may have on the social and economic costs to the community as a consequence of flooding.

Attachment 2

Guidance Material

Title	Web address
Relevant Legislation	
Biodiversity Conservation Act 2016	https://www.legislation.nsw.gov.au/#/view/act/2016/63/full
Coastal Management Act 2016	https://www.legislation.nsw.gov.au/#/view/act/2016/20/full
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Aboriginal Cultural Heritage	
Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
Aboriginal Site Recording Form	http://www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf

Title	Web address
Aboriginal Site Impact Recording Form	http://www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	http://www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf
Biodiversity	
Biodiversity Values Map	https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap
Biodiversity Assessment Method (OEH, 2017)	http://www.environment.nsw.gov.au/resources/bcact/biodiversity-assessment-method-170206.pdf
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH, 2017)	http://www.environment.nsw.gov.au/resources/bcact/guidance-decision-makers-determine-serious-irreversible-impact-170204.pdf
Ancillary rules: Biodiversity conservation actions	http://www.environment.nsw.gov.au/resources/bcact/ancillary-rules-biodiversity-actions-170496.pdf
Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	http://www.environment.nsw.gov.au/resources/bcact/ancillary-rules-reasonable-steps-170498.pdf
Ancillary rules: Impacts on threatened species excluded from application of the variation rules	http://www.environment.nsw.gov.au/resources/bcact/ancillary-rules-impacts-on-threatened-entities-excluded-from-variation-170497.pdf
OEH Threatened Species Profiles	http://www.environment.nsw.gov.au/threatenedspeciesapp/
BioNet Atlas	http://www.environment.nsw.gov.au/wildlifeatlas/about.htm
BioNet Vegetation Classification	http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx
Threatened Species Profile	http://www.environment.nsw.gov.au/threatenedSpeciesApp/
NSW Guide to Surveying Threatened Plants (OEH, 2016)	http://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-guide-to-surveying-threatened-plants
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna - Amphibians (DECC, 2009)	www.environment.nsw.gov.au/resources/Threatenedspecies/09213amphibians.pdf
Threatened Species Assessment Guideline - The Assessment of Significance (DECC 2007)	www.environment.nsw.gov.au/resources/Threatenedspecies/tsaguide07393.pdf
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC, 2004)	http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf

Title	Web address
Fisheries NSW policies and guidelines	http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions	http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales (DEC 2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf
Flooding	
Floodplain Development Manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Floodplain Risk Management Guidelines	http://www.environment.nsw.gov.au/topics/water/coasts-and-floodplains/floodplains/floodplain-guidelines
NSW Climate Impact Profile	http://climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation

Department of Primary Industries

Agricultural Land Use Planning

OUT20/3477

27 March 2020

Mr Joel Herbert
Environmental Assessment Officer
Energy and Resource Assessments
Locked Bag 5022, Parramatta NSW 2124
E: Joel.Herbert@planning.nsw.gov.au

Dear Mr Herbert

SEAR's Request –SEAR 1441 – Mt Bundarbo Pit - Bald Hill Quarry

Thank you for the opportunity to provide Secretary Environmental Assessment Requirements (SEAR) for the above proposal as per your correspondence dated 10 March 2020.

The NSW Department of Primary Industries (NSW DPI) Agriculture is committed to the protection and growth of agricultural industries, and the land and resources upon which these industries depend. Important issues for extractive industries are the potential impact on limited agricultural resources and the ability to rehabilitate the land to enable continued agricultural investment.

NSW DPI Agriculture provides SEARs (Attachment 1) and a range of publications to assist consent authorities, community and proponents in addressing the recommended SEARs (Attachment 2).

Should you require clarification on any of the information contained in this response, please contact Wendy Goodburn, Resource Management Officer Wendy Goodburn on phone: 0402 069 605, during office hours or by email: wendy.goodburn@dpi.nsw.gov.au.

Yours sincerely

Wendy Goodburn
Agricultural Land Use Planning – South east

Attachment 1: SEARs Recommendations

Issue and desired outcome	Detail / Requirement
Site Suitable for development	• Detail that the quarry is consistent with strategic plans and zone requirements • Complete a Landuse Conflict Risk Assessment (LUCRA) to identify potential land use conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide. • Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors.
Consideration for impacts to agricultural resources and land	• Describe the current and potential *Important Agriculture Land* on the proposed development site and surrounding locality including the land capability and agricultural productivity. • Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated. • Consider possible cumulative effects to agricultural enterprises and landholders. • Detail the expected life span of the proposed development
Bushfire risk identified and managed	• Risk assessment level and mitigation plan developed to address bush fire risk.
Suitable and secure water supply	• Estimated water demand and water availability should be clearly outlined in the proposal. The source of water and any sanitisation methods to be detailed in the application. • Outline any impacts to water use from agriculture and mitigation measures if required.
Surface & Groundwater protected	• Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession. A monitoring program should be developed.
Biosecurity Standards met	• Include a biosecurity (pests and weeds) risk assessment outlining the likely plant, animal and community risks. • Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed and pest management plans.
Suitable traffic movements	• Consideration of the route for movements needs to be taken into account so that impacts on sensitive receptors are minimised (eg noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves1 (TSR) and the movement of livestock or farm vehicles along / across the affected roads
Visual amenity achieved	• Amenity impacts are assessed and any necessary response to mitigate visual impacts is described and illustrated.
Land stewardship met	• Develop Rehabilitation and Decommissioning/Closure Plans that describes the design criteria of the final land use and landform along with the expected timeline for the rehabilitation program. • Outline monitoring and mitigation measures to be adopted for rehabilitation remedial actions.

Issue and desired outcome	Detail / Requirement
Adequate consultation with community **Contingency and Environmental Management Plan developed**	• Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure. • Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about; the proposal, the likely impacts and suitable mitigation measures or compensation. • Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with Council in relation to complaint issues. • Contingency plans should be developed to enable the operation to deal with emergency situations. Commitment to the preparation of an Emergency Management plan that outlines procedures and responsibilities for responding to bushfire threats which might result from extreme climatic conditions.

Attachment 2: Guidelines for assessment

Title	Location
Land Use Conflict Risk Assessment Guide	www.dpi.nsw.gov.au/content/agriculture/resources/lup/development-assessment/lucra
Agricultural Issues for Extractive industry Development	http://www.dpi.nsw.gov.au/content/agriculture/resources/lup/development-assessment/extractive-industries

Caleb Ferry

From: kirstyn.goulding@crownland.nsw.gov.au on behalf of Lands Ministerials <lands.ministerials@industry.nsw.gov.au>
Sent: Wednesday, 22 April 2020 1:09 PM
To: Caleb Ferry
Subject: Re: Request for Requirements - EAR 1441 - Mt Bundarbo Quarry, Jugiong

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Caleb

Please find following comments from Crown Lands:-

Where Crown Land is impacted by project activities it will be necessary for the applicant to seek an Extractive Industry Licence issued under the *Crown Land Management Act 2016* prior to any work commencing on Crown land.

I believe that the proponent has been in contact with the Goulburn Crown Lands office and that they are taking steps to address the issues raised by that office, being that:-

The proposal will directly impact Crown land including a Crown reserve (Lot 7002 DP 1031310) which is gazetted for trigonometrical purposes. It will be
required to liaise with the Surveyor General regarding the proposed use of this trig reserve, which is also subject to an incomplete Aboriginal Land Claim (Claim
No 11046) by the NSW Aboriginal Land Council. Concurrence must be provided by the Aboriginal Land Council (ALC), or the claim withdrawn, before the proposal could proceed over the claim area.

Additionally, as the proposal will directly impact on a Crown Road north of Lot 11 DP 133540, Crown Lands suggests that Bald Hill Quarry pursue the closure of
the affected roads and seek an easement for access where not already in place.

A tenure may be required to authorise the proposed use and occupation of the Crown land involved. This will be dependent upon the outcome of consultation with
the Surveyor General and the Aboriginal Land Council Claimant.

All of these points will need to be addressed, and don't seem to have been addressed as yet, in the proponent's application. The proponent was made aware of the majority of these requirements on 25 March 2020, via email.

Thank you
Kirstyn

Lands Stakeholder Relations

Team telephone numbers: Rebecca Johnson, Principal Project Officer, 4920 5040; Kirstyn Goulding, Administration Officer - Customer Liaison, 4920 5058; Kim Fitzpatrick, Senior Project Officer, 4920 5015, Deb Alterator, Project Support Officer 4920 5172

Crown Lands | Department of Planning, Industry and Environment
E lands.ministerials@industry.nsw.gov.au
Level 4, 437 Hunter Street Newcastle NSW 2295
www.dpie.nsw.gov.au

Joel Herbert

Environmental Assessment Officer
Department of Planning Industry and Environment
Parramatta NSW2124

Our ref: DOC20/212762

Your ref: EAR ID No.1441

File: EF18/49353

Emailed: via planning portal

23 March 2020

Dear Mr Herbert

Subject: Request for Secretary's Environmental Assessment Requirements - Proposal – Mt Bundarbo Quarry – EAR 1441.

Thank you for your email of 10 March 2020. This is a response from the NSW Department of Planning, Industry & Environment – Division of Resources & Geoscience.

Basalt is not a prescribed mineral under the *Mining Act 1992*. Therefore, the Division has no statutory role in authorising or regulating the extraction of this commodity, apart from its role under the *Work Health and Safety Act 2011* and associated regulations and the *Work Health and Safety (Mine and Petroleum Sites) Act 2013* and associated regulations, for ensuring the safe operation of mines and quarries. However, the Division is the principal government authority responsible for assessing the State's resources of construction materials and for advising State and local government on their planning and management.

All environmental reports (EIS or similar) accompanying Development Applications for extractive industry lodged under the *Environmental Planning & Assessment Act 1979* should include a resource assessment which:

- Documents the size and quality of the resource and demonstrates that both have been adequately assessed; and
- Documents the methods used to assess the resource and its suitability for the intended applications.

The above information should be summarised in the EIS, with full documentation appended. If deemed commercial-in-confidence, the resource assessment summary included in the EIS should commit to providing the Division with full resource assessment documentation separately. Applications to modify, expand, extend or intensify an existing consent that has already been adequately reported using the above protocol in publicly available documents, may restrict detailed documentation to the additional resources to be used, if accompanied by a summary of past resource assessments and of past production.

The Division collects data on the quantity of construction materials produced annually throughout the State. Forms are sent to all operating quarries at the end of each financial year for this purpose. The statistical data collected is of great value to Government and industry in planning and

resource management, particularly as a basis for analysing trends in production and for estimating future demand for particular commodities or in particular regions. Production data may be published in aggregated form, however production data for individual operations is kept strictly confidential.

In order to assist in the collection of construction material production data, the proponent should be required to provide annual production data for the subject site to the NSW Division of Resources and Geoscience as a condition of any new or amended development consent.

During the preparation of the EIS, The Division recommends that the proponent consult NSW Department of Planning & Environment's *'EIS Guideline - Extractive Industries – Quarries'*. This guideline is available from:

http://www.planning.nsw.gov.au/Assess-and-Regulate/Development-Assessment/~/media/4A89C0947A8C4D70A983F8EE1D7B9790.ashx

The Division would appreciate the opportunity for early consultation in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.

Queries regarding the above information, and future requests for advice in relation to this matter, should be directed to the Division of Resources & Geoscience - Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely,

Steven Palmer



Manager, Land Use Assessment

Geological Survey of NSW, Division of Resources & Geoscience

18 March 2020

Contact: Simone Tonkin
Phone: 03 5880 1736
Email :simone.tonkin@waternsw.com.au
Our ref: F2020/827

Executive Director
Planning Services
Department of Planning and Environment
PO Box 39
Sydney NSW 2000

Dear Sir,

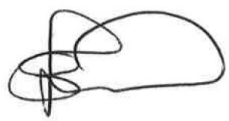
Re: EAR ID No.1441– Mt Bundarbo Pit – Bald Hill Quarry.

WaterNSW has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (EAR) and provides the following comments.

The information provided indicates that the proposal is for the to blast rock, extract and haul material for processing off site. Based on the information that has been provided the is no requirement for a licence or approval from WaterNSW.

Note: If there are changes to the proposal and water is to be extracted at the sites, the applicant will need to seek further advice from WaterNSW.

Yours sincerely



Simone Tonkin
Water Regulation Officer
Assessments and Approvals

Planning Industry and Environment
Locked Bag 5022
Parramatta NSW 2124

Attention: Mr Joel Herbert

Notice Number	1592806
Date	24-Mar-2020

RE: Proposed Mt Bundarbo Quarry - Ear ID No. 1441

I refer to your request for the Environment Protection Authority's (EPA) requirements for the environmental assessment (EA) in regard to the above proposal received by EPA on 10 March 2020.

The proposal involves the expansion of the existing quarry operations. The site is currently regulated under Environment Protection Licence (EPL) 2552. The Proponent should identify whether the project can comply with this EPL or whether a variation to the EPL conditions is required. Under the *Protection of the Environment Operations Act 1997* (POEO Act) the following scheduled activities may be relevant to the project:

- Extractive activities;
- Crushing, grinding or separating.

The EPA has considered the details of the proposal as provided, and, has identified the information it requires to issue its general terms of approval in Attachment A. In summary, the EPA's key information requirements for the proposal include an adequate assessment of:

1. Air quality impacts;
2. Noise and vibration impacts;
3. Water quality and soil surface water management;
4. Waste management;
5. Dangerous goods, chemical storage and bunding;
6. Mitigation measures for the above environmental issues.

In carrying out the assessment, the proponent should refer to the relevant guidelines as listed in Attachment B and any relevant industry codes of practice and best practice management guidelines.

Please note that this response does not cover biodiversity or Aboriginal cultural heritage issues, which are the responsibility of the Office of Environment and Heritage.

The environmental assessment should address the specific requirements outlined under each heading in Attachment A and assess impacts in accordance with the relevant guidelines mentioned. A full list of Guidelines is provided at Attachment B.

The Proponent should be made aware that any commitments made in the EA may be formalised as approval conditions and may also be placed as formal licence conditions. Pollution control measures should not be proposed if they are impractical, unrealistic or beyond the financial viability of the development. It is important that all conclusions are supported by adequate data.

Should project approval be granted, the development must comply with the POEO Act and associated regulations at all times. The proponent will need to make a separate application to the EPA for a variation to the existing EPL 2552.

The Proponent should be made aware that, consistent with provisions under Part 9.4 of the *Protection of the Environment Operations Act 1997* ("the Act") the EPA may require the provision of a financial assurance and/or assurances. The amount and form of the assurance(s) would be determined by the EPA and required as a condition of an Environment Protection Licence ("EPL").

In addition, as a requirement of an EPL, the EPA will require the Proponent to prepare, test and implement a Pollution Incident Response Management Plan and/or Plans in accordance with Section 153A of the Act.

Yours sincerely

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Janine Goodwin

Unit Head

South East - Queanbeyan

(by Delegation)

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ATTACHMENT A: EIS REQUIREMENTS FOR

Proposed Mt Bundarbo Quarry - Ear ID No. 1441

How to use these requirements

The EPA requirements have been structured in accordance with the DIPNR EIS Guidelines, as follows. It is suggested that the EIS follow the same structure:

A. Executive summary

B. The proposal

C. The location

D. Identification and prioritisation of issues

E. The environmental issues

F. List of approvals and licences

G. Compilation of mitigation measures

H. Justification for the proposal

A Executive summary

The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.

B The proposal

1. Objectives of the proposal

- The objectives of the proposal should be clearly stated and refer to:
  a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced;
  b) a life cycle approach to the production, use or disposal of products;
  c) the anticipated level of performance in meeting required environmental standards and cleaner production principles;
  d) the staging and timing of the proposal and any plans for future expansion;
  e) the proposal's relationship to any other industry or facility.

2. Description of the proposal

General

- Outline the production process including:
  a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc)
  b) any life-cycle strategies for the products.
- Outline cleaner production actions, including:
  a) measures to minimise waste (typically through addressing source reduction);
  b) proposals for use or recycling of by-products;
  c) proposed disposal methods for solid and liquid waste;
  d) air management systems including all potential sources of air emissions, proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points;
  e) water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge;
  f) soil contamination treatment and prevention systems.
- Outline construction works including:
  a) actions to address any existing soil contamination;
  b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site);
  c) construction timetable and staging; hours of construction; proposed construction methods;

d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures.

- Include a site diagram showing the site layout and location of environmental controls.

Air

- Identify all sources or potential sources of air emissions from the development.
  Note: emissions can be classed as either:
  - *point (e.g. emissions from stack or vent); or*
  - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*
- Provide details of the project that are essential for predicting and assessing air impacts including:
  a) the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored;
  b) an outline of procedures for handling, transport, production and storage;
  c) the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.

Noise and vibration

- Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.
- Specify the times of operation for all phases of the development and for all noise producing activities.
- For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.

Water

- Provide details of the project that are essential for predicting and assessing impacts to waters including:
  a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from *the Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000);
  b) the management of discharges with potential for water impacts;
  c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.

- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.
- Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include 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.

Waste and chemicals

Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*

- Provide details of liquid waste and non-liquid waste management at the facility, including:
  a) the transportation, assessment and handling of waste arriving at or generated at the site;
  b) any stockpiling of wastes or recovered materials at the site;
  c) any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site;
  d) the method for disposing of all wastes or recovered materials at the facility ;
  e) the emissions arising from the handling, storage, processing and reprocessing of waste at the facility;
  f) the proposed controls for managing the environmental impacts of these activities.
- Provide details of spoil disposal with particular attention to:
  a) the quantity of spoil material likely to be generated;
  b) proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil;
  c) the need to maximise reuse of spoil material in the construction industry;
  d) identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material;
  e) designation of transportation routes for transport of spoil.
- Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.
- Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.
- Reference should be made to the guidelines: EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*

Ecologically Sustainable Development - ESD

- Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including:
  a) an assessment of a range of options available for use of the resource, including the benefits of each option to future generations;
  b) proper valuation and pricing of environmental resources;
  c) identification of who will bear the environmental costs of the proposal.

3. Rehabilitation

- Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).

4. Consideration of alternatives and justification for the proposal

- Consider the environmental consequences of adopting alternatives, including alternative:
  a) sites and site layouts;
  b) access modes and routes;
  c) materials handling and production processes;
  d) waste and water management;
  e) impact mitigation measures;
  f) energy sources.
- Selection of the preferred option should be justified in terms of:
  a) ability to satisfy the objectives of the proposal;
  b) relative environmental and other costs of each alternative;
  c) acceptability of environmental impacts and contribution to identified environmental objectives;
  d) acceptability of any environmental risks or uncertainties;
  e) reliability of proposed environmental impact mitigation measures;
  f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.

C The location

1. General

- Provide an overview of the affected environment to place the proposal in its local and regional environmental context including:
  a) meteorological data (e.g. rainfall, temperature and evaporation, wind speed and direction);
  b) topography (landform element, slope type, gradient and length);
  c) surrounding land uses (potential synergies and conflicts);
  d) geomorphology (rates of landform change and current erosion and deposition processes);
  e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils);
  f) ecological information (water system habitat, vegetation, fauna);
  g) availability of services and the accessibility of the site for passenger and freight transport.

2. Air

- Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.
- Describe surrounding buildings that may effect plume dispersion.
- Provide and analyse site representative data on following meteorological parameters:
  a) temperature and humidity;
  b) rainfall, evaporation and cloud cover;
  c) wind speed and direction;
  d) atmospheric stability class;
  e) katabatic air drainage;
  f) air-recirculation.

3. Noise and vibration

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality.
- Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.

4. Water

- Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: http://www.environment.nsw.gov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.

5. Soil Contamination Issues

- Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.

D Identification and prioritisation of issues / scoping of impact assessment

- Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:
  a) relevant NSW government guidelines;
  b) industry guidelines;
  c) EISs for similar projects;
  d) relevant research and reference material;
  e) relevant preliminary studies or reports for the proposal;
  f) consultation with stakeholders.
- Provide a summary of the outcomes of the process including:
  a) all issues identified including local, regional and global impacts (e.g. increased/ decreased greenhouse emissions);
  b) key issues which will require a full analysis (including comprehensive baseline assessment);
  c) issues not needing full analysis though they may be addressed in the mitigation strategy;
  d) justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).

E The environmental issues

1. General

- The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution.
- Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.

  Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.

Describe baseline conditions

- Provide a description of existing environmental conditions for any potential impacts.

Assess impacts

- For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers.
- Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts.
- The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.
- The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and decommissioning if relevant.
- The level of assessment should be commensurate with the risk to the environment.

Describe management and mitigation measures

- Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.
- Proponents are expected to implement a 'reasonable level of performance' to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change.

- Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.
- Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:

  a) operational procedures to manage environmental impacts;

  b) monitoring procedures;

  c) training programs;

  d) community consultation;

  e) complaint mechanisms including site contacts;

  f) strategies to use monitoring information to improve performance;

  g) strategies to achieve acceptable environmental impacts and to respond in event of exceedences.

4. Air

Describe baseline conditions

- Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data. This description should include the following parameters:

  a) Dust deposition;

  b) Air particulates total suspended particles (TSP), PM_{10}, $PM_{2.5}$

  c) Odour;

Assess impacts

- Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
- Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA.
- Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.
- Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations.
- For potentially odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate.

  Note: With dust and odour, it may be possible to use data from existing similar activities to generate emission rates.

- Reference should be made to the following documents:

Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2016)*;*

Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2007);

Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006)*;*
Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006).

Describe management and mitigation measures

- Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.

5. Noise and vibration

Describe baseline conditions

- Determine the existing background (LA90) and ambient (LAeq) noise levels, as relevant, in accordance with the *NSW Noise Policy for Industry*.
- Determine the existing road traffic noise levels in accordance with the *NSW Road Noise Policy*, where road traffic noise impacts may occur.
- The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including:
  a) details of equipment used for the measurements;
  b) a brief description of where the equipment was positioned;
  c) a statement justifying the choice of monitoring site(s), including the procedure used to choose the site(s), having regards to Fact Sheets A and B of the *NSW Noise Policy for Industry;*
  d) details of the exact location of the monitoring site and a description of land uses in surrounding areas;
  e) a description of the dominant and background noise sources at the site;
  f) day, evening and night assessment background levels for each day of the monitoring period;
  g) the final Rating Background Level (RBL) value;
  h) graphs of the measured noise levels for each day should be provided;
  i) a record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring.

Assess impacts

- Determine the project noise trigger levels for the site. For each identified potentially affected receiver, this should include:
  a) determination of the project intrusive noise level for each identified potentially affected receiver;

b) selection and justification of the appropriate amenity category for each identified potentially affected receiver;

c) determination of the project amenity noise level for each receiver;

d) determination of the appropriate maximum noise level event assessment (sleep disturbance) trigger level.

- Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible affects on sleep. Determine expected noise level and noise character likely to be generated from noise sources during:

  a) site establishment;

  b) construction;

  c) operational phases;

  d) transport including traffic noise generated by the proposal;

  e) other services.

  Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).

- Determine the noise levels likely to be received at the reasonably most affected location(s) (these may vary for different activities at each phase of the development).
- The noise impact assessment report should include:

  a) a plan showing the assumed location of each noise source for each prediction scenario;

  b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site;

  c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc;

  d) methods used to predict noise impacts including identification of any noise models used;

  e) the weather conditions considered for the noise predictions;

  f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario;

  g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived;

  h) an assessment of the need to include modification factors as detailed in Fact Sheet C of the *NSW Noise Policy for Industry*.

- Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional feasible and reasonable mitigation measures.
- The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.
- Where relevant noise/vibration levels cannot be met after application of all feasible and reasonable mitigation measures the residual level of noise impact needs to be quantified by identifying:

  a) locations where the noise level exceeds the criteria and extent of exceedence;

b) numbers of people (or areas) affected;

c) times when criteria will be exceeded;

d) likely impact on activities (speech, sleep, relaxation, listening, etc);

e) change on ambient conditions;

f) the result of any community consultation or negotiated agreement.

- For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.
- Where blasting is intended an assessment in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment:

  a) bench height, burden spacing, spacing burden ratio;

  b) blast hole diameter, inclination and spacing;

  c) type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.

Describe management and mitigation measures

- Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.
- For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:

  a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage;

  b) control of traffic (eg: limiting times of access or speed limitations);

  c) resurfacing of the road using a quiet surface;

  d) use of (additional) noise barriers or bunds;

  e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern;

  f) more stringent limits for noise emission from vehicles (i.e. using specially designed ‘quite’ trucks and/or trucks to use air bag suspension;

  g) driver education;

  h) appropriate truck routes;

  i) limit usage of exhaust brakes;

  j) use of premium muffles on trucks;

  k) reducing speed limits for trucks;

l) ongoing community liaison and monitoring of complaints;

m) phasing in the increased road use.

4. Water

Describe baseline conditions

- Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

  Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004) *or be approved and analyses undertaken by accredited laboratories).*

- Provide site drainage details and surface runoff yield.
- State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: http://www.environment.nsw.gov.au/ieo/index.htm. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal.

  NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.

- State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water Quality* (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines).

  NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.

- State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government/nswstrategy.htm).
- Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.
- Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to

enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:

a) lake or estuary flushing characteristics;

b) specific human uses (e.g. exact location of drinking water offtake);

c) sensitive ecosystems or species conservation values;

d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc;

e) an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment;

f) historic river flow data where available for the catchment.

Assess impacts

- No proposal should breach clause 120 of the *Protection of the Environment Operations Act* 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).
- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.
- Include a rationale, along with relevant calculations, supporting the prediction of the discharges.
- Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).
- Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).
- Identify any potential impacts on quality or quantity of groundwater describing their source.
- Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.
- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.
- Containment of spills and leaks shall be in accordance with EPA's guidelines section 'Bunding and Spill Management' at http://www.epa.nsw.gov.au/mao/bundingspill.htm and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.
- The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:

  a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and

  b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.

- Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment.

  Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.

- Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.
- Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.
- Reference should be made to: *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004), *Guidelines for Fresh and Marine Water Quality* ANZECC 2018).

Describe management and mitigation measures

- Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.
- Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.
- Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.
- Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate.
- Describe hydrological impact mitigation measures including:
  a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition);
  b) minimising runoff;
  c) minimising reductions or modifications to flow regimes;
  d) avoiding modifications to groundwater.
- Describe groundwater impact mitigation measures including:
  a) site selection;
  b) retention of native vegetation and revegetation;;
  c) artificial recharge;
  d) providing surface storages with impervious linings;

e) monitoring program.

- Describe geomorphological impact mitigation measures including:
  a) site selection;
  b) erosion and sediment controls;
  c) minimising instream works;
  d) treating existing accelerated erosion and deposition;
  e) monitoring program.
- Any proposed monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004).

5. Soils and contamination

Describe baseline conditions

- Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination.

Assess impacts

- Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of:
  a) disturbing any existing contaminated soil;
  b) contamination of soil by operation of the activity;
  c) subsidence or instability;
  d) soil erosion and sediment transport;
  e) disturbing acid sulfate or potential acid sulfate soils.
- Reference should be made to: *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011)*; Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* (EPA, 2015).

Describe management and mitigation measures

- Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:
  a) erosion and sediment control measures;
  b) proposals for site remediation – see *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998);

c) proposals for the management of these soils – see *Acid Sulfate Soil Manual* (Acid Sulfate Soil Advisory Committee 1998) and *Acid Sulfate Soils Assessment Guidelines* (Acid Sulfate Soil Advisory Committee 1998).

6. Waste and chemicals

Describe baseline conditions

- Describe any existing waste or chemicals operations related to the proposal.

Assess impacts

- Assess the adequacy of proposed measures to minimise natural resource consumption and minimise impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals.
- Reference should be made to: the EPA's *Waste Classification Guidelines 2014 (as in force from time to time)*

Describe management and mitigation measures

- Outline measures to minimise the consumption of natural resources.
- Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.
- Outline measures to support any approved regional or industry waste plans.

7. Cumulative impacts

- Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.
- Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region.
- Identify infrastructure requirements flowing from the proposal (e.g. water and sewerage services, transport infrastructure upgrades).
- Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (e.g. travel demand management strategies).

F. List of approvals and licences

- Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).

G. Compilation of mitigation measures

- Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under EPA licences or approvals (e.g. outline of an environmental management plan).
- The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.

H. Justification for the Proposal

- Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts.

ATTACHMENT B: GUIDANCE MATERIAL

Title	Web address
Relevant Legislation	
Contaminated Land Management Act 1997	http://www.legislation.nsw.gov.au/#/view/act/1997/140
Environmentally Hazardous Chemicals Act 1985	http://www.legislation.nsw.gov.au/#/view/act/1985/14
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/#/view/act/1979/203
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/#/view/act/1997/156
Water Management Act 2000	http://www.legislation.nsw.gov.au/#/view/act/2000/92
Licensing	
Guide to Licensing	www.epa.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
Air Quality	
Approved methods for modelling and assessment of air pollutants in NSW (2016)	http://www.epa.nsw.gov.au/air/appmethods.htm
Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007)	https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/07001amsaap.pdf
The Assessment and Management of Odour from Stationary Sources in NSW: Technical Notes	https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/20060440framework.pdf
NSW Government Resource Efficiency Policy, (OEH 2014)	https://www.environment.nsw.gov.au/resources/government/NSW-GREP-140567.pdf
POEO (Clean Air) Regulation 2010	http://www.legislation.nsw.gov.au/#/view/regulation/2010/428
Noise and Vibration	
NSW Noise Policy for Industry	http://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)
Interim Construction Noise Guideline (DECC, 2009)	http://www.epa.nsw.gov.au/noise/constructnoise.htm
Assessing Vibration: a technical guideline (DEC, 2006)	http://www.epa.nsw.gov.au/noise/vibrationguide.htm

NSW Road Noise Policy (DECCW, 2011)	http://www.epa.nsw.gov.au/your-environment/noise/transport-noise
Waste, Chemicals and Hazardous Materials and Radiation	
Waste	
Environmental Guidelines: Solid Waste Landfills (EPA, 2016)	http://www.epa.nsw.gov.au/waste/landfill-sites.htm
EPA's Waste Classification Guidelines 2014	http://www.epa.nsw.gov.au/wasteregulation/classify-guidelines.htm
Resource recovery orders and exemptions	http://www.epa.nsw.gov.au/wasteregulation/orders-exemptions.htm
NSW Waste Avoidance and Resource Recovery Strategy 2014-2021	http://www.epa.nsw.gov.au/wastestrategy/warr.htm
Chemicals subject to Chemical Control Orders	
Chemical Control Orders (regulated through the EHC Act)	http://www.epa.nsw.gov.au/pesticides/CCOs.htm
National Protocol - Approval/Licensing of Trials of Technologies for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries
National Protocol for Approval/Licensing of Commercial Scale Facilities for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries
Water and Soils	
Acid sulphate soils	
Coastal acid sulfate soils guidance material	http://www.environment.nsw.gov.au/acidsulfatesoil/ and http://www.epa.nsw.gov.au/mao/acidsulfatesoils.htm
Acid Sulfate Soils Planning Maps	http://www.environment.nsw.gov.au/acidsulfatesoil/riskmaps.htm
Contaminated Sites Assessment and Remediation	
Managing land contamination: Planning Guidelines – SEPP 55 Remediation of Land	http://www.epa.nsw.gov.au/clm/planning.htm
Guidelines for Consultants Reporting on Contaminated Sites (EPA, 2000)	http://www.epa.nsw.gov.au/resources/clm/20110650consultantsglines.pdf
Guidelines for the NSW Site Auditor Scheme - 2nd edition (DEC, 2006)	http://www.epa.nsw.gov.au/resources/clm/auditorglines06121.pdf
Sampling Design Guidelines (EPA, 1995)	http://www.epa.nsw.gov.au/resources/clm/95059sampgdlne.pdf

National Environment Protection (Assessment of Site Contamination) Measure 1999 (or update)	http://www.scew.gov.au/nepms/assessment-site-contamination
Soils – general	
Managing land and soil	http://www.environment.nsw.gov.au/soils/landandsoil.htm
Managing urban stormwater for the protection of soils	http://www.environment.nsw.gov.au/stormwater/publications.htm
Landslide risk management guidelines	http://australiangeomechanics.org/admin/wp-content/uploads/2010/11/LRM2000-Concepts.pdf
Site Investigations for Urban Salinity (DLWC, 2002)	http://www.environment.nsw.gov.au/resources/salinity/booklet3siteinvestigationsforurbansalinity.pdf
Local Government Salinity Initiative Booklets	http://www.environment.nsw.gov.au/salinity/solutions/urban.htm
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2018) Guidelines for Fresh and Marine Water Quality	http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html
Applying Goals for Ambient Water Quality Guidance for Operations Officers - Mixing Zones	Contact the EPA on 131555
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf
State Groundwater Policy Framework Document (DLWC 1997)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/547550/avail_ground_nsw_state_groundwater_policy_framework_document.pdf
The NSW State Groundwater Quality Protection Policy (DLWC 1998)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0006/548286/nsw_state_groundwater_quality_policy.pdf
The NSW State Groundwater Dependent Ecosystems Policy (DLWC 1998)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0005/547844/groundwater_dependent_ecosystem_policy_300402.pdf
National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ & ANZECC, 1995)	https://www.water.wa.gov.au/__data/assets/pdf_file/0020/4925/8728.pdf
Bunding and Spill Management	
Storing and Handling Liquids: Environmental Protection - Participants Manual	https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/licensing/2007210liquidsmanual.pdf?la=en&hash=F58F9A86A4293434464AC43554AEEEB7FDCF6E01
Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management - Part B Review of Best	http://www.bunding.com.au/uploads/37069/ufiles/Environmental%20Compliance%20Report%20Liquid%20Chemical%20Storage,%20Handling%20and%20Spills%20Management.pdf

Practice and Regulation	

Joel Herbert

From: Evan Knoll
Sent: Tuesday, 21 April 2020 1:38 PM
To: Joel Herbert
Subject: FW: Request for Requirements - EAR 1441 - Mt Bundarbo Quarry, Jugiong
Attachments: PEA - Bundarbo Quarry Local SEARs.pdf; Application Form - Mt Bundarbo Quarry.pdf

Hi Joel

DPI Fisheries have no requirements to provide as the development does not impact waterways or areas for which the *Fisheries Management Act 1994* applies.

Kind regards

Evan Knoll | Fisheries Manager
Fish Passage Unit | Murray Darling | Fisheries
Department of Primary Industries
4 Marsden Park Road | Calala | NSW 2340
T: 02 6763 1428 | M: 0418 204 207 | E: evan.knoll@dpi.nsw.gov.au



PERMIT APPLICATION FORMS & FISH HABITAT POLICIES AVAILABLE AT:
https://www.dpi.nsw.gov.au/fishing/habitat/protecting-habitats/toolkit

Submit permit applications via email to: ahp.central@dpi.nsw.gov.au

From: jane.gordois@dpi.nsw.gov.au <jane.gordois@dpi.nsw.gov.au> **On Behalf Of** AHP Central
Sent: Thursday, 16 April 2020 9:41 AM
To: Evan Knoll <evan.knoll@dpi.nsw.gov.au>
Subject: Fwd: Request for Requirements - EAR 1441 - Mt Bundarbo Quarry, Jugiong

---------- Forwarded message ---------
From: **Landuse Enquiries** <landuse.enquiries@dpi.nsw.gov.au>
Date: Thu, 16 Apr 2020 at 09:31
Subject: Fwd: Request for Requirements - EAR 1441 - Mt Bundarbo Quarry, Jugiong
To: Lands Ministerials <lands.ministerials@industry.nsw.gov.au>, Landuse Ag <landuse.ag@dpi.nsw.gov.au>, AHP Central <ahp.central@dpi.nsw.gov.au>, NRAR ServiceDesk <nrar.servicedesk@industry.nsw.gov.au>

Hi all

Please find below correspondence requesting SEAR's for the above Local Designated Development application for your direct response to the Planning and Assessment group.

Regards,

Alistair
---------- Forwarded message ---------
From: **Caleb Ferry** <Caleb.Ferry@planning.nsw.gov.au>
Date: Wed, 15 Apr 2020 at 13:31
Subject: Request for Requirements - EAR 1441 - Mt Bundarbo Quarry, Jugiong
To: Adam Oehlman <landuse.enquiries@dpi.nsw.gov.au>, lands.ministerials@industry.nsw.gov.au <lands.ministerials@industry.nsw.gov.au>
Cc: Joel Herbert <Joel.Herbert@planning.nsw.gov.au>

Good afternoon,

Proposal – Mt Bundarbo Quarry, Jugiong

EAR ID No. 1441

Bald Hill Quarries Pty Ltd has requested the requirements of the Secretary of the Department of Planning, Industry and Environment for the preparation of an Environmental Impact Statement (EIS) for the above designated development located in Hilltops local government area.

A copy of the Applicant's request is attached for your reference.

Under Schedule 2 of the *Environmental Planning and Assessment Regulation 2000,* the Secretary is requesting your requirements for the EIS.

The Department notified agencies by email on 10 March, however your agency was mistakenly not included in this correspondence. The deadline for agency advice was 25 March. I apologise for the Department's oversight.

It would be appreciated if we could receive your advice as soon as possible.

Please send requirements and direct any queries to Joel Herbert on 8289 6614 or joel.herbert@planning.nsw.gov.au.

Regards,

Caleb Ferry

Student Para Planner

Energy and Resource Assessments | Department of Planning, Industry and Environment

T – 02 9274 6170 | E – caleb.ferry@planning.nsw.gov.au

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150

www.dpie.nsw.gov.au

The Department of Planning, Industry and Environment acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

--

Assessments Team

Water | Department of Planning, Industry and Environment

P 0417 626 567 or | **E** landuse.enquiries@dpi.nsw.gov.au

Level 3 | 26 Honeysuckle Drive | Newcastle | NSW 2300
www.dpie.nsw.gov.au

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

Hilltops COUNCIL

5 May 2020

Your Ref: EAR 1441
Contact Person: Andrew Raines

Energy and Resource Assessments
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150

Attention: Mr Joel Herbert

Dear Sir

Mt Bundarbo Quarry - Request for SEARs

I refer to your email dated 10 March 2020 and 15 April 2020 inviting comments on the scoping report prepared by Bald Hill Quarry Pty Ltd for the proposed quarry at Lot 148 DP753592, Lot 9 DP439146 and Lot 7002 DP1031310, Jugiong. Council appreciates the opportunity for comment.

The existing quarry development at the subject property has development consent (T98/027) that expires in 2025. This consent was recently modified by Hilltops Council to extend the life of the quarry by 5 years. Council understands this modification application has triggered the need for this development application to allow for the continuance of extractive operations at the property.

The proposed quarry is partly on Crown Land. The applicant must obtain owners consent from Crown Lands for the development.

The proposed quarry area is identified on the Harden Local Environmental Plan 2011 Natural Resources Land Map. A soil and land capability impact assessment must support the EIS that considers the specific requirements of the quarry, the likely pre and post quarry soil impacts and detail measures to address such impacts. The EIS is to address soil management, rehabilitation and give consideration to post quarrying agricultural suitability.

The proposed quarry area is also identified on the Harden Local Environmental Plan 2011 Natural Resources Biodiversity Map. The EIS must detail the extent of any vegetation to be cleared on site. This is to include an assessment of the likely biodiversity impacts of the development, undertaken in accordance with the Biodiversity Assessment Method, and include a strategy to offset any impacts of the development in accordance with the Biodiversity Offset Scheme.

Vehicular access to the development site will be via an existing private access to the Hume Highway which services other land uses (quarry and waste management facility). Any traffic

MAILING ADDRESS
Locked Bag 5,
Young NSW 2594
www.hilltops.nsw.gov.au

BOOROWA OFFICE
6-8 Market Street,
Boorowa NSW 2586

HARDEN OFFICE
3 East Street,
Harden NSW 2587

YOUNG OFFICE
189 Boorowa Street,
Young NSW 2594

P 1300HILLTOPS / 1300 445 586
F 02 6384 2576 E mail@hilltops.nsw.gov.au

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HILLTOPS BOOROWA · HARDEN · YOUNG

impact assessment must detail traffic movements and impacts on the surrounding road network and consider the cumulative impact of these land uses.

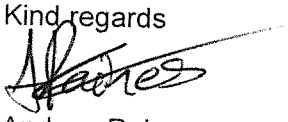
Council's Harden Contribution Plan for Other Developments applies to the land. Council is open to entering into a Planning Agreement with the Applicant for the ongoing road maintenance.

With noting the concerns above, generally the EIS must contain reports which outline and give due consideration to:

- Noise and vibration (including blasting frequency and methods)
- Air quality (bust control)
- Ecology (flora and fauna)
- Aboriginal heritage
- Traffic and haulage routes
- Surface water and water balance (including water demand and supply)
- Groundwater
- Soils

Such reports must take into consideration the cumulative impacts of the proposal and surrounding developments, including the existing quarry and waste management facility.

Kind regards



Andrew Raines
Senior Planner

NSW RURAL FIRE SERVICE

Dept. Of Planning - Urban
GPO Box 39
Sydney NSW 2001

Your reference: EAR 1441
Our reference: DA20200313000974-Original-1

ATTENTION: Joel Herbert

Date: Friday 24 April 2020

Dear Sir/Madam,

Development Application
Other – Part3A – Other
5423 Hume Hwy Jugiong NSW 2726 AUS, 148//DP753592, 7002//DP1031310, 9//DP439146

I refer to your correspondence regarding the above proposal which was received by the NSW Rural Fire Service on 10/03/2020.

The NSW RFS has considered the information submitted and notes that the proposed development has the potential to increase the level of bush fire risk within the landscape and, the development may be impacted upon during a bush fire event. As such, the environmental assessment for the proposed extension of Bald Hill Quarry should address the following bush fire criteria:

- The aim and objectives of *Planning for Bush Fire Protection 2019;*
- Identification of potential ignition sources during construction and operation of the development;
- Storage of fuels and other hazardous materials;
- Proposed bush fire protection measures for the development, including vegetation management and fire suppression capabilities;
- Operational access for fire fighting appliance to the site; and
- Emergency and evacuation planning.

For any queries regarding this correspondence, please contact Peter Dowse on 1300 NSW RFS.

Yours sincerely,

Bradley Bourke
Team Leader, Dev. Assessment & Planning
Planning and Environment Services

Postal address

NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address

NSW Rural Fire Service
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127

T (02) 8741 5555
F (02) 8741 5550
www.rfs.nsw.gov.au

SWT20/00024
SF2020/042938
MM/CB

24 March 2020

The Manager
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Joel Herbert

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENT – EAR ID 1441, PROPOSED EXTRACTIVE INDUSTRY – MT MUNDARBO QUARRY.

I refer to correspondence forwarded to Transport for NSW (TfNSW) requesting the provision of key issues and assessment requirements to be included in the Secretary's Environmental Assessment Requirements.

From the brief information provided it is understood that the proposed development is for the establishment of a new extraction pit on the subject site located to the east of Jugiong. The subject site currently contains 2 quarry pits with one being operated as a landfill and the other as a quarry. The subject site has frontage to the Hume Highway, which is a classed as local road, within a 110 km/h speed zone.

It is understood that the proposed quarry is in addition to the existing quarry operation on the subject site but will be operated within the current approved extraction rates. The degree of traffic assessment required to support the proposal will depend on the level of impact resulting from traffic generated by the proposed quarry, the rate of extraction of material and the standard of construction of, and current usage characteristics of, the public roads servicing the proposed quarry sites.

TfNSW is interested in the characteristics of the traffic generated by the development and in the impact of the development on the safety and efficiency of the road network. A traffic impact assessment should outline measures to address and manage traffic related issues generated by the development. The documentation submitted should address the potential impacts on the road network associated with the development during the lifetime of the project, works required to the existing road infrastructure, the measures to be implemented to maintain the standard and safety of the road network, and the procedures to monitor and ensure compliance. A transport management plan may be required to outline measures to manage traffic related issues generated by the development.

For guidance in the preparation of the TIA the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12 - Traffic Impacts of Development and Part 3 - Traffic Studies and Analysis and the "Guide to Traffic Generating Developments" prepared by the RTA and similar documentation. As a minimum the TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, peak traffic volumes,

vehicle types, travel routes for vehicles accessing the site and provide recommendations for any mitigation measures, such as intersection upgrades, considered necessary to address traffic related impacts.

TfNSW emphasises the need to appropriately consider and minimise the impacts of the development on the existing road network and maintain the level of safety, efficiency and maintenance along the existing road network. Any Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network, particularly intersections.

Any enquiries regarding this correspondence may be referred to the Manager, Land Use - TfNSW (South West Region), Maurice Morgan, phone (02) 6923 6611.

Yours faithfully

Per:
Lindsay Tanner
Director South West

18 March 2020

Contact: Simone Tonkin
Phone: 03 5880 1736
Email :simone.tonkin@waternsw.com.au
Our ref: F2020/827

Executive Director
Planning Services
Department of Planning and Environment
PO Box 39
Sydney NSW 2000

Dear Sir,

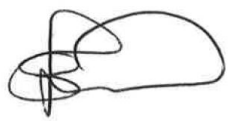
Re: EAR ID No.1441– Mt Bundarbo Pit – Bald Hill Quarry.

WaterNSW has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (EAR) and provides the following comments.

The information provided indicates that the proposal is for the to blast rock, extract and haul material for processing off site. Based on the information that has been provided the is no requirement for a licence or approval from WaterNSW.

Note: If there are changes to the proposal and water is to be extracted at the sites, the applicant will need to seek further advice from WaterNSW.

Yours sincerely

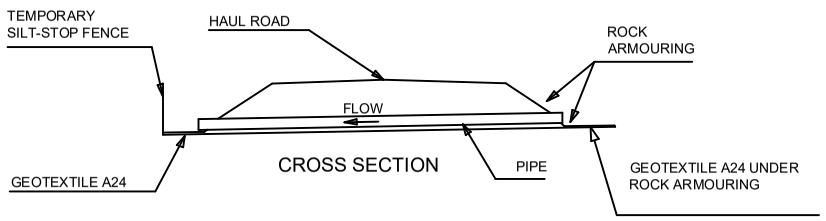


Simone Tonkin
Water Regulation Officer
Assessments and Approvals

APPENDIX B PROPOSAL PLANS

TYPICALS

DETAIL A - HAUL ROAD



CONSTRUCTION NOTES:

1 - TOPSOIL STRIPPED AND STOCKPILED FOR BATTERS BEFORE FILL PLACEMENT.

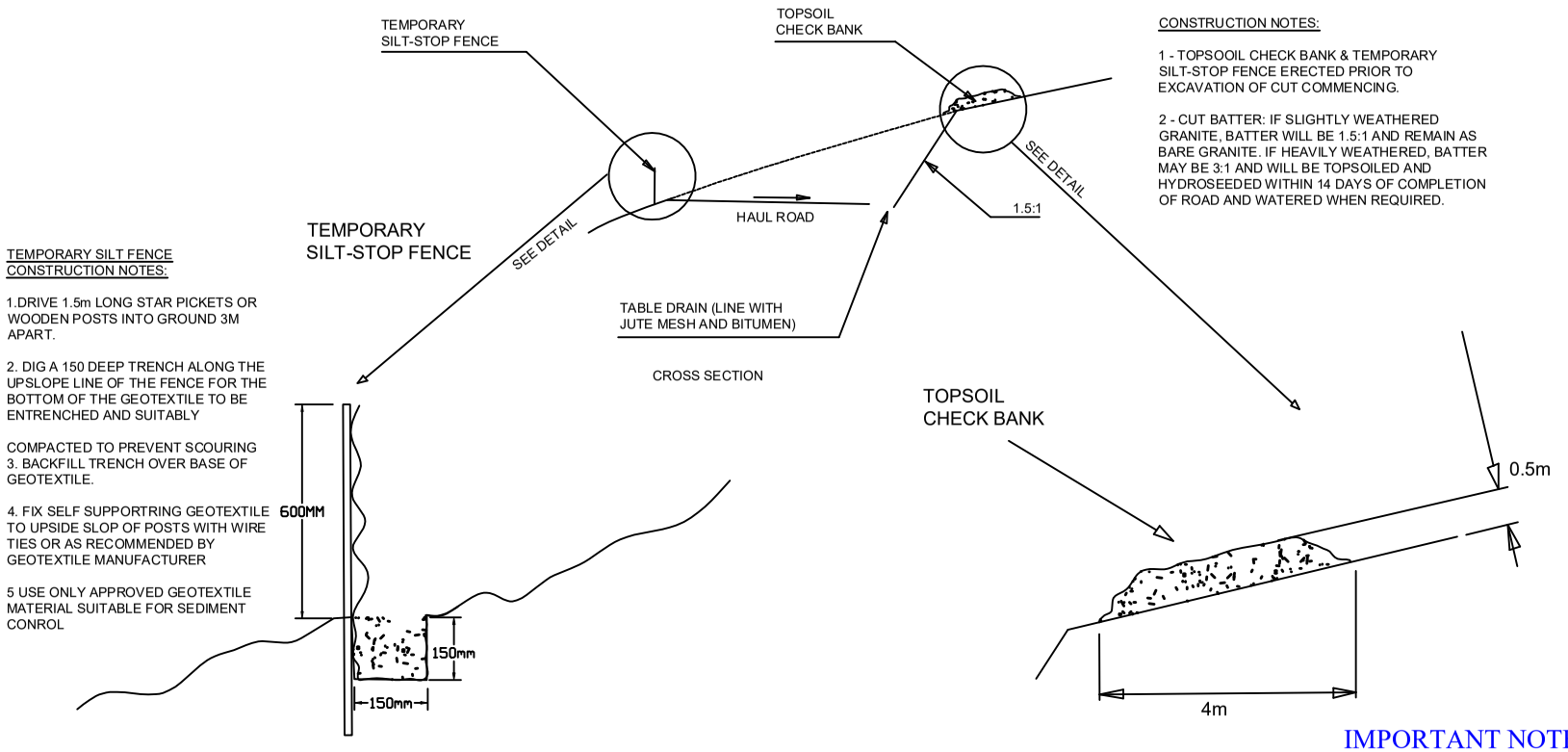
2 - ROCK ARMOURING 100mm MINIMUM DIAMETER GRADED ROCK.

3 - STRIPPED TOPSOIL SPREAD ON BATTERS AND HYDROSEEDED WITHIN 14 DAYS OF COMPLETION OF ROAD.

4 - SILT-STOP FENCE ERECTED PRIOR TO COMMENCEMENT OF FILL PLACEMENT.

5 - BATTERS TO BE 15 : 1 (H:V)

DETAIL B- CUT SILT FENCE &TOPSOIL CHECK BANK



TEMPORARY SILT FENCE CONSTRUCTION NOTES:

1.DRIVE 1.5m LONG STAR PICKETS OR WOODEN POSTS INTO GROUND 3M APART.

2. DIG A 150 DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE GEOTEXTILE TO BE ENTRENCHED AND SUITABLY

COMPACTED TO PREVENT SCOURING

3. BACKFILL TRENCH OVER BASE OF GEOTEXTILE.

4. FIX SELF SUPPORTRING GEOTEXTILE TO UPSIDE SLOP OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER

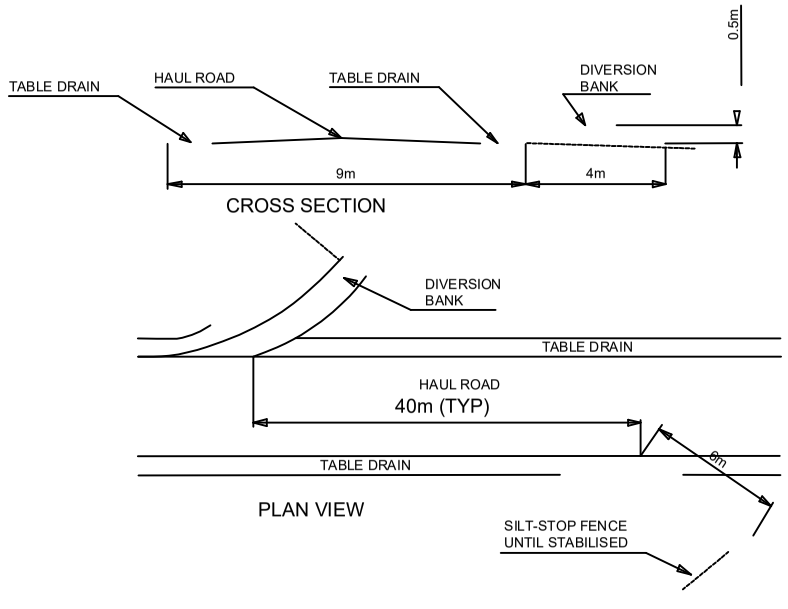
5 USE ONLY APPROVED GEOTEXTILE MATERIAL SUITABLE FOR SEDIMENT CONROL

CONSTRUCTION NOTES:

1 - TOPSOOIL CHECK BANK & TEMPORARY SILT-STOP FENCE ERECTED PRIOR TO EXCAVATION OF CUT COMMENCING.

2 - CUT BATTER: IF SLIGHTLY WEATHERED GRANITE, BATTER WILL BE 1.5:1 AND REMAIN AS BARE GRANITE. IF HEAVILY WEATHERED, BATTER MAY BE 3:1 AND WILL BE TOPSOILED AND HYDROSEEDED WITHIN 14 DAYS OF COMPLETION OF ROAD AND WATERED WHEN REQUIRED.

DETAIL C - DIVERSION BANK

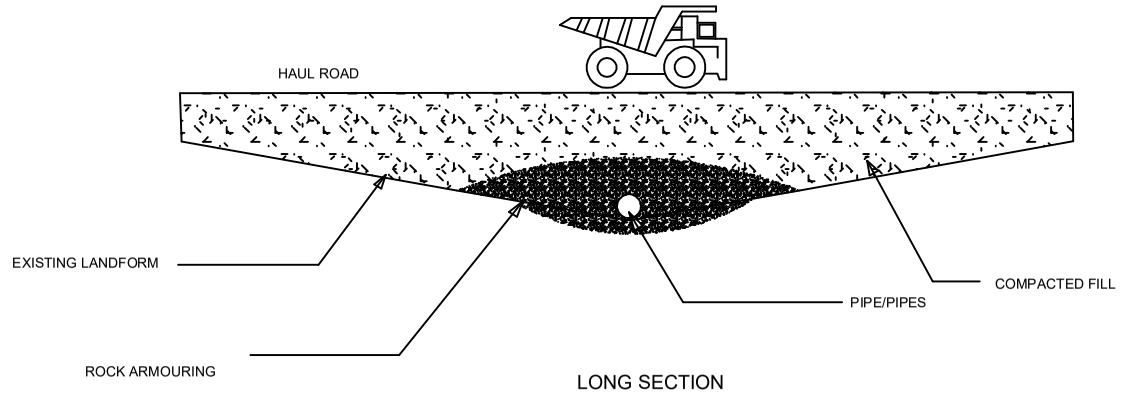


CONSTRUCTION NOTES:

1 - TOPSOIL CLEARED FROM ROAD USED TO CONSTRUCT DIVERSION BANKS AND STORE FOR FUTURE REHABILITATION OF ROAD.

2 - TABLE DRAIN & DIVERSION BANK TO BE SEEDED WITHIN 14 DAYS OF COMPLETION OF ROAD AND WATERED WHEN REQUIRED.

DETAIL D - CULVERT

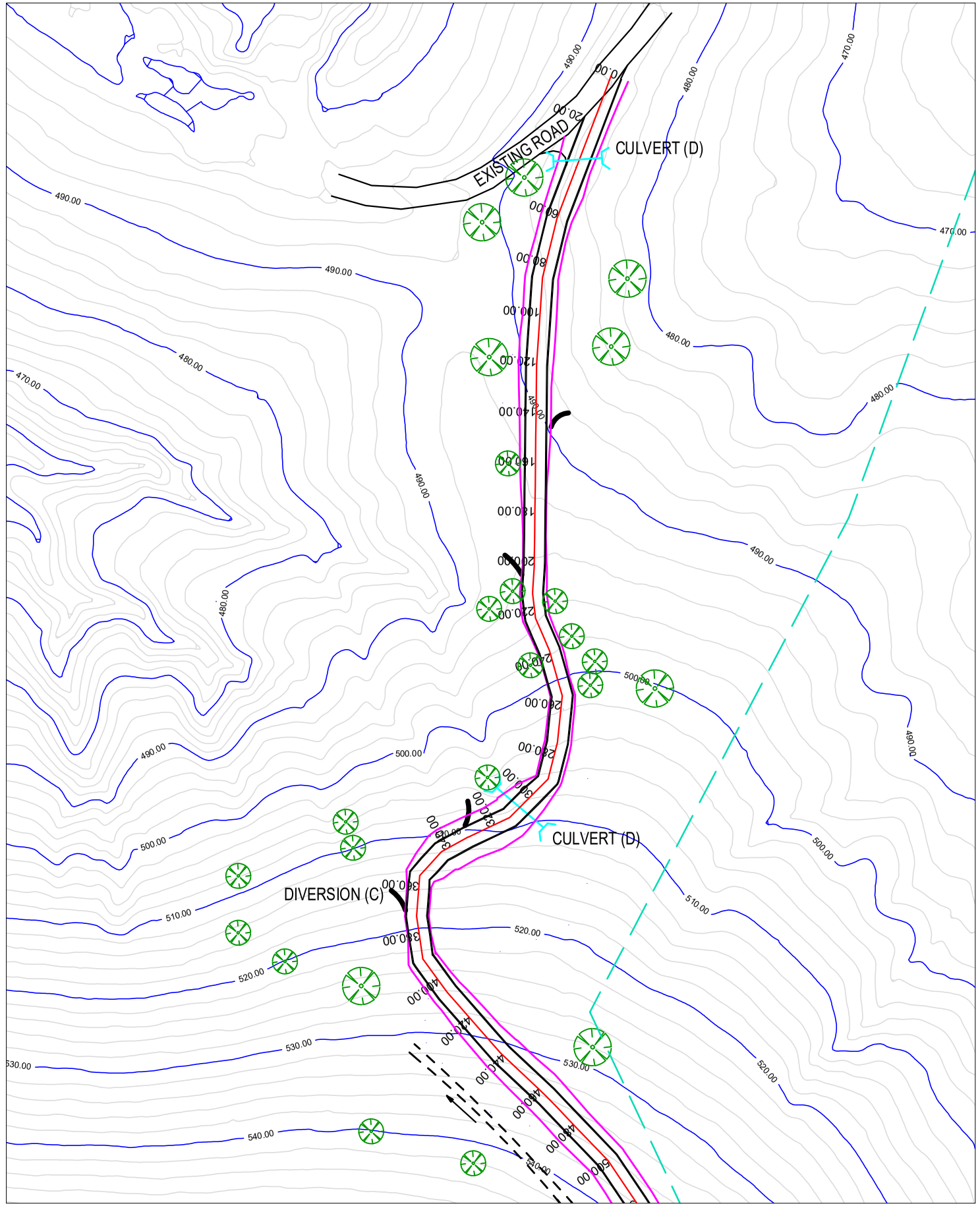


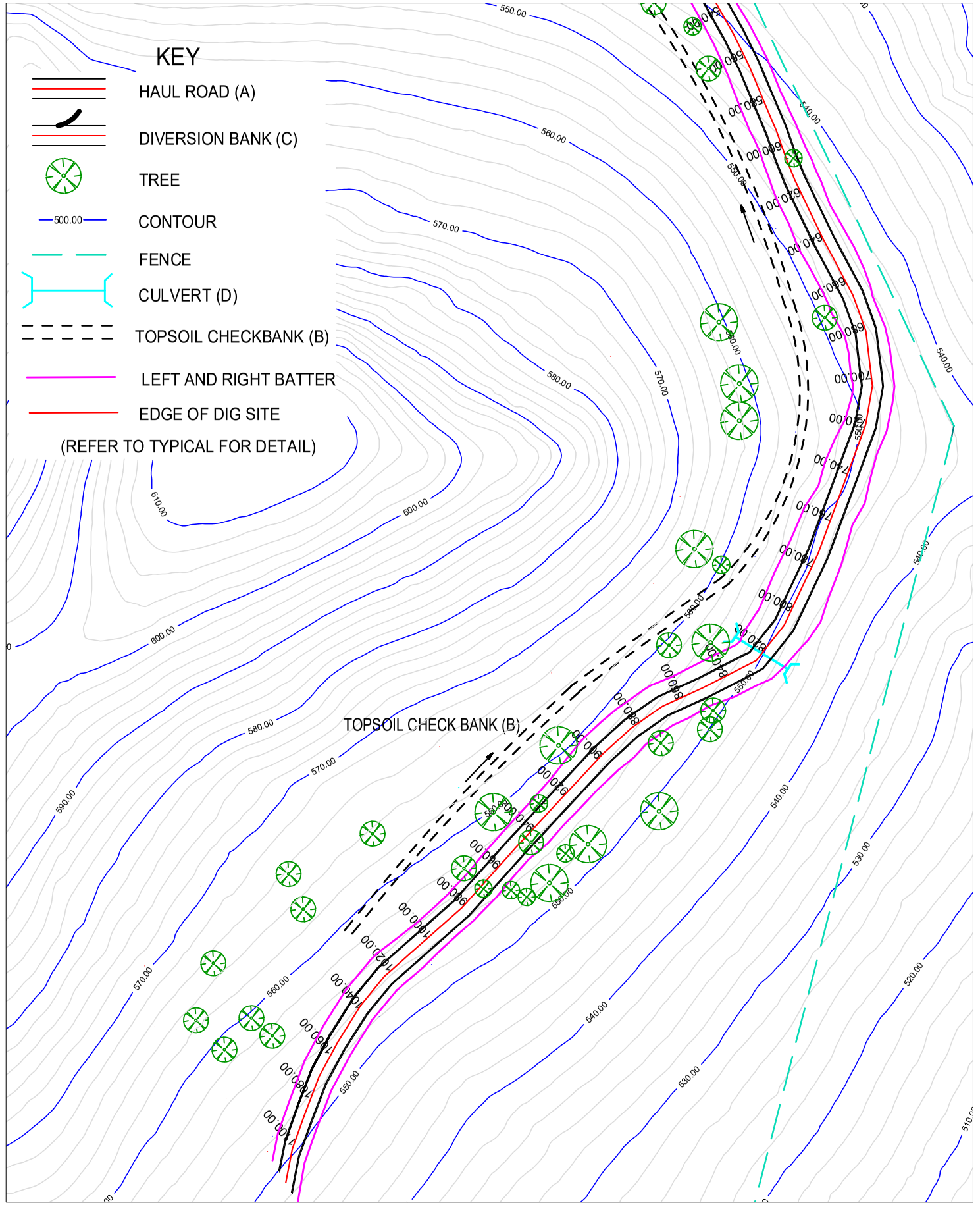
IMPORTANT NOTE

This plan is prepared for BALD HILL QUARRY from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.

Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services. This note is an integral part of the plan. The boundaries shown here are depicted by remote sensing techniquies eg. google, six maps.

SCALE 1:2000 A3						ALLSPEC & PARTNERS	CLIENT: BALD HILL QUARRY
ORIGIN OF LEVELS CORS						BUILDING - LAND - GUIDANCE	PROJECT: PROPOSED ROAD DESIGN TYPICALS PROPOSED QUARRY
CONTOUR INTERVAL ... 2m						OFFICE: 58 FITZROY STREET, TUMUT. 2720 P: 02 6947 6761 E: admin@allspecap.com	LOCATION: BALD HILL QUARRY BALD HILL, JUGIONG, NSW
DATUM: MGA 2020	1	ADJUSTED TYPIACALS, ADDED DETAIL	KW	JMc	07/05/2021	THE FULL SPECTRUM OF DEVELOPMENTS	Sheet 2 of 2 / Rev 3 / Size A3 / DATE: 07/05/2021 / PLAN No. 2016.dwg
	No.	REVISIONS & AMENDMENTS	Drawn	Approved	Date		





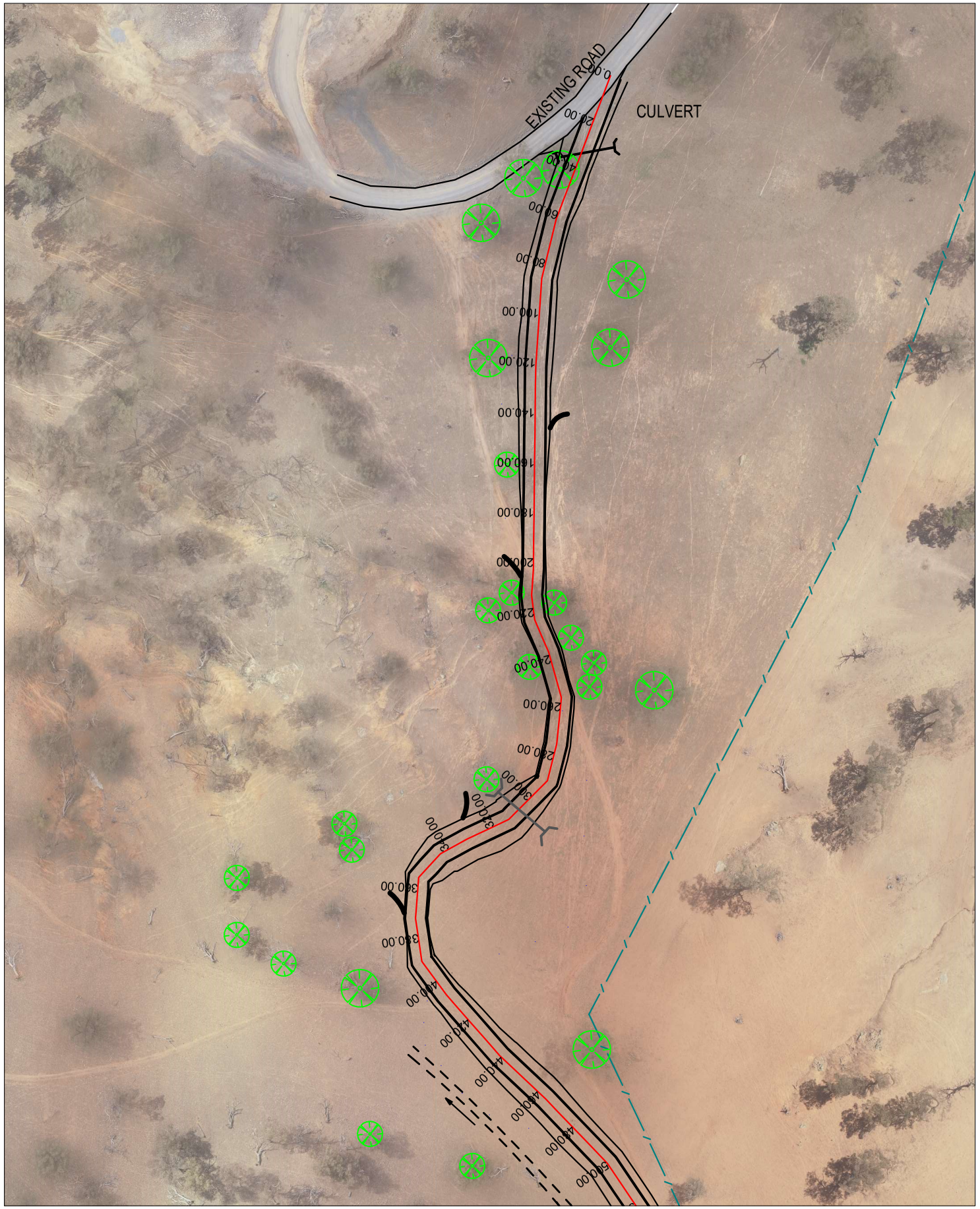
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ORIGIN OF LEVELS CORS						BUILDING - LAND - GUIDANCE	PROJECT: PROPOSED ROAD DESIGN LAYOUT PROPOSED QUARRY
CONTOUR INTERVAL ... 2m						OFFICE: 58 FITZROY STREET, TUMUT. 2720 P: 02 6947 6761 E: admin@allspecap.com	LOCATION: BALD HILL QUARRY BALD HILL, JUGIONG, NSW
DATUM: MGA 2020	1	ADJUSTED TYPIACALS, ADDED DETAIL	KW	JMc	07/05/2021	THE FULL SPECTRUM OF DEVELOPMENTS	
	No.	REVISIONS & AMENDMENTS	Drawn	Approved	Date		

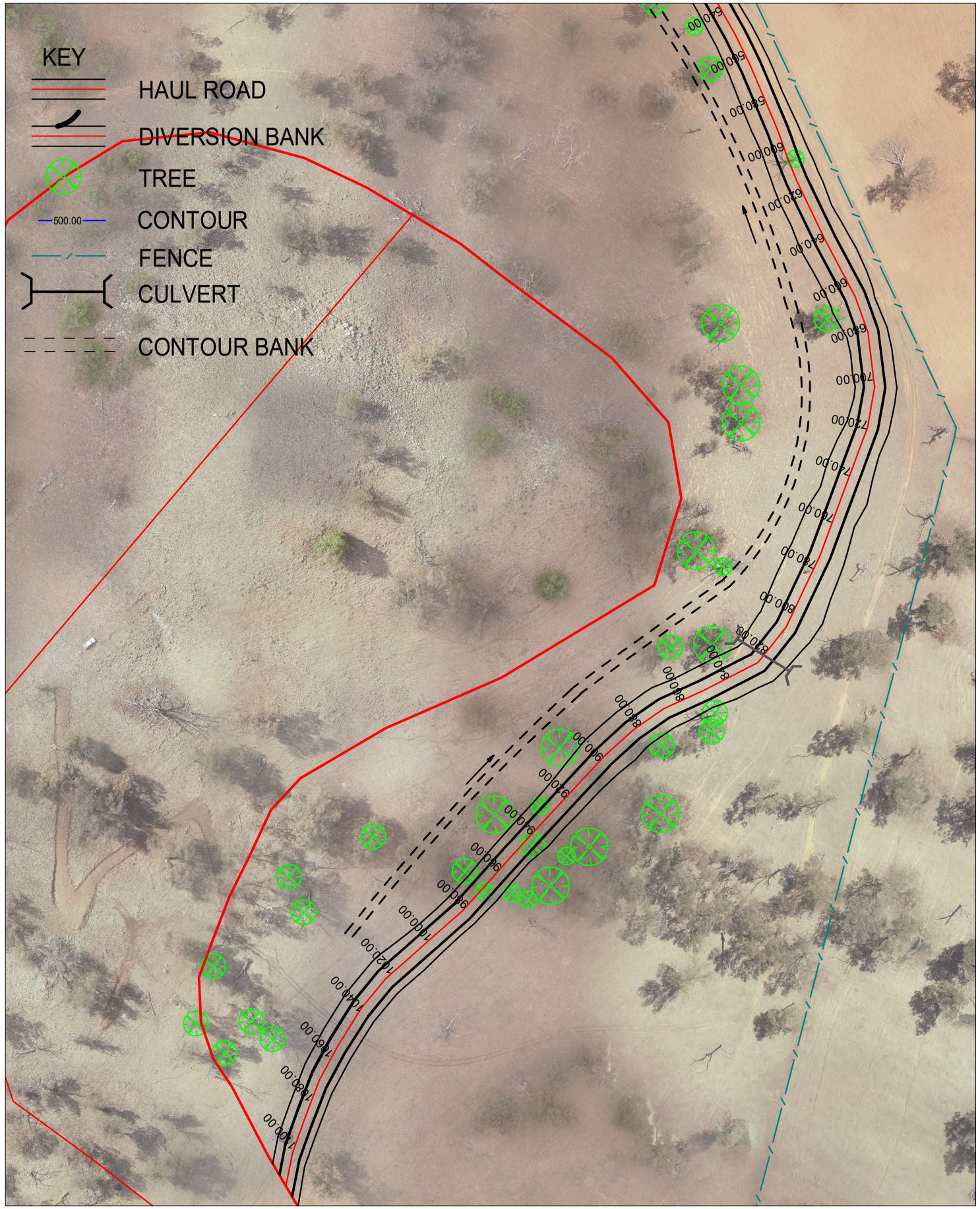
Sheet 1 of 2

Rev 1 Size A3

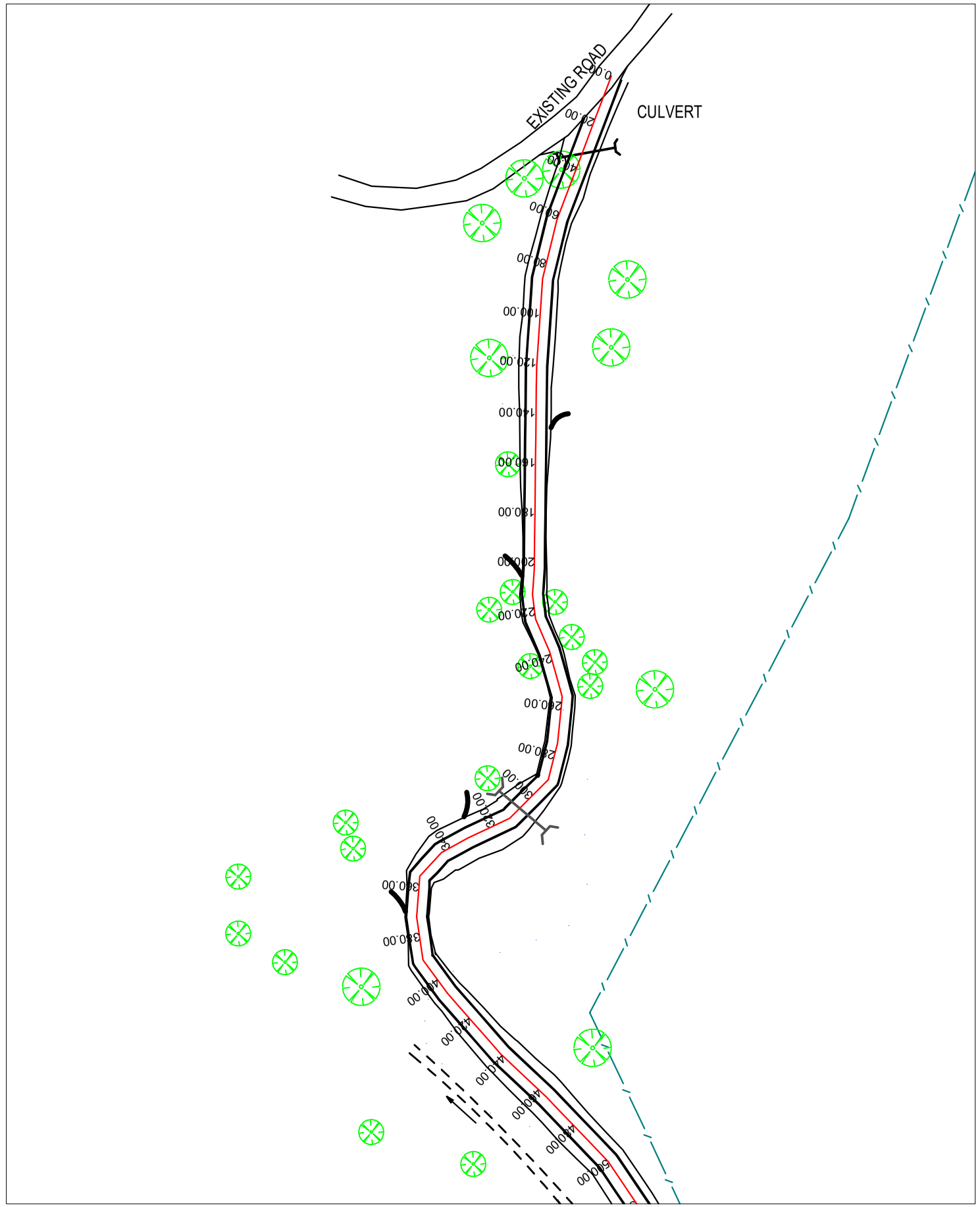
DATE: 6/05/2021

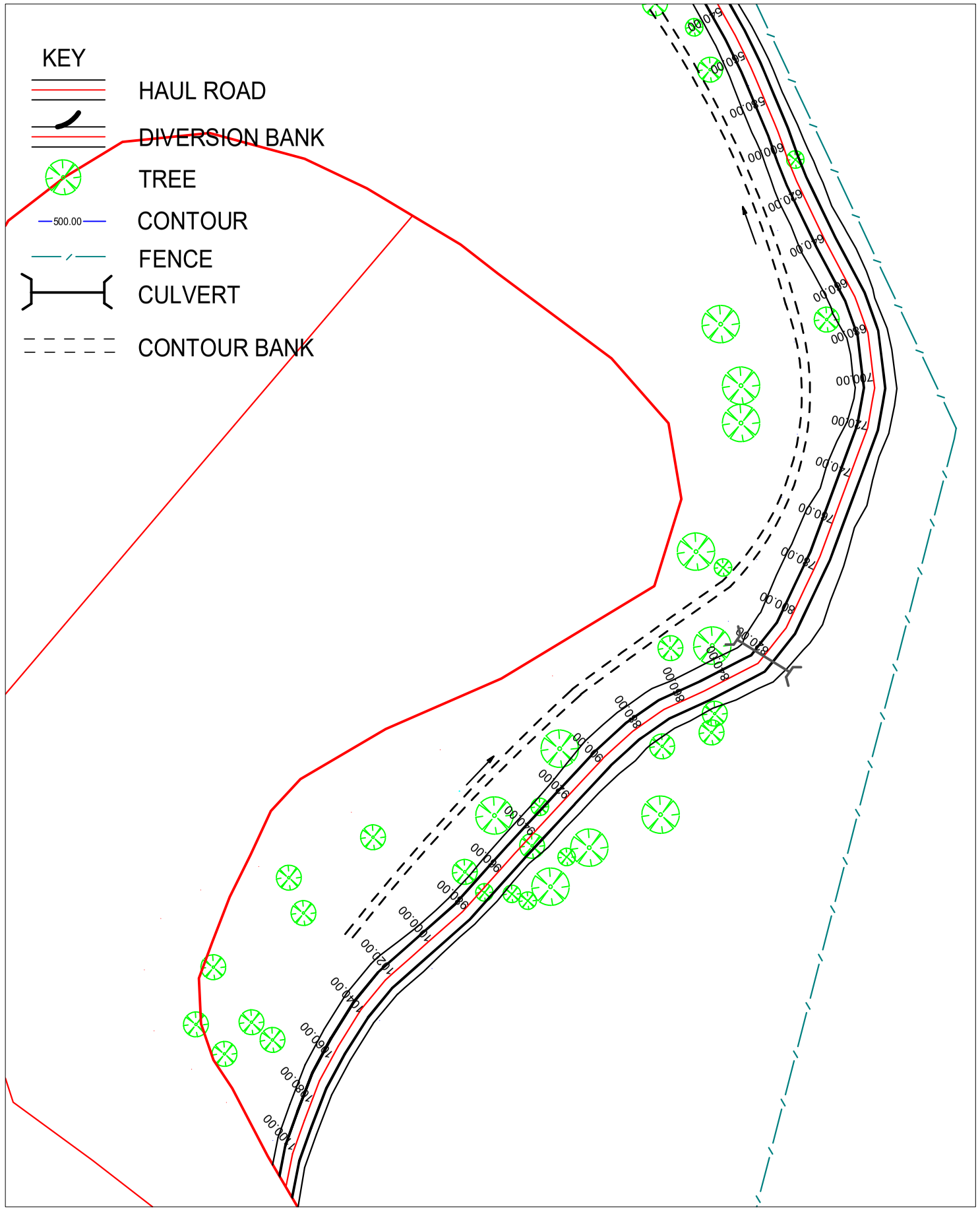
PLAN No. 2016.dwg



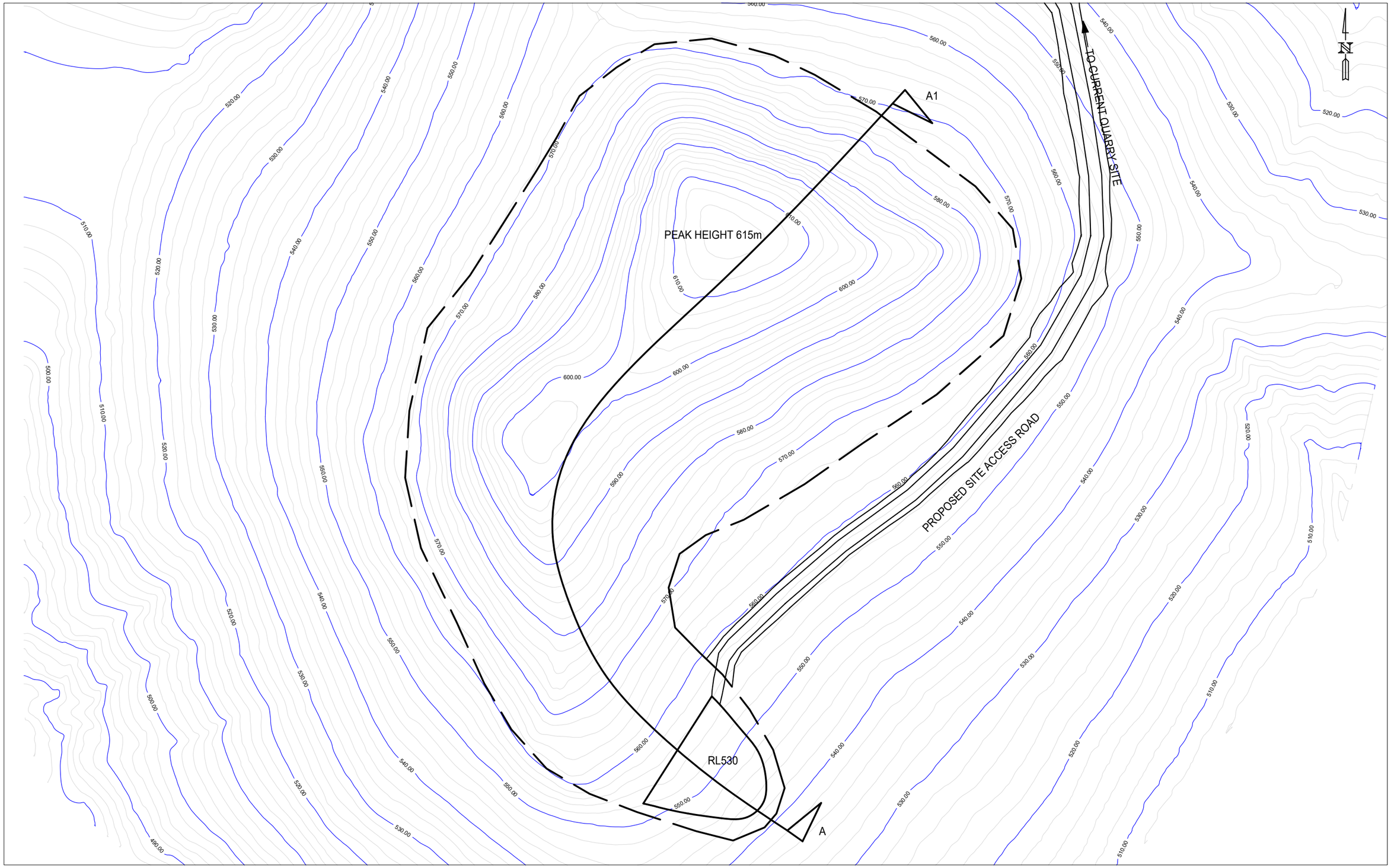


SCALE 1:2000 A3						ALLSPEC & PARTNERS	CLIENT: BALD HILL QUARRY	Sheet 1 of 1
ORIGIN OF LEVELS CORS						BUILDING - LAND - GUIDANCE	PROJECT: PROPOSED ROAD DESIGN PROPOSED QUARRY	Rev 1 Size A3
CONTOUR INTERVAL ... 2m						OFFICE: 58 FITZROY STREET, TUMUT. 2720 P: 02 6947 6761 E: admin@allspecap.com		DATE: 31/03/2021
DATUM: MGA	No.	REVISIONS & AMENDMENTS	Drawn	Approved	Date	THE FULL SPECTRUM OF DEVELOPMENTS	LOCATION: BALD HILL QUARRY BALD HILL, JUGIONG, NSW	PLAN No. 2016.dwg





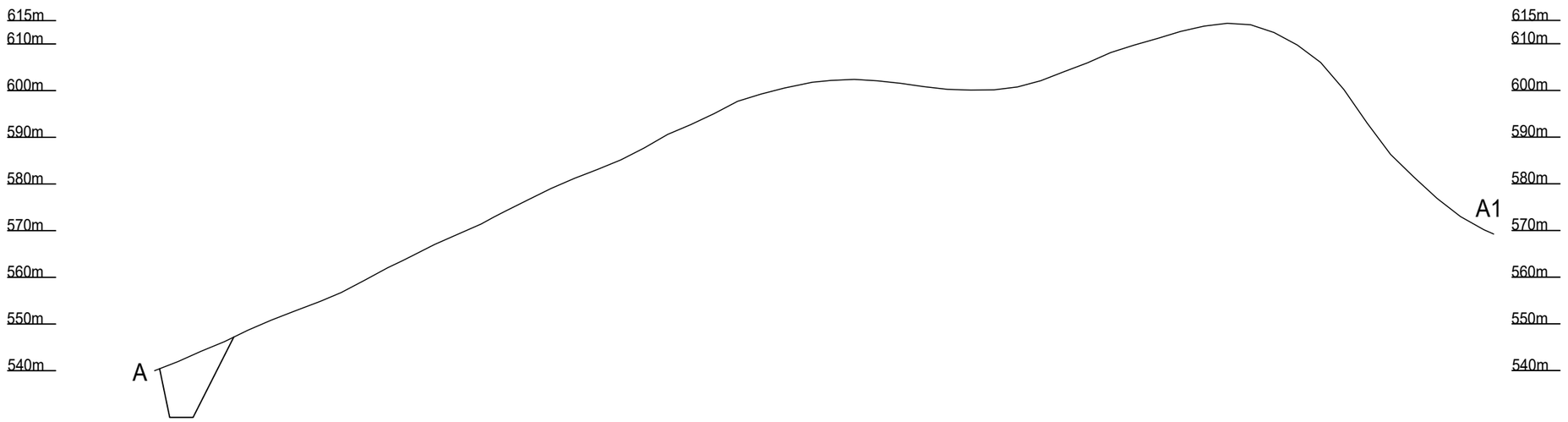
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ORIGIN OF LEVELS CORS						BUILDING - LAND - GUIDANCE	PROJECT: PROPOSED ROAD DESIGN PROPOSED QUARRY
CONTOUR INTERVAL ... 2m						OFFICE: 58 FITZROY STREET, TUMUT. 2720 P: 02 6947 6761 E: admin@allspecap.com	LOCATION: BALD HILL QUARRY BALD HILL, JUGIONG, NSW
DATUM: MGA	No.	REVISIONS & AMENDMENTS	Drawn	Approved	Date	THE FULL SPECTRUM OF DEVELOPMENTS	Sheet 1 of 1 / Rev 1 / Size A3 / DATE: 31/03/2021 / PLAN No. 2016.dwg



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 1

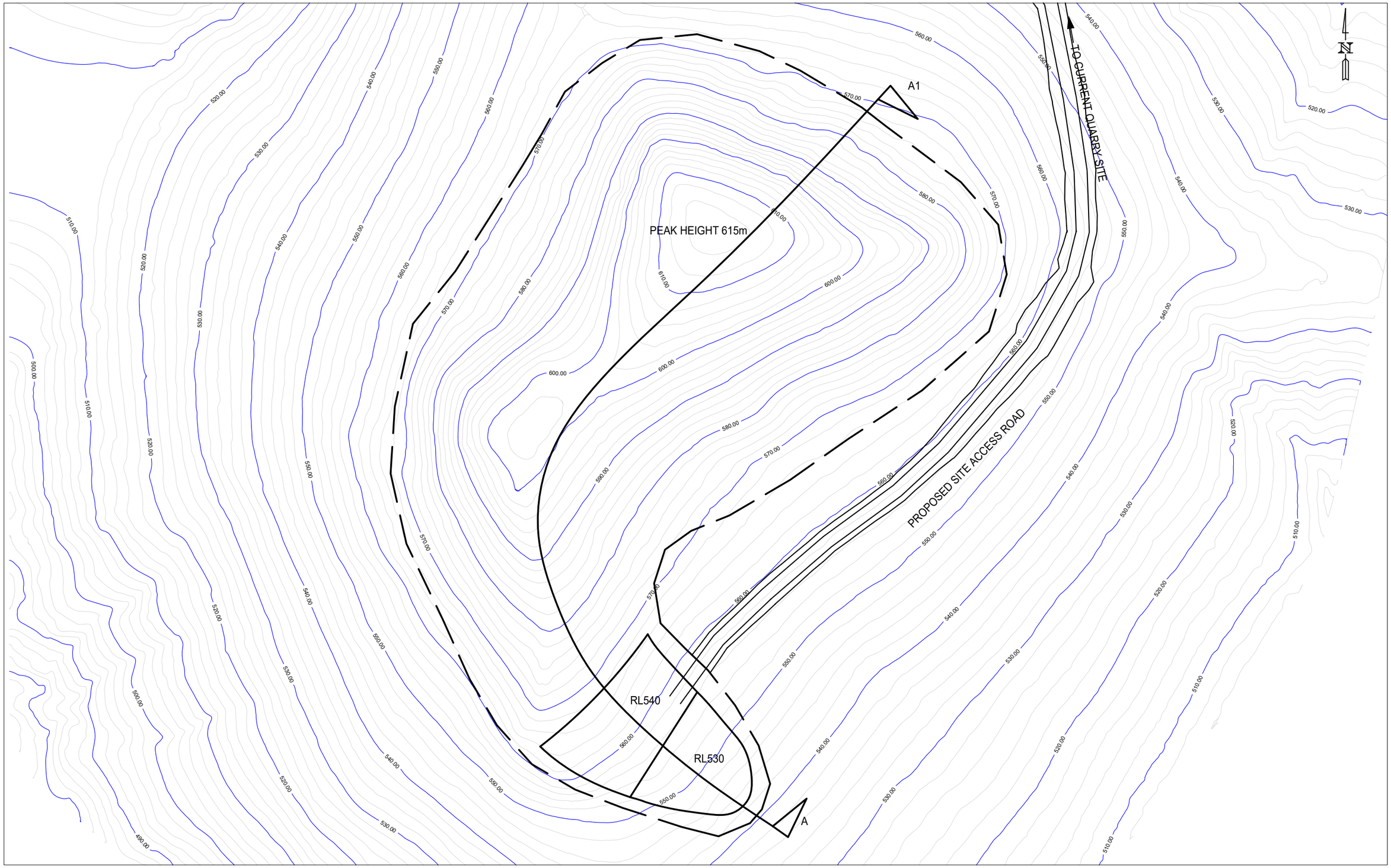
PLAN VIEW



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 1

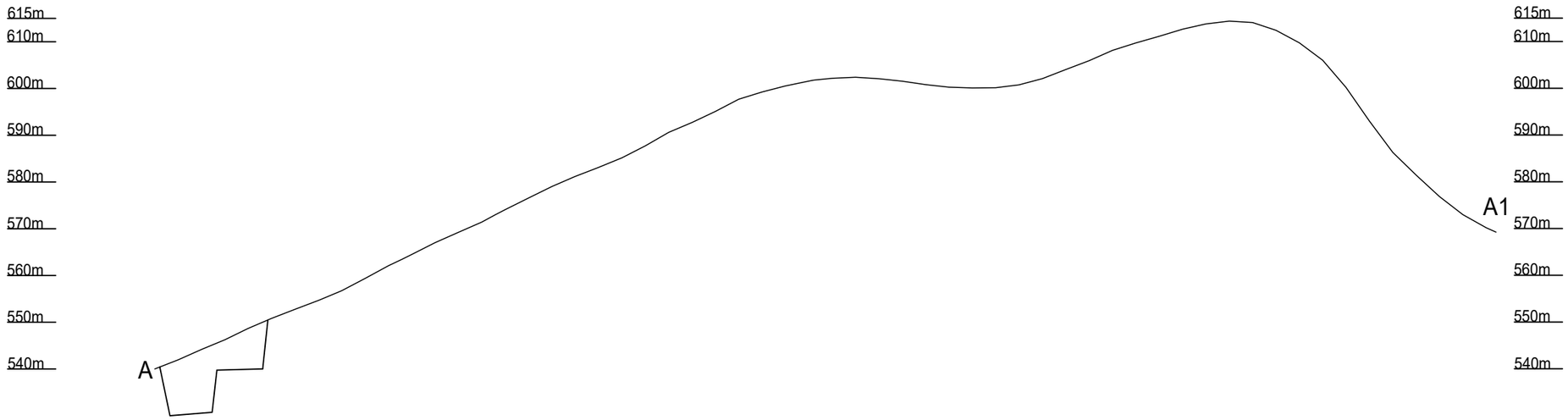
PROFILE VIEW **NTS**



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 2

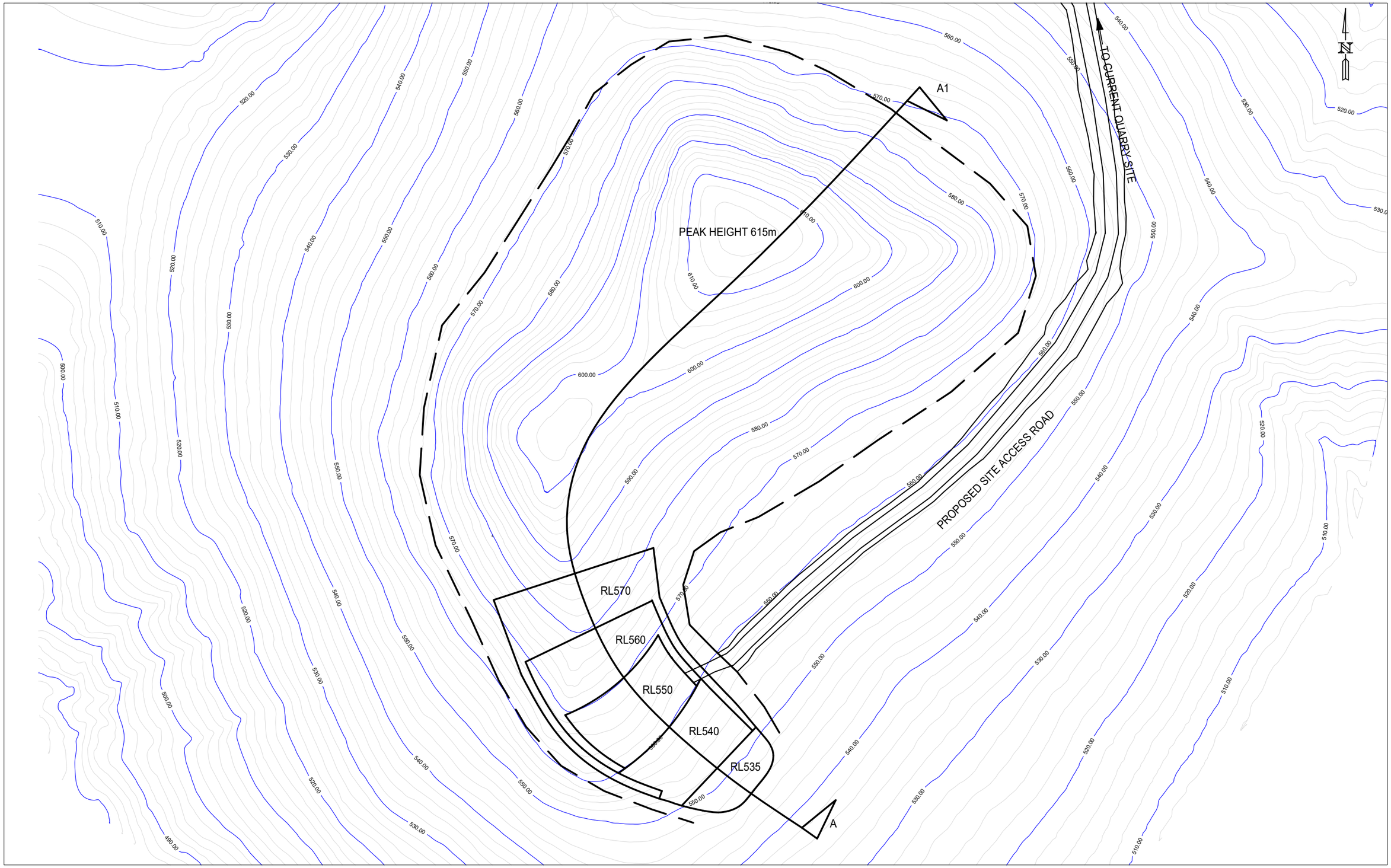
PLAN VIEW *(APPROX 18-24 MONTHS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 2

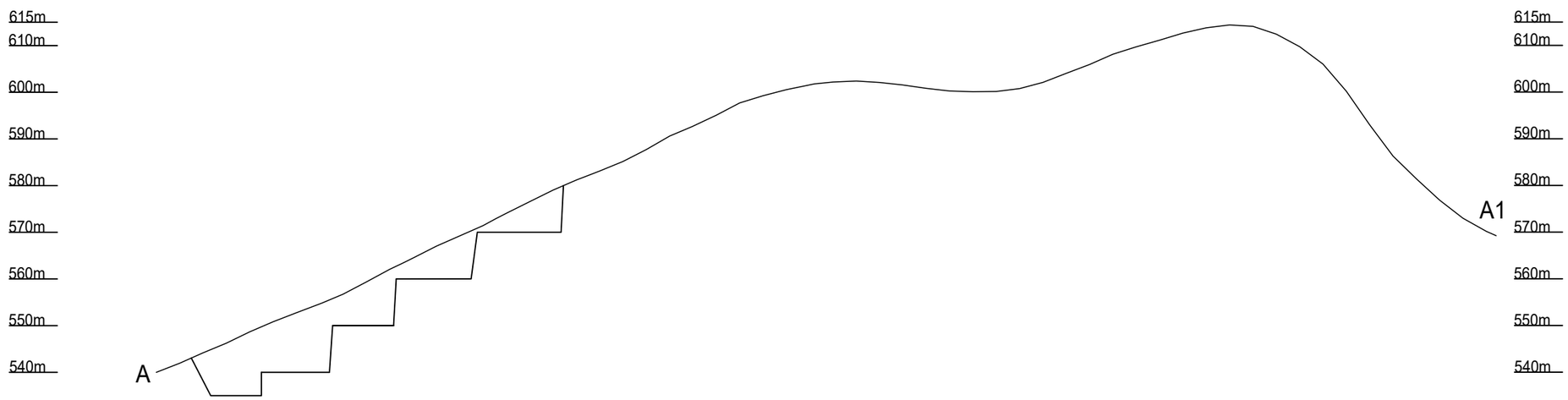
PROFILE VIEW **NTS** *(APPROX 18-24 MONTHS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 3

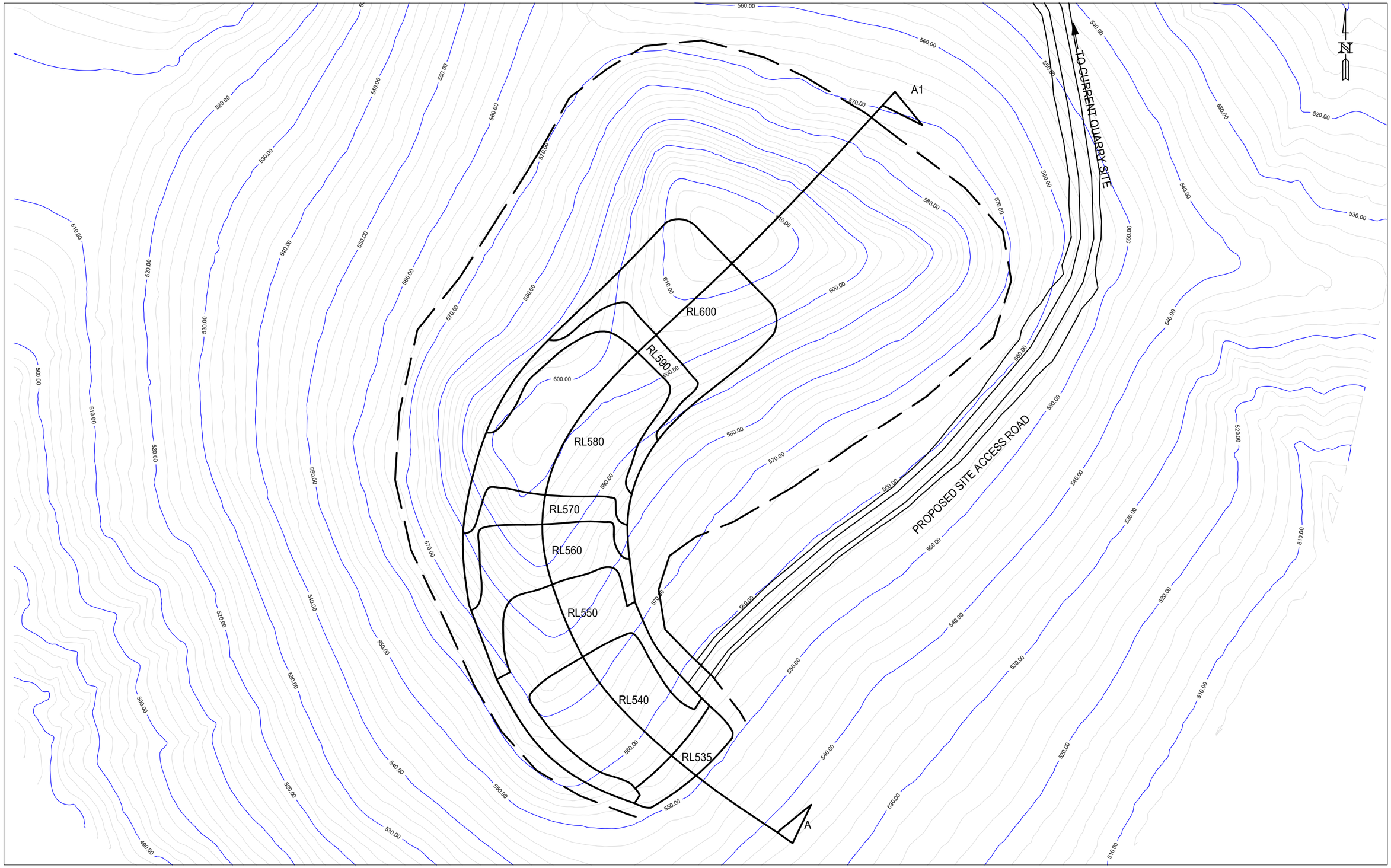
PLAN VIEW *(APPROX 3-4 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 3

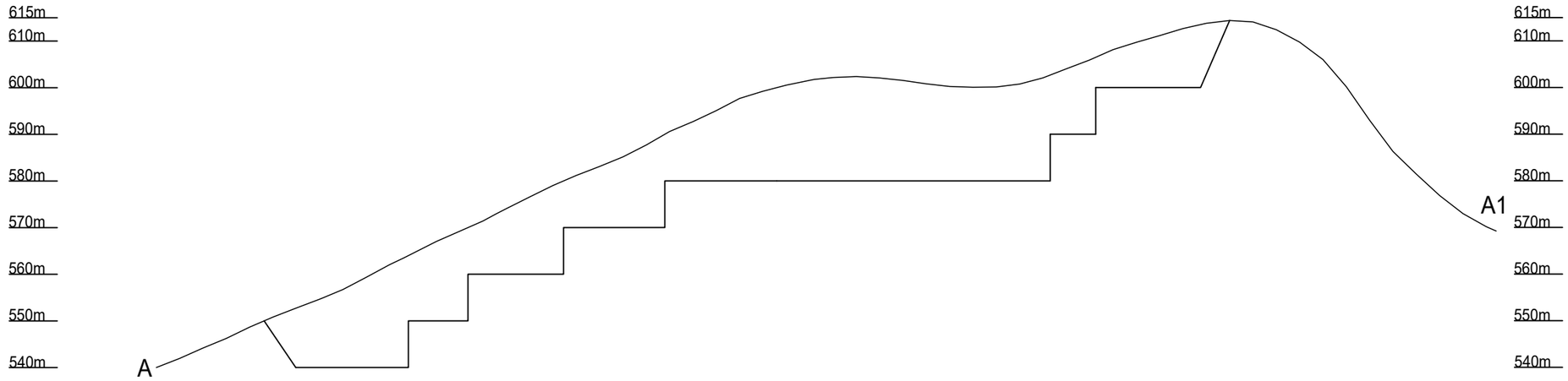
PROFILE VIEW **NTS** *(APPROX 3-4 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 4

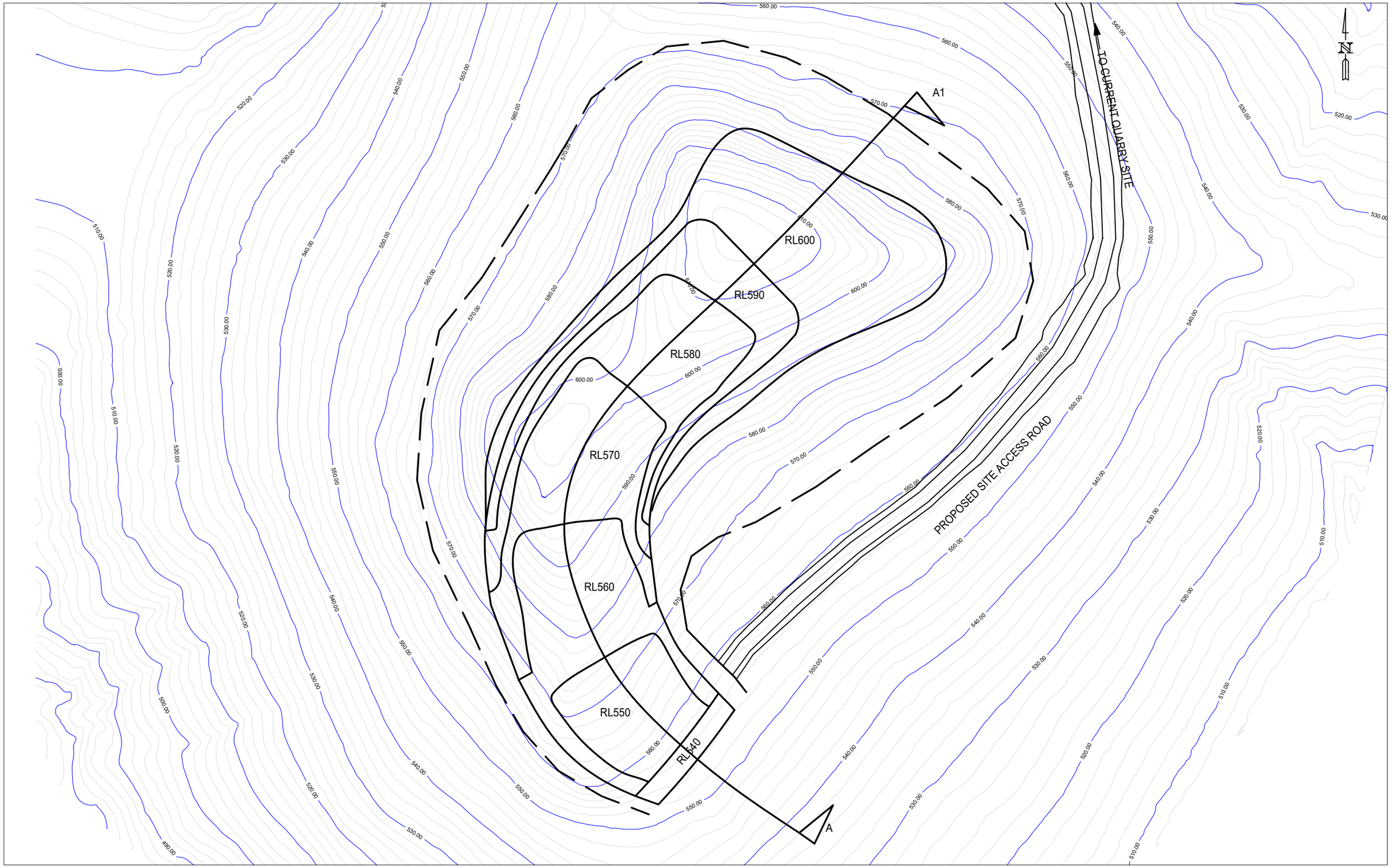
PLAN VIEW *(APPROX 10-15 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 4

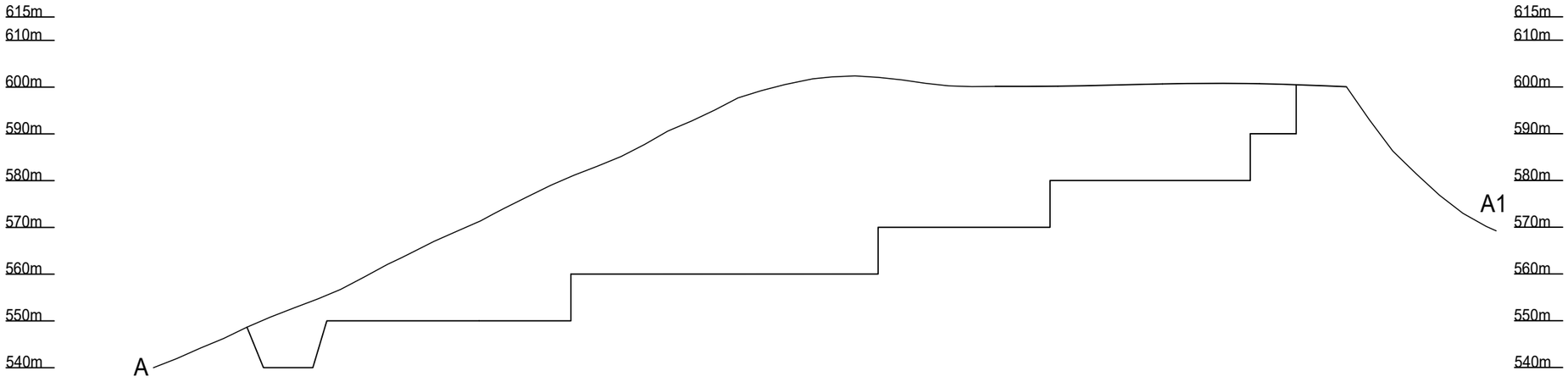
PROFILE VIEW **NTS** *(APPROX 10-15 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 5

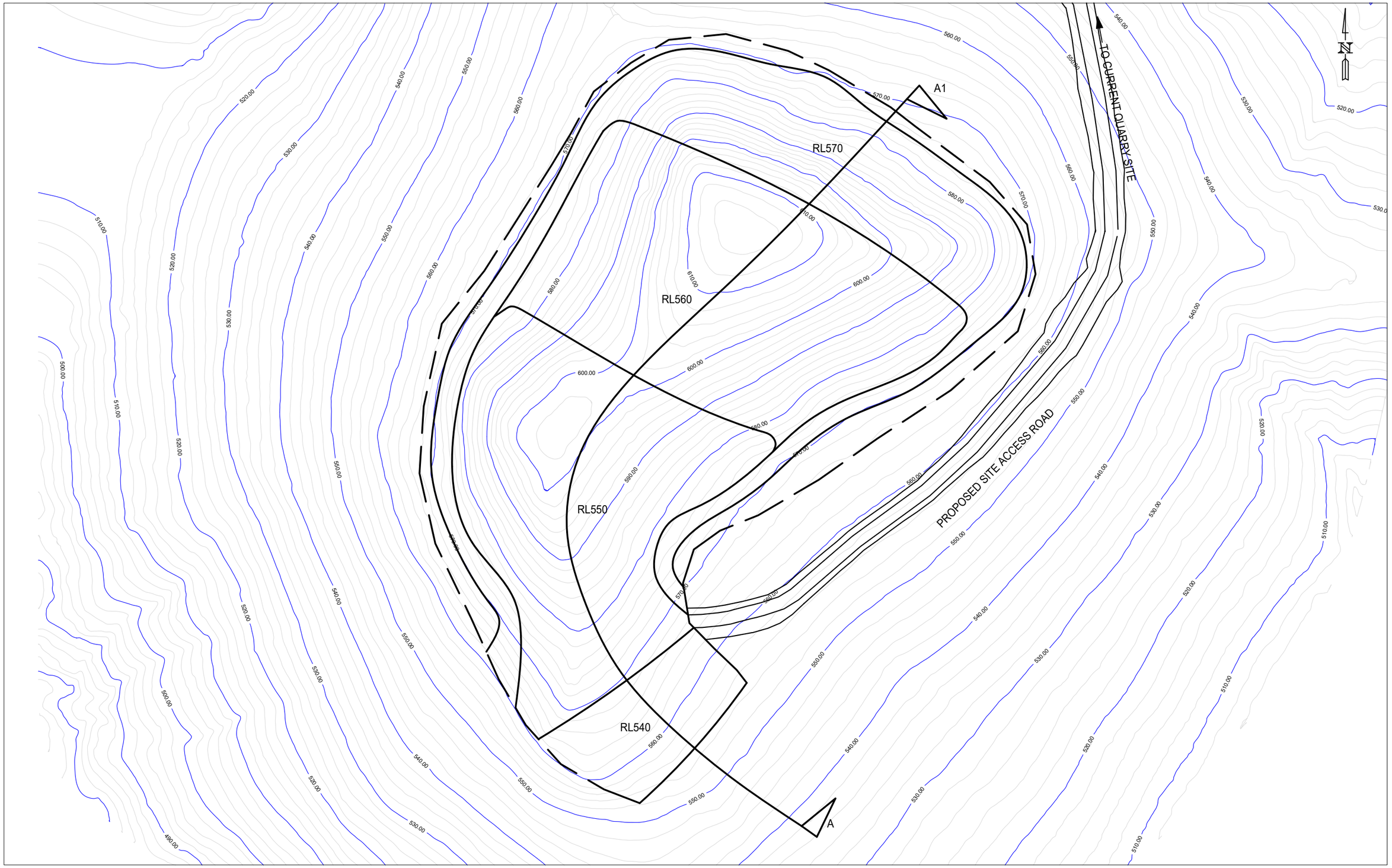
PLAN VIEW *(APPROX 15-20 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 5

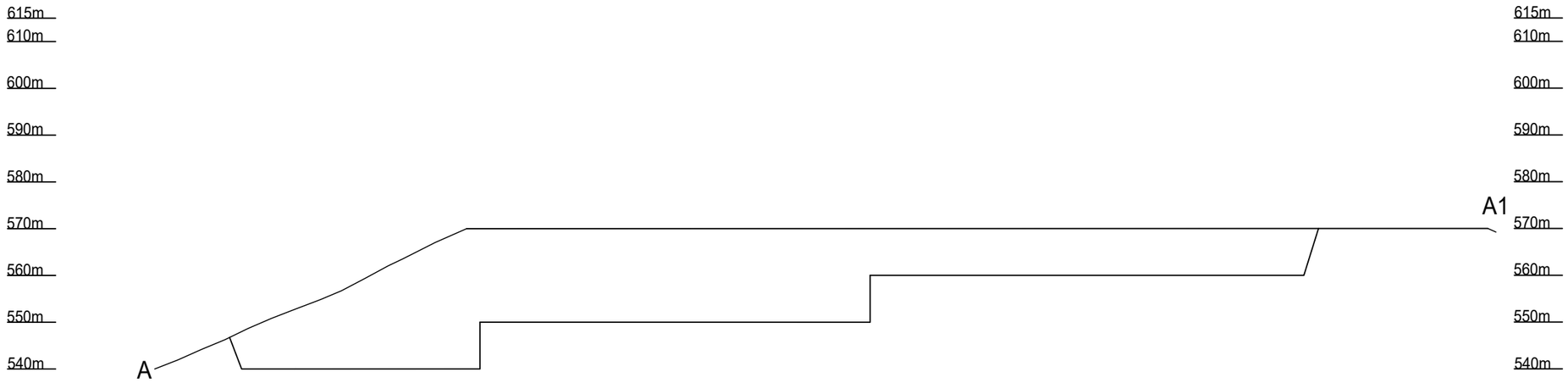
PROFILE VIEW **NTS** *(APPROX 15-20 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 6

PLAN VIEW *(APPROX 25-30 YEARS)*



BUNDARBO QUARRY

PIT DEVELOPMENT & BLASTING ARRANGEMENT STAGE 6

PROFILE VIEW **NTS** *(APPROX 25-30 YEARS)*

APPENDIX C CONSULTATION

From: Nicola Smith
To: Nicola Smith
Subject: FW: EAR 1441 - Mt Bundarbo Quarry - BCD Allison Treweek
Date: Wednesday, 3 February 2021 2:04:45 PM
Attachments: image001.png
fa5b7dc2-a089-43b4-8383-a1c7b331c3fc.png
image003.jpg
de58af7f-fec6-4fec-bb92-cf2246cff3bc.png
44daa097-c87b-4677-8f42-d1313d380f84.png

Received a call form Allison Treweek from BCD, South East, Queanbeyan regarding request for information.

Standard SEARs, I can justify using information provided – height of hill, quarry operation, distance from Murrumbidgee River and distance from sensitive receivers.

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

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From: Nicola Smith
Sent: Wednesday, 16 December 2020 11:32 AM
To: info@environment.nsw.gov.au
Subject: EAR 1441 - Mt Bundarbo Quarry - BCD Allison Treweek

Hello,

Could this email please be directed to Allison Treweek, South East, Queanbeyan.

Hi Allison,

I have a few queries regarding flood modelling and the proposal. I'm keen to discuss whether modelling is required because of the development and the result on the landscape of the existing quarry operations.

Could you please get in contact at your convenience.

Best regards,
Nicola

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

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BALD HILL QUARRY

Bald Hill Quarry Pty Ltd (ABN 19 003 764 725)
5423 Hume Highway, Jugiong, NSW, 2726
02 6227 7817

22 April 2021

Crown Lands Aboriginal Land Claims Unit
PO Box 2155 Dangar NSW 2309

Re: Undetermined Land Claims

To whom it may concern,

Bald Hill Quarry Pty Ltd is preparing a Development Application for submission shortly, in which it seeks to establish a new quarry pit extractive resource located 8 kms east of Jugiong and 55 km west of Yass, NSW (Figure 1) and on Lot 148 DP753592, Lot 11 DP133540, Lot 9 DP439146, and Lot 7002 DP1031310 and road reserve (see Figure 2).

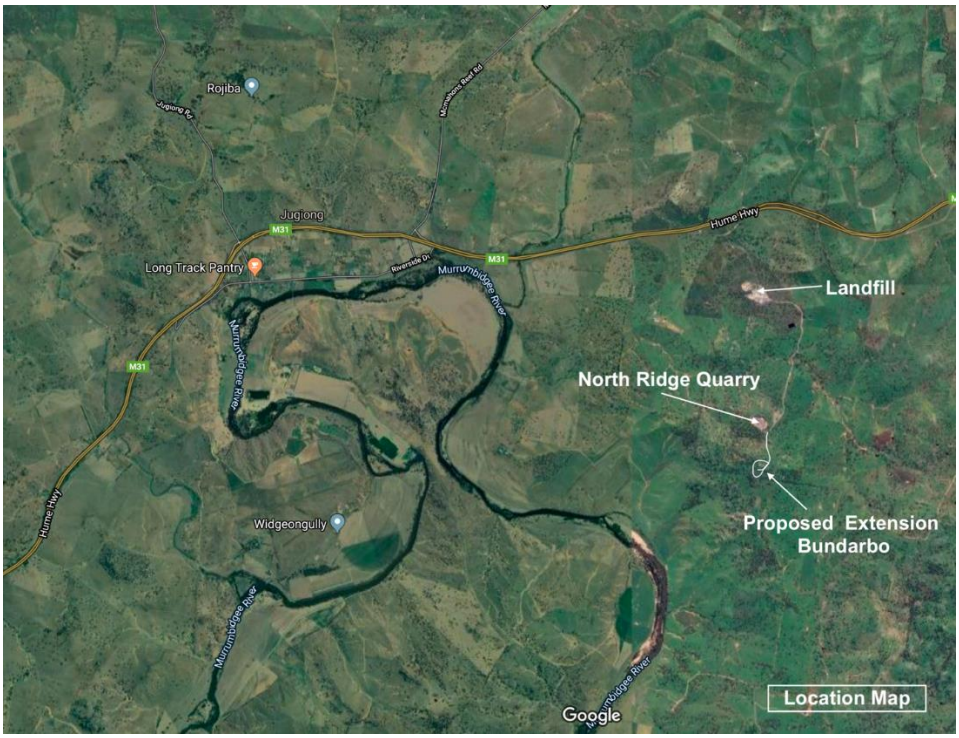


Figure 1: Location of the proposed project



Figure 2: Proposed project in regards to land description

The Crown Land Reserve Lot 7002 DP1031310 contains a trigonomentrical station and is subject to two undertermined Aboriginal Land Claims. Bald Hill Quarry Pty Ltd requests the two undertermined Aboriginal Land Claims from May 2006 (claim no. 11046) and May 2020 (claim no.51172) both raised by NSW Aboriginal Land Council be assessed due to their assocation with the above mentioned project

Young Local Aboriginal Land Council (YLALC) is the local indigenous body that has oversite of the area the subject of the Development Proposal.

Bald Hill Quarry Pty Ltd sees the Young Local Aboriginal Land Council (YLALC) as having an integral part in the bringing together of the proposal for submission. Following initial meetings, a site inspection, participation in the heritage surveys and having subsequently reviewed the information and findings presented in the Environmental Impact Statement, YLALC have commenced the process of establishing their position of the land claims.

As of the writing of this request Bald Hill Quarry Pty Ltd has not yet received advice from the YLALC on the position it holds regarding the claims.

Bald Hill Quarry Pty Ltd, as the claims are associated with the project, accordingly seeks to have the claims determined.

If there are any further questions, please do not hesitate to contact me.

Kind Regards,



Belinda Fourie
Work Health Safety and Environment Manager
safety@baldhillquarry.com.au
Ph: 0490 552 596

From: Nicola Smith
To: "queanbeyan@epa.nsw.gov.au"
Subject: Mt Bundarbo Quarry SEAR 1441
Date: Wednesday, 30 September 2020 1:43:00 PM
Attachments: image001.png

Hello,

NGH have been engaged for the EIA for the proposed Mt Bundarbo Quarry, SEAR 1441.

In regards to noise and vibration, NGH would complete this assessment using a distance-attenuation model to estimate noise impacts on nearby sensitive receivers. We also have blasting records from the proponent from their operational quarries.

I was after confirmation that EPA do not require a specialist noise assessment?

Best regards,
Nicola.

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

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From: Nicola Smith
Sent: Wednesday, 30 September 2020 1:37 PM
To: Janine Goodwin <Janine.Goodwin@epa.nsw.gov.au>
Subject: Mt Bundarbo Quarry SEAR 1441

Hi Janine,

I hope this finds you well.

NGH have been engaged for the EIA for the proposed Mt Bundarbo Quarry, SEAR 1441.

In regards to noise and vibration, NGH would complete this assessment using a distance-attenuation model to estimate noise impacts on nearby sensitive receivers. We also have blasting records from the proponent from their operational quarries.

I was after confirmation that EPA do not require a specialist noise assessment?

Best regards,
Nicola.

NICOLA SMITH

SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
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(PO Box 5464) Wagga Wagga NSW 2650



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From: Shayne Kneen
To: Nicola Smith
Subject: RE: 20-481 - Mt Bundarbo Pit EIS SEAR 1441 - GSNSW follow up.
Date: Monday, 1 February 2021 3:34:26 PM
Attachments: image002.jpg
image003.png
image004.jpg

Hi Nicola,

Thank you for your question.

Are you able to provide a Lot and DP for the offset area under investigation, or possibly a shape file or map to assist us in reviewing the Offset investigation area?

Best regards

Shayne Kneen
Geoscientist - Land Use - Geological Survey of NSW

Mining, Exploration and Geoscience |
Department of Regional NSW
E shayne.kneen@planning.nsw.gov.au
516 High St | Maitland NSW 2320
PO Box 344 | Hunter Region MC NSW 2310
nsw.gov.au/regionalnsw

-



The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

From: Nicola Smith <nicola.s@nghconsulting.com.au>
Sent: Thursday, 28 January 2021 2:59 PM
To: DRG GSNSW Landuse Minerals Mailbox <landuse.minerals@geoscience.nsw.gov.au>
Subject: 20-481 - Mt Bundarbo Pit EIS SEAR 1441

Hello,

NGH have been engaged to undertake the environmental assessment for Mt Bundarbo quarry DA, SEAR 1441.

There is an area owned by the proponent in proximity to the development site that is under investigation as a biodiversity offset area.

As per your agency requirements, this is early consultation regarding the potential offset area. As the preliminary investigation has not started, what information can I provide to you at this time?

Thanks,
Nicola

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
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35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

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From: Nicola Smith
To: Nicola Smith
Subject: RE: c/o Andrew Raines - EAR 1441
Date: Friday, 23 October 2020 12:28:17 PM
Attachments: image001.png

Email followed up with a phone conversation with Andrew 23/10/2020 regarding the GHG emissions – NGH fine to assess as long as addressed.
Photomontages – no development planned for within 1.5 km radius of development footprint. Can be simple visual assessment with DEM to show elevation and photos.
Council also open to discussing a VPA – voluntary planning agreement – with submission of the DA.

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
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From: Andrew Raines <Andrew.Raines@hilltops.nsw.gov.au>
Sent: Friday, 23 October 2020 10:32 AM
To: Nicola Smith <nicola.s@nghconsulting.com.au>
Subject: RE: c/o Andrew Raines - EAR 1441

Good morning Nicola,

Thank you for your email below regarding an anticipated development application.

Council has not received a copy of the SEARs for the development proposal. The requirements of the SEARs must be adequately addressed in the EIS.

Depending on the SEARs requirements, the method of providing an assessment of GHG emission sources (direct and indirect emissions) before and after the development would be acceptable. The EIS should detail measures to avoid or mitigate such emissions.

The EPA Queanbeyan Office may be able to advise on technical guidelines to assist with estimating GHG emissions.

I trust the above is of assistance.

Kind regards,
Andrew

Andrew Raines
Senior Planner

Locked Bag 5
YOUNG NSW 2594
andrew.raines@hilltops.nsw.gov.au
Phone (02) 6384 2535
Fax (02) 6386 0105

Boorowa Office – 6-8 Market St BOOROWA
Harden Office – 3 East St HARDEN
Young Office – 189 Boorowa St YOUNG

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Please consider the environment before printing this e-mail

From: Nicola Smith <nicola.s@nghconsulting.com.au>
Sent: Friday, 9 October 2020 10:12 AM
To: mail@hilltops.nsw.gov.au
Subject: c/o Andrew Raines - EAR 1441

Hi Andrew,

I would like to discuss a component of the EIA for the proposed Mt Bundarbo Quarry, EAR 1441.

A SEAR requirement of the EPA is to provide a summary of the outcomes of the process including changes in greenhouse gas emissions.

As the consent authority, would Council be satisfied with NGH making the assessment for GHG emissions associated with the proposal. The process would minimally increase GHG emissions from the extra 2 km haulage distance and occasional blasting. Even though both pits would be operating concurrently, the on-site processing plant can only continue to process the current material load (max 2,000 t per day) and therefore, there would be no additional processing or haulage of material.

Thanks,

Nicola

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au
35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650



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NSW GOVERNMENT Customer Service

Spatial Services
346 Panorama Ave, Bathurst NSW 2795,
Tel 02 6332 8200 | TTY 1300 301 181
ABN 81 913 830 179 | www.customerservice.nsw.gov.au

Belinda Fourie
Bald Hill Quarry
5423 Hume Highway
Jugiong NSW 2726

Email: safety@baldhillquarry.com.au

Dear Belinda,

RE: Removal of permanent survey mark TS6184 "Bundarbo" and Reference Marks for a new resource pit .

Mark Locality: Jugiong

Your Reference: **Baldhill Quarry** **Our Reference:** **R 20/186**

I refer to your correspondence via email regarding the above Preservation of Survey Infrastructure (POSI) application.

Your request to remove TS6184 "Bundarbo" has been considered and approved with the following conditions:

1. No replacement survey mark is needed for TS6184.
2. TS6184 is located upon Lot 7002 in DP1031310 and is connected to the State cadastre through Crown Plan CP581-3040 and Deposited Plan DP439146. It is critical the relationship between the State cadastre and the new open cut quarry at Mt Bundarbo is maintained. An investigation must be performed by a NSW registered land surveyor for the reference marks and boundaries mentioned in the above plans.
3. Regarding the integrity of the cadastre, any reference mark to be replaced will require a Deposited Plan of Survey Information Only (DPoSIO) which must be prepared by a NSW registered land surveyor and lodged with NSW Land Registry Services. Prior to the lodgement of the above plan a draft copy must be submitted to DCS Spatial Services for feedback. Following the lodgement of the above plan please supply the DP number as confirmation to Surveyor-General-Approvals@customerservice.nsw.gov.au

   In particular, the following conditions apply:

   a. All *'to be destroyed'* and *'vulnerable'* survey marks identified in must be located and surveyed prior to commencement of the works and their locations shown on the final plan.

   b. Ensure that all survey marks are connected by closed survey. Where possible those connections should be made directly from permanent survey marks or newly placed marks as defined in schedules 1, 3 or 4 of the Regulation. Two independent radiations (from two different marks) may be sufficient where fully closed connections are not practical.

   c. All replacement survey marks must be placed within 150 metres of the respective survey mark to-be-destroyed and their location shown on the final plan.

4. DCS Spatial Services must be formally notified of the removal of the TS6184 using the Mark Status Report facility on our website https://www.spatial.nsw.gov.au/surveying/surveying_services/forms_and_applications/scims_status_report

Please note:

- During the interim period from mark destruction to the re-establishment of new survey marks and/or lodgement of a Plan for Survey Information Only, your contact details may be provided to any member of the public who might enquire about the loss of survey infrastructure. If contacted, the applicant must supply any relevant information that may assist in their inquiry (such as survey data relevant in defining GDA, AHD or the cadastre).

- If a minor variation to this approval is required, then notification needs to be sent to: Surveyor-General-Approvals@customerservice.nsw.gov.au

- Any major variation to the approval will require a new application for Survey Mark(s) Removal.

- DCS Spatial Services should be consulted on network design and survey practice aspects prior to commencement of the survey.

- If a Plan of Survey Information Only is required by this approval, quote the Approval No. adjacent to the Surveyor's Reference on that plan.

- SCIMS data can be obtained free of charge from the "*SIX Maps - SCIMS Online*" facility from the new DCS Spatial Services Portal by logging in or registering a new "*SIX*" account at https://six.nsw.gov.au/

- Where possible, provide at least 30 business days notification before the proposed removal or replacement of survey marks (permanent survey marks or reference marks) thereby extending the timeframe of 14 days minimum under Clause 90 of the Regulation.

- For all future requests to remove a survey mark please use the Application for Surveyor General Approval - Survey Mark(s) Removal form on our website under Surveyor Generals Directions No.11 https://www.spatial.nsw.gov.au/surveying/surveying_services/forms_and_applications/survey_marks_removal

Please quote the Approval No. R 20/186 in any future correspondence.

Yours sincerely,



Daniel Sadler

for Narelle Underwood
Surveyor-General of NSW

21 July 2020

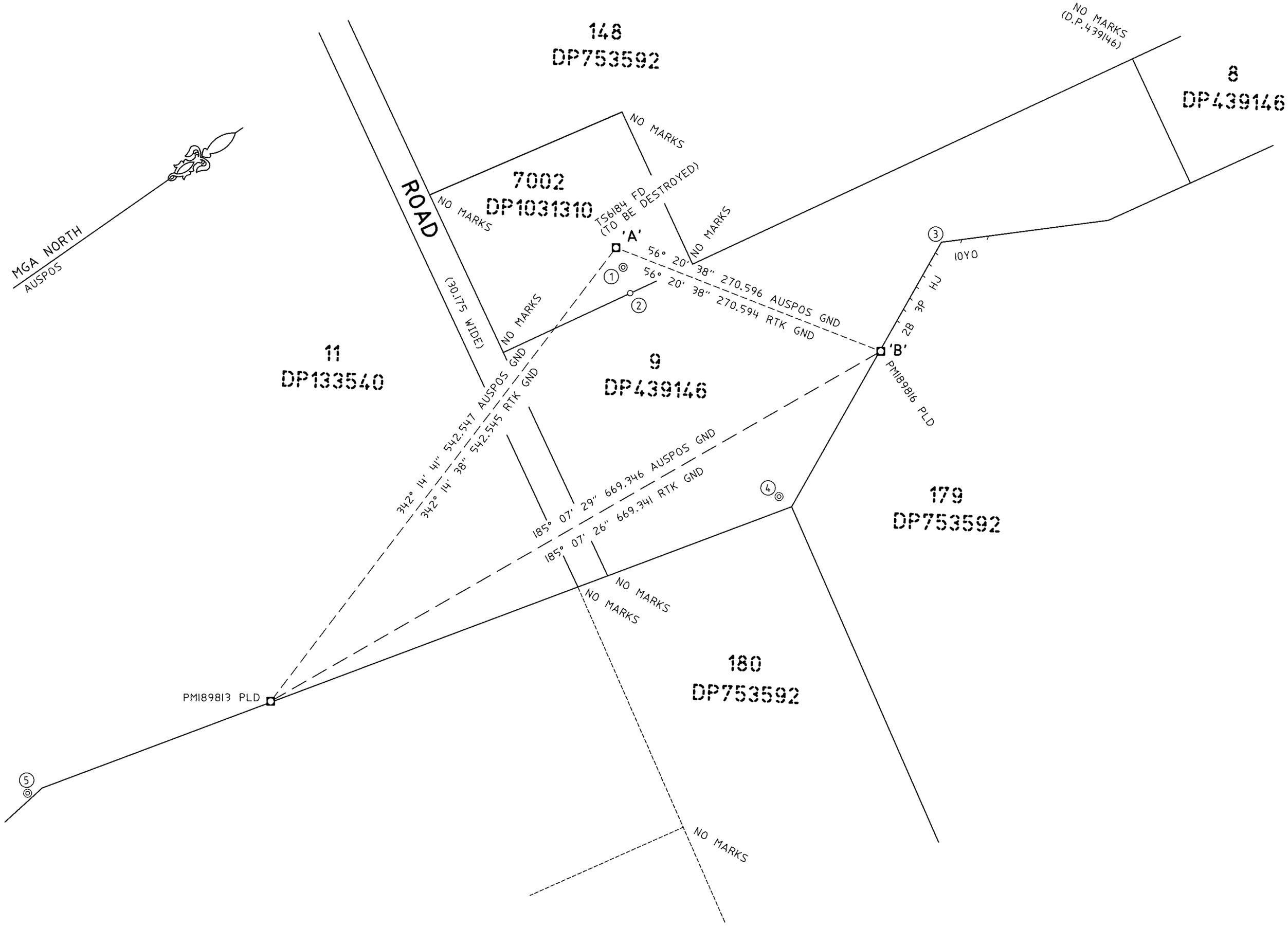
COORDINATE SCHEDULE							
MARK	MGA CO-ORDINATES: GDA2020		ZONE	CLASS	ORDER	METHOD	STATE
	EASTING	NORTHING					
PM189813	629 777.680	6 142 030.429	55	D	U	AUSPOS	PLACED
PM189816	629 837.451	6 142 696.906	55	D	U	AUSPOS	PLACED
TS6184	629 612.278	6 142 546.984	55	A	0.02	SCIMS	FOUND
DATE OF SCIMS COORDINATES: 28/09/20 MGA ZONE: 55							
MGA DATUM: GDA2020 COMBINED SCALE FACTOR 0.99971							

GNSS VALIDATION SCHEDULE				
FROM	TO	BEARING	DISTANCE	METHOD
TS 6184	PM 189816	56° 20' 38"	270.596	AUSPOS
		56° 20' 38"	270.594	RTK GNSS

NOT INVESTIGATED IN NSW LRS.
SURVEY INFORMATION ONLY.
NOT TO BE USED FOR TITLE DESCRIPTION

SCHEDULE OF MARKS FOUND			
ID	MARK	ORIGIN	STATUS
1	BRASS PLUG FD TS 6184-1	581-3040	FOUND TO BE DESTROYED
2	ROCK CAIRN FD	581-3040	FOUND TO BE DESTROYED
3	SFP IN LOCK SPIT FD	(UNKOWN)	FOUND
4	RM TREE FD	(7199-1716)	FOUND
5	RM GIP FD	(7199-1716)	FOUND

CONNECTIONS		
LINE	BEARING	DIST.
TS6184 TO (1)	84° 33' 10"	4.205
(1) TO (2)	102° 39' 10"	40.835
(2) TO (3)	26° 12' 30"	296.125
(3) TO PM189816	154° 48' 00"	118.445
PM189816 TO (4)	156° 19' 30"	170.29
(4) TO PM189813	194° 05' 15"	526.545
PM189813 TO (5)	193° 56' 20"	264.435
(5) TO TS6184	352° 30' 15"	780.015



SURVEYOR Name: STEPHEN R EMERY Date: 9/3/2021 Reference: 19689 Approval No.R20/186	PLAN OF SURVEY INFORMATION ONLY	LGA: HILLTOPS Locality: BERREMANGRA Reduction Ratio 1:3000 Lengths are in metres.	Registered 20/04/2021	DP1273064

Req:R708786 /Doc:DP 1273064 P /Rev:20-Apr-2021 /NSW LRS /Pgs:ALL /Prt:21-Apr-2021 03:30 /Seq:1 of 2
© Office of the Registrar-General /Src:PORTAL /Ref:lrs:eplan-eplan FOR SURVEYORS USE ONLY

Req:R708786 /Doc:DP 1273064 P /Rev:20-Apr-2021 /NSW LRS /Pgs:ALL /Prt:21-Apr-2021 03:30 /Seq:2 of 2
© Office of the Registrar-General /Src:PORTAL /Ref:lrs:eplan-eplan FOR SURVEYORS USE ONLY

PLAN FORM 6_E (2020)	**DEPOSITED PLAN ADMINISTRATION SHEET**	Sheet 1 of 1 sheet(s)

Office Use Only

Registered: 20/04/2021

Title System: TORRENS

Office Use Only

DP1273064

PLAN OF SURVEY INFORMATION ONLY

LGA: HILLTOPS

Locality: BERREMANGRA

Parish: BIRREMA

County: HARDEN

Survey Certificate

I, STEPHEN R EMERY

of CMS Surveyors Pty Ltd, PO Box 463 Dee Why NSW 2099

a surveyor registered under the *Surveying and Spatial Information Act 2002*, certify that:

(a) The land shown in the plan was surveyed in accordance with the Surveying and Spatial Information Regulation 2017, is accurate and the survey was completed on 09-Mar-2021

(b) ~~Partial Survey~~

(c) ~~Compilation~~

Datum Line: "A"-"B"

Type: Urban ☐ Rural ☑

Signature: Dated: 10-Mar-2021

Surveyor Identification No: 1605

Surveyor registered under the *Surveying and Spatial Information Act 2002*

~~Crown Lands NSW/Western Lands Office Approval~~

~~I,----------(Authorised Officer) in approving this plan certify that all necessary approvals in regard to the allocation of the land shown herein have been given.~~

~~Signature:----------~~

~~Date:----------~~

~~File Number:----------~~

~~Office:----------~~

~~Subdivision Certificate~~

~~I,----------~~

~~----------certify that the provisions of section 6.15 of the *Environmental Planning and Assessment Act 1979* have been satisfied in relation to the proposed subdivision, new road or reserve set out herein.~~

~~Signature:----------~~

~~Registration number:----------~~

~~Consent Authority:----------~~

~~Date of endorsement:----------~~

~~Subdivision Certificate number:----------~~

~~File number:----------~~

Plans used in the preparation of survey.

581-3040
DP439146
7199-1716
3263-1716
3405-1716

Statements of intention to dedicate public roads, create public reserves and drainage reserves, acquire/resume land.

Surveyor's Reference: 19689 Approval No. R20/186

Signatures, Seals and Section 88B Statements should appear on the following sheet(s)

From: Nicola Smith
To: Nicola Smith
Subject: TfNSW consultation
Date: Friday, 4 September 2020 12:12:54 PM
Attachments: image001.png

Consultation with Maurice Morgan from TfNSW occurred 4/09/2020.

Discussion whether a Traffic Impact Assessment is necessary for the proposal.

No TIA necessary. Require:

- Photos of intersection in south bound and north bound directions to determine how the pavement of the treatments is holding up.
- Maximum cumulative daily and annual traffic movements for the entire project (Bald Hill Landfill, North Ridge Quarry and proposal) including light vehicles, deliveries etc.
- Reference to Austroads guidelines part 12.

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.
Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au
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(PO Box 5464) Wagga Wagga NSW 2650

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SWT20/00024
SF2020/042938
CB

23 March 2020

The General Manager
Hilltops Council
Locked Bag 5
YOUNG NSW 2594

Attention: Andrew Raines

DA T98/029.2 – PROPOSED INCREASED EXTRACTION RATE, BALD HILL QUARRY, HUME HIGHWAY, JUGIONG

I refer to the additional information submitted in relation to the subject development consent modification. The additional documentation includes a road safety audit (RSA) prepared by D-Tal Consulting and traffic management plan prepared by Amber Organisation Pty Ltd.

It is noted that the following recommendations are made in the RSA report regarding the previously approved design for improvements to the intersection of the access road (Old Hume Highway) with the Hume Highway;

- Provision of line marking to delineate the 2 lanes within the median crossover between the carriageways of the Hume Highway turn facilities in accordance with the previously approved design plans,
- Provision of a stop/hold line on the access road (Old Hume Highway) leg of the intersection,
- Widening of Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.
- Completion of a Road Dilapidation Survey for the auxiliary lanes on the Hume Highway at its intersection of the access road (Old Hume Highway) including median crossover

In addition to the conditions outlined in previous correspondence from Transport for NSW dated 25 November 2020, Transport for NSW has assessed the additional information provided and raise no objection to the to the Consent Authority ensuring that the development is undertaken in accordance with the information submitted as amended by the inclusion of the following additional conditions of consent (if approved);

1. All work required to address the recommendations of the Road Safety Audit prepared by D-Tal Consulting in February 2021 shall be completed to the satisfaction of Transport for NSW prior to implementation of the increased extraction rate.

2. Prior to completing any line marking work a Road Dilapidation Survey shall be undertaken by a suitably qualified contractor to identify existing pavement issues. Any pavement work deemed necessary by the Road Dilapidation Survey shall be completed prior to the line marking upgrade.

3. Detail design plans including pavement design details will be submitted to Transport for NSW for approval prior to commencement of any work associated with the recommendations of the

Road Safety Audit. An updated line marking and signposting plan shall be developed in consultation with Transport for NSW and submitted for approval.

Please be advised that under the provisions of the Environmental Planning & Assessment Act it is the responsibility of the Consent Authority to assess the environmental implications, and notify potentially affected persons, of any development including conditions.

Any enquiries regarding this correspondence may be referred to the Team Leader, Development services, TfNSW (South West), Maurice Morgan, phone (02) 6923 6611.

Please forward a copy of the Notice of Determination for this Development Application to the Land Use -TfNSW at the same time as advising the applicant.

Yours faithfully



Maurice Morgan
Team Leader, Development Services (South West)

From:	Nicola Smith
To:	Maurice Morgan
Bcc:	d14aae37-f909-4ec6-ac3d-4b6290899142.metaPublish@thehub.nghenvironmental.com.au
Subject:	20-481 - Mt Bundarbo Pit EIS - Bald Hill Quarry Jugiong - Intersection upgrade to accept B-Doubles
Date:	Saturday, 17 April 2021 10:55:05 PM
Attachments:	image001.png image004.png d14aae37-f909-4ec6-ac3d-4b6290899142.png

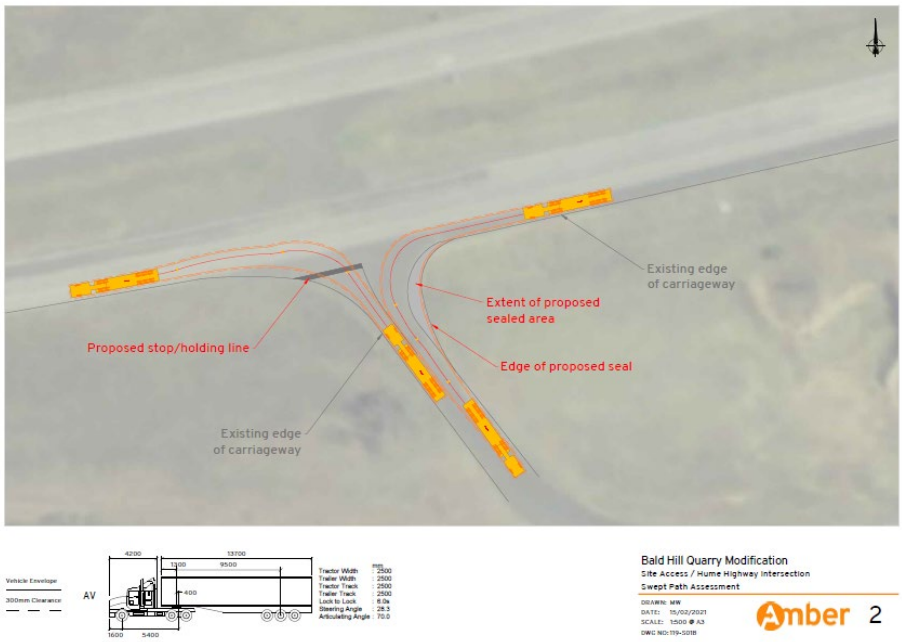
Hi Maurice,

I hope this finds you well.

I'm getting in touch to provide further information regarding EAR 1441 – Mt Bundarbo Quarry EIS.

Bald Hill Quarry recently had an intersection audit done and have since revised their Traffic Impact Assessment to include the intersection upgrade that came out of the audit.

The upgrade would include the addition of a small area of new pavement at the intersection of the Old Hume Highway (image below) with the Hume Highway to accommodate B-Doubles (29 m).



Is there any additional information you would require prior to the EIS being submitted towards the end of April?

Best regards,
Nicola.

NICOLA SMITH
SENIOR ENVIRONMENTAL CONSULTANT
M. Phil (Phys Geog), B. Sc.

Please note I do not work Mondays
T. 02 6923 1537 **M.** 0410 411 660
E. nicola.s@nghconsulting.com.au

NGH

35 Kincaid Street
(PO Box 5464) Wagga Wagga NSW 2650

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BALD HILL QUARRY

5423 Hume Highway, Jugiong, NSW, 2726
0490 552 596
safety@baldhillquarry.com.au

18 August 2020

Re: Mt Bundarbo Aboriginal Heritage Survey Proposal

1. Introduction

Bald Hill Quarry Pty Ltd (BHQ) would like to develop a new open cut quarry pit at Mt Bundarbo as part of its Jugiong Regional Quarry and Landfill project. After meeting with the board of the Young Local Aboriginal Land council (LALC), there is a requirement to undertake an Aboriginal Heritage Survey over the project area.

2. Background

Bald Hill Quarry (BHQ) Pty Ltd, is a regional landfill and quarry operating adjacent to the Hume Highway 7km east of Jugiong in Southern NSW (Figure 1). The basalt quarry has been operating in the area for more than 30 years. The current operations include open pits, crushing, screening and transporting material offsite providing the local area with aggregates and road base material.

Development consent for the operation was originally granted in 1984. In 1989, following significant investment and restructuring, Bald Hill Quarry Pty Ltd commenced a strategic market development plan targeting a quality product to a market specifically seeking high quality crushed rock products.

A Development consent for the north ridge operation was granted in April 1999 (DA T.98.027) for the extension of hard rock quarrying activities, new extraction site, ongoing use of existing processing plant, new raw fee haul route and product transportation. Bald Hill can extract 100,000 to 150,000 tonnes per annum (tpa) with peak demands of up to 300,000 tpa.

BHQ Jugiong also operates under Environmental Protection Licence (EPL) number 2552, last updated in May 2016.

The original pit is now a landfill and the north ridge pit is still in operation as outlined in the Environmental Impact Statement (1998) and Development approval DA T.98.027.

The Landfill known as “Ecofill” is accommodated in a disused quarry void. Ecofill has a contractual arrangement with a consortium of Local Government Councils known as South West

Regional Waste Management Group (SWRWMG) to take waste from their waste transfer stations and furthermore to restrict all other sources of waste to the Local Government Areas the Councils represent. The Facility is open Five (5) days a week with most waste being delivered by truck.

3. Scope

The proposed project is located on Crown Land Reserve (Lot 7002 DP 1031310), which has an undetermined Aboriginal Land Claim from May 2006 (Claim No. 11046). Bald Hill Quarry met with the Board of Young LALC on Tuesday the 11th August 2020. From the meeting it was requested this proposal be provided of the general survey area and proposed project location to guide an Aboriginal heritage survey of the area.

4. Location

The site is located 8 kms east of Jugiong and 55 km west of Yass, NSW. The proposed new open cut pit is sited approx. 800m SSE of the current North Ridge extraction site and is locally identified as Mt. Bundarbo.

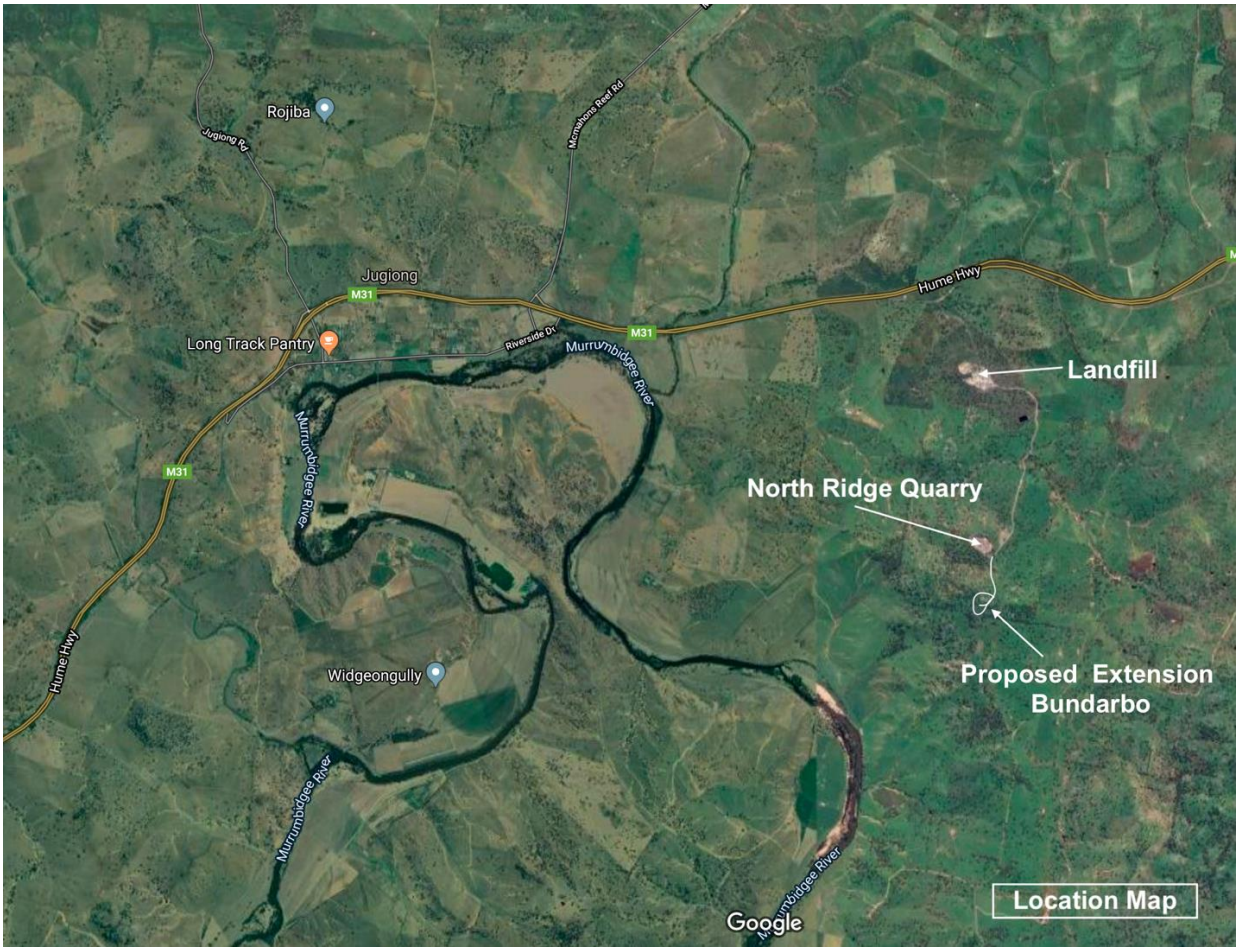


Figure 1: Location of the proposed project

The Bundarbo project and survey area is located on Lot 148 DP753592, Lot 11 DP133540, Lot 9 DP439146, and Lot 7002 DP1031310 and road reserve (see Figure 2).



Figure 2: Proposed project in regards to land description

5. Proposed project

The objectives of the proposal are as follows:

Specific aspects of Mt Bunarbo project:

- Disturbance 800m haul road and potential 7ha pit area.
- Drill and Blast in pit (2-5 blasts per year)
- Construction equipment – Dozer, excavator, loader and dump truck
- Operational equipment – excavator, loader and dump truck
- Hours of operation would be 6 am to 6pm Monday to Friday and 7am to 6pm Saturday and Sunday excluding public holidays.

If there are any questions or additional information require please contact me on the details below.

A Bald Hill Quarry person will be assisting with access to the site. Look forward to working with Young LALC.

Kind Regards,



Belinda Fourie
Work Health, Safety and Environment Manager
safety@baldhillquarry.com.au

BALD HILL QUARRY

Bald Hill Quarry Pty Ltd (ABN 19 003 764 725)
5423 Hume Highway, Jugiong, NSW, 2726
02 6227 7817
safety@baldhillquarry.com.au

8 March 2021

Mrs Norma Freeman
Chief Executive Officer
Young Local Aboriginal Land Council

Re: Proposed Quarry Project Mt Bundarbo

Dear Ms Freeman,

Young Local Aboriginal Land Council (LALC) is aware through previous contacts and communication of a proposal by Bald Hill Quarry Pty Ltd (BHQ) for an expansion of its existing Jugiong quarry operations at Mt Bundarbo, Jugiong, NSW. BHQ is currently finalizing the Environmental Impact Statement to accompany a development application to be submitted seeking approval for the project. The approval, if granted will allow BHQ to extend its operations to include a new rock resource to replace the current pit which is expected to be exhausted within the next 2-3 years.

At a meeting with the Young LALC in August 2020, the potential project and its impact and interaction with Crown Land Reserve (Reserve 40113 for Trigonometrical purposes) on Lot 7002 DP 1031310 was presented and discussed. It was further identified that the Crown reserve has 2 undetermined Aboriginal Land Claims from May 2006 (claim no. 11046) and May 2020 (claim no.51172) both raised by NSW Aboriginal Land Council.

Acknowledging the varied interests that Crown Land and Aboriginal Land rights have regarding this reserve, BHQ undertook to consult with all parties in moving forward. In preparing the Development Application for submission, the undetermined Land Claims are something that needs to be addressed.

As the claims remain undetermined the effect on the land is that it 'freezes' the ability to deal with the land and places uncertainty with respect on how land as the subject of a claim can be dealt with, and how it will impact on future projects by either Aboriginal land claimants or other stakeholders such as Crown land managers and local councils.

Hence, recognising the prominent role Young LALC has in the Land Rights claim process I seek an understanding of the Young LALC position on the parcel of land regarding the undetermined claims. With Young LALC having visited the site and been involved in the preparation of the Heritage Study for the project approval process, it is hoped adequate background information is available.

Bald Hill Quarry Pty Ltd is happy to work with the Young LALC in providing sensible outcomes for all parties and would work collaboratively to manage any process required.

We appreciate you are extremely busy with a range of projects, however having an understanding of your position prior to the end of March would assist in directing how we proceed with our Development Approval.

If there are any further questions, please do not hesitate to contact me.

Kind Regards,



Belinda Fourie
Work Health Safety and Environment Manager
safety@baldhillquarry.com.au

From: Belinda Fourie
To: Nicola Smith
Subject: Young LALC consultation
Date: Thursday, 13 May 2021 9:57:15 AM
Attachments: image001.png

Hi Nik,

Please see dates below.

date	Person	Reason
9-12-2020	Norma	Tried to get an idea on their interest in the land after site visit
15-2-2021	Norma	Requested a meeting
25-2	NorAm	Tried get a meeting
26-2	Norma	Tried to get meeting
4-3	Norma	Tried to get a meeting
8-3	Norma	Sent a letter
10-3	Norma	Norma responded that she had sent the letter the head office
30-3		Followed up on their position on the site
8-4		Sent the letter for request of determination

Cheers,
Belinda

Belinda Fourie
Work Health Safety and Environment Manager
Bald Hill Quarry Pty Ltd
Ph: 0490 552 596
Email: safety@baldhillquarry.com.au

BALD HILL QUARRY

Bald Hill Quarry

Mt Bundarbo Project

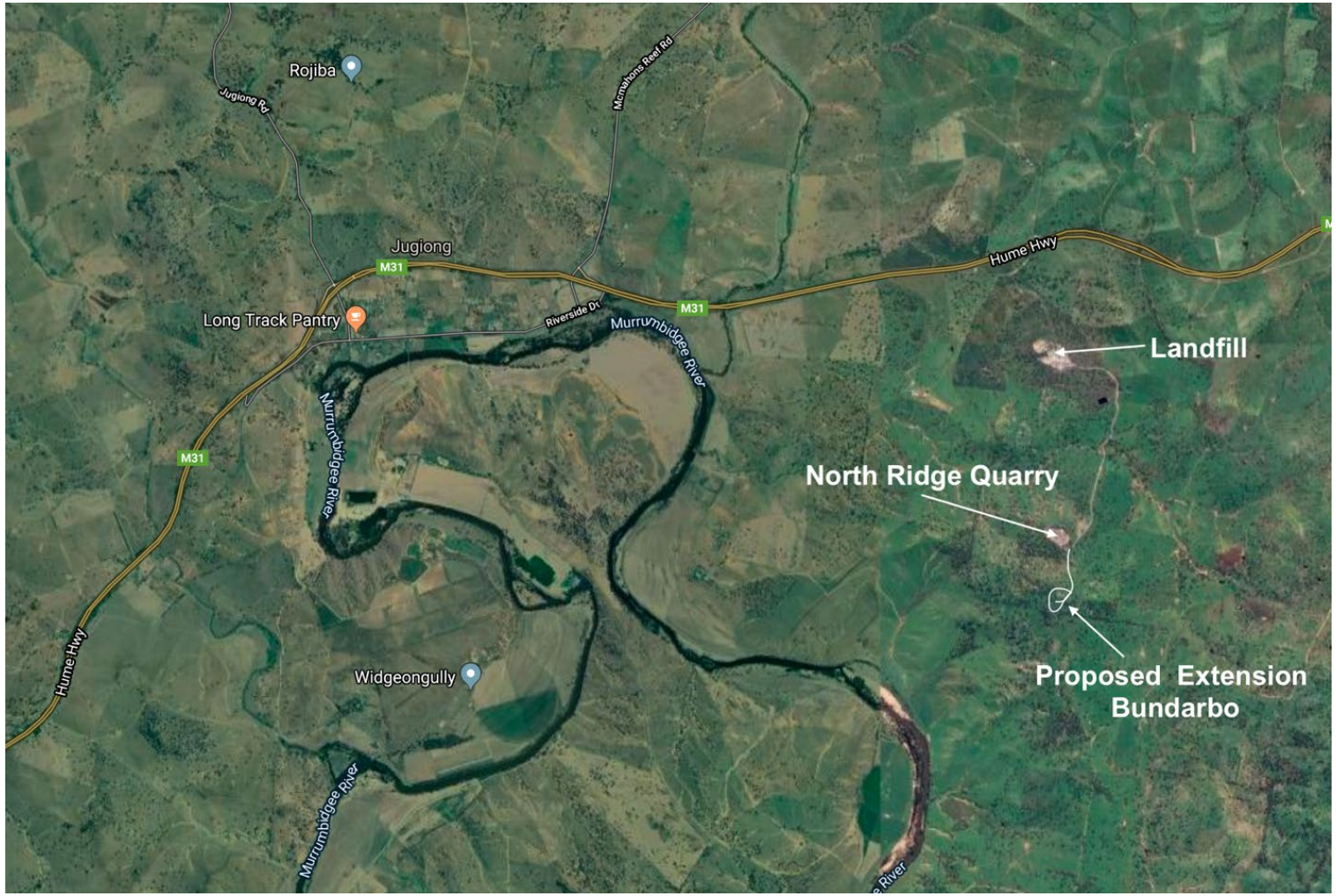
August 2020



Bald Hill Quarry



- Established in 1989
- Operates five quarry's in the Riverina and Murray region
- Provide services for local governments
- Provide services for state government projects with Tier 1 and 2 construction companies.


Rojiba
Jugiong Rd
McMahons Reef Rd
Jugiong
M31
Hume Hwy
Long Track Pantry
Riverside Dr
Murrumbidgee River
Landfill
M31
North Ridge Quarry
Hume Hwy
Widgeongully
Proposed Extension
Bundarbo
Murrumbidgee River

Location

Consultation

- Land tenure – Crown land parcel
- Consultation with Crown lands and the Surveyor General
- Land title claim – undetermined submitted in May 2006
- Understanding of connections in the area
- Process forward…….

The Project

- An additional pit to the project essential to state projects such as wind farms in the region
- Encompass a 800m haul road and a 7 ha pit
- Drill and Blast
- Construction
- Operation
- Not dissimilar to North ridge area



Project Area



Discussion/Questions??



Minutes meeting Tony Willsallen, Michael and Angela Field Benangaroo Homestead 11th January 21

1) Review drawings of the proposed quarry development plan as drawn by John. Emphasised protection of the visual skyline as quarry development progresses.
2) Comments re potential visual impact from Richard Walkers adjoining property
3) Explained the water runoff management system proposed with a sump at Southern most point of excavation.
4) Michael flagged possibility of future stock water source from sump. This is could be possible BUT dependent on availability. North Ridge could be an option for this
5) Michael asked if we could upgrade an existing track around Mt Bundarbo on the Western side. Tony suggested we keep this off the DA. When constructing the haul road we would build the road along Michaels preferred route at that time. Call it a farm road doesn't require DA
6) Angela expressed frustration with the appearances at North Ridge re the stockpile area and local crushing. Tony explained this was unavoidable given the large volumes currently being produced. Tony explained any waste material from the new quarry will be back filled as the development progresses, unlike North Ridge
7) Michael requested we attempt to stockpile top soil for future rehab when the excavation is progressively filled.
8) Next step agreed when the planning models are drawn overlaid on the survey we would consult again with Michael and Angela for their approval.
9) Benagaroo have agreed to complete the closed road application and to forward us a copy when this is lodged for our records.
10) Michael has requested the actual trig station when it is removed for preservation.
11) We briefly discussed our potential plan to primary crush at Mt Bundarbo. Michael asked if this could be done at North Ridge. Tony explained additional cost of double handling would rule this option out.

APPENDIX D BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

APPENDIX E ABORIGINAL HERITAGE DUE DILIGENCE ASSESSMENT

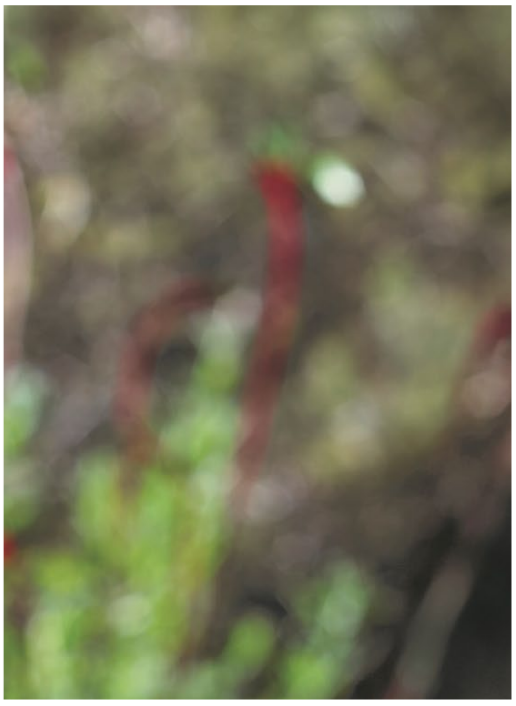
ABORIGINAL DUE DILIGENCE ASSESSMENT

Mount Bundarbo Quarry

May 2021

Project Number: 20-481





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ACRONYMS AND ABBREVIATIONS

AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BHQ	Bald Hill Quarry Pty Ltd
EP&A Act	The Environmental Planning and Assessment Act 1979 (NSW)
Ha	Hectares
Km	Kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
Mt Bundarbo	Mount Bundarbo
NGH	NGH Pty Ltd
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
Proposal Area	Area subject to this assessment

EXECUTIVE SUMMARY

NGH Pty Ltd (NGH) was commissioned by Bald Hill Quarry Pty Ltd (BHQ) to undertake a Due Diligence assessment for Aboriginal heritage sites for the development of a new open cut quarry pit, haul road extension and intersection upgrade at the Jugiong Regional Quarry and Landfill project at Mount Bundarbo (Mt Bundarbo) near Jugiong in New South Wales. The proposed works area comprises of Lot 9 DP439146, Lot 11 DP133540, Lot 148 DP753592 and Lot 7002 DP1031310 5423 and a portion of the Old Hume Highway road reserve located within the Hilltops Local Government Area.

Background and Desktop Assessment

An extensive search in the AHIMS database was undertaken over a 16 km x 16 km radius centred on the Proposal Area. The results yielded a total of 90 Aboriginal sites recorded within the search area and no Aboriginal Places. No previously registered AHIMS sites are located within or adjacent to the Proposal Area.

The desktop assessment of the proposed works for the Old Hume Highway road reserve indicated that the area was highly disturbed by the construction and maintenance of the existing road and was unlikely to contain Aboriginal objects. No field inspection of this area was warranted.

Mt Bundarbo, which is the focus of the proposed new quarry works, is a basalt peak overlooking the Murrumbidgee River which is located approximately 1.8 km south-west of the proposed new quarry and haul road development area. The proposed new quarry development area includes the crests and saddle features of Mt Bundarbo. These undisturbed features are considered to have higher potential to contain Aboriginal sites in accordance with the Due Diligence Code of Practice and archaeological modelling for the area. Mt Bundarbo itself is also a fine-grained olivine basalt deposit with outcropping that may have also been used as a source of material. The desktop assessment therefore indicated that there are landscapes present within the proposed new quarry and haul road development areas that have potential to contain Aboriginal objects and a site inspection by archaeologist with representatives from the Young Local Aboriginal Lands Council (LALC) was required.

Field Assessment

A visual inspection and assessment of the Proposal Area, excluding the Old Hume Highway road reserve, was undertaken on November 11th, 2020 by two qualified NGH archaeologists and two representatives of the Young LALC.

The visibility of the Proposal Area for the proposed new quarry and haul road was generally poor (less than 10%) with much of it covered by tall dense grass and weeds, however some exposures were present including along an existing access track. The slopes of Mt Bundarbo which lead up to crests and saddle features were relatively steep ranging from 20- 65° with very steep slopes on the western and northern sides of the Proposal Area. A number of exposed rocky outcrops were scattered across the Proposal Area for the proposed new quarry and haul road, in particular on the slopes and crests of Mt Bundarbo. The outcroppings were visually inspected however no evidence of quarrying or Aboriginal objects were identified.

While several arrangements of stone were noted on the crests and saddle of Mt Bundarbo these were not considered to be Aboriginal in origin by the archaeologist or the two representatives from the Young LALC. The stone arrangements were all considered to be modern and it was noted that one arrangement marked a historic Trigonometric Station location while several lines of arranged stones marked out the Crown Land lot boundary. Mature native trees within the Proposal Area for the proposed new quarry and haul road, including several Kurrajong trees, where inspected with no scaring considered to be Aboriginal in origin recorded.

No Aboriginal sites or areas of archaeological potential were identified during the field assessment, and it was determined the Proposal Area for the proposed new quarry and haul road is unlikely to impact any Aboriginal objects by both the NGH archaeologist and Young LALC representatives.

Impact Assessment Conclusion

As no Aboriginal sites or areas of archaeological potential were identified within the Proposal Area for the proposed new quarry and haul road, it is concluded that the proposed development of a new open cut quarry pit and haul road as assessed in this report does not require any further heritage investigation and the works can proceed with caution.

The desktop assessment of the proposed works for the Old Hume Highway road reserve indicated that the area was highly disturbed by the construction and maintenance of the existing road. It was concluded that the area was unlikely to contain Aboriginal objects and the works in the road reserve can proceed with caution.

Recommendations

It is recommended that:

1. Works within the Proposal Area may proceed with caution.
2. Any proposed activity outside of the current assessment area should also be subject to an Aboriginal heritage assessment with representatives from the Young LALC.
3. If any items suspected of being Aboriginal in origin are discovered during works, all work in the immediate vicinity must stop and Heritage NSW must be notified. The find will need to be assessed and if found to be an Aboriginal object an Aboriginal Heritage Impact Permit (AHIP) may be required.
4. In the unlikely event that human remains are identified during works, all work must cease in the immediate vicinity and the area must be cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of crime scene or possible Aboriginal remains. If the remains are thought to be Aboriginal, Heritage NSW must be notified.

Bald Hill Quarry Pty Ltd is reminded that it is an offence under the *NSW National Parks and Wildlife Act 1974* to disturb, damage or destroy and Aboriginal object without a valid Aboriginal Heritage Impact Permit (AHIP).

1. INTRODUCTION

NGH Pty Ltd (NGH) was commissioned by Bald Hill Quarry Pty Ltd (BHQ) to undertake a Due Diligence assessment for Aboriginal heritage sites for the proposed development of a new open cut quarry pit and haul road at Mount Bundarbo (Mt Bundarbo) and the intersection upgrade on the Old Hume Highway (the Proposal Area) located near Jugiong in New South Wales (NSW). The proposed pit would be part of the extension of the existing North Ridge Quarry and Bald Hill Landfill area. This due diligence assessment was undertaken to evaluate the presence or potential for Aboriginal objects to occur within the Proposal Area that may be affected by the proposed works.

1.1. Subject Site

The Proposal Area for the new quarry pit and haul road is locally identified as Mt Bundarbo and consists of Lot 9 DP 439146, Lot 11 DP 133540, Lot 148 DP 753592, Lot 7002 DP 1031310 (Crown Land), and part of a crown road reserve approximately 7.5 km south-east of the township of Jugiong, Parish of Harden in the Hilltops Local Government Area (LGA).

The Proposal Area also includes a new section of pavement in the road reserve for site access on the Old Hume Highway at the intersection with the Hume Highway. The footprint of intersection works is approximately 800 m^2 and includes existing pavement. The intersection upgrade involves the creation of new pavement adjoining the existing pavement of the Old Hume Highway. The new pavement would encompass a small area of existing road batters and drainage. The area has been heavily disturbed. There are no trees within the footprint.

The Proposal Area covers approximately 29.57 hectares (ha) and is shown in Figure 1-1 and Figure 1-2. The proposed haul road is approximately 75 m east of the existing North Ridge extraction site located off the existing haul road and proposed new pit location approximately 700 m south-southeast of the existing North Ridge quarry area.

The North Ridge Quarry and Bald Hill Landfill is a basalt quarry that has been operating in the area for more than 30 years. The current operations include open pits, crushing, screening and transporting material offsite providing the local area with aggregates and road base material. The proposed works would be an extension of the existing quarry. The proposed new pit would extract and process 100,000 to 150,000 tonnes per annum with peak demands of up to 450,000 tonnes per annum, with total extraction not exceeding 5 million tonnes. The footprint of the proposed new quarry pit would be approximately 8 ha. Quarrying would use a combination of mechanical and drill and blast processes. The material recovered from the new pit would be either campaign crushed/screened at Mt Bundarbo and/or hauled via the new access road to the existing haul road for processing. Processing would be conducted at the existing facility 4 km north of the proposed new quarry pit.

1.2. Project Personnel and Aboriginal Consultation

The Due Diligence assessment was carried out by qualified archaeologists Jasmine Tearle and Jill Taylor of NGH. This included background research and the completion of this report. NGH archaeologist Kirsten Bradley and Jill Taylor completed the field inspection for this assessment. NGH senior archaeologist Kirsten Bradley reviewed the report for quality assurance purposes and approved the report for distribution.

The due diligence process does not formally require consultation with Aboriginal community groups however BHQ requested that the Young Local Aboriginal Land Council (LALC) were involved and consulted with for this assessment. Early involvement with the Aboriginal community is considered best archaeological practise. In this case the engagement and consultation of the Young LALC was determined to be the appropriate Aboriginal community group for this project. This is particularly relevant as while the Proposal Area is within the boundaries of the Young LALC, they are also noted to have two undetermined Aboriginal land claims on the Crown reserve (Lot 7002 DP 1031310), which covers a portion of land within the Proposal Area.

The Young LALC were invited to participate in the fieldwork and two members of the Young LALC (Marnie Freeman and Keith Freeman) were involved in all aspects of the field inspection undertaken for this assessment. A copy of this draft report was also provided to Young LALC on the 2nd of February 2021 for comment. The Young LALC replied on the 10th March 2021 that they did not have any issues with the report however they would like it noted in the recommendations that the Young LALC should be involved if any new areas are proposed for ground disturbance. This would ensure their continued involvement into the future. The recommendations (recommendation #2) of this report have been adjusted to incorporation this comment to ensure the future involvement of the Young LALC for any future works outside the area currently assessed.

An updated copy of the report (Final v1.1) was also provided to the Young LALC in the 6th of May 2021.

The Planning Secretary's Environmental Assessment Requirements (SEARs) for the project also noted for heritage that "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" (EAR 1433 dated 27/05/2020) be undertaken. The consultation and involvement of the Young LALC for this assessment is considered to address this requirement in full.

1.3. Approach and Format of this Report

This report has been drafted in keeping with the sequence of steps identified in the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (OEH 2010). The Due Diligence Code of Practice provides a five-step approach to determine if an activity is likely to cause harm to an Aboriginal object, as defined by the *NSW National Parks and Wildlife Act 1974*. The steps follow a logical sequence of questions, the answer to each question determines the need for the next step in the process.

The Due Diligence Code of Practice sets out the steps which the Proponent is required to take in order to:

- Identify whether Aboriginal objects are, or are likely to be, present in the Proposal Area;
- Determine whether or not their activities are likely to harm Aboriginal objects (if present) in the Proposal Area; and
- Determine whether an Aboriginal Heritage Impact Permit (AHIP) application is required.

Each section within this report follows the relevant step outlined in the Due Diligence Code of Practice as shown in Table 1-1.

Table 1-1 Due Diligence Steps for this report

Due Diligence Steps
Step 1. Will the activity disturb the ground surface?
Step 2a. Search the AHIMS database and use any other sources of information of which you are already aware
Step 2b. Are activities proposed in areas where landscape features indicate the presence of Aboriginal objects?
Step 3. Can you avoid harm to the object or disturbance of the landscape feature?
Step 4. Undertake a desktop assessment and visual inspection. Is it likely that Aboriginal objects will be impacted by the proposed works?
Step 5. Further investigations and impact assessment

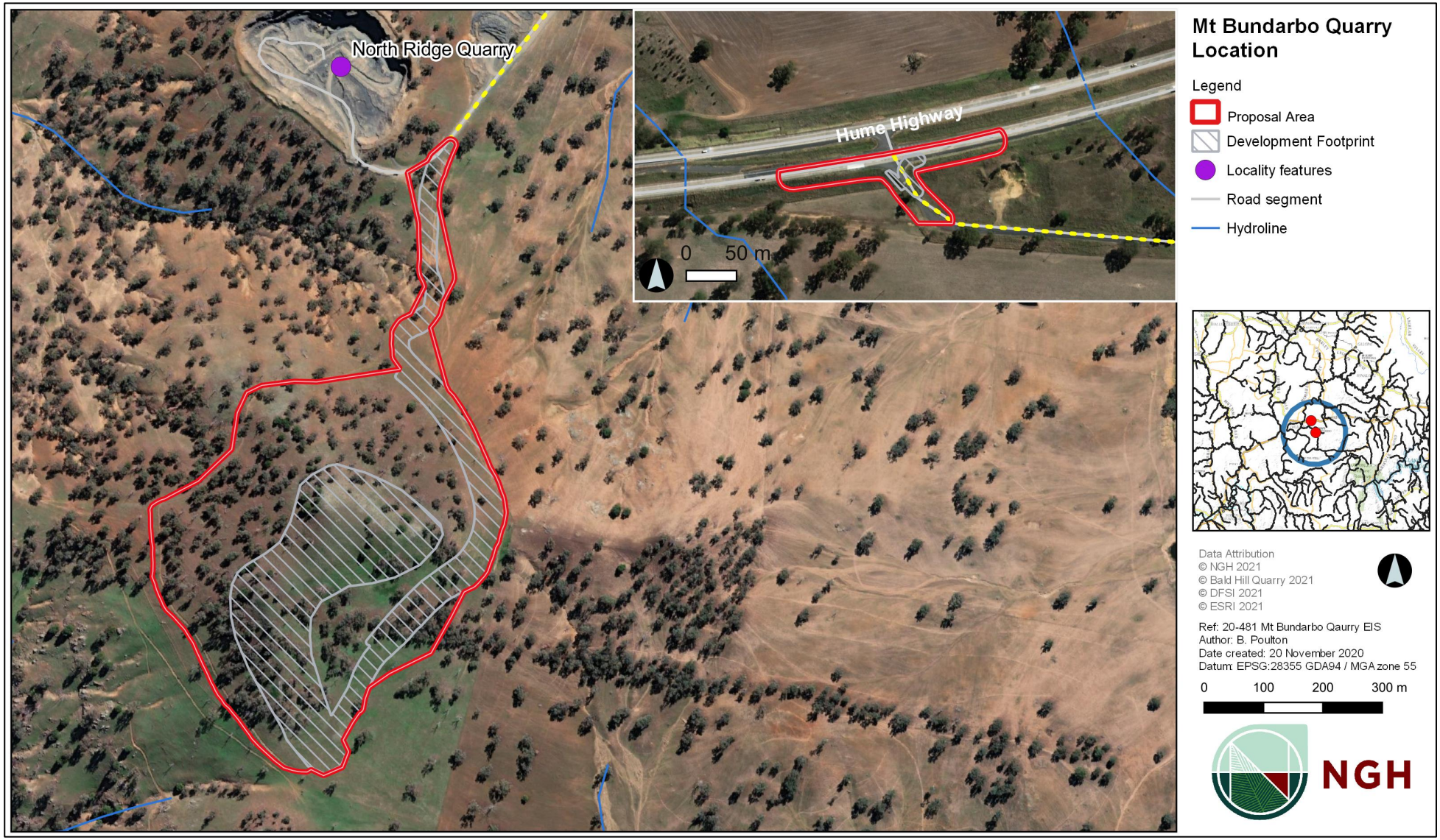


Figure 1-1 General Project Location

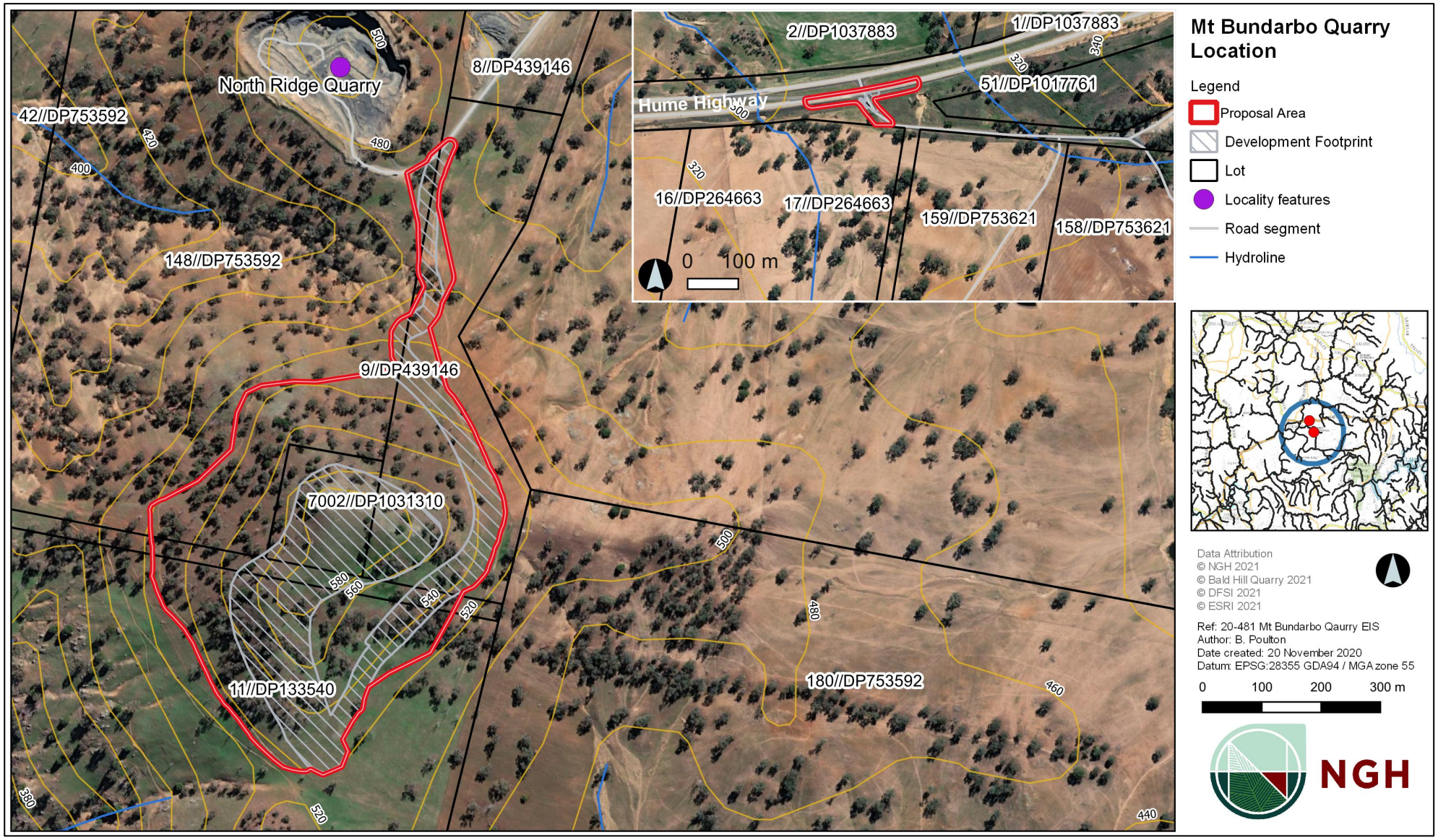


Figure 1-2 Proposal Area

2. LEGISLATION

In NSW, Aboriginal heritage is principally protected by two legislative acts:

- The *National Parks and Wildlife Act 1974* (NSW) (NPW ACT); and
- The *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

2.1. NSW National Parks and Wildlife Act 1974

Part 6 of the NPW Act concerns Aboriginal objects and places and various sections describe the offences, defences and requirements to harm an Aboriginal object or place. All Aboriginal material receives blanket protection under the NPW Act of NSW. The main offences under section 86 of the NPW Act are:

- A person must not harm or desecrate an object that the person knows is an Aboriginal object.
- A person must not harm an Aboriginal object.
- For the purposes of this section, "circumstances of aggravation" are:
    - that the offence was committed in the course of carrying out a commercial activity, or
    - that the offence was the second or subsequent occasion on which the offender was convicted of an offence under this section.
- A person must not harm or desecrate an Aboriginal place.

Under section 87 of the NPW Act, there are specified defences to prosecution including authorisation through an AHIP or through exercising due diligence or compliance through the regulation.

Section 89A of the Act also requires that a person who is aware of an Aboriginal object must notify the Director-General in a prescribed manner. In effect, this section requires the completion of Aboriginal Heritage Information Management System (AHIMS) site cards for all sites located during heritage surveys.

The strict liability offence of harming Aboriginal objects has a number of defences and include the statutory defence of due diligence (Section 2.4) through complying with an adopted industry code of practice, or compliance with the conditions of an AHIP.

2.2. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is legislation for the management of development in NSW. It sets up a planning structure that requires developers (individuals or companies) to consider the environmental impacts of new projects. Under this Act, cultural heritage is considered to be a part of the environment. It provides for the identification, protection, and management of heritage items through inclusion of these items into schedules of planning instruments, such as Local Environmental Plans (LEPs) or Regional Environmental Plans (REPs). This Act requires that Aboriginal cultural heritage and the possible impacts to Aboriginal heritage that development may have are formally considered in land-use planning and development approval processes.

The Proposal Area is located within the Hilltops LGA. This LGA was established in 2016 and incorporates the former council areas of Boorowa, Harden and Young. The Proposal Area falls within the Harden LEP, 2011. Schedule 5 of the LEP 2011 details the included environmental heritage items covered by the plan. No Aboriginal sites or places are identified within close proximity to the Proposal Area in the Harden LEP.

3. GROUND DISTURBANCE

Step 1. Will the activity disturb the ground surface or any culturally modified trees?

The proposed development of the new pit at Mount Bundarbo will include but is not limited to:

- A new 800 m section of haul road;
- A new quarry footprint of approximately 8 ha;
- A new approximate 800 m^2 area of pavement for site access;
- Drill and Blasting for extraction; and
- The current operating conditions of the North Ridge Quarry and Bald Hill Landfill.

Initial construction of the site would be through clearing and earthworks using heavy machinery such as excavators and dozers. Initial extraction of material may be through drill and blast processing and use of heavy machinery such as excavators. The processing of material would be either via a mobile campaign crushing at Mt Bundarbo or taken back to the existing processing plant for processing.

These activities will require significant ground disturbance and the use of heavy machinery. Any Aboriginal sites within the disturbance footprint could therefore be subject to harm. The affirmation that ground disturbance will occur requires the next step in the Due Diligence process.

4. REGISTER SEARCH AND LANDSCAPE ASSESSMENT

Step 2a. Search the AHIMS Database and other information sources

A search of relevant heritage registers for Aboriginal sites and places provides an indication of the presence of previously recorded sites. A register search is not conclusive however, as it requires that an area has been inspected and any sites are provided to the relevant body to add to the register. However, as a starting point, the search will indicate whether any sites are known within or adjacent to the investigation area. The Aboriginal Heritage Information Management System (AHIMS) provides a database of previously recorded Aboriginal heritage sites. A search provides basic information about any sites previously identified within a search area in NSW. The results of the search are valid for 12 months for the purposes of a Due Diligence level assessment. On the 30th of September a search of the AHIMS database was undertaken over a 16 km x 16 km area with a 50 m buffer centred on the Proposal area. The AHIMS Client Service ID was 539383. There were 90 Aboriginal sites recorded within this search area and no declared Aboriginal Places. Table 4-1 below shows the breakdown of site types and Figure 4-1 shows the location of the AHIMS sites in relation to the Proposal Area. None of the archaeological sites currently recorded on AHIMS are located within or directly adjacent to the Proposal Area. The closest recorded AHIMS site is located approximately 6 km west of the Proposal Area.

Table 4-1 Breakdown of previously recorded Aboriginal sites in the region.

Site Type	Number
Artefact	80
Modified Tree	7
Potential Archaeological Deposit (PAD)	2
Artefact and Water Hole	1
TOTAL	**90**

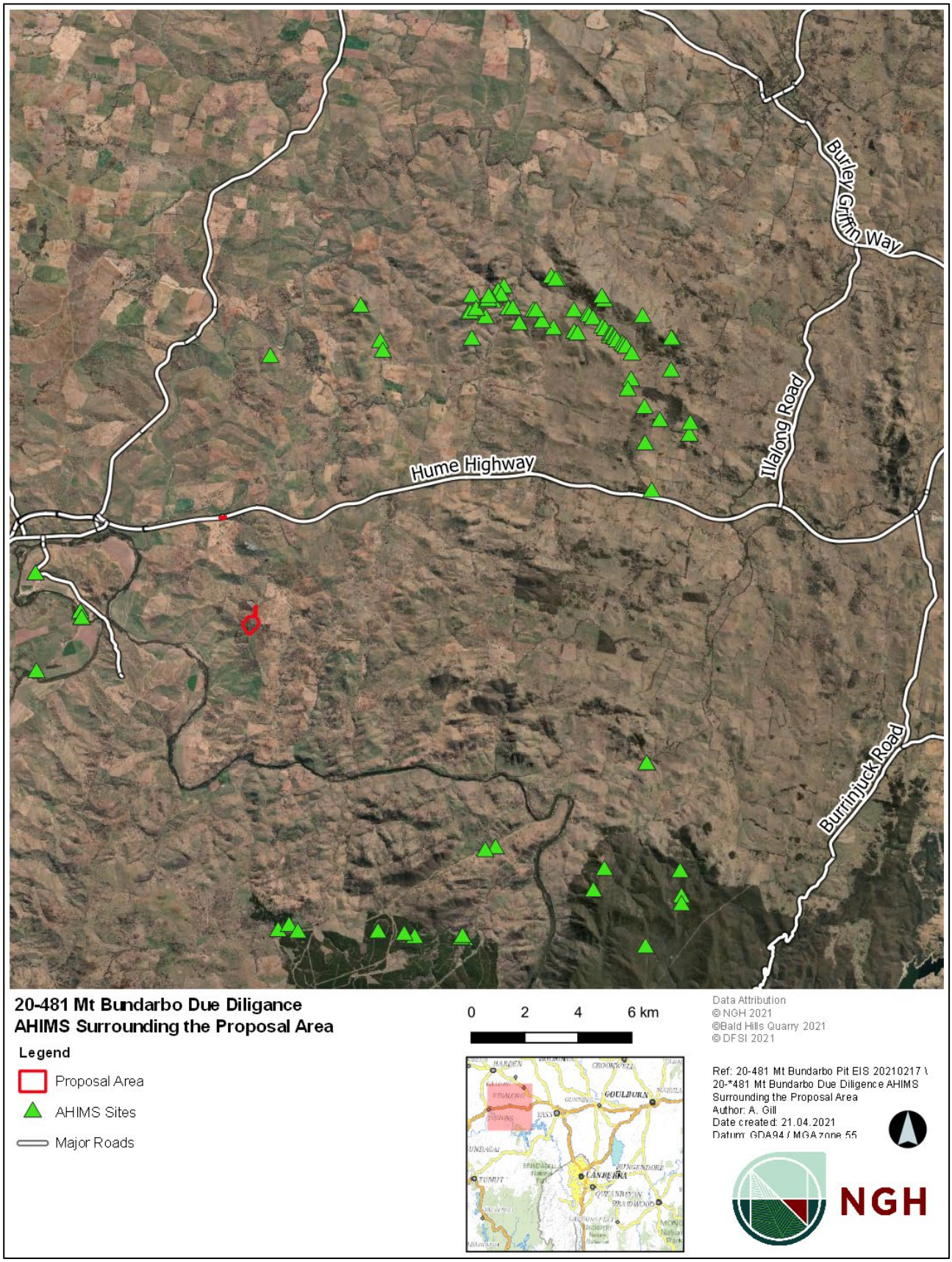


Figure 4-1 AHIMS sites surrounding the Proposal Area

4.1. Local Archaeological context

The local Jugiong area and the wider region have been the subject of several archaeological assessments, primarily conducted through the requirement of archaeological heritage impact assessments prior to land development. An overview of the relevant studies undertaken in the area is provided below.

In 1994 Officer and Navin completed an archaeological survey for the proposed Jugiong Quarries, approximately 5 km west of the current Proposal Area (as cited in Stone 1998, p.3) A total of two possible scarred trees, one open camp site, and one isolated find comprising a ground edge hatchet were identified. The open campsite was located in a riverine source-bordering dune adjacent to Murrumbidgee River and the hatchet was located in a high terrace above the river, in a quarry face (as cited in Stone 1998, p.3). Officer and Navin completed excavation of the campsite adjacent to Murrumbidgee River in 1995 and identified a low density of artefacts with evidence of bipolar flaking. The raw material recorded was predominantly quartz (as cited in Stone 1998, p.3).

A number of surveys have also been completed for improvements to the Hume Highway in the Coolac area, approximately 20 km south-west of the current Proposal Area. In 1994, Navin, Officer and Legge completed a heritage assessment identifying three scarred trees, two open campsites and one artefact scatter/procurement site (as cited in Stone 1998, p.3). A subsequent survey by Navin and Officer in 1996 located three more open camp sites and one possible scarred tree(as cited in Stone 1998, p.3). The raw materials were predominantly quartz and felsite, and most of the sites were located near minor watercourses. In 2004, Navin and Officer completed a third assessment of the area, identifying a further open campsite and one area of PAD. The campsite comprised six artefacts, five of quartz and a single tuff, located 150 m from the junction of Ginger Beer Creek and Muttama Creek on an elevated terrace (as cited in OzArk 2011, p.18).

In 1997, Stone completed an archaeological assessment of the proposed pine plantation area east of Nanangroe station, approximately 8 km south of the current Proposal Area (as cited in Stone 1998, p.3). A total of 11 Aboriginal sites were identified comprising nine low density artefact scatters, one isolated find and one possible modified tree. Included in the artefact types was a single backed blade. The sites were located on ridgelines and hillslopes overlooking Matchems Creek and level surfaces adjacent to the creek.

In 1998 Stone completed a further archaeological assessment for the Nanangroe Plantation (Stone 1998). During this assessment, a total of seven new sites were identified. These comprised six artefact scatters and one isolated find. The artefact assemblages contained predominantly waste flakes, with lesser numbers of cores, flakes, flaked pieces, microblades, scrapers, and a broken hammerstone, with raw materials including chert, silcrete, quartzite, quartz, indurated siltstone and mudstone, and volcanic (Stone 1998, p.8). The sites were located on gentle slopes adjoining Yellow Clay Creek and its drainage lines, with two sites located in the headwaters of Matchems Creek within a gully and on a saddle above a drainage line. Stone determined the sites were predominantly of low significance, with a single site N5 (*AHIMS# 50-6-0057)* considered to be of moderate significance due to its high artefact density and location on a ridgeline. The site N5 had an artefact density of 1 per m^2 in condition of very low visibility.

In 2002 Dearling surveyed the former Bald Hill Quarry, which is less than 2km north of the current Proposal Area, prior to its conversion to the current land fill. Transects covering a ridgeline, lower gradient spurs and a creek were walked. Visibility at the time of survey was very poor (less than 8% of the entire area surveyed) and the area was considered highly disturbed due to previous land use, including land clearing, ploughing and the construction and use of the quarry itself. No Aboriginal sites or objects were located during this survey. The highly disturbed nature of the survey area led Dearling to conclude that the probability of finding any in-situ sites or objects was low (Dearling, 2002).

In 2009 NSW Archaeology prepared an Aboriginal Archaeological Assessment for the Yass Valley Wind Farm now the Coppabella Hills Wind Farm, approximately 10 km north-east of the current Proposal Area (NSW Archaeology Pty Ltd 2009). A modification assessment was also prepared by NSW Archaeology for the project in 2017 (NSW Archaeology Pty Ltd 2017). During the initial survey a total of 70 sites were recorded which were predominantly low-density artefact scatters. The survey for the modification identified an additional 12 sites. The site locales recorded were predominantly situated along deflated and eroded soil profiles on crests. Given

the relatively large areas of exposure and the low density of artefacts recorded, it was concluded that artefact density in the Coppabella Hills was generally very low. Several areas were predicted to contain subsurface artefacts in low/moderate density including several ridge saddles with testing recommend to be undertaken as part of salvage works prior to development (NSW Archaeology Pty Ltd 2017).

4.2. Landscape Assessment

Step 2b. Are there undisturbed landscape features likely to contain Aboriginal objects?

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW outlines a range of landscape features that have higher potential to contain Aboriginal objects. It is also necessary to consider whether there are landscape features of undisturbed land that may contain Aboriginal objects. These include land that is:

- within 200 m of water;
- located within a sand dune system;
- located on a ridge top, ridge line or headland;
- located within 200 m below or above a cliff face; or
- within 20 m of a cave, rock shelter or cave mouth.

Understanding the landscape context of the Proposal Area may help us to better understand the archaeological modelling of the area and assist in identifying local resources that may have been utilised by Aboriginal people. This information can then potentially be used in predicting the nature of Aboriginal occupation across the landscapes within and adjacent to the Proposal Area. Factors that are typically used to inform the archaeological potential of landscapes include the presence or absence of resources that would have been utilised by Aboriginal people including water, animal and plant foods, stone, and other resources.

4.2.1. Geology

The Bundarbo rock deposit is a Tertiary basalt flow, one of four associated volcanic features aligned approximately north-south of which Mt Bundarbo is the most prominent. With an approximate peak elevation of 595 m, Australian Height Datum (AHD) the basalt 'cap' of Mt Bundarbo is exposed across an area of approximately 400 m x 200 m. Weathering has resulted in outcrop being scatter across the peak and slopes. Mt Bundarbo itself is also a fine-grained olivine basalt deposit that may have also been used as a source of material.

Any rock outcrops, which are known to be located across the peak and slopes of Mt Bundarbo, have the potential to have been used for quarrying or as source material for the manufacture of stone artefacts.

4.2.2. Topography

The Proposal Area is within the South Western Slopes Bioregion, characterised by foothills and isolated ranges of the lower inland slopes of the Great Dividing Range. The Proposal Area comprises the peak and slopes of Mt Bundarbo. Mt Bundarbo has steeply sloped sides on the north, west and south western faces of the mountain, while the south eastern slopes have a more moderate gradient slope. Mt Bundarbo has a peak elevation of 595 m, AHD. The proposed haul road section of the Proposal Area extends across a lower slope towards the North Ridge Quarry, dropping to an elevation of approximately 480 m. There are no caves, crevices or cliffs noted to occur within the Proposal Area and therefore low potential for any rock shelters or areas to have been used for shelters.

The Murrumbidgee River at its closest to the Proposal Area is located approximately 1.8 km south-west. A total of six 1st order, ephemeral, unnamed drainage lines surround the Proposal Area, within 400 m, and one on the south-western edge within 200 m. These waterways drain into Sawpit Creek running west to east on

the northern side of the Proposal Area and into the Murrumbidgee River. From the peak of Mt Bundarbo there is a view of the Murrumbidgee River and the surrounding area.

The landscape features that make up the top of Mt Bundarbo consists of two crests separated by a saddle. Previous archaeological studies in the region have indicated that crests and saddles, particularly those that overlook or are adjacent to a water source may have a higher potential for archaeological objects to occur as Aboriginal people may have used them as travelling pathways. Mt Bundarbo has a commanding view of the region overlooking the Murrumbidgee River to its southwest and surrounding hilltops and valleys in every direction and may have been a vantage point used by Aboriginal people.

Red Podzolic Soils are the dominant soil type present across much of the Proposal Area. These soils grade into Lithosols on the hill tops and often occur in close association with Yellow Solonetzic Soils, with Red Podzolic Soils on the hill slopes and Yellow Solonetzic Soils in the drainage lines. In general, the soil profile across the Proposal Area comprises Lithosols derived entirely from the underlying basalt. By far the greater extent of the site comprises rock outcrops or subcrop irregularly covered by a thin skeletal soil, particularly the elevated areas and steeper slopes. The area located to the southeast has basalt clay soils (basalt floaters are common) and where present, a thin dark coloured silt topsoil overlies a red brown silty clay subsoil. Soils present on the lower slopes of the Proposal Area and along the proposed haul road extension comprise shallow granitic soils with coarse-textured A-horizons overlying silty clay subsoils. It is considered unlikely that there will be any subsurface potential within the Proposal Area, particularly on the steep slopes of Mt Bundarbo.

4.2.3. Vegetation

The main vegetation types identified within the Proposal Area are Western Slopes Grassy Woodlands, Western Slopes Grasslands and exotic (non-native) dominated. Remnant tree communities contain *Eucalyptus albens* (white box), and *E. blakelyi* (Blakely's red gum) on most slopes, *Brachychiton populneus* (Kurrajong) on mid to upper slopes and *E. melliodora* (yellow box) on lower slopes in association with the above communities. Consequently, there is some potential for old growth native trees to be located within the Proposal Area that may contain evidence of Aboriginal cultural modification.

4.2.4. Historic Land Use

The region has historically been used for agricultural and grazing purposes, as well as some *Pinus radiata* (radiata pine) plantations and vineyards in some areas (State of NSW and Department of Planning, Industry and Environment 2020).

Historical Parish maps of Birrema from 1888 and 1943 notes the Mt Bundarbo Trigonometric Station as being located within the Proposal Area.

The area proposed for works within the Old Hume Highway road reserve have been historically highly disturbed by the construction and maintenance of the existing roads.

4.3. Aboriginal Site Prediction

Based on the assessment of information from the environmental context and results of previous archaeological studies in and around the area, several predictive modelling statements can be made. These are included in Table 4-2 below.

Table 4-2. Aboriginal Site Prediction Statements

Site Type	Site Description	Potential
Stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations through to isolated finds.	Artefacts scatters and isolated artefacts have potential to occur in low to moderate densities particularly on crests, saddles spurs and elevated flat land associated with water sources. This site type may occur within the Proposal Area.
Potential Archaeological Deposits (PADs)	Potential subsurface deposits of archaeological material	Potential to occur in areas of moderate to deep soil profile, in particular in archaeologically sensitive landforms such as elevated flats or terraces associated with drainage lines and along spurs, saddles and crests. This site type is unlikely to occur within the Proposal Area, in particular on the steep slopes.
Modified trees	Trees that have undergone cultural modification.	Potential to occur within the Proposal Area in areas with remnant mature native trees and/or isolated old growth paddock trees remain.

5. IMPACT AVOIDANCE

Step 3. Can any AHIMS listed objects, or landscape features be avoided?

The proposed works area for the Old Hume Highway road reserve have been highly disturbed by the construction and maintenance of the existing roads and there are no AHIMS sites or landscape features which warrant avoidance. Given the previous disturbance of the Old Hume Highway road reserve the works in this area are considered unlikely to contain Aboriginal objects and no field inspection of this area was warranted.

The Proposal Area for the proposed new quarry and haul road includes the entirety of Mt Bundarbo which has landscape features which include crests and a saddle which are noted to be archaeologically sensitive. Mt Bundarbo is a prominent feature in the landscape which is unable to be avoided by the proposed works. The desktop assessment alone for the proposed new quarry and haul road is therefore not sufficient to conclusively appraise the archaeological potential of the landscape or the location of any Aboriginal objects and the next step in the process, a visual inspection, must be conducted to properly appraise the presence and potential for Aboriginal objects to occur within the Proposal Area for the proposed new quarry and haul road.

6. DESKTOP ASSESSMENT AND VISUAL INSPECTION

Step 4. Does the desktop assessment confirm that there are likely to be Aboriginal objects present or below the ground surface?

The assessment process is primarily a desktop exercise, using available information such as the AHIMS search results and relevant archaeological reports that have been previously completed in the area. Visual inspection is also required where landscape features are present that may contain sites. The footprint for the intersection upgrade was not included in the visual inspection due to the ongoing disturbance of the

intersection with subsequent road development and upgrades. In addition to the disturbed area, there are no trees within the footprint.

The desktop assessment of the proposed works for the Old Hume Highway road reserve indicated that the area was highly disturbed by the construction and maintenance of the existing road and the proposed works area is considered unlikely to contain Aboriginal objects. No field inspection of this area was warranted or undertaken.

A visual inspection of the Proposal Area, excluding the Old Hume Highway road reserve, was undertaken on November 11th, 2020 by qualified archaeologists Kirsten Bradley and Jill Taylor with two Young LALC representatives (Keith Freeman and Marnie Freeman). The two representatives from the Young LALC were present for the entirety of the visual inspection of the Proposal Area for the proposed new quarry and haul road with the two NGH senior archaeologist. All assessment observations, conclusions and the recommendations presented in this assessment were discussed in detail during the fieldwork with the two representatives from the Young LALC. At no time was any objection for any of the visual assessment items detailed below noted.

The following provides a summary of the landscape in relation to the archaeological potential for Aboriginal objects to occur within the Proposal Area for proposed new quarry and haul road.

The field survey was undertaken by inspecting the Proposal Area for proposed new quarry and haul road on foot, targeting areas of both low and high archaeologically sensitivity, areas of proposed development, areas that appeared to be less disturbed, exposures and any areas of increased visibility. The visibility of the Proposal Area for the proposed new quarry and haul road was generally poor (less than 10%) with much of it covered by tall dense grass and weeds, however some exposures were present including along an existing haul road that had very high visibility averaging 80%.

The proposed development footprint for the new haul road followed a lower gradient slope (15 to 25°) in a southward direction from the existing haul road towards Mt Bundarbo along a portion of an existing track which then trailed around the lower slopes of the eastern side of Mt Bundarbo. The exposures and cuts along the existing track generally indicated that the haul road area and lower slopes within the Proposal Area for the proposed new quarry and haul road have a very shallow soil red clay rich deposit overlying basalt bedrock. The proposed haul road and lower gradient slope landforms within the Proposal Area for the proposed new quarry and haul road were deemed to have a shallow soil profile and to have low archaeological potential for Aboriginal objects. No surface Aboriginal objects were recorded in these landforms in the Proposal Area.

The upper slopes of Mt Bundarbo which lead up to crests and saddle features were relatively steep ranging from 25- 65° with very steep slopes on the western and northern sides of the Proposal Area for the proposed new quarry and haul road. Steep slopes are considered to have relatively low archaeological potential to contain *in situ* subsurface deposits and the steep gradient of the slope is not conducive for camping or other activities by Aboriginal people.

A number of exposed rocky outcrops were scattered across the Proposal Area for the proposed new quarry and haul road, in particular on the slopes and crest of Mt Bundarbo. The outcroppings were visually inspected by the survey team however no evidence of quarrying or Aboriginal objects were identified. The quality of the weathered outcropping within the Proposal Area for the proposed new quarry and haul road was noted by the Young LALC representatives onsite to be a poor source material.

The landscape features that make up the top of Mt Bundarbo consists of two crests separated by a saddle with an uninterrupted view of the Murrumbidgee River and the surrounding area. Several arrangements of stone were noted on the crest and saddle of Mt Bundarbo. These were not considered to be Aboriginal in origin by the archaeologist or the two representatives from the Young LALC. No Aboriginal cultural significance or concerns that these may have been Aboriginal in origin were noted by the Young LALC representatives for any of the stone arrangements inspected within the Proposal Area for the proposed new quarry and haul road. The stone arrangements were all considered to be historic European and/or modern in origin. It was noted that one arrangement marked a Trigonometric Station location at the highest point on the north-western side of the crest of Mt Bundarbo, which was demarked by a concrete pillar with metal disk and a historic rock cairn. Several lines of arranged stones were also noted to mark out the Crown Land (Lot 7002 DP 1031310) boundary. This was very noticeable along the southern boundary of the Crown Land lot. While visibility on

the crests and saddle was generally poor, covered in thick grasses and weeds, a number of exposures were present that showed a skeletal soil structure with a very thin brownish red humic layer overlaying decomposing bedrock indicating that the crest and saddle features of Mt Bundarbo have low archaeological potential to contain *in situ* subsurface deposits. While Mt Bundarbo is a prominent feature in the landscape it was also noted by the two representatives from the Young LALC that the Proposal Area for the proposed new quarry and haul road had low potential for Aboriginal objects given its distance from the Murrumbidgee River and the steep slopes which would have to be climbed to reach the crest and saddle. No surface Aboriginal objects were recorded on the crest and saddle landforms within the Proposal Area for the proposed new quarry and haul road.

The trees within the Proposal Area for the proposed new quarry and haul road were predominantly native species. All old growth native trees within the Proposal Area, in particular the Brachychiton populneus, commonly known as the kurrajong, which is known for its Aboriginal cultural uses, were examined for the presence of Aboriginal cultural modification. For a tree to have been a mature specimen suitable for bark extraction at the time before European settlement interrupted Aboriginal people practicing traditional ways, the tree would have to be a native species and over 100 years old. While a number of trees within the Proposal Area for the proposed new quarry and haul road have scarring none were considered to conform in any way to the standard scarring morphology accepted for Aboriginal modification (cf. Long 2005).

No Aboriginal objects were recorded within the Proposal Area for the proposed new quarry and haul road as part of this Due Diligence Assessment. The landforms present within the Proposal Area for the proposed new quarry and haul road, originally determined during the desktop assessment to have increased archaeological sensitivity, were subsequently determined to have low archaeological potential and low potential for *in situ* subsurface deposits due the shallow rocky soil profile and presence of outcropping bedrock. Consequently, no landscapes or areas with archaeological potential were identified within the Proposal Area for the proposed new quarry and haul road.



Plate 1 View south from the start of the new proposed haul track along the low slopes and existing track with Mt Bundarbo the tallest point in the background.



Plate 2 View north along the low slopes of the proposed haul road from the existing track.



Plate 3 View west along the low slopes from the southern extent of the proposed haul road corridor, with the northern side of Mt Bundarbo in the background.



Plate 4 View north along the low slopes on the eastern side of the Proposal Area along an existing track.



Plate 5 View north along the low slopes on the eastern side of the Proposal Area along an existing track.



Plate 6 View north from the northern side of the steep upper slopes of Mt Bundarbo looking back to the proposed haul road.

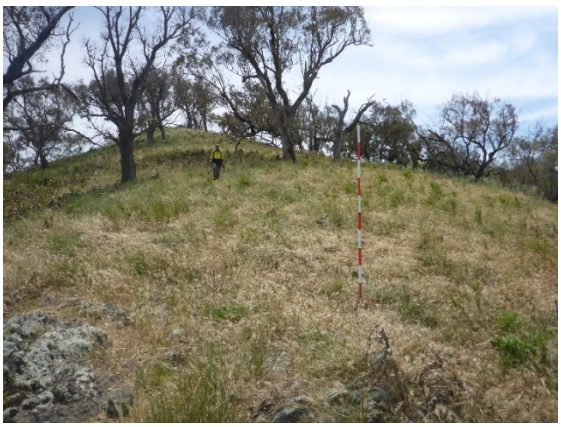


Plate 7 View north from the southern side of the steep upper slopes of Mt Bundarbo.



Plate 8 View west from the crest of Mt Bundarbo with the Trigonometric Station and historic rock cairn.



Plate 9 View south from the northern crest of Mt Bundarbo across the saddle towards the southern crest.



Plate 10 View north from the saddle to the northern crest of Mt Bundarbo with the Trigonometric Station in the far background. Note the line stone arrangement in the foreground along a Lot boundary.



Plate 11 View north from the southern lower crest with the northern crest of Mt Bundarbo with the Trigonometric Station in the far background.



Plate 12 View southwest to the Murrumbidgee River from the southern crest of Mt Bundarbo.

7. FURTHER ASSESSMENT

Step 5. Is further investigation or impact assessment required?

The Due Diligence Code of Practice states that if, after the desktop research and visual inspection is completed, it is evident that harm will occur to Aboriginal objects or heritage places then further and more detailed assessment is required. However, if the research and inspection conclude that there are no, or unlikely to be any, objects impacted by the proposed activity, then the activity can proceed with caution.

As no Aboriginal sites or areas of archaeological potential were identified within the Proposal Area for the proposed new quarry and haul road, and it was deemed that the area has low potential to contain *in situ* subsurface deposits due to the steep terrain and skeletal soil profile. Given this it was concluded that the proposed works for the development of a new open cut quarry pit at Mt Bundarbo and its associated haul road as part of the extension of the North Ridge Quarry and Bald Hill Landfill area near Jugiong, as assessed in this report, would not require any further heritage investigation and works can proceed with caution.

The desktop assessment of the proposed works for the Old Hume Highway road reserve indicated that the area was highly disturbed by the construction and maintenance of the existing road. It was concluded that the area was unlikely to contain Aboriginal objects and the works in the road reserve can proceed with caution.

8. RECOMMENDATIONS

The following recommendations are based on a number of considerations including:

- Background research into the area.
- Landscape assessment.
- Field inspection.
- Consideration of the proposed works, and
- Legislative context for the development proposal.

Based on an assessment of the project, the location and previous level of disturbance, the proposed work can proceed with caution with the following recommendations.

1. Works within the Proposal Area may proceed with caution.
2. Any proposed activity outside of the current assessment area should also be subject to an Aboriginal heritage assessment with representatives from the Young LALC.
3. If any items suspected of being Aboriginal in origin are discovered during works, all work in the immediate vicinity must stop and Heritage NSW must be notified. The find will need to be assessed and if found to be an Aboriginal object an Aboriginal Heritage Impact Permit (AHIP) may be required.
4. In the unlikely event that human remains are identified during works, all work must cease in the immediate vicinity and the area must be cordoned off. The proponent must contact the local NSW Police who will make an initial assessment as to whether the remains are part of crime scene or possible Aboriginal remains. If the remains are thought to be Aboriginal, Heritage NSW must be notified.

Bald Hill Quarry Pty Ltd are remined that it is an offence under the NSW *National Parks and Wildlife ACT 1974* to disturb, damage or destroy an Aboriginal object without a valid AHIP.

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APPENDIX F AIR QUALITY IMPACT ASSESSMENT

MT BUNDARBO PIT QUARRY

Air Quality Impact Assessment

Prepared for:

NGH Pty Ltd
35 Kincaid Street
Wagga Wagga NSW 2650



SLR Ref: 610.30189-R01
Version No: -v2.0
January 2021

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with NGH Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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610.30189-R01-v2.0	29 January 2021	Jason Shepherd	Judith Cox	Judith Cox
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1 Introduction

NGH Consulting Pty Ltd (NGH) has commissioned SLR Consulting Australia Pty Ltd (SLR) to prepare an Air Quality Impact Assessment (AQIA) for the proposed extension of the existing Bald Hill Quarry, Mt Bundarbo, NSW (Mt Bundarbo pit; the Project). The AQIA includes both existing and proposed operations (together, the Site).

This AQIA has been prepared in accordance with the NSW EPA document 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales' (NSW EPA, 2017), hereafter referred to as 'the Approved Methods'. The assessment methodology included the modelling of local meteorology and the dispersion of potential emissions from the Project to predict the level of impact that may be experienced in the surrounding environment.

1.1 Background

Bald Hill Quarry Pty Ltd (BHQ), is a regional landfill and basalt quarry operating adjacent to the Hume Highway, approximately 7 km east of Jugiong in southern NSW. The quarry has been operating in the area for more than 30 years with the operations including open pits, crushing, screening and transporting material offsite providing the local area with aggregates and road base material.

Development consent for the operation was originally granted in 1984. In 1989, following significant investment and restructuring, BHQ commenced a strategic market development plan targeting a quality product to a market specifically seeking high quality crushed rock products.

A Development Approval for the existing north ridge operation was granted in April 1999 (DA T.98.027) for the extension of hard rock quarrying activities, a new extraction site, ongoing use of existing processing plant, new raw feed haul route and product transportation. BHQ currently extracts and despatches 100,000 to 150,000 tonnes per annum (tpa) with equivalent peak demands of up to 300,000 tpa.

BHQ operates under Environmental Protection Licence (EPL) number 2552, last updated in May 2016.

The original pit is now a landfill and the North Ridge pit is still in operation, as outlined in the Environmental Impact Statement (1998) and Development Approval DA T.98.027.

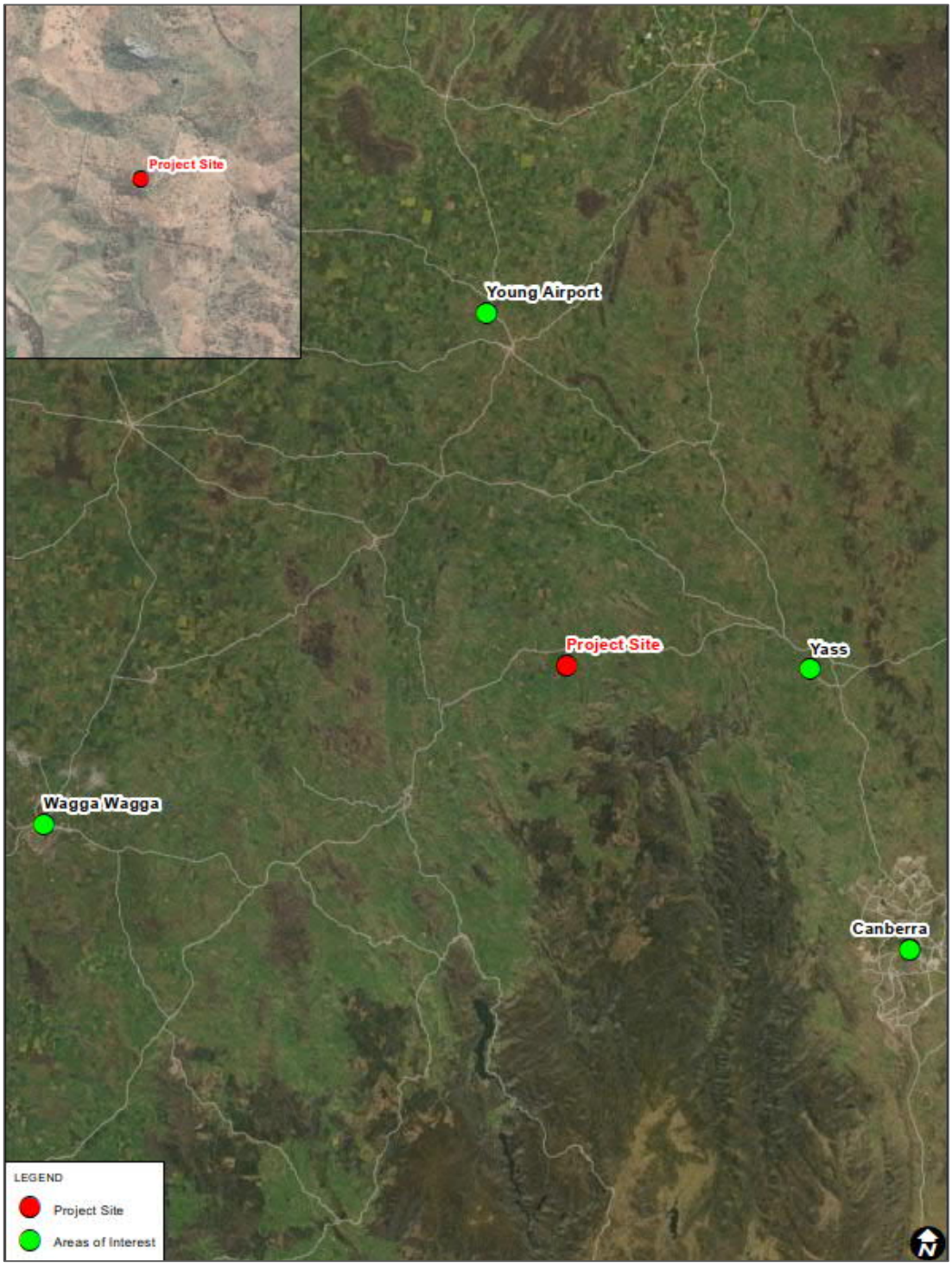
The landfill known as "Ecofill" is accommodated in an exhausted quarry void. Ecofill has a contractual arrangement with a consortium of Local Government Councils known as South West Regional Waste Management Group (SWRWMG) to take waste from their waste transfer stations and furthermore to restrict all other sources of waste to the Local Government Areas the Councils represent. Ecofill is open five days a week with most waste being delivered by truck.

2 Project Overview

2.1 Project Location

The Project location is presented in Figure 1.

Figure 1 Location of Project



2.2 Project Description

The Project is to consist of a new open cut pit (Mt Bundarbo pit) serviced by an 800 m extension to the current haul road servicing North Ridge pit. The total Project area is approximately 10 hectares (ha). Initial construction of the site will be through clearing and earthworks using excavator and dozer. Winning of material would be through drill and blast, with extraction by excavator, loader and dump truck to move the material for processing.

Processing of material is proposed to be either by campaign mobile crushing at Mt Bundarbo pit, or taken back to the existing processing plant, near North Ridge pit for processing (crushing).

The existing and proposed Project layouts are presented in Figure 2.

The existing and Project operations will operate together, however, as the Mt Bundarbo pit becomes more accessible and throughput increases, so the throughput of North Ridge pit will correspondingly reduce.

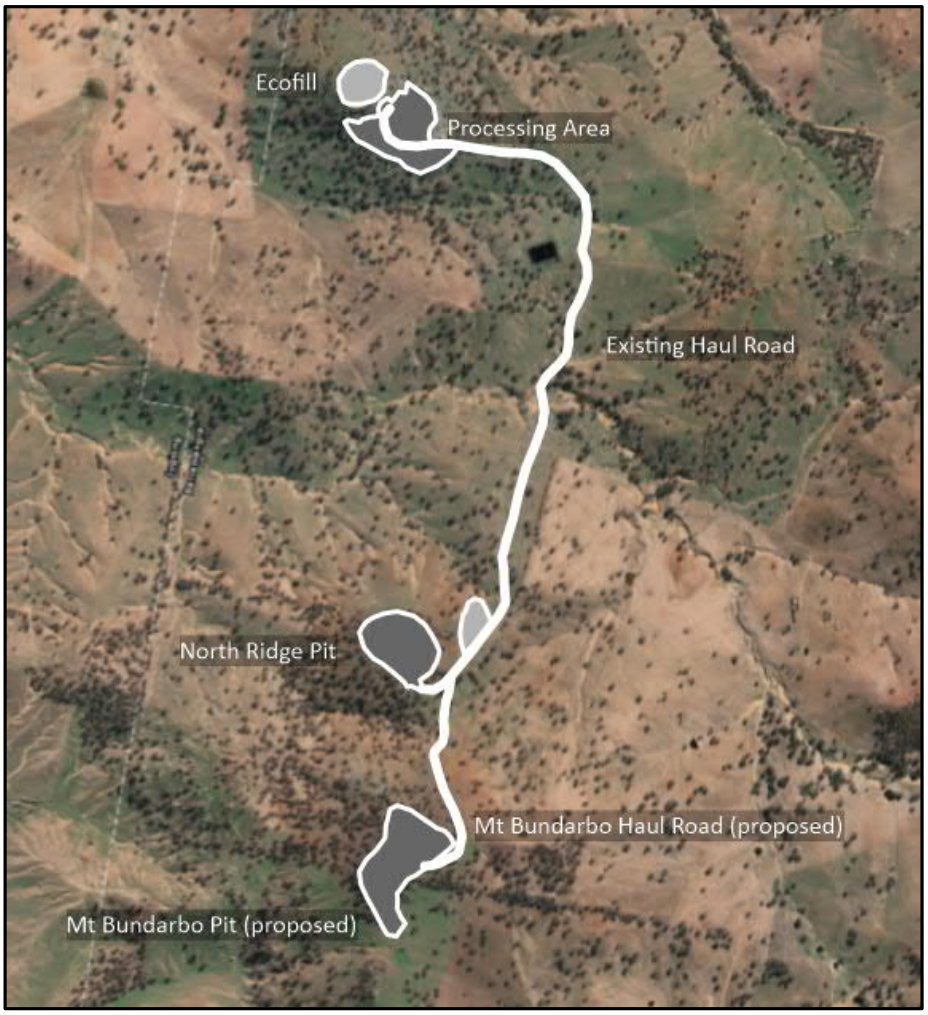
The existing and additional Project operations are summarised in Table 1.

Table 1 Existing and Proposed Operations

	Existing – North Ridge	Project – Mt Bundarbo
Throughput and progression timelines		
Normal	100,000 – 150,000 tpa	NA
Peak	300,000 tpa	NA
	270,000 tpa	180,000 tpa
Construction phase	NA	Approx. 3 months
	NA	Haul road extension Sediment and erosion controls Strip topsoil and store Bulk earthworks (cut and fill) Haul road pavement emplacement Topsoil restoration
Equipment inventory (fixed and mobile)		
Processing	Fixed three stage crushing and screening plant.	Diesel mobile crushing and screening on campaign basis located at existing processing area or Bundarbo Pit.
	Up to maximum 2000 hours per annum (40 h/wk)	Up to maximum 2000 hours per annum (40 h/wk)
Excavators	Up to 3 shared across both pits	
Loaders	Up to 5 front end loaders (FEL) shared across both pits	
Haulage	Up to 3 dump trucks shared across both pits: • 1x Komatsu 325-6 31t empty 67t laden • 2x Komatsu 465-5 42t empty 96t laden	
Grading	1 grader shared across both pits	
Water cart	1 water cart shared across both pits – assume watering rate of 2L/m^2/h	

	Existing – North Ridge	Project – Mt Bundarbo
Tool truck	1 tool truck shared across both pits	
Light vehicles	3 utes shared across both pits	
Drilling and blasting		
Drilling for blasts	15 holes/day to 15 m shared across both pits	
Blasts	11-15 blasts per year, up to 650 m^2	
Hours of operation		
Haul road construction	7:00 am to 8:00 pm Mon-Sat	
Pit activity	7:00 am to 6:00 pm Mon-Sat	
Raw haulage	7:00 am to 6:00 pm Mon-Sat	
Processing	7:00 am to 4:00 pm Mon-Fri	
Product dispatch	7:00 am to 10:00 pm Mon-Sun	
Blasting	7:00 am to 4:00 pm Mon-Fri	

Figure 2 Proposed Project Layout



3 Pollutants of Interest

The key pollutants associated with mining and extractive industries are suspended particulate matter (TSP, PM_{10} and $PM_{2.5}$) and dust deposition. While emissions of pollutants associated with the combustion of diesel fuel, including nitrogen oxides (NOx), sulphur dioxide (SO_2), carbon monoxide (CO) and Volatile Organic Compounds (VOCs), will be generated by the proposed operations at the quarry, these emissions are unlikely to compromise air quality goals at the closest receptors, given the nature and scale of the operation. They have therefore not been considered further.

In common usage, the terms "dust" and "particulates" are often used interchangeably. The term "particulate matter" refers to a category of airborne particles, typically less than 30 microns (μm) in diameter and ranging down to 0.1 μm and is termed total suspended particulate (TSP).

Particulate matter has the capacity to affect health and to cause nuisance effects and is categorised by size and/or by chemical composition. The potential for harmful effects depends on both. The particulate size ranges are commonly described as:

- TSP – refers to all suspended particles in the air. In practice, the upper size range is typically 30 μm to 50 μm.
- PM_{10} – refers to all particles with equivalent aerodynamic diameters of less than 10 μm, that is, all particles that behave aerodynamically in the same way as spherical particles with diameters less than 10 μm and with a unit density.
- $PM_{2.5}$ – refers to all particles with equivalent aerodynamic diameters of less than 2.5 μm diameter. These are often referred to as 'fine' particles and are a sub-component of PM_{10}.
- Deposited dust – refers to particulate that settles out over a given area and time under the influence of gravity. Deposited dust can include particles of any size, but it generally comprises particles larger than 20 micrometres (μm) in diameter that rapidly settle out of the air near the point of emission. It is measured to assess if an emission source is causing a nuisance, such as soiling of property and materials.

Both natural and anthropogenic processes contribute to the atmospheric load of particulate matter. Coarse particles ($PM_{2.5-10}$) are derived primarily from mechanical processes, resulting in the suspension of dust, soil, or other crustal materials from roads, farming, mining, dust storms, and so forth. Coarse particles also include sea salts, pollen, mould, spores, and other plant parts.

Fine particles, or $PM_{2.5}$, are derived primarily from combustion processes, such as vehicle emissions, wood burning, coal burning for power generation, hazard reduction burns, and bush fires. Fine particles also consist of transformation products, including sulphate and nitrate particles, and secondary organic aerosol from volatile organic compound emissions.

The size of particles determines their behaviour in the respiratory system, including how far the particles are able to penetrate, where they deposit, and how effective the body's clearance mechanisms are in removing them. Additionally, particle size is an important parameter in determining the residence time and spatial distribution of particles in ambient air, which are key considerations in assessing exposure.

$PM_{2.5}$, and in particular the ultrafine sub-micron particles, may penetrate beyond the larynx and into the thoracic respiratory tract and evidence suggests that particles in this size range are more harmful than the coarser component of PM_{10}.

Silica is one of the most abundant minerals found in the earth's crust. Crystalline silica is most dangerous to health when dust is generated, becomes airborne and is then inhaled. Respirable crystalline silica (RCS) dust particles are small enough to penetrate deep into the lungs and can cause irreversible lung damage.

3.1 Air Quality Criteria

The ambient air quality impact assessment criteria set by NSW EPA for suspended particulate matter are summarised in Table 2. These include updated PM_{10} and $PM_{2.5}$ air quality goals established by the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) (National Environment Protection Council, 2016), which were adopted by NSW EPA through an amendment to the Approved Methods in 2017 (NSW EPA, 2017). In the absence of a criterion for RCS, this is adopted from the Victorian Protocol for Environmental Management: Mining and Extractive Industries (EPAV, 2007).

Table 2 AQIA Criteria

Pollutant	Averaging Time	Goal
TSP	Annual	90 µg/m^3
PM_{10}	24-Hours	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24-Hours	25 µg/m^3
	Annual	8 µg/m^3
RCS (as PM2.5)	Annual	3 µg/m^3
Dust deposition	Annual • Total [a] • Increase above background [a]	 4 g/m^2/month 2 g/m^2/month

a As insoluble solids

4 Existing Environment

4.1 Local Setting

The Project is located in close proximity to rural residential land. There are several individual rural residences in close proximity to the Project, which are identified and discussed below.

4.2 Sensitive Receptors

A sensitive receptor is a location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of known or likely future sensitive receptors.

The Site is situated in a rural environment surrounded by farming properties with a small number of residential dwellings situated over 1 km from the Site. A list of sensitive receptor points identified and provided by NGH in the immediate vicinity of the site is shown in Table 3, along with the respective distances of each of these receptor points to the nearest site boundary. Figure 3 illustrates the location of the surrounding receptors in relation to the Site.

Table 3 Details of Identified Sensitive Receptors

Receptor ID	Location (m, UTM)		Approximate Distance and Direction from Nearest Site Activity [a] (m)	Elevation (m, AHD)
	Easting	Northing		
R1	631,314	6,144,955	1,000 E	475
R2	631,628	6,144,971	1,300 E	475
R3	631,176	6,143,494	1,150 E	430
R4	630,557	6,140,984	1,600 SE	405
R5	628,385	6,140,872	2,000 SW	310
R6	627,921	6,145,007	1,500 W	370

a Activity with potential to generate dust emission

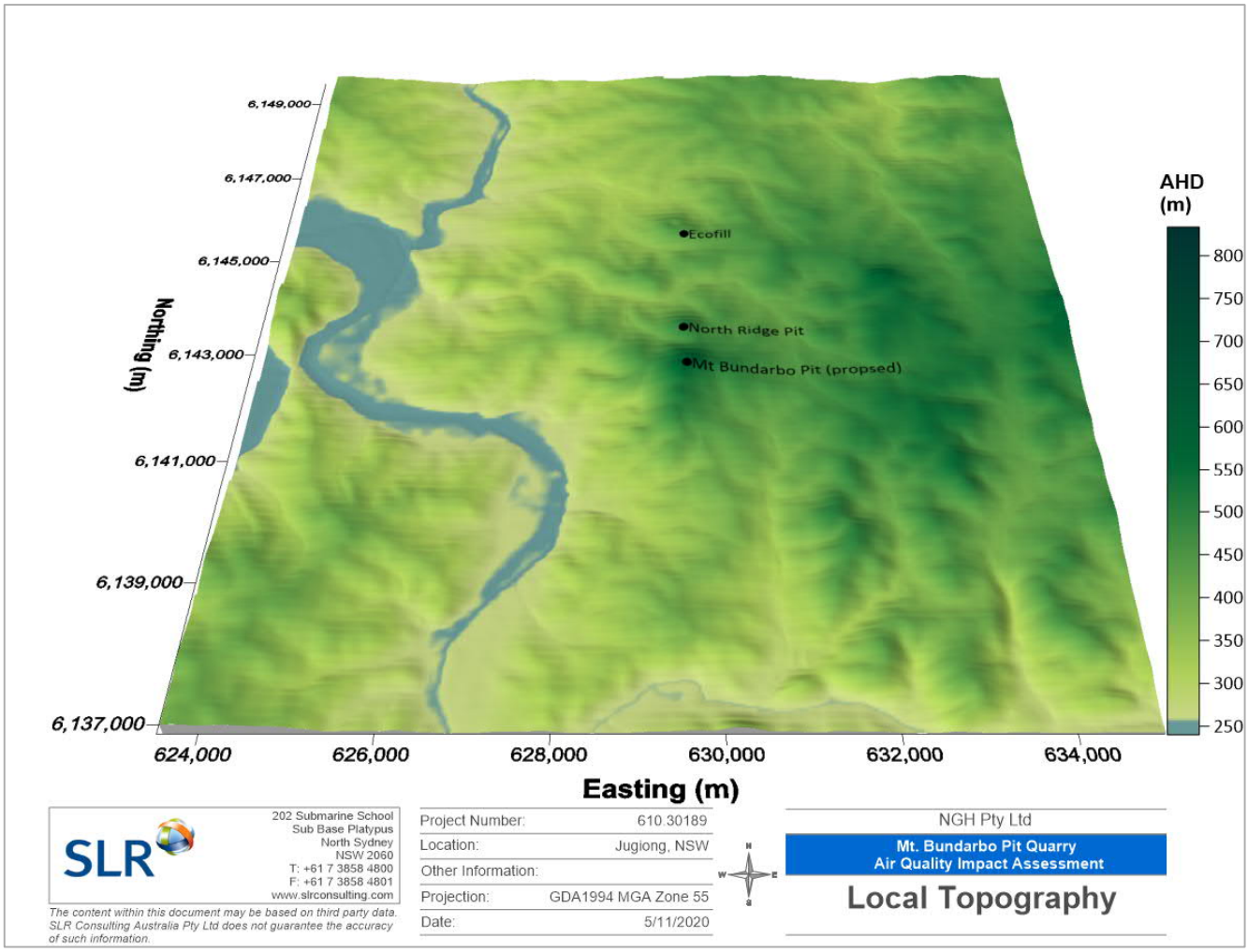
Figure 3 Locations of Sensitive Receptors



4.3 Topography

The land surrounding the proposed location for Mt Bundarbo pit generally falls away from the Site in all directions. Over approximately 2 km, the elevations drops approximately 200 m to the north and south, 300 m to the west and 100m to the east. Further out, there are several topographical features including the Murrumbidgee River 3 km to the west, and hills over 700 m in height to the east. A three-dimensional representation of the topographical features in the region surrounding the Project is presented in Figure 4.

Figure 4 Site Topography



4.4 Meteorology

Local wind speed and direction influence the dispersion of air pollutants. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. Wind direction, and the variability in wind direction, determines the general path pollutants will follow and the extent of crosswind spreading. Surface roughness (characterised by features such as the topography of the land and the presence of buildings, structures and trees) affects the degree of mechanical turbulence, which also influences the rate of dispersion of air pollutants.

In relation to dust emissions due to wind erosion, temperature, rainfall and relative humidity all influence the soil moisture content and hence the threshold friction velocity, which is the minimum friction velocity required to initiate movement of soil particles by wind.

The Bureau of Meteorology (BoM) maintains and publishes data from weather stations across Australia. The nearest available automatic weather station (AWS) collecting data suitable for use in a quantitative air dispersion modelling study operated by the BoM is Young Airport (approximately 70 km to the north-northwest of the Project Site).

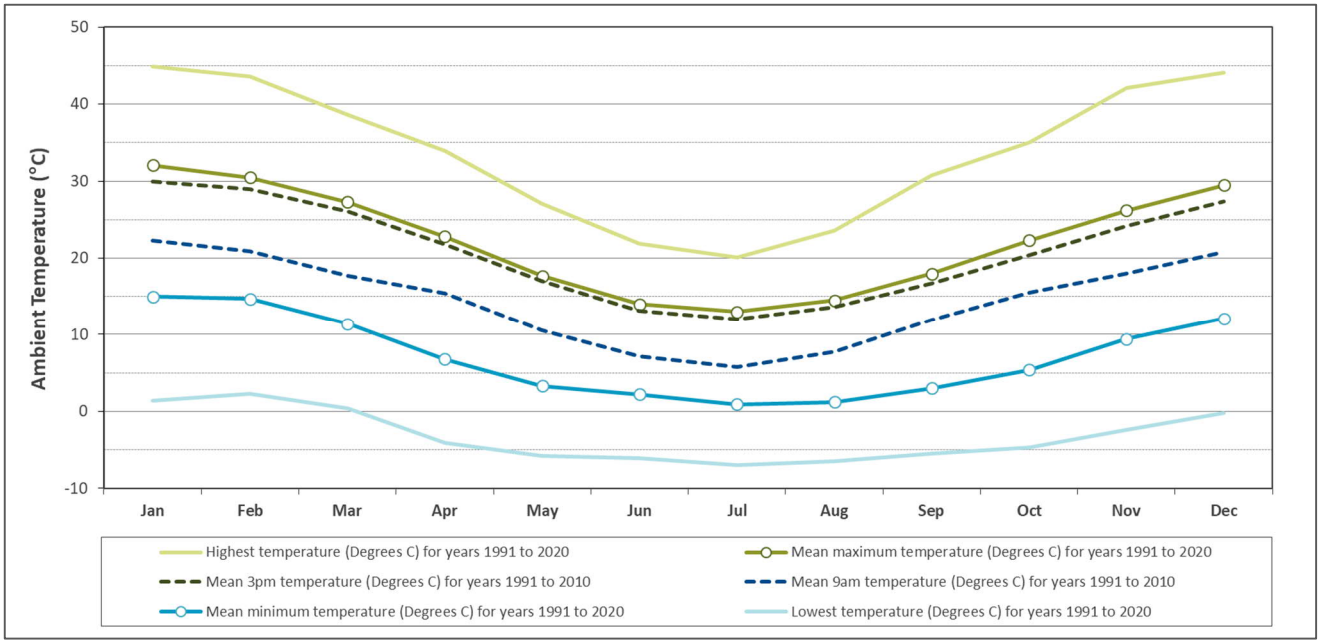
In addition to Young Airport AWS, the BoM operate several other weather stations that are situated closer to the project site including Burrinjuck Dam (22 km), Cootamundra Airport (42 km), Gundagai (37 km). However, the data collected at these locations were not suitable for use due to very limited parameters recorded (i.e. 9am wind speed data only).

A review of the data collected by Young Airport AWS between 1991 and 2020 is provided in the following sections.

4.4.1 Temperature

Temperature statistics for Young Airport AWS between 1991 and 2020 are summarised in Figure 5. Mean maximum temperatures range from 13°C in winter to 32.1°C in summer, while mean minimum temperatures range from 0.9°C in winter to 15°C in summer. Longer periods of higher temperatures can dry out soil resulting in both higher background dust and on-site dust emissions.

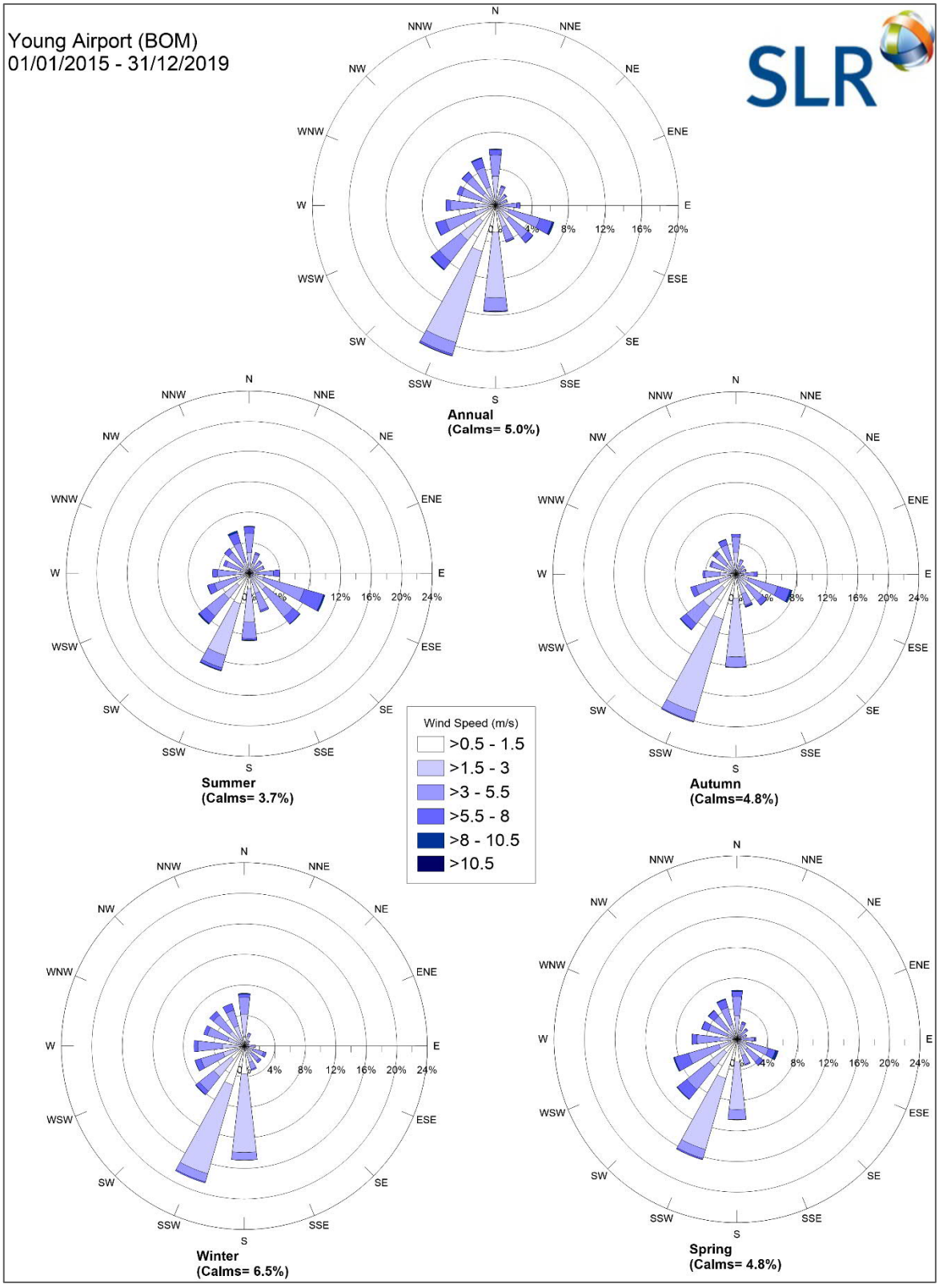
Figure 5 Temperature Trends for Young AWS (1991 – 2020)



4.4.2 Wind

Annual and seasonal wind roses for Young Airport for the years 2015 to 2019 are presented in Figure 6. The wind roses show that overall, winds from the south-southwest are predominant, with very few winds from the northeast. Autumn, winter and spring are consistent with the overall distribution. Summer has winds distributed more evenly between the south-southwest and east-southeast directions and consistent with the other seasons has very few winds from the northeast.

Figure 6 Annual and Seasonal Wind Roses – Young Airport BoM AWS (2015 – 2019)

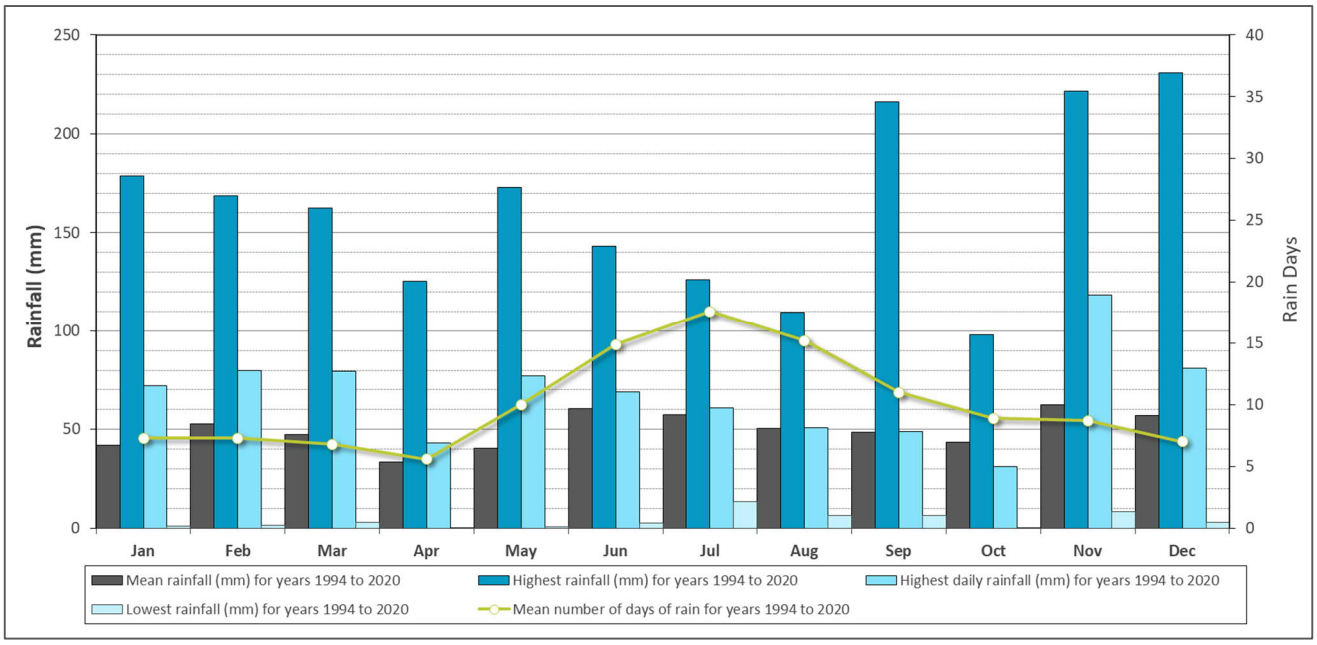


4.4.3 Rainfall

Rainfall statistics for Young Airport for the years 1994 to 2020 are summarised in Figure 7. The mean annual rainfall is 589 millimetres (mm). The average monthly rainfall is distributed relatively evenly across all months with the highest average monthly rainfall of 62 mm/month in November and an average of 8.7 rain days recorded in this month. The lowest average of 33 mm/month, and 5.6 days of rain occurs in April. The highest monthly rainfall recorded over the time period examined was 231 mm recorded in December 2010. The maximum daily rainfall of 119 mm was recorded on 29 November 2010.

Note that while rainfall may scavenge dust / particulate from the air, for the purposes of modelling it has conservatively not been considered in this assessment.

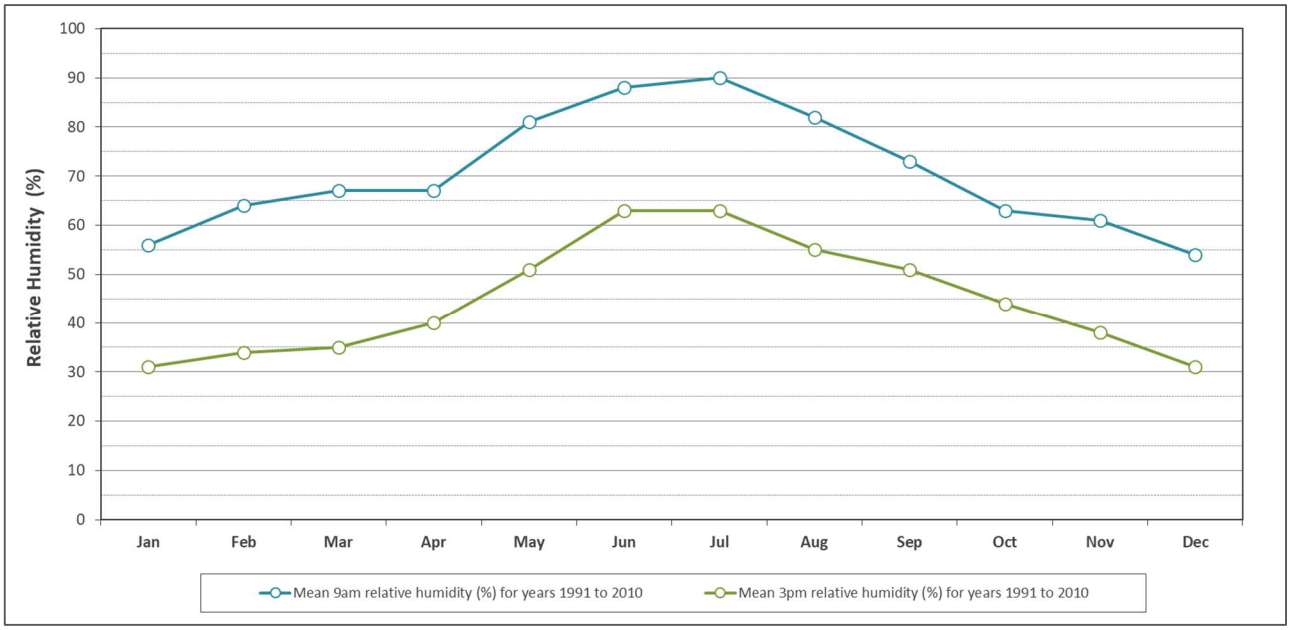
Figure 7 Long Term Monthly Rainfall Data for Young Airport



4.4.4 Relative Humidity

Humidity statistics (9 am and 3 pm monthly averages) for Young Airport (2015 – 2019) are summarised in Figure 8. Morning humidity levels range from an average of around 90% in winter to around 54% in summer. Afternoon humidity levels are lower, at around 63% in winter dropping to around 31% in summer.

Figure 8 Humidity Data for Young Airport



4.4.5 Evaporation

BoM publish total evaporation maps for Australia showing the amount of water which evaporates from an open pan. Annual average and seasonal average evaporation rates for the area in which the Project is situated are calculated from these maps which indicate the following:

- approximate total annual average evaporation rate: 1800 mm, or 0.21 mm/h
- approximate total summer average evaporation rate: 800 mm, or 0.37 mm/h

Using water carts and water sprays to supress dust emissions will achieve less control in areas with greater evaporation than areas with less evaporation. Greater rates of watering are likely to be required in summer when evaporation rates are increased to achieve adequate dust control.

4.5 Background Air Quality

4.5.1 Suspended Particulate Matter

The nearest Air Quality Monitoring Station (AQMS) operated by the NSW Environment, Energy and Science (EES) Group - part of the Department of Planning Industry and Environment - measuring continuous PM_{10} and $PM_{2.5}$ concentrations is located at Wagga Wagga North, approximately 100 km to the west-southwest of the Project.

The Wagga Wagga North AQMS forms part of the air quality monitoring network for the rural NSW region, and is located near the Wagga Wagga racecourse on Beckwith Street. During dry periods, the racecourse has the potential to give rise to dust emissions due to horse riding activities and wind-blown dust.

The AQMS is located within residential area, with the nearest industry 5.5 km to the northeast. Particulate concentrations recorded by the Wagga Wagga AQMS are likely to be influenced by these local sources. The Project is located 100 km away and is surrounded by land primarily used for grazing. Therefore, for the purpose of this assessment, data recorded by the Wagga Wagga AQMS has been considered to conservatively represent background particulate concentrations at the Project site.

PM_{10}

Summaries of the 24-hour average and annual average PM_{10} concentrations measured by the Wagga Wagga North AQMS during 2015 to 2019 calendar years are presented in Table 4 and Figure 9.

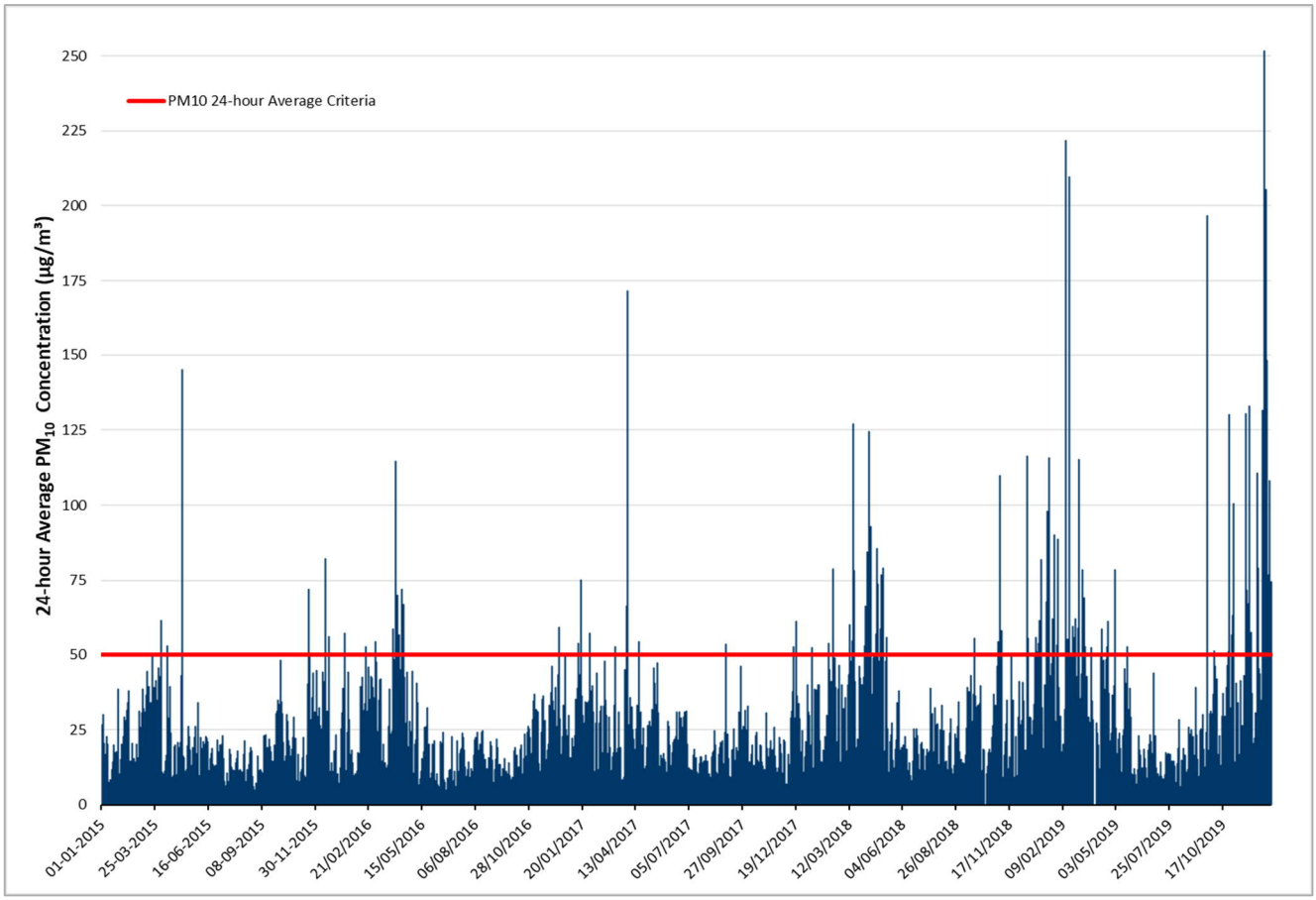
Table 4 Summary of PM_{10} Monitoring Data at Wagga Wagga North AQMS (2015-2019)

Year	Maximum 24-Hour PM_{10} Concentration	Number of Exceedances of 24-Hour Criterion	Annual PM_{10} Concentration
	($\mu g/m^3$)	(days/year)	($\mu g/m^3$)
2015	145.1	7	19.8
2016	114.7	16	20.6
2017	171.6	11	20.7
2018	127.2	35	27.4
2019	251.7	64	35.0
5 Year Average	NA	NA	24.7
Criterion	50	NA	25

Red font indicates an exceedance of the applicable criterion

A review of the recorded exceedances of the 24-hour average PM_{10} criterion showed that three of the exceedances were caused by exceptional events (i.e. dust storms, bush fires etc). The remaining eight due to local particle sources attributed to agricultural activities (NSW, OEH, 2019).

Figure 9 24-Hour Average PM_{10} Data Monitored at Wagga Wagga North AQMS (2015-2019)



$PM_{2.5}$

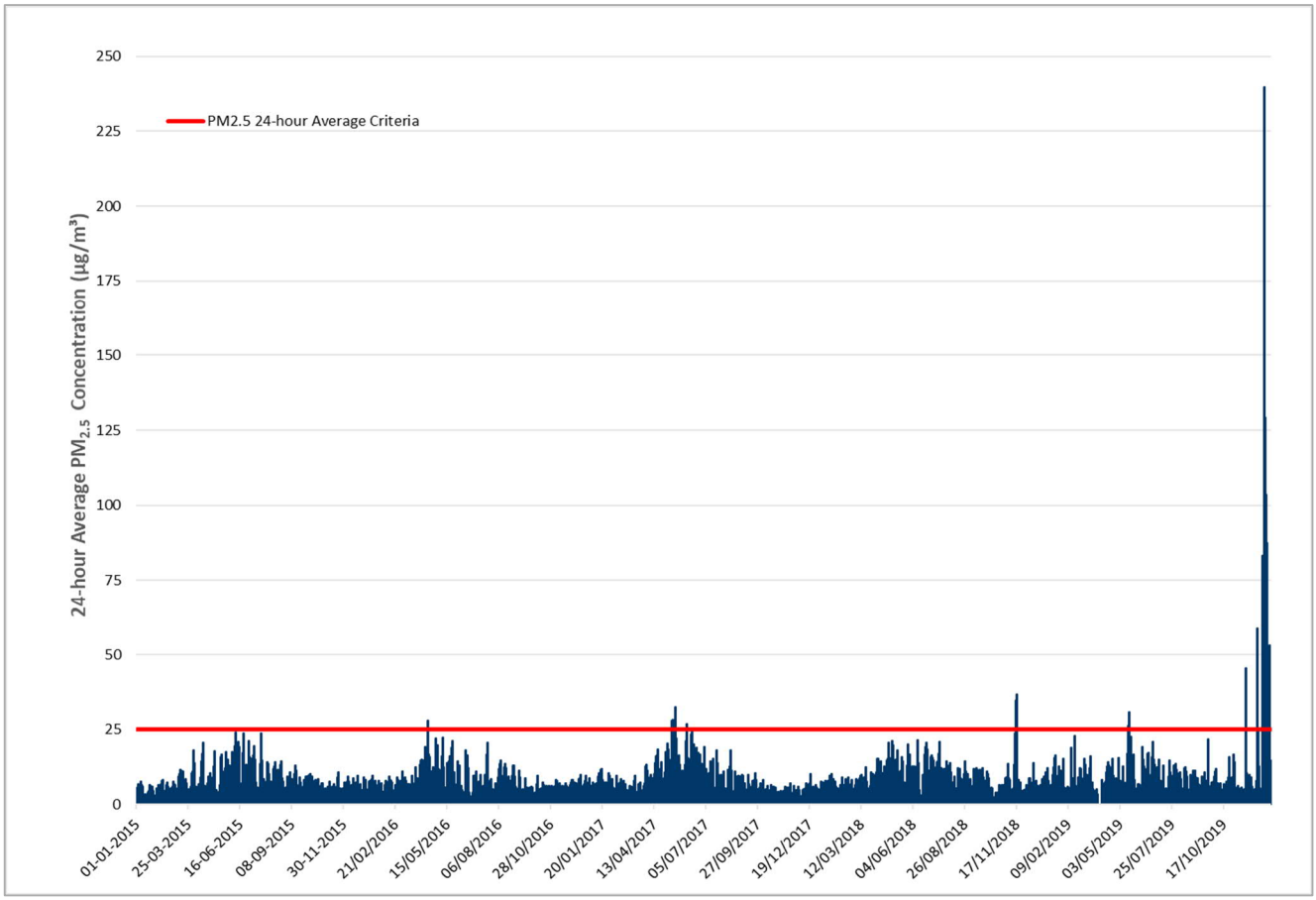
A summary of the 24-hour average and annual average $PM_{2.5}$ concentrations measured by the Wagga Wagga North AQMS during 2015-2019 calendar years are presented in Table 5 and Figure 10.

Table 5 Summary of $PM_{2.5}$ Monitoring Data at Wagga Wagga North AQMS (2015-2019)

Year	Maximum 24-Hour $PM_{2.5}$ Concentration	Number of Exceedances of 24-Hour Criterion	Annual $PM_{2.5}$ Concentration
	(µg/m³)	(days/year)	(µg/m³)
2015	24.2	0	7.5
2016	28.1	2	7.4
2017	32.5	5	8.1
2018	36.8	2	8.5
2019	239.7	18	11.1
5 Year Average	NA	NA	8.5
Criterion	25	NA	8

Red font indicates an exceedance of the applicable criterion

Figure 10 24-Hour Average $PM_{2.5}$ Data Monitored at Wagga Wagga North AQMS (2015-2019)



A review of the recorded exceedances of the 24-hour average $PM_{2.5}$ criterion showed that three of these exceedances were caused by the exceptional events (Hazard Reduction Burning) and two due non-exceptional events (NSW, OEH, 2019).

4.5.2 Dust Deposition

Deposited dust is an indicator of the effectiveness of site management practices and the potential for off-site nuisance. Gauges are usually located on a site boundaries to monitor deposition rates that conservatively represent off-site impacts. One or more gauges is often located in an upwind or background location so that the net impact of site emissions can be demonstrated.

BHQ conduct dust deposition monitoring at four locations around the existing operations as shown in Figure 11.

A brief summary of the insoluble solids results from these locations for the period September 2018 to July 2020 is provided in Table 6 and indicates that the annual average criterion is exceeded at L7. A plot of the monthly minimum deposition rates and annual average minimum deposition rates as measured across all locations is presented in Figure 12.

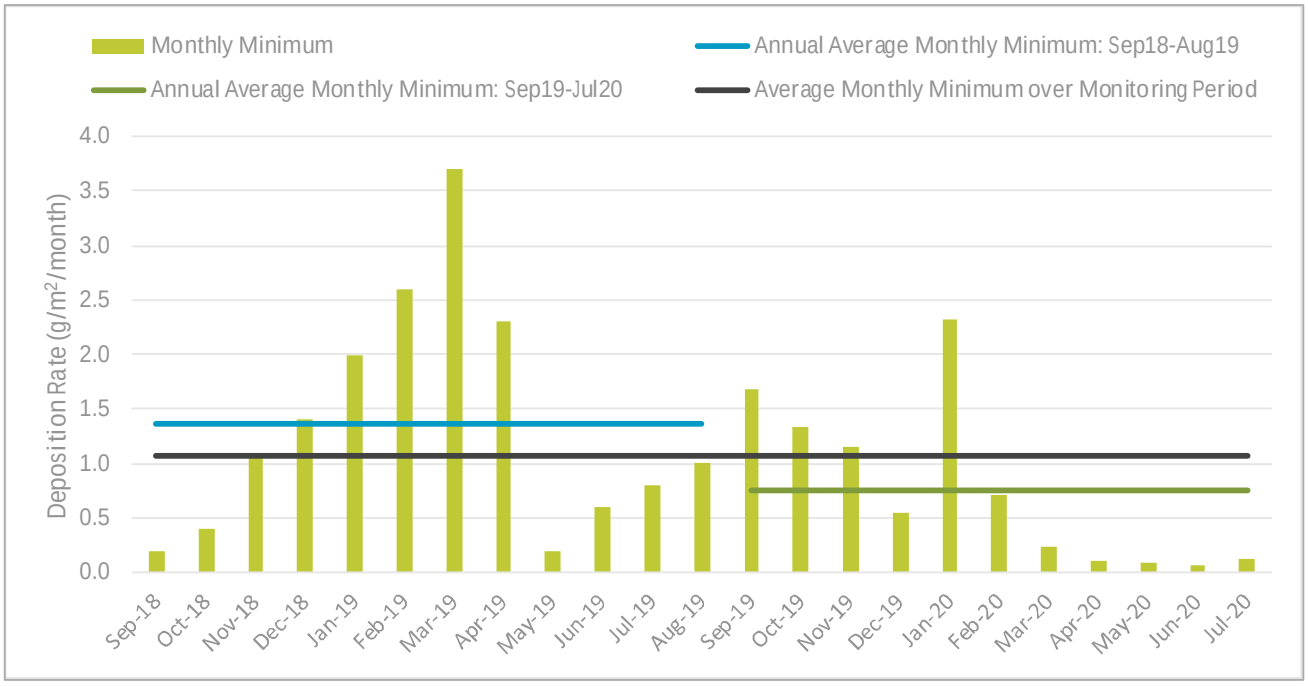
Figure 11 BHQ Dust Deposition Monitoring Locations L5 to L7



Table 6 BHQ Insoluble Solids Deposition Rate Monitoring Summary: September 2018 – July 2020

Monitoring Location	Deposition Rate (g/m^2/month)		
	Maximum	Minimum	Average
L4	14	0.5	3.0
L5	5.0	0.1	1.4
L6	5.6	0.2	1.8
L7	36	0.5	4.2
Criterion (annual average)			4

Figure 12 BHQ Minimum Insoluble Solids Deposition Rate: September 2018 – July 2020



The average of the monthly minimum deposition rate across all locations of 1.1 g/m^2/month for the period September 2018 to July 2020 may be considered indicative of the annual average background dust deposition rate in the area, i.e. without impacts from BHQ operations.

5 Assessment Methodology

The assessment follows the Approved Methods using the Level 2 assessment methodology. The Approved Methods specify how assessments based on the use of air dispersion models should be completed. They include guidelines for the preparation of meteorological data to be used in dispersion models and the relevant air quality criteria for assessing the significance of predicted concentration and deposition rates from projects.

5.1 Dispersion Model

The Approved Methods lists AUSPLUME v6.0 and CALPUFF v5.7 or later as approved models. AUSPLUME is a steady state Gaussian plume dispersion model developed by the EPA Victoria (EPAV) and frequently used in Australia for simple near-field applications is based on Industrial Source Complex (ISC) model. ISC was replaced for regulatory purposes in the US in December 2006 by the American Meteorological Society (AMS)/USEPA Regulatory Model (AERMOD). EPAV replaced AUSPLUME with AERMOD as its regulatory model in January 2014 and in recent years the NSW EPA consider the use of AERMOD as being in accordance with the Approved Methods.

AERMOD is a steady-state plume modelling system with three components: AERMOD (dispersion model), AERMAP (terrain data pre-processor) and AERMET (meteorological data pre-processor). A significant feature of AERMOD is the Pasquill-Gifford stability-based dispersion is replaced with a turbulence-based approach that uses the Monin-Obukhov length scale to account for the effects of atmospheric turbulence-based dispersion.

Emissions from the existing and Project operations have been modelled using AERMOD to predict maximum pollutant ground level concentrations (GLC) resulting from the emissions to air from the Project.

5.2 Environmental Inputs

AERMOD requires a range of inputs to describe the Project environment:

- Topographical data
- Meteorological data
- Background pollutant concentrations

The sources of the required data are summarised in Table 7 and these inputs are discussed in the following sections.

Table 7 Air Quality Model Input and Post Processing Data

Item	Source	Description
Topographical data	Shuttle Radar Topography Mission (SRTM)	3 second (~90m) resolution
Meteorological data	TAPM	Wind speed, wind direction, temperature, relative humidity, cloud cover, upper air (twice daily sonde)
Background pollutant concentrations	EPA Wagga Wagga AAQMS	24-hour average concentrations of PM_{10} and $PM_{2.5}$ (from 1-hour averaged concentrations)
	Supplemented by monitoring at BHQ	Monthly average dust deposition rate

5.2.1 Topography

Shuttle Radar Topography Mission (SRTM) three arc-second (approximately 90 m) global digital surface model data are commonly used for plume dispersion modelling purposes. The raw SRTM data cannot distinguish between ground surface topography and other elevated features such as tree canopies and buildings and is therefore subject to editing and processing, such as: delineating and flattening water bodies, better defining coastlines, removing spikes and wells, and filling small voids. Due to the relatively flat topography, few trees and few buildings in the project area, the dataset is considered adequate for the assessment. Data was processed with AERMAP for use in AERMOD.

5.2.2 Meteorology

In order to determine a representative meteorological year for use in dispersion modelling, five years of meteorological data (2015-2019) from the closest meteorological monitoring station, Young Airport AWS, were analysed against the five-year average meteorological conditions. Specifically, the following parameters were analysed:

- Frequency and distribution of the predominant wind directions
- Hourly wind speeds observed
- Hourly temperature
- Hourly relative humidity.

Based on this analysis, it was concluded that the year 2017 was representative of the last five years of meteorological conditions experienced at the Site, and hence the 2017 calendar year was adopted for use in this AQIA. A summary of the analysis is presented in Appendix A.

In the absence of NSW AERMOD specific guidance, meteorological input files were developed in accordance with guidelines provided in EPAV Publication No. 1550 (EPAV, 2013), for meteorological pre-processing using AERMET. AERMET requires on-site hourly data for the following meteorological parameters:

- Wind speed
- Wind direction
- Temperature

AERMET also requires hourly cloud cover data and twice daily vertical temperature and moisture profiles (upper air) data. In Australia this is generally limited to major airports. The nearest source of this data is Canberra Airport, approximately 86 km southeast of the Project. The distance and topography (elevation change of approximately 60 m) between Canberra Airport and the Project means this upper air data may not be considered representative of the Project location. Furthermore, due to the longitude of Canberra Airport, the twice daily soundings that occur at midnight and noon, Greenwich time do not coincide close enough to local sunrise and sunset. In the absence of on-site or upper air meteorological data for the Project location, The Air Pollution Model (TAPM v4.05) was used to generate a synthetic meteorological data set and the following parameters were used to construct an AERMET input file:

- Wind speed
- Wind direction
- Temperature at 2 m and at 10 m

- Net radiation

The TAPM modelling is described in more detail in Appendix B.

AERMET (version 18081) was used to process these data to produce the surface and profile meteorological input files required by AERMOD.

The following surface characteristics of the Project location required for AERMET were determined in accordance with EPAV guidance (EPAV, 2013a) informed from publicly available on-line aerial imagery:

- Surface roughness - the height at which the mean horizontal wind speed approaches zero, based on a logarithmic profile
- Bowen ratio - an indicator of surface moisture.
- Albedo - an indicator of reflectivity of the surface.

A summary of AERMET modelling options and parameters used for the assessment is provided in Table 8. A summary of the AERMOD meteorological files is provided in Table 9.

Table 8 AERMET Model Parameters

Parameter	Option / Source			
Adjusted U* (surface friction velocity)	Yes			
Mixing Heights from Onsite Data or Upper Air Data	TAPM			
Threshold Wind Speed (m/s)	0.28			
Wind speed and Direction	TAPM			
Temperature	TAPM			
Relative Humidity	TAPM			
Solar Radiation	TAPM			
Cloud Cover	NA			
Upper Air Data	NA			
Scalar Parameters	Summer	Autumn	Winter	Spring
Albedo	0.18	0.18	0.20	0.18
Bowen Ratio	0.8	1.0	1.0	0.4
Surface Roughness 0° – 360° (m)	0.1	0.01	0.001	0.05

Table 9 AERMOD Meteorological Input Data

Meteorological Year	Available Hours	Missing Hours	Calms (<0.28 m/s) [a]	Valid Hours [a]
2017	8760	0 (0.0%)	70 (0.79%)	8690 (99.2%)

a AERMOD does not predict GLCs during calms

5.2.3 Background Air Quality

5.2.3.1 PM_{10} and $PM_{2.5}$

In the absence of appropriate, site-specific hourly background data at the Project, concentrations of PM_{10} and $PM_{2.5}$ monitored at Wagga Wagga North AQMS are adopted to conservatively represent the Project conditions. This can be considered a conservative approach as being a less rural area, the Wagga Wagga data is impacted by anthropogenic emissions of PM_{10} and $PM_{2.5}$.

5.2.3.2 TSP

In the absence of appropriate, site-specific hourly background data at the Project or at Wagga Wagga North AQMS, daily-varying ambient TSP concentrations have been estimated from the Wagga Wagga North PM_{10} concentrations using a TSP/PM_{10} ratio of 2.

5.2.3.3 RCS

Ambient monitoring data of RCS is not available in the region. Findings from a literature review showed that only one RCS monitoring campaign has been completed in Australia. This was conducted by Queensland Government (QG) to investigate impact of RCS due to quarrying operations.

The monitoring was carried out for one year (December 2008 to December 2009) at two sites located in the wider community. Findings of the monitoring campaign and recorded 7-day average of RCS and $PM_{2.5}$ data were made publicly available (DSITIA, 2009) by Queensland Department of Environment and Science (DES) formerly known as Department of Science, Information Technology, Innovation and the Arts (DSITIA). The findings of this campaign are summarised below:

- Annual average $PM_{2.5}$ crystalline silica concentrations in the Mount Cotton community were very low, less than ten percent of the guideline value of 3 µg/m³ set in the Victorian Governments Protocal for Environmental Management for Mining and Extractive Industries (PEMMEI).
- Crystalline silica was detected in 90 percent of $PM_{2.5}$ samples collected at the monitoring site located within 300 meters of the quarry boundary but in less than 50 percent of samples at a distance of 1.5 kilometres from the quarry

In addition to the above, further investigation of RCS data presented in the DSITIA report showed the following:

- Annual average RCS concentration of 0.2 µg/m³ at Site 1 located in the Mount Cotton Community, approximately 1.5 km from the quarry.
- Annual average RCS concentration of 0.3 µg/m³ at Site 2 located approximately 300 m from the quarry boundary.
- The average ratio of RCS and $PM_{2.5}$ concentration was 0.027 and 0.028 at Site 1 and Site 2 respectively.

Based on the findings of the above study, background RCS concentrations were estimated from the annual average $PM_{2.5}$ concentrations (Section 4.5.1) and a conservative RCS/$PM_{2.5}$ ratio of 0.03, rounded up to one significant figure, giving 0.3 µg/m^3.

It is noted that another study in the UK (Stacey, Butler, Thorpe, & Roberts, 2018) reports measured urban background RCS concentrations less than 0.3 µg/m^3, and a median RCS level at a rural location of 0.02 µg/m^3,indicating that 0.3 µg/m^3 can be considered conservative at the relatively rural Project location.

5.2.3.4 Dust Deposition

A background dust deposition rate of 1.1 g/m^2/month is assumed based on BHQ monitoring results (Section 4.5.2).

5.2.4 Adopted Background for this Assessment

The site-representative background ambient air quality concentrations adopted for use in this assessment are summarised in Table 10.

Table 10 Adopted Background Concentrations for Cumulative Impact Assessment

Pollutant	Averaging Period	Background	Notes
TSP	Annual	41 µg/m^3	Assumed to be equal to 2x PM_{10} concentrations at Wagga Wagga North AQMS during 2017.
PM_{10}	24-hour	Daily varying	From 1-hour average asmonitored at Wagga Wagga North AQMS during 2017
	Annual	21 µg/m^3	
$PM_{2.5}$	24-hour	Daily varying	
	Annual	8.1 µg/m^3	
RCS	Annual	0.3 µg/m^3	Assumed to be equal to 0.03x $PM_{2.5}$ annual average concentration.
Deposited dust	Annual	1.1 g/m^2/month	Average of monthly minimum monitored at BHQ 2018-2020

5.3 Source Characteristics and Emission Rates

AERMOD requires a range of inputs to describe the emissions to air as a result of the proposed activities. Emission rates of TSP, PM_{10} and $PM_{2.5}$ associated with each of the identified dust emitting activities were derived from emission factors provided by the National Pollutant Inventory Handbook for Mining and Extractives (DSEWPC, 2012) (NPI).

5.3.1 Emission Rate Estimation Methodology

Particulate emissions from the were estimated for various particle size fractions based on the relevant emission factors sourced from National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining (Environment Australia, 2012) (hereafter the NPI EETM for Mining), and the USEPA's AP-42 Emission Factor Handbook. Formulae are provided in Appendix C.

The emission calculations were performed using the activity data and based on the following assumptions:

- Haulage distances (total vehicle kilometres travelled (VKT)) on unpaved roads were estimated based on the length of each haul route and number of trips per day.
- No suppression (i.e. industrial water sprays) will be adopted for the activities occurring in pit (i.e. material handling, wind erosion from product stockpiles and overburden emplacement areas.
- Water sprays are used on the crushing, and screening processes.
- A water cart will be used on haul roads (see below).

- A maximum annual extraction rate output of 300,000 t for existing operations and 450,000 t for proposed operations.
- While emissions due to wind erosion occur on a 24/7 basis, emissions from mechanical sources (crushing, haulage, etc.) only occur during daytime operating hours.
- It is assumed that all site activities cease during blasting, therefore the emissions are not cumulative and are therefore not assessed.
- Emissions for each of the crushing process stages (primary, secondary, tertiary, screening, conveying) are conservatively based on the total throughput.

Haul Road Watering to Supress Wheel Generated Dust

The NPI EETM for Mining indicates emission control of wheel generated dust as follows:

- Level 1 watering (2 L/m^2/h): 50% control
- Level 2 watering (>2 L/m^2/h): 75% control

Site specific watering emission control C expressed as a percentage can be estimated from typical evaporation rates for the area and haul road traffic rate using the following equation (Air & Waste Management Association, 2000):

$$C = 100 - \frac{0.8pdt}{i}$$

where p is the average hourly daytime evaporation rate, d is the average hourly daytime traffic rate, t is the time (hours) between water application and i is the application intensity (L/m^2).

From the evaporation rates for Young Airport (Section 4.4.5), a control of greater than 90% is calculated for the Site haul roads, including for the summer months, with a watering rate of less than 1 L/m^2/h. However, for modelling purposes, a 75% control factor was conservatively applied to the unpaved haul road wheel generated dust estimates.

Wind Speed Dependent Wind Erosion

The base wind erosion emission rates presented in Table 15 (Section 6.2) were varied hourly based on a cubic relationship with the wind speed for that hour to accurately simulate the increased dust generation at higher wind speeds. That is, for each hour, h, the hourly emission rate, E is:

$$E(h) = E_{base} * u(h)^3 / \overline{u^3}$$

where E_{base} is base emission rate, u is the hourly wind speed contained within the meteorological file. Note that although increased wind speed generates increased wind erosion emission rates, it also promotes increased plume dispersion. This offsetting effect generally leads to reduced ground level concentrations.

Wind Speed Sensitive Emission Activities

The base emission rates of wind speed sensitive emission activities including excavators, front end loaders and trucks (dumping) presented in Table 15 (Section 6.2) were varied hourly based on a relationship with the wind speed for that hour to accurately simulate the increased dust generation at higher wind speeds. For each hour, h, the hourly emission rate, E is:

$$E(h) = E_{base} * \left(\frac{u(h)}{2.2}\right)^{1/3} \Big/ \overline{\left(\frac{u}{2.2}\right)^{1/3}}$$

5.3.2 Additional Model Parameters and Options

Particle size distributions required by AERMOD to model dust deposition rates were derived from AP42 emission factors for aggregate handling processes, unpaved industrial (haul) roads and wind erosion.

A summary of additional AERMOD modelling options and parameters used for the assessment is provided in Table 11 and Table 12.

Table 11 Particle Size Distribution for Deposition

Source Type	Particle Diameter (µm)	Mass Fraction	Particle Density (g/cm^3)
Material handling [a]	2.5 5.0 10 15 30	0.072 0.199 0.203 0.176 0.351	2.5 2.5 2.5 2.5 2.5
Wheel generated dust	2.5 10 30	0.031 0.276 0.694	2.5 2.5 2.5
Wind erosion	2.5 10 15 30	0.075 0.425 0.100 0.400	2.5 2.5 2.5 2.5

a Trucks dumping, loading trucks, crushing, bulldozing etc.

Table 12 Model Parameters

Parameter	Option
Adjusted U* (friction velocity)	Yes
Output type	Concentration (µg/m^3) Dry deposition (g/m^2)
Depletion options	PM_{10} and $PM_{2.5}$: None (modelled as a gas) TSP: Dry only
Dispersion coefficient	Rural
Building downwash	None (no buildings included)
Gridded receptors	Uniform cartesian 5 km x 5 km; 50 m spacing; 0 m (AGL)
Discrete receptors	Sensitive receptors; 0 m (AGL) DDG monitoring locations; 0 m (AGL)

AGL Above ground level

5.3.3 Accuracy of Modelling

All atmospheric dispersion models, including AERMOD, represent a simplification of the many complex processes involved in the dispersion of pollutants in the atmosphere. To obtain good quality results it is important that the most appropriate model is used and the quality of the input data (meteorological, terrain, source characteristics) is adequate.

The main sources of uncertainty in dispersion models, and their effects, are discussed below:

- Oversimplification of physics: This can lead to both under-prediction and over-prediction of ground level pollutant concentrations. Uncertainties are greater in Gaussian plume models as they do not include the effects of non-steady-state meteorology (i.e., spatially- and temporally-varying meteorology).
- Uncertainties in emission rates: Ground level concentrations are proportional to the pollutant emission rate. In addition, most modelling studies assume constant worst-case emission levels, or are based on the results of a small number of stack tests (where relevant), however in reality, operations (and thus emissions) are often quite variable. Accurate measurement of emission rates and source parameters requires continuous monitoring.
- Uncertainties in wind direction and wind speed: Wind direction affects the direction of plume travel, while wind speed affects plume rise and dilution of plume. Uncertainties in these parameters can result in errors in the predicted distance from the source of the plume impact, and magnitude of that impact. In addition, aloft wind directions commonly differ from surface wind directions. The preference to use rugged meteorological instruments to reduce maintenance requirements also means that light winds are often not well characterised.
- Uncertainties in mixing height: If the plume elevation reaches 80% or more of the mixing height, more interaction will occur, and it becomes increasingly important to properly characterise the depth of the mixed layer as well as the strength of the upper air inversion.
- Uncertainties in temperature: Ambient temperature affects plume buoyancy, so inaccuracies in the temperature data can result in potential errors in the predicted distance from the source of the plume impact, and magnitude of that impact.
- Uncertainties in stability estimates: Gaussian plume models use estimates of stability class, and 3D models use explicit vertical profiles of temperature and wind (which are used directly or indirectly to estimate stability class for Gaussian models). In either case, uncertainties in these parameters can cause either under-prediction or over-prediction of ground level concentrations. For example, if an error is made of one stability class, then the computed concentrations can be off by 50% or more.

The USEPA makes the following statement in its Modelling Guideline (US EPA, 2005) on the relative accuracy of models:

> "Models are more reliable for estimating longer time-averaged concentrations than for estimating short-term concentrations at specific locations; and the models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere within an area. For example, errors in highest estimated concentrations of $\pm$10 to 40% are found to be typical, i.e., certainly well within the often quoted factor-of-two accuracy that has long been recognised for these models. However, estimates of concentrations that occur at a specific time and site are poorly correlated with actually observed concentrations and are much less reliable."

This AQIA utilises the AERMOD dispersion model, incorporating meteorological output from TAPM. The meteorological dataset has been compiled using observations from a nearby automatic weather station for a five-year period.

6 Project Inputs

6.1 Scenarios

Worst-case, maximum emission, conditions that are expected to occur under normal operating conditions were modelled.

The modelled scenarios are:

- Existing operation – based on peak throughput with extraction from North Ridge Pit.
- Proposed operation – based on projected peak throughput with extraction of 270,000 tpa from North Ridge pit (processed by fixed processing plant in processing area) and 180,000 from Mt Bundarbo pit (processed by mobile processing plant in pit).

6.2 Project Emissions to Air

The basis of the emission rate estimation from the existing and proposed operations are summarised in Table 13 an Table 14. The resulting emission inventories are summarised in Table 15 and Table 16.

In the absence of RSC emission data, RCS emissions are conservatively assumed to be equal to the $PM_{2.5}$ emissions for all sources.

Table 13 Existing Operation

Parameter	Quantity	Units	Comment	Source
Summary				
Throughput	300,000	t/yr	Peak annual rate	Client
Extraction and Hauling				
Excavator(s) in North Ridge pit	300,000	t/yr	Conservatively assume excavation and loading are separate activities	Client
Loader(s) in North Ridge pit	300,000	t/yr		Client
Hauling from North ridge pit to processing	300,000	t/yr	10% silt; 69t ave. GMV	Client
Unloading from trucks to processing	300,000	t/yr	-	Client
Loader(s) to crusher	300,000	t/yr	-	Client
Loader(s) for dispatch	300,000	t/yr	-	Client
Wheel Generated Dust				
Hauling North Ridge pit to Processing return	12.3	VKT/h	10% silt; 69t ave. GMV	Client
Light vehicles on all haul routes	6.3	VKT/h	25 kph; 15 min per hour	Estimate/client
Processing				
Primary crushing	300,000	t/yr	Water sprays	Client
Secondary crushing	300,000	t/yr	Water sprays	Client
Tertiary crushing	300,000	t/yr	Water sprays	Client
Screening	300,000	t/yr	Water sprays	Client
Conveying	300,000	t/yr	Water sprays	Client
Other Activity				
Grader on all haul routes	5	km/yr	all haul routes	Estimate/client
Drilling for blasting	15	Holes/day	-	Client
Wind Erosion				
North Ridge pit	6.5	ha	50% active	Estimate/Client
Processing Area	5.0	ha	100% active	Client

VKT/h Vehicle kilometres travelled per hour

ave GMV Average of empty and laden to account for return trip

Table 14 Proposed Operation

Parameter	Quantity	Units	Comment	Source
Summary				
Throughput	450,000	t/yr	Peak annual rate	Client
Extraction and Hauling				
Excavator(s) in North Ridge pit	270,000	t/yr	Conservatively assume excavation and loading are separate activities	Client
Excavator(s) in Mt Bundarbo pit	180,000	t/yr		Client
Loader(s) in North Ridge pit	270,000	t/yr		Client
Loader(s) in Mt Bundarbo pit	180,000	t/yr		Client
Hauling from North ridge pit to processing	270,000	t/yr	10% silt; 69t ave. GMV	Client
Unloading from trucks to fixed processing	270,000	t/yr	-	Client
Unloading from trucks to mobile processing	180,000	t/yr	-	Client
Loader(s) to fixed crusher	270,000	t/yr	-	Client
Loader(s) to mobile crusher	180,000	t/yr	-	Client
Loader(s) for fixed dispatch	270,000	t/yr	-	Client
Loader(s) for Mt Bundarbo dispatch	180,000	t/yr	-	Client
Wheel Generated Dust				
Hauling North Ridge pit to Processing return	12.5	VKT/h	10% silt; 69t ave. GMV	Client
Hauling Mt Bundarbo mobile processing to fixed processing area for dispatch	9.2	VKT/h	10% silt; 69t ave. GMV	Client
Light vehicles on all haul routes	6.3	VKT/h	25 kph; 15 min per hour	Estimate/client
Processing				
Fixed Primary crushing	270,000	t/yr	Water sprays	Client
Fixed Secondary crushing	270,000	t/yr	Water sprays	Client
Fixed Tertiary crushing	270,000	t/yr	Water sprays	Client
Fixed Screening	270,000	t/yr	Water sprays	Client
Fixed Conveying	270,000	t/yr	Water sprays	Client
Mobile Primary crushing	180,000	t/yr	Water sprays	Client
Mobile Secondary crushing	180,000	t/yr	Water sprays	Client
Mobile Tertiary crushing	180,000	t/yr	Water sprays	Client
Mobile Screening	180,000	t/yr	Water sprays	Client
Mobile Conveying	180,000	t/yr	Water sprays	Client
Other Activity				
Grader on all haul routes	5	km/yr	all haul routes	Estimate/client
Drilling for blasting	15	Holes/day	-	Client
Wind Erosion				
North Ridge pit	6.5	ha	50% active	Estimate/Client

Parameter	Quantity	Units	Comment	Source
Mt Bundarbo pit	8.6	ha	50% active	Estimate/Client
Processing Area	5.0	ha	100% active	Client

VKT/h Vehicle kilometres travelled per hour

ave GMV Average of empty and laden to account for return trip

Table 15 Estimated Particulate Emissions: Existing Operation

Activity	Emission Factor before control					Control	%			Emission Rate (kg/hr)		
	TSP	PM_{10}	$PM_{2.5}$	Unit	Source	Assumption	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
Excavating/Loading/Unloading												
Excavator(s) in North Ridge pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.13	0.06	0.01
Loader(s) in North Ridge pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.13	0.06	0.01
Unloading from trucks to fixed processing	0.012	0.0043	0.0013	kg/t	NPI EETM	None	0	0	0	1.1	0.38	0.11
Loader(s) to crusher	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.17	0.08	0.02
Loader(s) for dispatch	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.08	0.04	0.01
Wheel Generated Dust												
Hauling North Ridge pit to Processing return	5.2	1.5	0.15	kg/VKT	NPI EETM	Level 2 watering	75	75	75	16	4.7	0.47
Light vehicles on all haul routes	0.68	0.21	0.02	kg/VKT	NPI EETM	Level 2 watering	75	75	75	1.1	0.33	0.03
Processing												
Primary crushing	0.0100	0.0040	0.0007	kg/t	NPI EETM	Water sprays[a]	0	0	0	1.2	0.46	0.085
Secondary crushing	0.0300	0.0120	0.0022	kg/t	NPI EETM	Water sprays[a]	0	0	0	3.5	1.4	0.26
Tertiary crushing	0.0300	0.0100	0.0019	kg/t	NPI EETM	Water sprays[a]	0	0	0	3.5	1.2	0.21
Screening	0.0080	0.0060	0.0011	kg/t	NPI EETM	Water sprays[a]	0	0	0	0.92	0.69	0.13
Conveying	0.0050	0.0020	0.0004	kg/t	NPI EETM	Water sprays[a]	0	0	0	0.58	0.23	0.043
Other Activity												
Grader on all haul routes	0.19	0.08	0.01	kg/VKT	NPI EETM	None	0	0	0	0.95	0.42	0.03
Drilling for blasting	0.59	0.31	0.0177	kg/hole	NPI EETM	None	0	0	0	0.40	0.21	0.012
Wind Erosion												
North Ridge pit	0.40	0.20	0.03	kg/ha/h	NPI EETM	Pit retention	0	0	0	1.3	0.65	0.10
Processing area	0.40	0.20	0.03	kg/ha/h	NPI EETM	None	0	0	0	2.0	1.0	0.15

a High moisture content emission factors with no additional control from water sprays assumed.

Table 16 Estimated Particulate Emissions: Proposed Operation

Activity	Emission Factor before control					Control	%			Emission Rate (kg/hr)		
	TSP	PM_{10}	$PM_{2.5}$	Unit	Source	Assumption	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
Excavating/Loading/Unloading												
Excavator(s) in North Ridge pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.13	0.06	0.01
Excavator(s) in Mt Bundarbo pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.09	0.04	0.01
Loader(s) in North Ridge pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.13	0.06	0.01
Loader(s) in Mt Bundarbo pit	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.09	0.04	0.01
Unloading from trucks fixed processing	0.012	0.0043	0.0013	kg/t	NPI EETM	None	0	0	0	1.07	0.38	0.11
Unloading from trucks mobile processing	0.012	0.0043	0.0013	kg/t	NPI EETM	None	0	0	0	0.71	0.25	0.07
Loader(s) to fixed crusher	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.17	0.08	0.02
Loader(s) to mobile crusher	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.11	0.05	0.01
Loader(s) for fixed for dispatch	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.14	0.06	0.01
Loader(s) for mobile for dispatch	0.0015	0.00069	0.00015	kg/t	NPI EETM	None	0	0	0	0.08	0.04	0.01
Wheel Generated Dust												
Hauling North Ridge pit to Processing return	5.2	1.5	0.15	kg/VKT	NPI EETM	Level 2 watering	75	75	75	16	4.8	0.48
Hauling dispatch from mobile processing (unsealed) to fixed processing	3.7	1.1	0.11	kg/VKT	NPI EETM	Level 2 watering	75	75	75	13	3.9	0.39
Light vehicles on all haul routes	0.68	0.21	0.02	kg/VKT	NPI EETM	Level 2 watering	75	75	75	1.1	0.33	0.03
Processing												
Fixed Primary crushing	0.0100	0.0040	0.0007	kg/t	NPI EETM	Water sprays [a]	0	0	0	1.2	0.47	0.087
Fixed Secondary crushing	0.0300	0.0120	0.0022	kg/t	NPI EETM	Water sprays [a]	0	0	0	3.5	1.4	0.26
Fixed Tertiary crushing	0.0300	0.0100	0.0019	kg/t	NPI EETM	Water sprays [a]	0	0	0	3.5	1.2	0.22
Fixed Screening	0.0080	0.0060	0.0011	kg/t	NPI EETM	Water sprays [a]	0	0	0	0.94	0.70	0.13
Fixed Conveying	0.0050	0.0020	0.0004	kg/t	NPI EETM	Water sprays [a]	0	0	0	0.59	0.23	0.043

Activity	Emission Factor before control					Control	%			Emission Rate (kg/hr)		
	TSP	PM_{10}	$PM_{2.5}$	Unit	Source	Assumption	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
Mobile Primary crushing	0.0100	0.0040	0.0007	kg/t	NPI EETM	Water sprays [a]	0	0	0	0.78	0.31	0.058
Mobile Secondary crushing	0.0300	0.0120	0.0022	kg/t	NPI EETM	Water sprays [a]	0	0	0	2.3	0.94	0.17
Mobile Tertiary crushing	0.0300	0.0100	0.0019	kg/t	NPI EETM	Water sprays [a]	0	0	0	2.3	0.78	0.14
Mobile Screening	0.0080	0.0060	0.0011	kg/t	NPI EETM	Water sprays [a]	0	0	0	0.63	0.47	0.087
Mobile Conveying	0.0050	0.0020	0.0004	kg/t	NPI EETM	Water sprays [a]	0	0	0	0.39	0.16	0.029
Other Activity												
Grader on all haul routes	0.19	0.08	0.01	kg/VKT	NPI EETM	None	0	0	0	0.95	0.42	0.03
Drilling for blasting North Ridge	0.59	0.31	0.0177	kg/hole	NPI EETM	None	0	0	0	0.40	0.21	0.012
Drilling for blasting Mt Bundarbo	0.59	0.31	0.0177	kg/hole	NPI EETM	None	0	0	0	0.40	0.21	0.012
Wind Erosion												
North Ridge pit	0.40	0.20	0.03	kg/ha/h	NPI EETM	None	0	0	0	1.3	0.65	0.10
Mt Bundarbo pit	0.40	0.20	0.03	kg/ha/h	NPI EETM	None	0	0	0	1.7	0.86	0.13
Processing area	0.40	0.20	0.03	kg/ha/h	NPI EETM	None	0	0	0	2.0	1.0	0.15

a High moisture content emission factors with no additional control from water sprays assumed.

7 Assessment of Impacts

The sections below present a summary of the air quality impacts predicted by the modelling at the sensitive receptors identified in Section 4.2. Isopleth plots showing a comparison of the incremental impact predicted due to the existing and proposed emissions (i.e. excluding background levels) for each pollutant are presented in Appendix C. These plots do not represent the dispersion pattern for any individual time period, but rather illustrate the maximum concentration that was predicted to occur at each model calculation point given the range of meteorological conditions occurring over the 2017 modelling period.

7.1 Existing Operations

7.1.1 PM_{10}

Maximum 24-Hour Average PM_{10} Concentrations

To assess the maximum cumulative 24-hour average PM_{10} concentrations at each of the identified sensitive receptors, a contemporaneous analysis was performed, as required by the Approved Methods when the background concentration dataset contains exceedances of the criterion. At each receptor, each individual incremental 24-hour average prediction was added to the corresponding day's background concentration measured by the Wagga Wagga AQMS, to calculate the cumulative 24-hour average PM_{10} impacts.

Table 17 presents a summary of the predicted maximum incremental and cumulative concentration at the sensitive receptors and indicates that the predicted exceedances of the criterion are dominated by the high background events when the assessment criterion is already exceeded, and the incremental impact of the Project on those days is negligible. Analysis of the data indicates that no additional exceedances result from the quarry operations at any of the receptors with the exception of R6 for which there are four.

Table 17 Summary of Maximum 24-Hour Average PM_{10} Concentrations: Existing Operations

Receptor ID	Maximum 24-Hour Average PM_{10} Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	172	0.37	172
R2	172	0.21	172
R3	172	0.42	172
R4	172	0.12	172
R5	172	0.23	172
R6	172	0.83	172
Criterion			50

Concentrations reported to two significant figures.

In accordance with the Approved Methods, a contemporaneous analysis of the maximum predicted concentrations at this worst impacted receptor, R6, was performed and is presented in Table 18. The highest predicted incremental concentration was equal to 54% of the criterion.

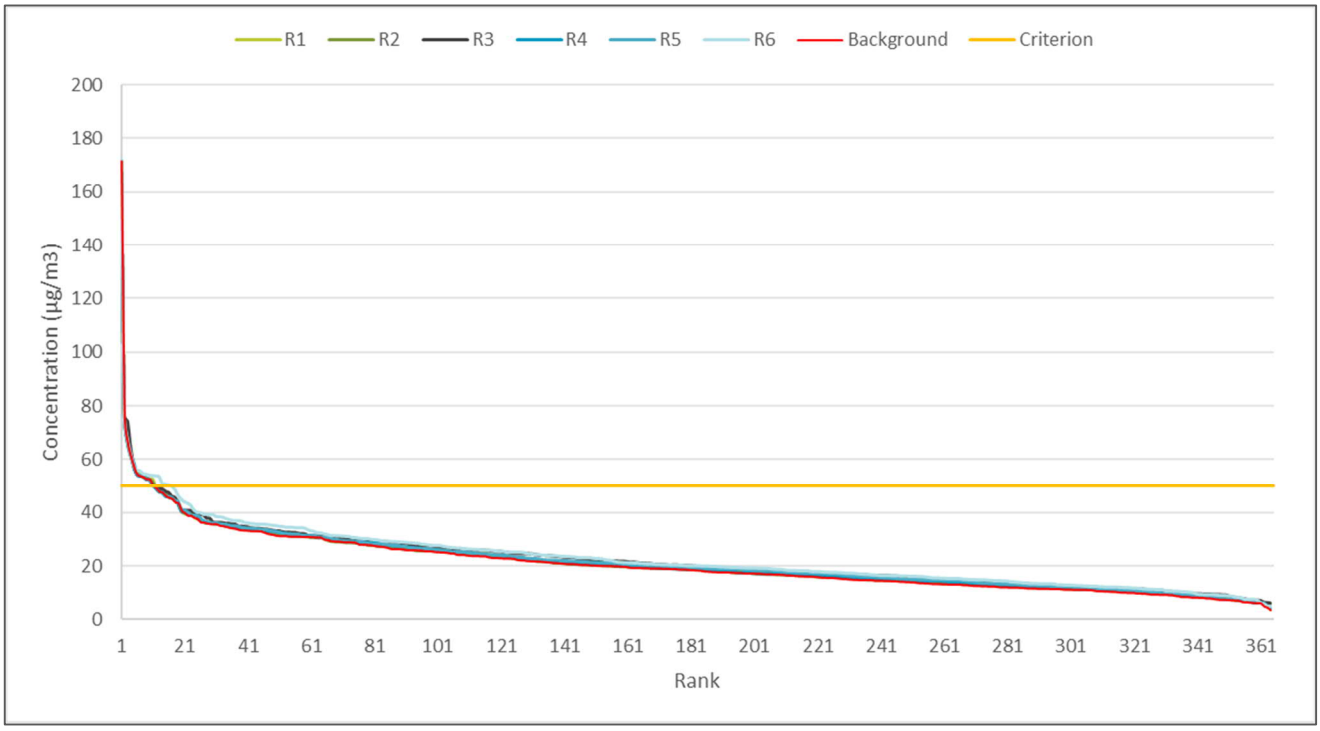
Table 18 Summary of 24-hour Average PM_{10} Contemporaneous Analysis – Receptor R6: Existing Operations

Date	PM_{10} 24-Hour Average (µg/m³)			Date	PM_{10} 24-Hour Average (µg/m³)		
	Highest Background	Project Increment	Total		Background	Highest Project Increment	Total
01-04-2017	172	0.49	172	03-06-2017	28	28	56
18-01-2017	75	0.41	76	18-06-2017	18	24	42
30-03-2017	66	2.2	68	11-06-2017	21	18	38
20-12-2017	61	0.21	61	31-08-2017	39 [a]	16	54
31-01-2017	57	1.4	59	13-06-2017	21	14	35
19-04-2017	54	0.019	54	17-06-2017	22	14	36
14-01-2017	54	0.11	54	19-06-2017	17	14	31
01-09-2017	53	0.67	54	08-06-2017	13	13	26
15-12-2017	53	0.29	53	22-08-2017	11.0	13	24
13-03-2017	53	0.019	53	25-08-2017	7.2	12	20

Concentrations reported to two significant figures.
a No data for this date – concentration equal to the average of the 24-hour periods preceding and following this date.

Figure 14 presents a plot of the predicted 24-hour cumulative PM_{10} impacts at the sensitive receptors and background concentrations in descending order and illustrates no exceedances over and above those caused by the elevated background concentrations, of which there are eleven, for all but receptor R6.

Figure 13 Predicted 24-Hour PM_{10} Cumulative Concentrations at Sensitive Receptors: Existing Operations



Annual Average PM_{10} Concentrations

Table 19 presents the incremental and cumulative annual average PM_{10} concentrations predicted at each of the identified receptors and indicates that the cumulative annual average PM_{10} concentrations at all receptors are below the criterion.

Table 19 Predicted Incremental and Cumulative Annual Average PM_{10} Concentrations: Existing Operations

Receptor ID	Annual Average PM_{10} Concentrations ($\mu g/m^3$)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	21	0.64	21
R2	21	0.54	21
R3	21	1.8	23
R4	21	0.75	22
R5	21	1.0	22
R6	21	2.2	23
Criterion			25

Concentrations reported to two significant figures.

7.1.2 $PM_{2.5}$

Maximum 24-Hour Average $PM_{2.5}$ Concentrations

To assess the maximum cumulative 24-hour average $PM_{2.5}$ concentrations at each of the identified sensitive receptors, a contemporaneous analysis was performed, as required by the Approved Methods when the background concentration dataset contains exceedances of the criterion. At each receptor, each individual incremental 24-hour average prediction was added to the corresponding day's background concentration measured by the Wagga Wagga AQMS, to calculate the cumulative 24-hour average $PM_{2.5}$ impacts.

Table 20 presents a summary of the predicted incremental and cumulative impacts at the sensitive receptors and indicates that the predicted exceedances of the criterion are dominated by the high background events when the assessment criterion is already exceeded, and the predicted incremental impact of the Project on those days is negligible. Analysis of the data indicates that no additional exceedances result from the quarry operations at any of the receptors.

Table 20 Summary of Maximum 24-Hour Average $PM_{2.5}$ Concentrations: Existing Operations

Receptor ID	Maximum 24-Hour Average $PM_{2.5}$ Concentrations (µg/m³)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	32	0.0021	32
R2	32	0.0017	32
R3	32	0.0046	32
R4	32	0.0018	32
R5	32	0.0015	32
R6	32	0.43	33
Criterion			25

Concentrations reported to two significant figures.

In accordance with the Approved Methods, a contemporaneous analysis of the maximum predicted concentrations at the worst impacted receptor, R6, was performed and is presented in Table 21. The highest predicted incremental concentration was equal to 14% of the criterion.

Table 21 Summary of 24 hours Average $PM_{2.5}$ Contemporaneous Analysis – Receptor R3: Existing Operations

Date	$PM_{2.5}$ 24-Hour Average (µg/m³)			Date	$PM_{2.5}$ 24-Hour Average (µg/m³)		
	Highest Background	Project Increment	Total		Background	Highest Project Increment	Total
17-05-2017	32	0.43	33	03-06-2017	21	3.5	25
13-05-2017	28	0.37	29	18-06-2017	14	3.3	17
12-05-2017	28	0.40	28	11-06-2017	20	2.1	22
04-06-2017	27	1.0	28	31-08-2017	8.0	1.8	9.7
13-06-2017	25	1.6	27	13-06-2017	25	1.6	27
14-05-2017	24	0.20	25	22-08-2017	4.0	1.6	5.6
12-06-2017	24	0.58	24	19-06-2017	13	1.6	15
18-05-2017	22	0.33	22	17-06-2017	14	1.5	16
03-06-2017	21	3.5	25	01-06-2017	3.7	1.3	5.0
05-05-2017	20	0.19	20	08-06-2017	9.7	1.3	11

Concentrations reported to two significant figures.

Annual Average $PM_{2.5}$ Concentrations

Table 22 presents the incremental and cumulative annual average $PM_{2.5}$ concentrations predicted at each of the identified receptors and indicates that the cumulative annual average $PM_{2.5}$ concentrations at all receptors exceed the annual average criterion, primarily due to the background concentration that is already above the criterion.

Table 22 Predicted Incremental and Cumulative Annual Average PM_{10} Concentrations: Existing Operations

Receptor ID	Annual Average $PM_{2.5}$ Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	8.1	0.071	8.2
R2	8.1	0.060	8.2
R3	8.1	0.18	8.3
R4	8.1	0.076	8.2
R5	8.1	0.10	8.2
R6	8.1	0.24	8.4
Criterion			8.0

Concentrations reported to two significant figures.

Annual Average RCS Concentrations

Table 23 presents the incremental and cumulative annual average RCS concentrations predicted at each of the identified receptors and indicates that the criterion is met at all receptors.

Table 23 Predicted Incremental and Cumulative Annual Average RCS Concentrations: Existing Operations

Receptor ID	Annual Average RCS Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	0.3	0.071	0.37
R2	0.3	0.060	0.36
R3	0.3	0.18	0.48
R4	0.3	0.076	0.38
R5	0.3	0.10	0.40
R6	0.3	0.24	0.54
Criterion			3

Concentrations reported to two significant figures.

7.1.3 Particles as TSP

Annual Average TSP Concentrations

Table 24 presents the incremental and cumulative annual average TSP concentrations predicted at each of the identified receptors.

Table 24 Predicted Incremental and Cumulative Annual Average TSP Concentrations: Existing Operations

Receptor ID	Annual Average TSP Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	42	0.46	42
R2	42	0.37	42
R3	42	0.43	42
R4	42	0.11	42
R5	42	0.19	42
R6	42	0.58	42
Criterion			90

Concentrations reported to two significant figures.

Table 24 indicate that the predicted cumulative concentrations at both receptors are below the annual average TSP criterion of 90 µg/m^3.

7.1.4 Dust Deposition

Table 25 shows the annual average dust deposition rates predicted at each of the identified receptors and indicates that the predicted incremental and cumulative annual average dust deposition rates at both receptors are well below the criterion of 2 g/m^2/month (incremental increase in dust deposition) and below 4 g/m^2/month (cumulative dust deposition). The incremental impacts predicted due to the estimated emissions from the Project are very low, and represent a negligible contribution to the total cumulative concentrations.

Table 25 Predicted Annual Average Dust Deposition Rates: Existing Operations

Receptor ID	Annual Average Dust Deposition Rate (g/m^2/month)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	2.0	0.068	2.1
R2	2.0	0.051	2.1
R3	2.0	0.050	2.0
R4	2.0	0.011	2.0
R5	2.0	0.016	2.0
R6	2.0	0.057	2.1
Criterion			4

Deposition rates reported to two significant figures.

7.2 Proposed Operations

7.2.1 PM_{10}

Maximum 24-Hour Average PM_{10} Concentrations

Table 26 presents a summary of the predicted maximum incremental and cumulative concentration at the sensitive receptors and indicates that the predicted exceedances of the criterion are dominated by the high background events when the assessment criterion is already exceeded, and the incremental impact of the Project on those days is negligible. Analysis of the data indicates that no additional exceedances result from the quarry operations at any of the receptors with the exception of R6 for which there are two.

Table 26 Summary of Maximum 24-Hour Average PM_{10} Concentrations: Proposed Operations

Receptor ID	Maximum 24-Hour Average PM_{10} Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	172	0.68	172
R2	172	0.40	172
R3	172	0.46	172
R4	172	0.16	172
R5	172	0.73	172
R6	172	0.079	172
Criterion			50

Concentrations reported to two significant figures.

In accordance with the Approved Methods, a contemporaneous analysis of the maximum predicted concentrations at this worst impacted receptor, R6, was performed and is presented in Table 28. The highest predicted incremental concentration was equal to 28% of the criterion.

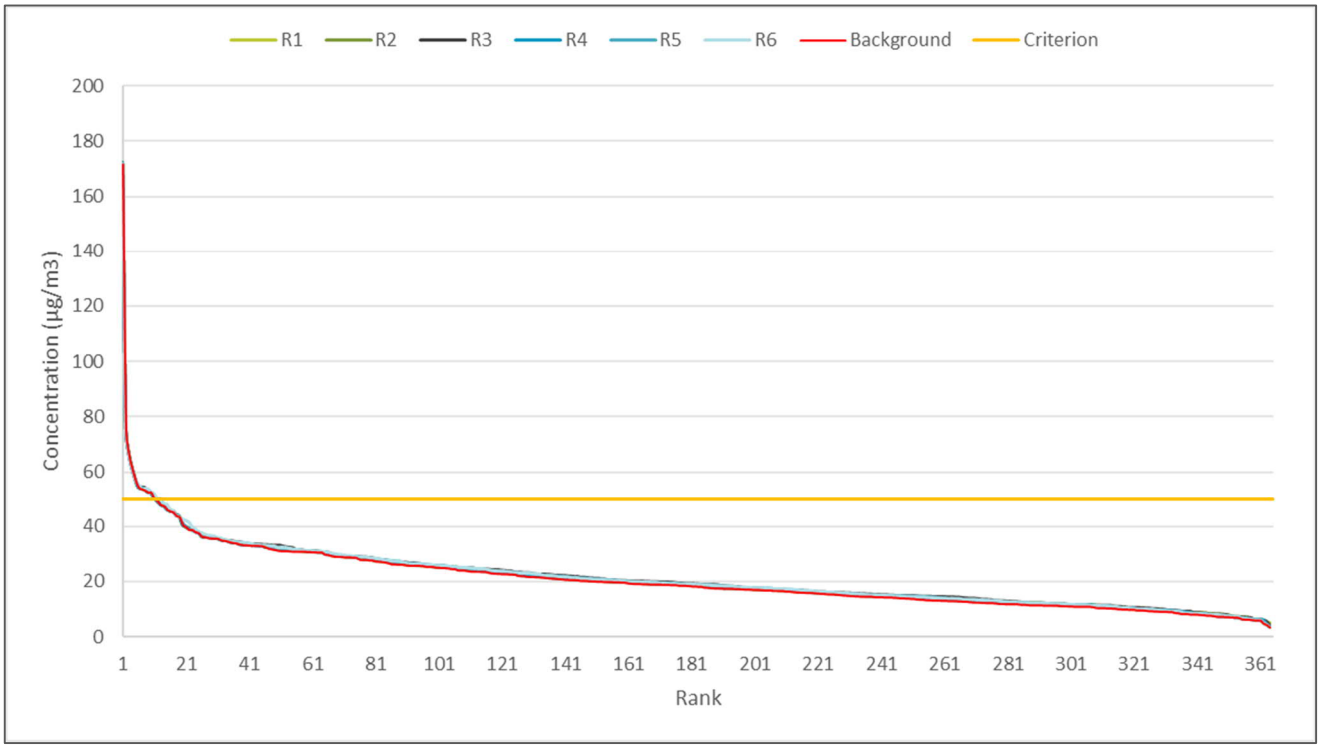
Table 27 Summary of 24-hour Average PM_{10} Contemporaneous Analysis – Receptor R6: Proposed Operations

Date	PM_{10} 24-Hour Average (µg/m³)			Date	PM_{10} 24-Hour Average (µg/m³)		
	Highest Background	Project Increment	Total		Background	Highest Project Increment	Total
01-04-2017	172	0.079	172	03-06-2017	28	14	41
18-01-2017	75	0.0061	75	18-06-2017	18	9.1	27
30-03-2017	66	0.047	66	22-08-2017	11	8.7	20
20-12-2017	61	0.063	61	19-06-2017	17	8.4	26
31-01-2017	57	0.013	57	11-06-2017	21	7.0	28
19-04-2017	54	1.0	56	07-06-2017	12	5.0	17
14-01-2017	54	0.0094	54	13-06-2017	21	4.7	26
01-09-2017	53	0.51	54	12-07-2017	11	4.7	16
15-12-2017	53	0.13	53	22-05-2017	15	4.4	19
13-03-2017	53	1.3	54	19-05-2017	25	4.3	30

Concentrations reported to two significant figures.

Figure 14 presents a plot of the predicted 24-hour cumulative PM_{10} impacts at the sensitive receptors and background concentrations in descending order and illustrates no exceedances over and above those caused by the elevated background concentrations, of which there are eleven, for all but receptor R6.

Figure 14 Predicted 24-Hour PM_{10} Cumulative Concentrations at Sensitive Receptors: Proposed Operations



Annual Average PM_{10} Concentrations

Table 28 presents the incremental and cumulative annual average PM_{10} concentrations predicted at each of the identified receptors and indicates that the cumulative annual average PM_{10} concentrations at all receptors are below the criterion.

Table 28 Predicted Incremental and Cumulative Annual Average PM_{10} Concentrations: Proposed Operations

Receptor ID	Annual Average PM_{10} Concentrations ($\mu g/m^3$)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	21	0.44	21
R2	21	0.37	21
R3	21	0.85	22
R4	21	0.31	21
R5	21	0.49	21
R6	21	0.64	21
Criterion			25

7.2.2 $PM_{2.5}$

Maximum 24-Hour Average $PM_{2.5}$ Concentrations

Table 29 presents a summary of the predicted incremental and cumulative impacts at the sensitive receptors and indicates that the predicted exceedances of the criterion are dominated by the high background events when the assessment criterion is already exceeded, and the incremental impact of the Project on those days is negligible.

Table 29 Summary of Maximum 24-Hour Average $PM_{2.5}$ Concentrations: Proposed Operations

Receptor ID	Maximum 24-Hour Average $PM_{2.5}$ Concentrations ($\mu g/m^3$)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	32	0.0018	32
R2	32	0.0014	32
R3	32	0.0024	32
R4	32	0.0013	32
R5	32	0.0015	32
R6	32	0.45	33
Criterion			25

Concentrations reported to two significant figures.

Analysis of the data indicates that no additional exceedances result from the quarry operations at any of the receptors.

In accordance with the Approved Methods, a contemporaneous analysis of the maximum predicted concentrations at the worst impacted receptor, R6, was performed and is presented in Table 30. The highest predicted incremental concentration was equal to 9.6% of the criterion.

Table 30 Summary of 24 hours Average $PM_{2.5}$ Contemporaneous Analysis – Receptor R3: Proposed Operations

Date	$PM_{2.5}$ 24-Hour Average (µg/m³)			Date	$PM_{2.5}$ 24-Hour Average (µg/m³)		
	Highest Background	Project Increment	Total		Background	Highest Project Increment	Total
17-05-2017	32	0.45	33	03-06-2017	21	2.4	24
13-05-2017	28	0.21	28	22-08-2017	4.0	1.5	5.5
12-05-2017	28	0.41	28	19-06-2017	13	1.3	15
04-06-2017	27	0.29	27	18-06-2017	14	1.2	15
13-06-2017	25	0.65	26	11-06-2017	20	1.2	21
14-05-2017	24	0.037	25	22-05-2017	14	0.71	15
12-06-2017	24	0.033	24	12-07-2017	8	0.68	8.2
18-05-2017	22	0.20	22	19-05-2017	16	0.66	17
03-06-2017	21	2.4	24	13-06-2017	25	0.65	26
05-05-2017	20	0.25	21	01-06-2017	3.7	0.53	4.2

Concentrations reported to two significant figures.

Annual Average $PM_{2.5}$ Concentrations

Table 31 presents the incremental and cumulative annual average $PM_{2.5}$ concentrations predicted at each of the identified receptors and indicates that the cumulative annual average $PM_{2.5}$ concentrations at all receptors exceed the annual average criterion, primarily due to the background concentration that is already above the criterion.

Table 31 Predicted Incremental and Cumulative Annual Average PM_{10} Concentrations: Proposed Operations

Receptor ID	Annual Average $PM_{2.5}$ Concentrations (µg/m³)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	8.1	0.052	8.2
R2	8.1	0.045	8.2
R3	8.1	0.10	8.2
R4	8.1	0.038	8.2
R5	8.1	0.067	8.2
R6	8.1	0.093	8.2
Criterion			8.0

Concentrations reported to two significant figures.

Annual Average RCS Concentrations

Table 32 presents the incremental and cumulative annual average RCS concentrations predicted at each of the identified receptors and indicates that the criterion is met at all receptors.

Table 32 Predicted Incremental and Cumulative Annual Average RCS Concentrations: Proposed Operations

Receptor ID	Annual Average RCS Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	0.3	0.052	0.35
R2	0.3	0.045	0.35
R3	0.3	0.10	0.40
R4	0.3	0.038	0.34
R5	0.3	0.067	0.37
R6	0.3	0.093	0.39
Criterion			3

Concentrations reported to two significant figures.

7.2.3 Particles as TSP

Annual Average TSP Concentrations

Table 33 presents the incremental and cumulative annual average TSP concentrations predicted at each of the identified receptors and indicate that the predicted cumulative concentrations at both receptors are below the annual average TSP criterion of 90 µg/m^3.

Table 33 Predicted Incremental and Cumulative Annual Average TSP Concentrations: Proposed Operations

Receptor ID	Annual Average TSP Concentrations (µg/m^3)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	42	0.70	42
R2	42	0.55	42
R3	42	0.80	42
R4	42	0.26	42
R5	42	0.47	42
R6	42	0.66	42
Criterion			90

Concentrations reported to two significant figures.

7.2.4 Dust Deposition

Table 34 shows the annual average dust deposition rates predicted at each of the identified receptors and indicates that the predicted incremental and cumulative annual average dust deposition rates at both receptors are well below the criterion of 2 g/m^2/month (incremental increase in dust deposition) and below 4 g/m^2/month (cumulative dust deposition). The incremental impacts predicted due to the estimated emissions from the Project are very low, and represent a negligible contribution to the total cumulative concentrations.

Table 34 Predicted Annual Average Dust Deposition Rates: Existing Operations

Receptor ID	Annual Average Dust Deposition Rate ($g/m^2/month$)		
	Regional Background	Incremental Concentration	Cumulative Concentration
R1	2.0	0.11	2.1
R2	2.0	0.079	2.1
R3	2.0	0.10	2.1
R4	2.0	0.025	2.0
R5	2.0	0.038	2.0
R6	2.0	0.067	2.1
Criterion			4

Deposition rates reported to two significant figures.

8 Dust Mitigation Measures

The results of the dispersion modelling indicate compliance for long term (annual average) particulate averages and potential non-compliance of short term (24-hour average) criteria for PM_{10} and $PM_{2.5}$. The non-compliance of short-term averages was primarily due to the elevated background concentrations.

Nevertheless, in order to ensure that impacts on off-site air quality are minimised and within the scope permitted by the existing planning approval, mitigation measures for dust emissions are recommended as listed in Table 35

Table 35 Recommended Dust Mitigation Measures for the Project

Potential Pollution Source	Control Measures
Wind generated dust from exposed areas and stockpiles.	Wet suppression or chemical coating
	Covering all loads leaving the site
	The speed limit on unpaved surfaces is limited to 15km/hr
	High level watering (greater than 2L/m^2/hr) may be done on unpaved road surfaces. This can be achieved through the use of a water cart
	A wheel wash may be built at the end of the unpaved section of the haul road for vehicles leaving the unpaved road
Loading product to haul and road trucks.	Covering all loads leaving the site
Fixed materials handling activities: - Crushing and screening - Dumping of product to the primary crushing facility	Wet suppression (water sprays)
	Minimising dust-generating activities during times of high wind speeds
	Reduction of the intensity/rate of activities in response to excessive dust generation
Other quarrying activities: - Dumping of material to stockpiles by front end loaders and conveyors - Drilling and blasting of rock - Stripping of overburden	Wet suppression (water sprays)
	Minimising dust-generating activities during times of high wind speeds
	Relocation of offending plant and equipment to less sensitive on-site areas
	Reduction of the intensity/rate of activities in response to excessive dust generation

9 Conclusions

Dispersion modelling predicts that the off-site long-term particulate concentrations and annual average dust deposition rates would be below the respective NSW EPA criteria, except for 24-hour average PM_{10} and 24-hour average $PM_{2.5}$ concentrations when background concentrations were above than the criteria. Exceedances of the criteria were predicted for existing as well as proposed operations. One 24-hour average PM_{10} exceedance was predicted at a sensitive receptor in addition to those due to background concentrations for proposed operations. The incremental impact of the Project on these days is negligible.

Given that the modelling included a conservative approach to emission estimation (e.g. maximum throughput for all hours of operation), it is concluded that the proposed operations are likely to cause no, or minor additional exceedances of the 24-hour average PM_{10} criterion and no additional exceedances of the $PM_{2.5}$ criterion at the identified receptor locations.

Annual PM_{10}, $PM_{2.5}$, RCS, TSP, dust deposition and criteria are predicted to be met at all receptors.

Predicted increases in impacts over existing operations are summarised in Table 36.

Table 36 Maximum Increase in Air Quality Impacts at Sensitive Receptors due to Proposed Operations

Indicator	Averaging Period	Incremental	Cumulative
PM_{10}	24-hour	220% (R5)	0.29% (R5)
	Annual	-31% (R2)	-0.80% (R2)
$PM_{2.5}$	24-hour	6% (R6)	0.073% (R6)
	Annual	-25% (R2)	-0.19% (R2)
RCS	Annual	-25% (R2)	-4.3% (R2)
TSP	Annual	150% (R5)	150% (R5)
Dust deposition	Annual	120% (R5)	7.2% (R3)

Based on the results of this assessment, it is concluded that the air quality impacts do not represent a constraint to this Development application.

10 References

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APPENDIX A

Selection of Representative Meteorological Year

Selection of Representative Meteorological Year

Once emitted to atmosphere, emissions will:

- Rise according to the momentum and buoyancy of the emission at the discharge point relative to the prevailing atmospheric conditions;
- Be adverted from the source according to the strength and direction of the wind at the height which the plume has risen in the atmosphere;
- Be diluted due to mixing with the ambient air, according to the intensity of turbulence; and
- (Potentially) be chemically transformed and/or depleted by deposition processes.

Dispersion is the combined effect of these processes.

Dispersion modelling is used as a tool to simulate the air quality effects of specific emission sources, given the meteorology typical for a local area together with the expected emissions. Selection of a year when the meteorological data is atypical means that the resultant predictions may not appropriately represent the most likely air quality impacts. Therefore, in dispersion modelling, one of the key considerations is the representative nature of the meteorological data used.

The year of meteorological data used for the dispersion modelling was selected by reviewing the most recent five years of historical surface observations at Young Airport AWS (2015 to 2019 inclusive) to determine the year that is most representative of average conditions. Wind direction, wind speed and ambient temperature were compared to averages for the region to determine the most representative year.

Data collected from 2015 to 2019 are summarised in Figure A1 to Figure A3. Examination of the data indicates the following:

- Figure A1 indicates relatively similar wind roses for all years analysed.
- Figure A2 indicates that 2017 exhibits generally lower wind speeds than average.
- Figure A3 shows that 2017 exhibits generally lower temperatures than average.

Given the above considerations, the year 2017 was selected as a representative, and with respect to dispersion modelling, a conservative year of meteorology.

Figure A1 Frequency of Winds at Young Airport AWS for 2015 – 2019

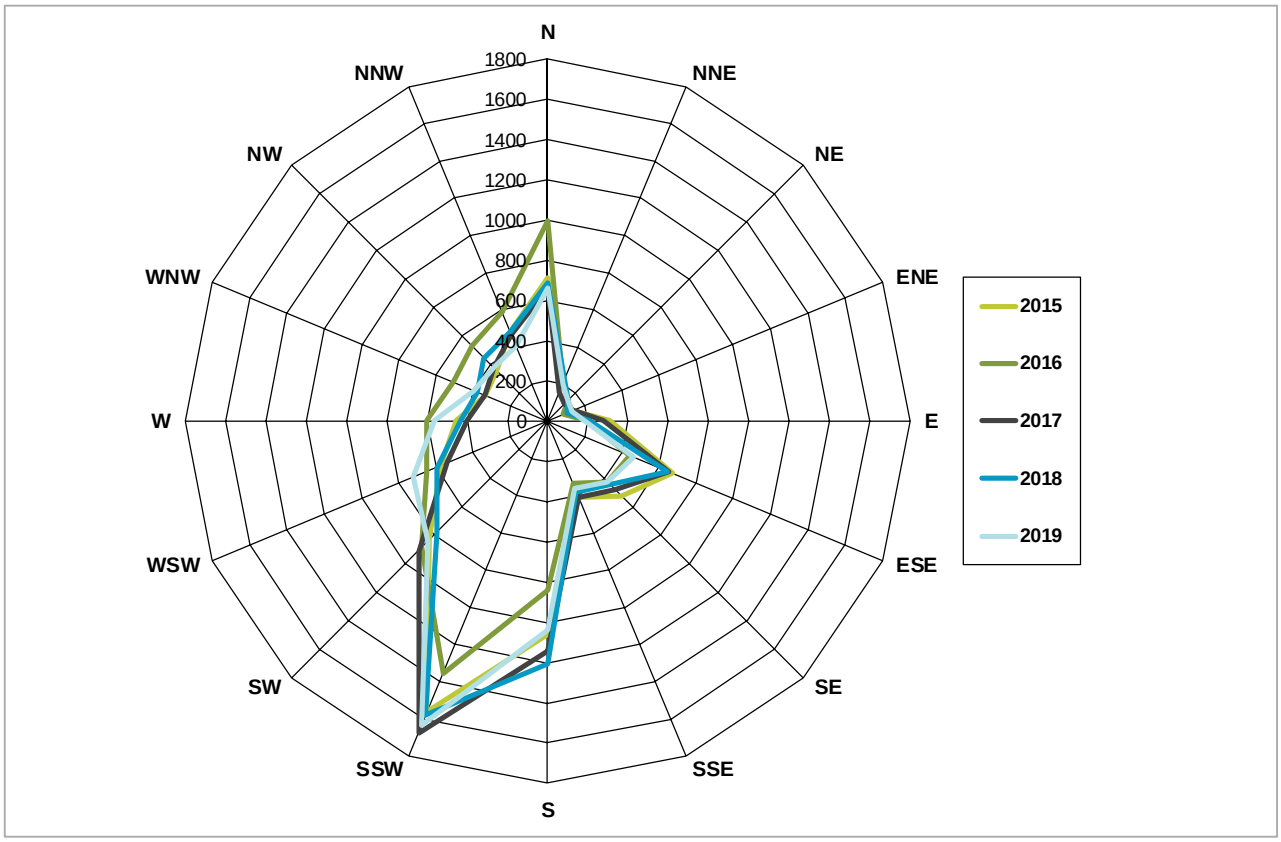


Figure A2 Monthly Average Wind Speed at Young Airport AWS for 2015 – 2019

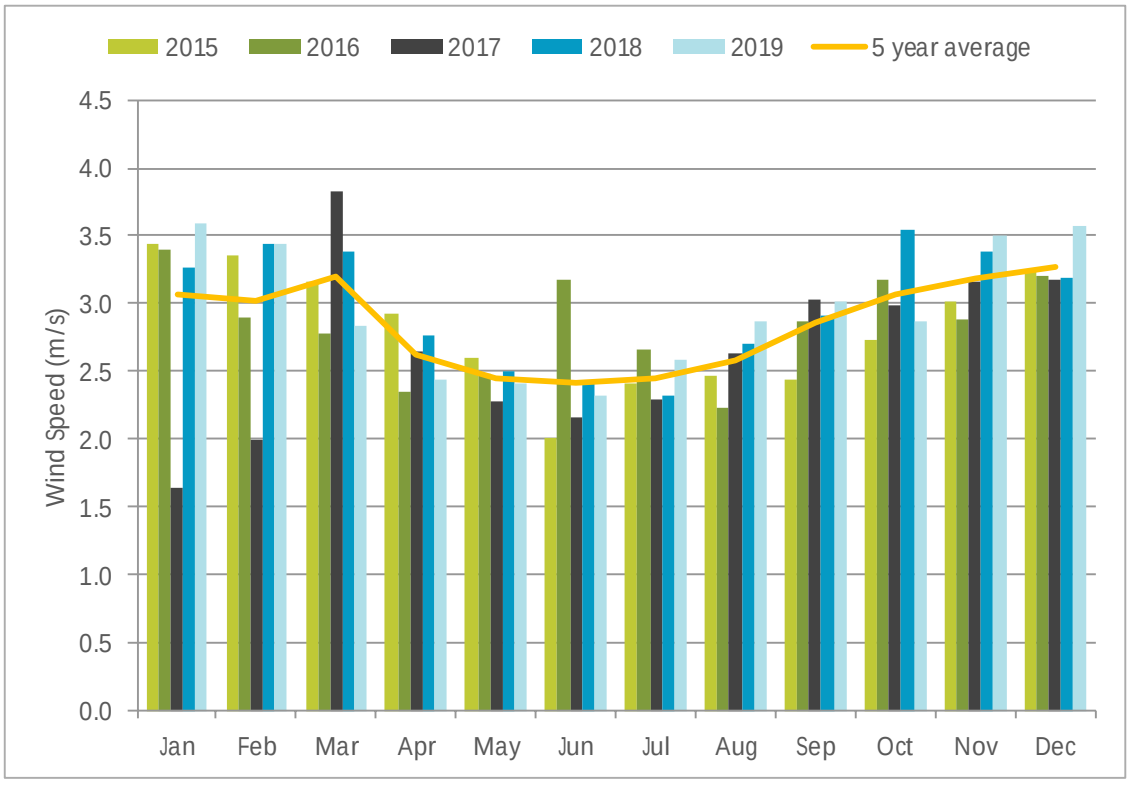
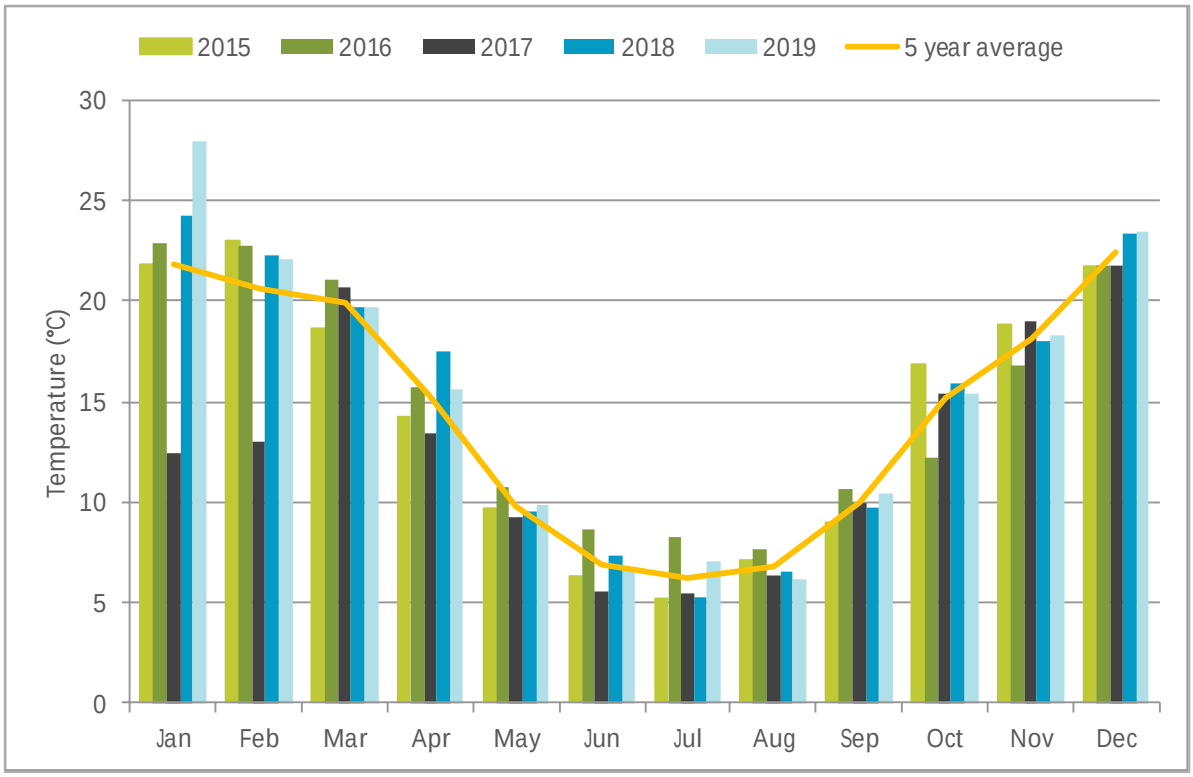


Figure A3 Monthly Average Temperature at Young Airport AWS for 2015 – 2019



APPENDIX B

Meteorological Modelling

TAPM Model Configuration

Prognostic models, such as The Air Pollution Model (TAPM), solve the equations of atmospheric dynamics to produce physically realistic three-dimensional meteorological fields, such as wind, temperature, humidity, surface fluxes and boundary-layer structure. They are the models used in weather forecasting and climate research, and as a basis for dispersion modelling. Data from local climate stations are optional and local flows arise through the dynamic forcing simulated by the computational model. Larger-scale fields (up to global scale) are required for their initialization and ongoing boundary updates.

TAPM (Version 4.0) was used to generate synthetic meteorological data sets, which were then processed in AERMET to create the surface and profile meteorology data sets used by AERMOD. TAPM is a model developed at Commonwealth Scientific and Industrial Research Organisation (CSIRO) Marine and Atmospheric Research which is widely used throughout Australia for this purpose and is recognised by state regulatory authorities.

TAPM was run for the 2017 with no observed data assimilation.

TAPM was initially configured with a nested model grid coverage designed to capture, broad scale synoptic flows, regional and broader scale sea breezes and land breezes, regional and broader wind channelling around terrain features and influence of land use.

The following TAPM setup was used:

- Outer grid resolution 30 km with nested grids of 10 km, 3 km and 1 km
- 41-by-41 horizontal grid points centred at the location of the Site
- 25 vertical levels
- Nine-second terrain height database
- TAPM default databases for land use and sea surface temperature

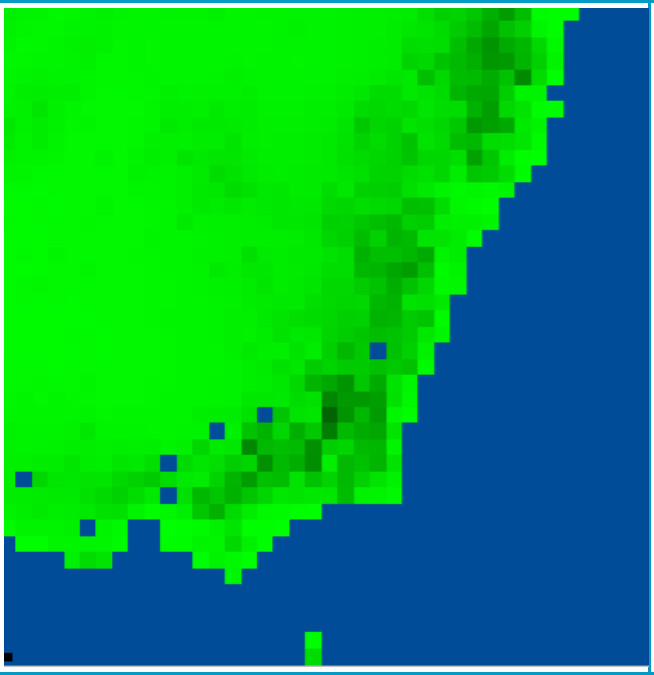
The parameters used for the model runs are provided in Table B1, and apply to the meteorological component of TAPM. The pollution dispersion components of TAPM have not been used. For all other input parameters default values were used. Graphical representations of the three grids are presented in Figure C1.

Table B1 TAPM Configuration Parameters

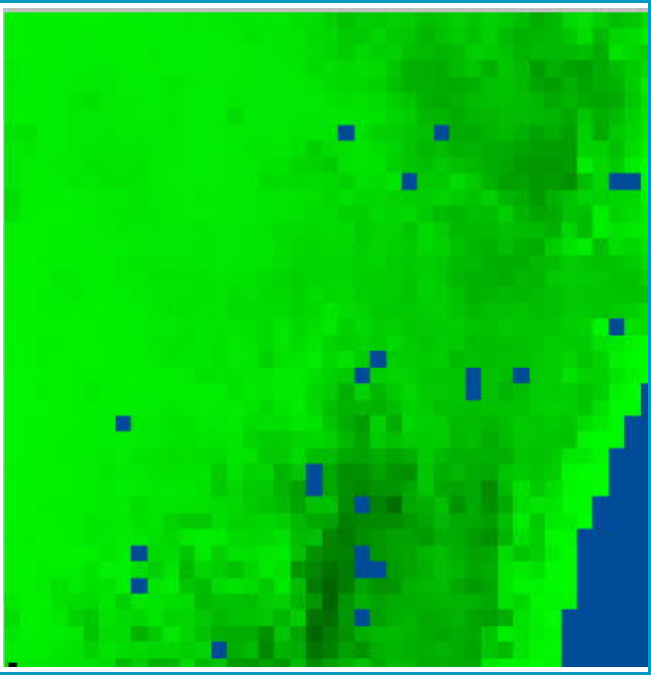
Parameter	Value
Start and end dates	31 December 2016 – 1 January 2018
Grid Centre (Lat/Long, WGS84)	34° 51.0'S, 148°25.0'E
Grid Centre (UTM Co-ordinates [m])	629798, 6142355
No. of grids	4
No. of horizontal grid points	41 x 41
Horizontal grid spacing	30 km, 10 km, 3 km, 1 km
No. of vertical levels	25 (up to 8000 m)
Monthly deep-soil moisture content (12 values)	0.15 m^3/m^3 (model default)
Topography	TAPM datasets
Vegetation and land use	TAPM datasets
Surface vegetation and precipitation processes	Included
Snow processes and non-hydrostatic processes	Excluded
Grid used for extracted profile	4 (1.0 km)
Location of extracted profile (UTM Co-ordinates [m])	629798, 6142355
Data assimilation	None

Figure C1 TAPM Grids

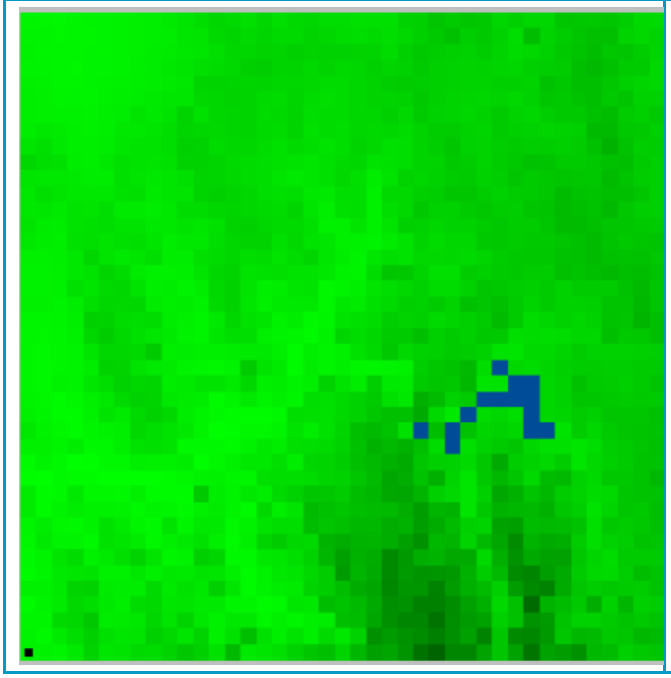
Grid 1: 30 km Resolution



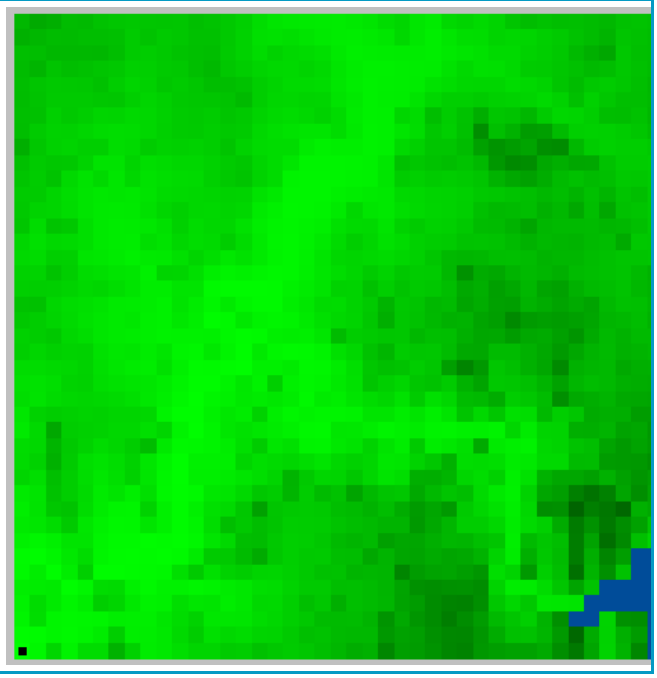
Grid 2: 10 km Resolution



Grid 3: 3 km Resolution



Grid 4: 1 km Resolution



TAPM Solution Summary

Wind Speed and Wind Direction

The 2017 annual, and seasonal wind roses for the TAPM model solution extracted at the Project location are presented in Figure B2.

The solutions indicate the following:

- Annually, winds from the east and northeastern quadrants are predominant with few winds from the south.
- All seasons are relatively similar to the annual distribution.
- Summer sees a more even distribution between winds from the east and northeast.

TAPM predicts an annual average wind speed of 4.0 m/s at the Project; 4.1 m/s during the day (0600-1800) and 3.8 during the night (1800-0600).

The diurnal variations in maximum and average wind speed predicted by TAPM at the Project during 2017 are illustrated in Figure B3. Wind speeds during the day are greater due to convective forcing. The frequency of wind speeds predicted by TAPM at the Project during 2017 are illustrated in Figure B4. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. In general, higher wind speeds promote dispersion and result in lower pollutant ground level concentrations.

Figure B2 TAPM Solution Annual and Seasonal Wind Roses at the Project (2017)

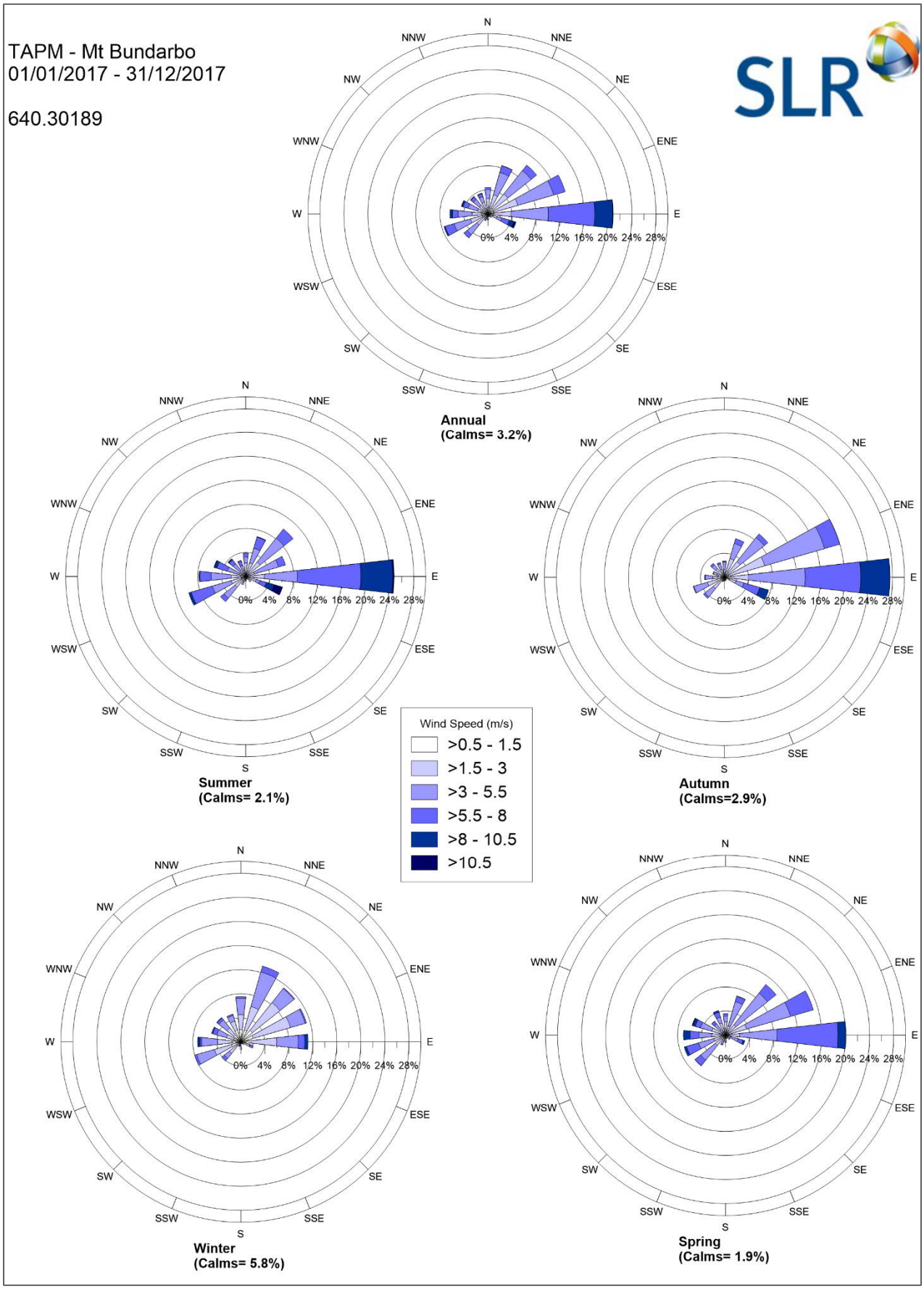


Figure B3 TAPM Predicted Diurnal Variation in Wind Speed for the Project Site (2017)

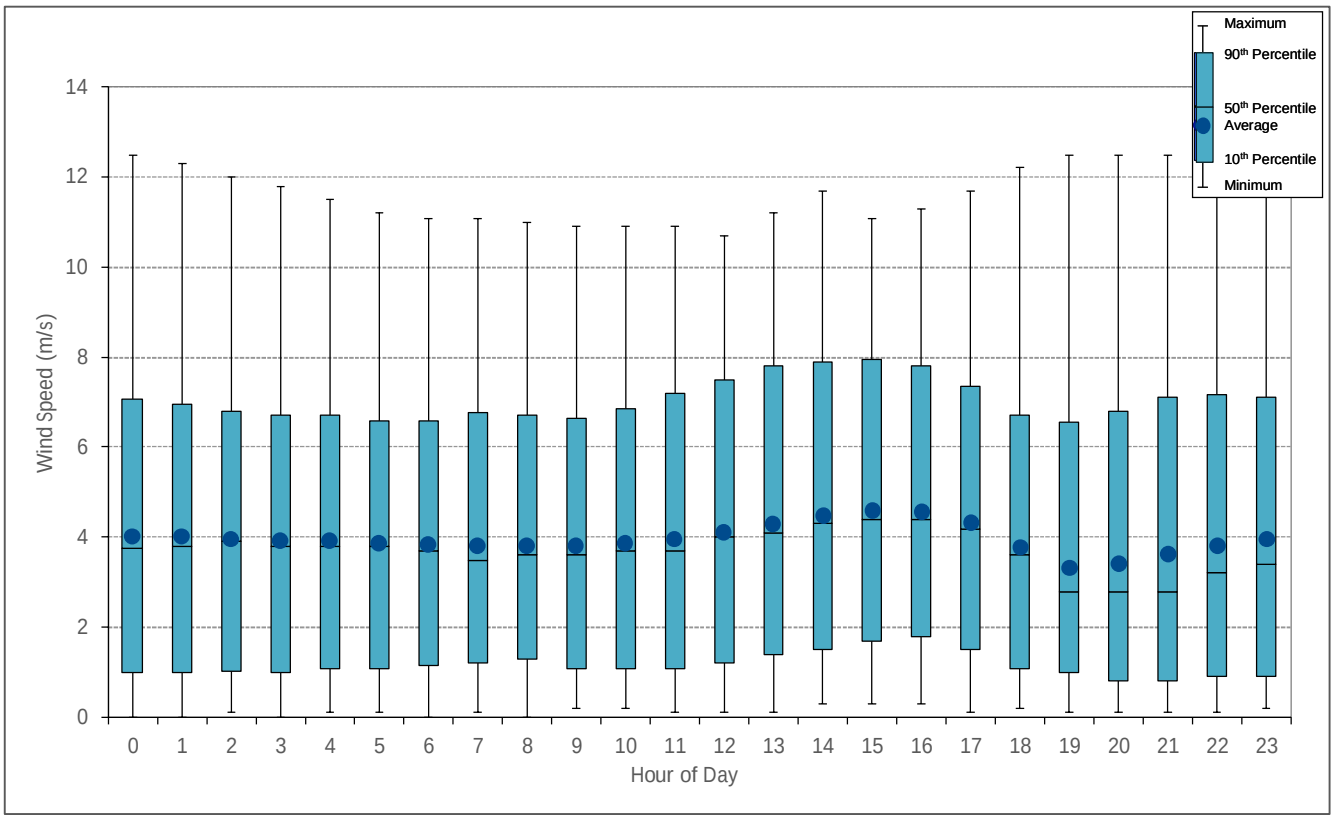
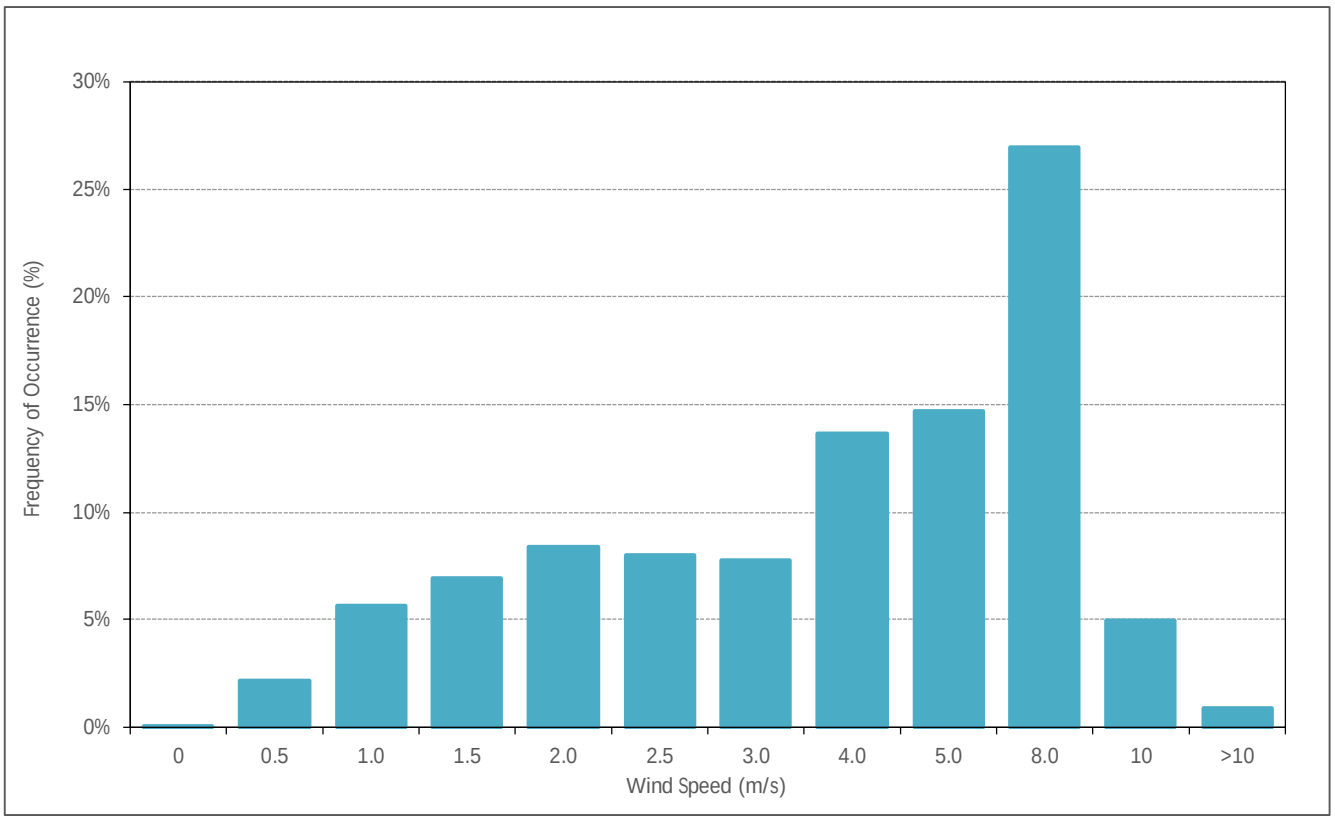


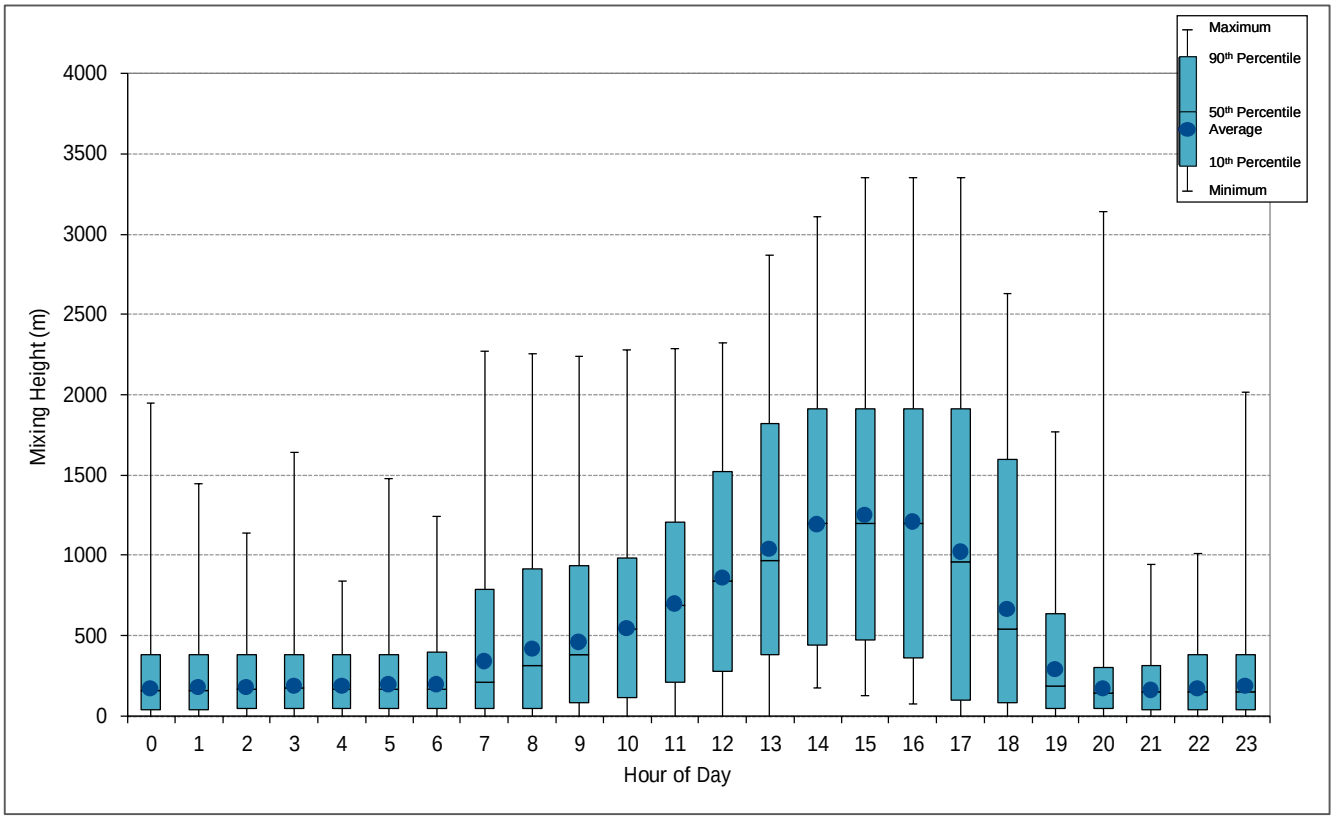
Figure B4 TAPM Predicted Wind Speed Frequency for the Project Site (2017)



Mixing Height

The TAPM data along with regional upper air data is input into AERMET to produce AERMOD ready meteorological files. The diurnal variations in maximum and average mixing heights predicted by AERMET at the Project are illustrated in Figure B5. An increase in the mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. The maximum average mixing heights occur in the early to mid-afternoon, then begin to decrease due to the dissipation of ground-based temperature inversions and the growth of the convective mixing layer.

Figure B5 AERMET Predicted Diurnal Variation in Mixing Height for the Project Site (2017)



APPENDIX C

Emission Formulas

Inventory Activity	Units	TSP Emission Factor	PM_{10} Emission Factor	$PM_{2.5}$ Emission Factor	Source	Valid ranges		
						Parameter	Min	Max
Overburden Activities								
Loading/unloading overburden to/from trucks/front end loader, excavator, or shovel	kg/t	$0.74 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$	$0.35 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$	$0.053 \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$	NPI EETM / AP42 13.2.4	M	0.25	4.8
Bulldozers/front end loaders on overburden i.e. dozers FEL pushing material around	kg/hr	$2.6 \times \frac{s^{1.2}}{M^{1.3}}$	$0.3375 \times \frac{s^{1.5}}{M^{1.4}}$	0.105 * TSP	NPI EETM / AP42 11.9 Table 11.9-2	s M	3.8 2.2	15.1 16.8
Graders	kg/t	$0.0034 \times S^{2.5}$	$0.0034 \times S^{2.0}$		NPI EETM / AP42 11.9 Table 11.9-4	N/A		
Hauling								
Hauling on unsealed roads	kg/VKT	$\left(\frac{0.4536}{1.6093}\right) \times 4.9 * \left(\frac{s}{12}\right)^{0.7} \times \left(\frac{W \times 1.1023}{3}\right)^{0.4}$	$\left(\frac{0.4536}{1.6093}\right) \times 1.5 * \left(\frac{s}{12}\right)^{0.9} \times \left(\frac{W \times 1.1023}{3}\right)^{0.4}$	$\left(\frac{0.4536}{1.6093}\right) \times 0.15 * \left(\frac{s}{12}\right)^{0.9} \times \left(\frac{W \times 1.1023}{3}\right)^{0.4}$	AP42 13.2.2	s W	1.8 1.8	25.2 260
Hauling on sealed roads	kg/VKT	$(k(sL)^{0.91} \times (W * 1.1023)^{1.02})/1000$			AP42 13.2.1	sL = silt loading	Varies by industry see Table 13.2.1-3	
		k = 3.23	k = 0.62	k = 0.15				
Wind Erosion								
Wind erosion	kg/ha/h	0.4	0.2	0.03 * TSP (AP42-13-2-5 Industrial wind erosion states a emission factor multiplier for $PM_{2.5}$ of 0.075*TSP)	NPI EETM	N/A		
Drilling and Blasting								

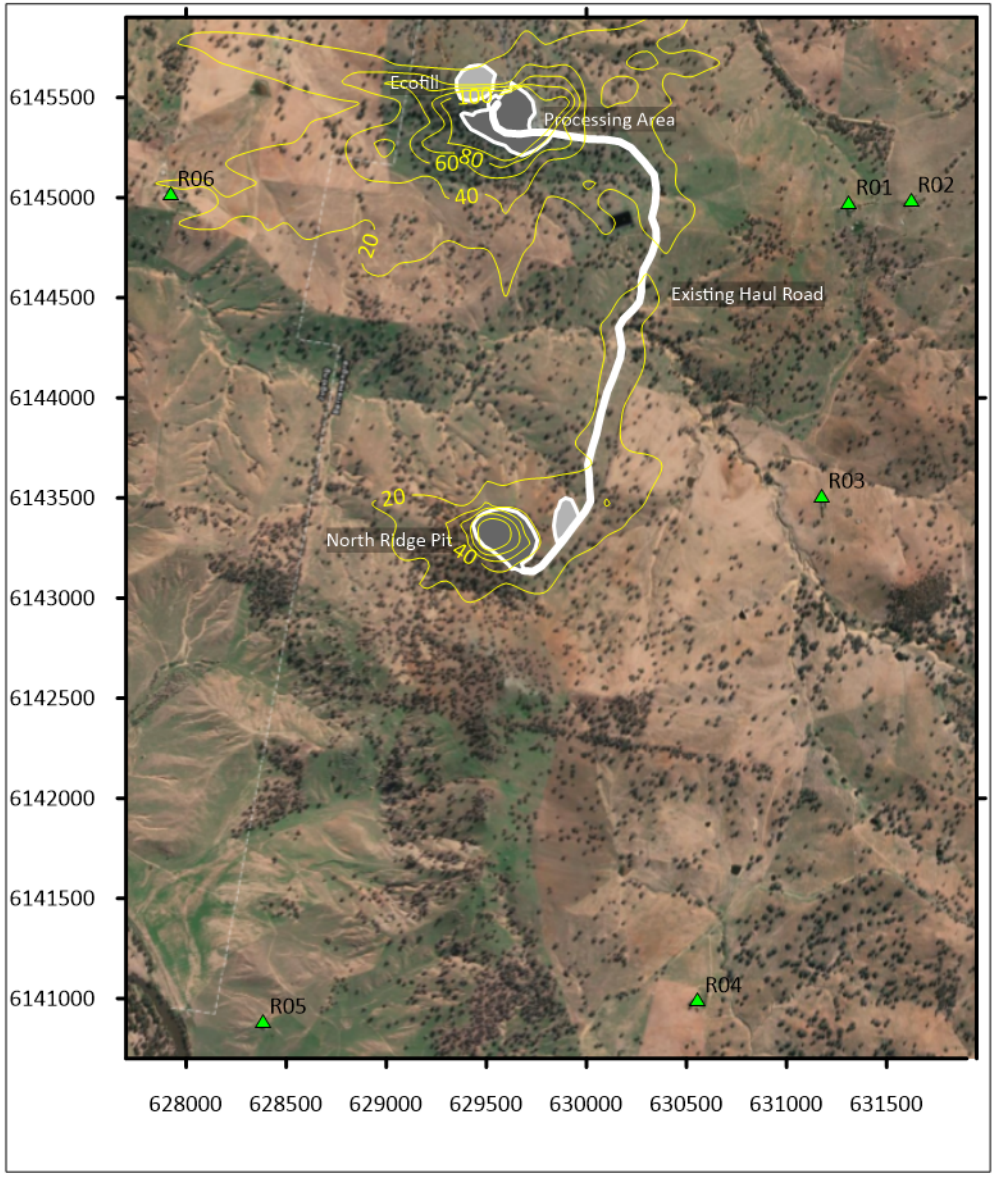
Inventory Activity	Units	TSP Emission Factor	PM_{10} Emission Factor	$PM_{2.5}$ Emission Factor	Source	Valid ranges		
						Parameter	Min	Max
Drilling	kg/hole	0.59	0.52 * TSP (PM_{10} ratio assumed same as blasting AP42 11.9.7 Table 11.9-2)	0.03 * TSP ($PM_{2.5}$ ratio assumed same as blasting AP42 11.9.7 Table 11.9-2)	NPI EETM / AP42 11.9 Table 11.9-4	N/A		
Blasting	kg/blast	$0.00022 \times A^{1.5}$	0.52 * TSP	0.03 * TSP	NPI EETM / AP42 11.9 Table 11.9-2	A		
Crushing – Low Moisture Content								
Primary Crushing	kg/t	0.2	0.02	0.0037	NPI EETM	AP42 11-19-2 Curshed stone processing table 11.19..2-1 PM_{10} x 0.00005 / 0.00027 (using the ratio of controlled tertiary crushing $PM_{2.5}$ and controlled tertiary crushing PM_{10} emission factors for as a scaling factor) used for all crushing activities		
Secondary Crushing	kg/t	0.6	0.06	0.0111	NPI EETM			
Tertiary Crushing	kg/t	1.4	0.08	0.0148	NPI EETM			
Wet Grinding (Milling)	kg/t	0	0	0.0000	NPI EETM			
Dry Grinding with air conveying or classification	kg/t	14.4	13	2.41	NPI EETM			
Dry Grinding without air conveying or classification	kg/t	1.2	0.16	0.0296	NPI EETM			
Drying	kg/t	9.8	5.9	1.09	NPI EETM			
Handling, transferring, conveying	kg/t	0.06	0.03	0.0056	NPI EETM			
Screening	kg/t	0.08	0.06	0.0111	NPI EETM			

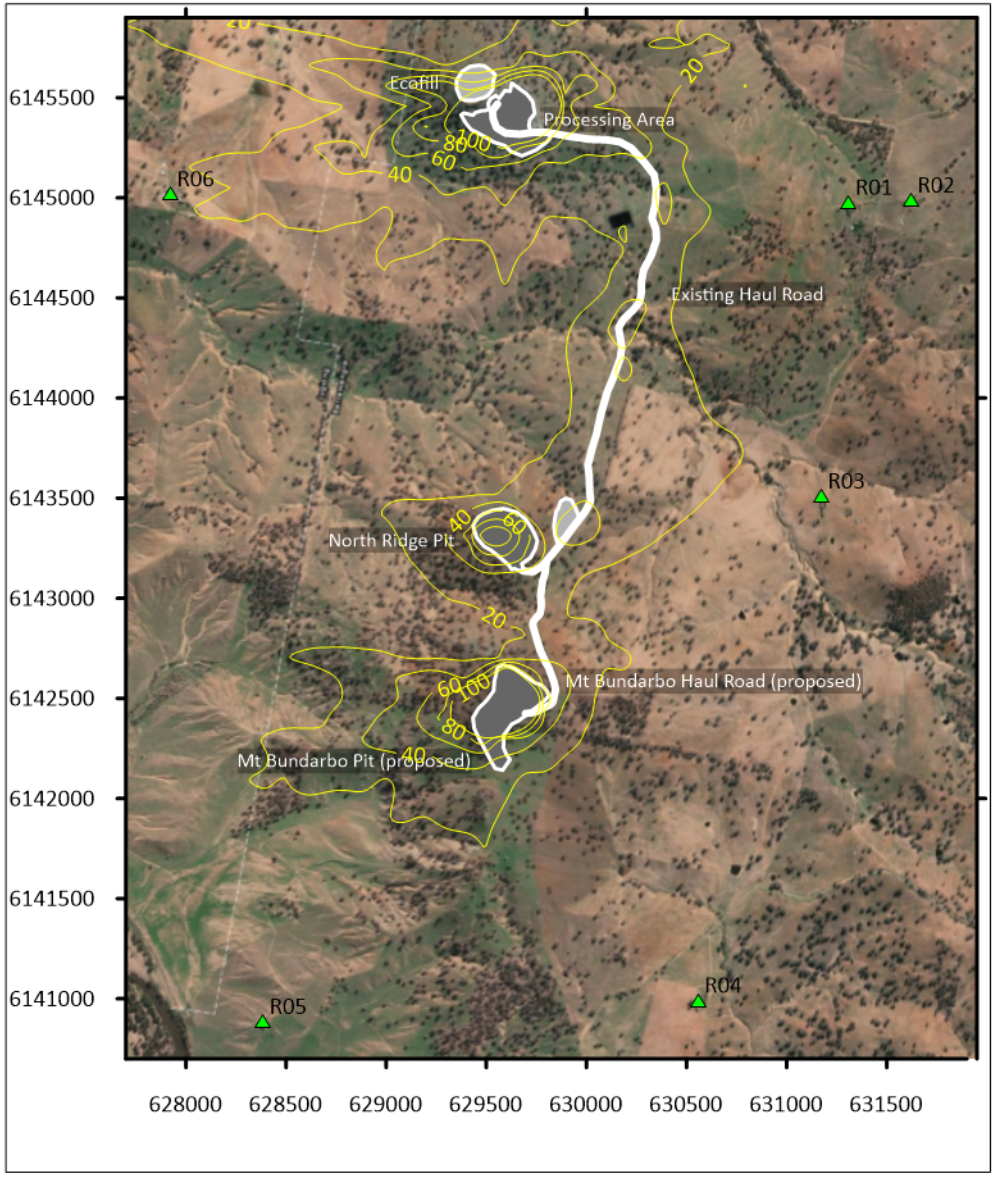
Where:

A = horizontal area (m2)
M = material moisture content (%)
s = material silt content (or surface silt content in unpaved roads) (%)
u = wind speed (m/s)
d = drop height (m)
W = mean vehicle weight (tonnes)
S = mean vehicle speed (km/h)
sL = silt loading (%)

APPENDIX D

Isopleth Plots





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GDA 1994 MGA Zone 55S

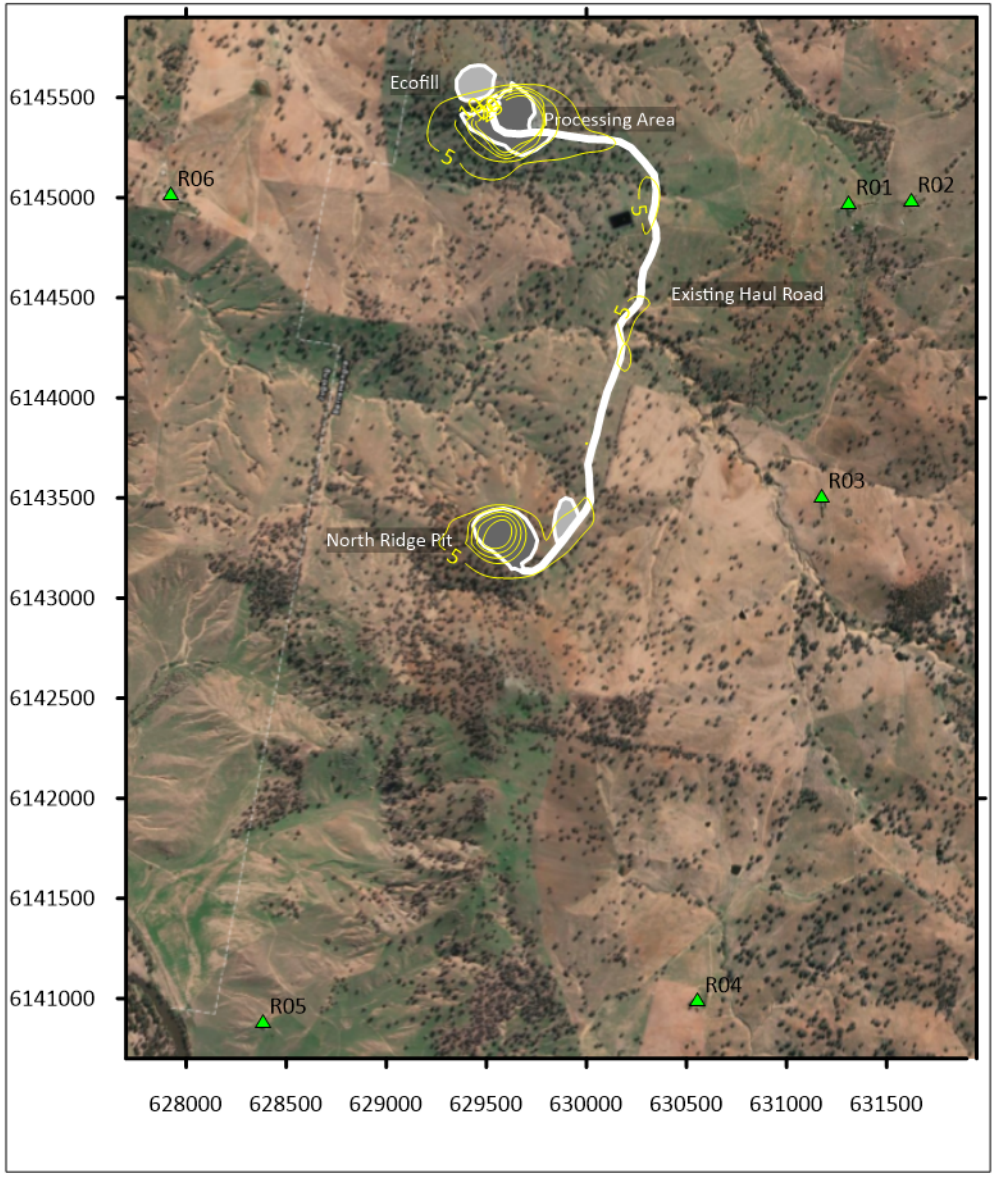
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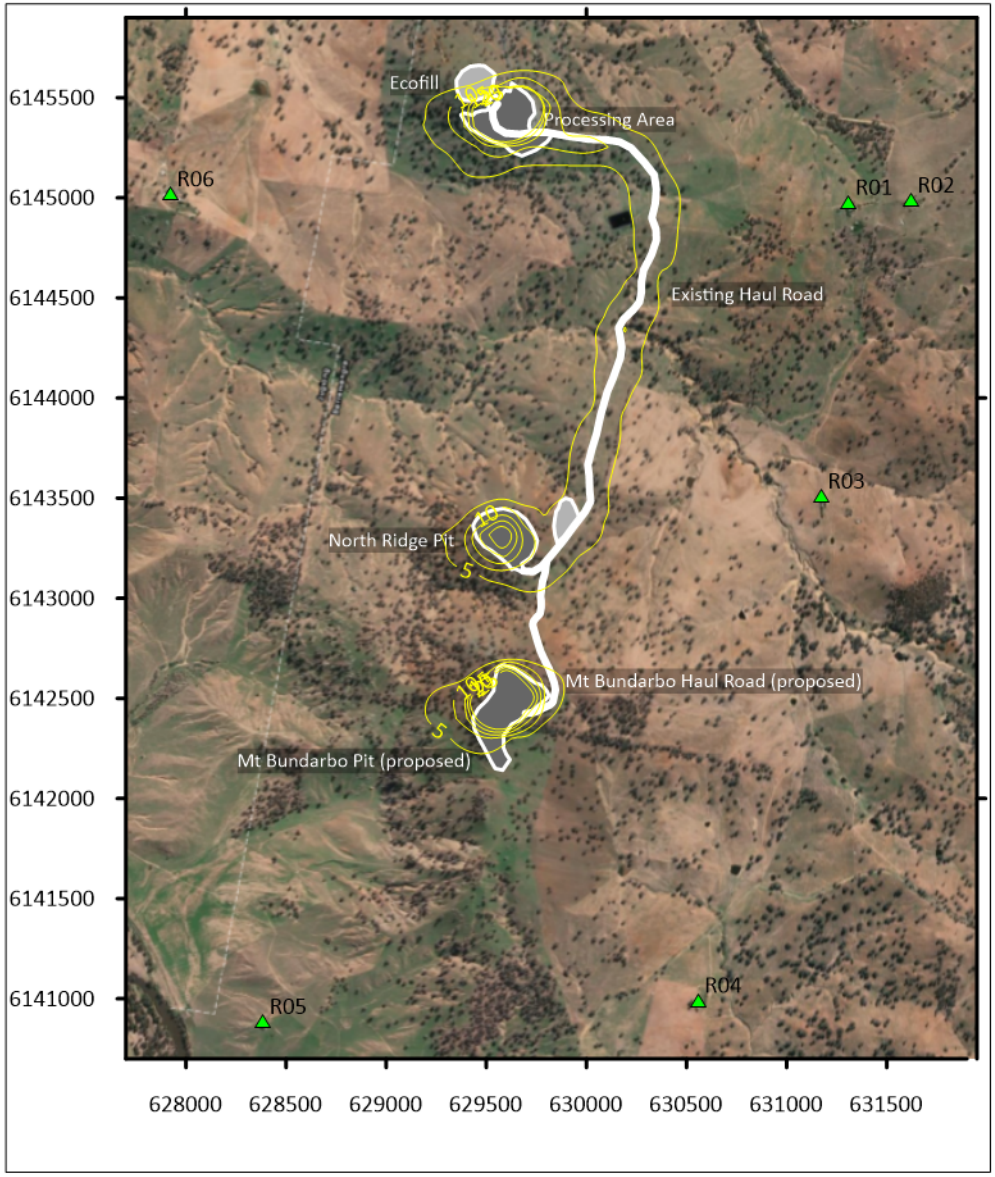
slrconsulting.com/au PH 61 7 3858 4800

Pollutant: PM_{10}
Averaging Period: 24-Hour
Scenario: Existing Operations
Units: $\mu g/m^3$

Pollutant: PM_{10}
Averaging Period: 24-Hour
Scenario: Proposed Operations
Units: $\mu g/m^3$

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610.30189





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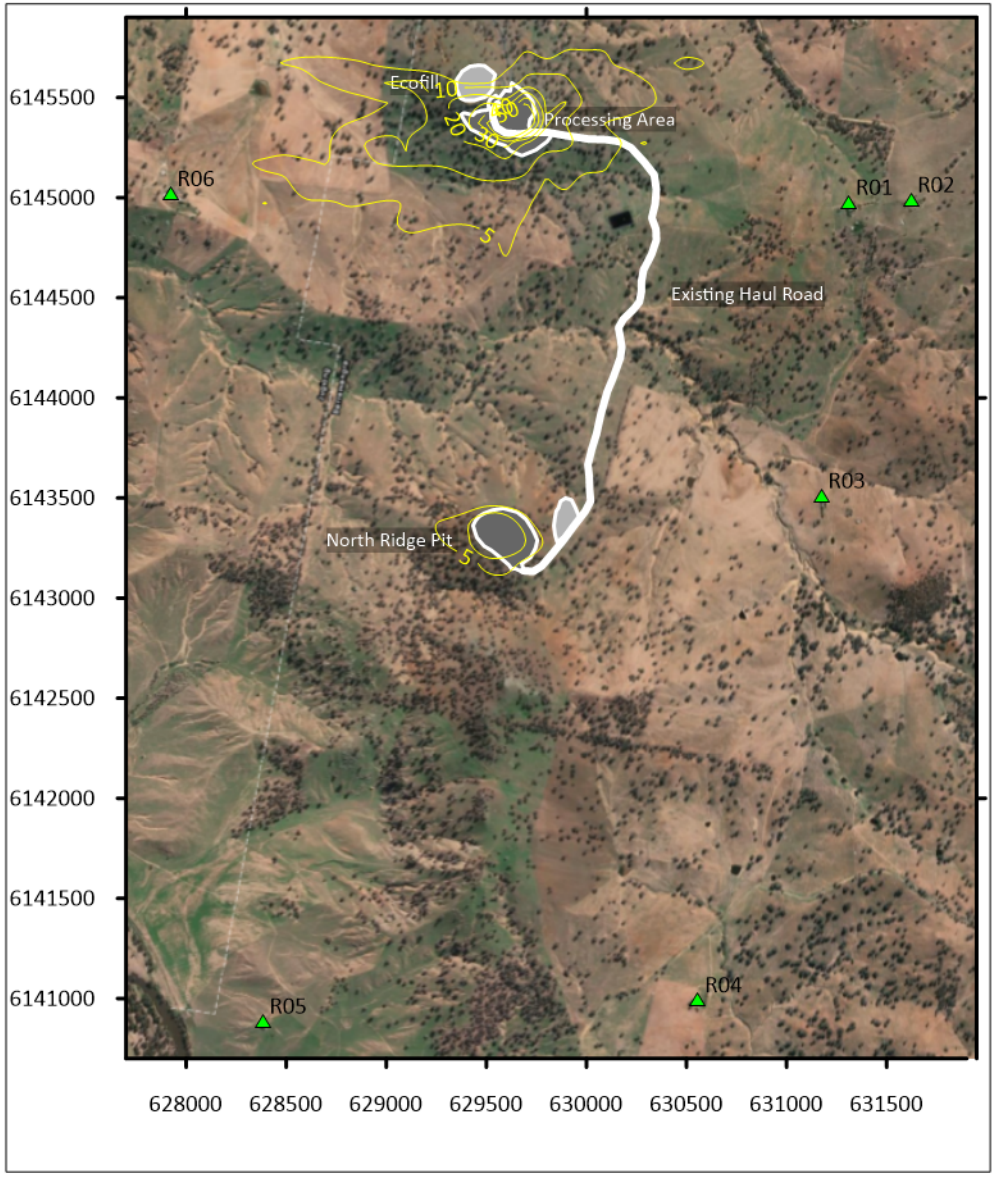
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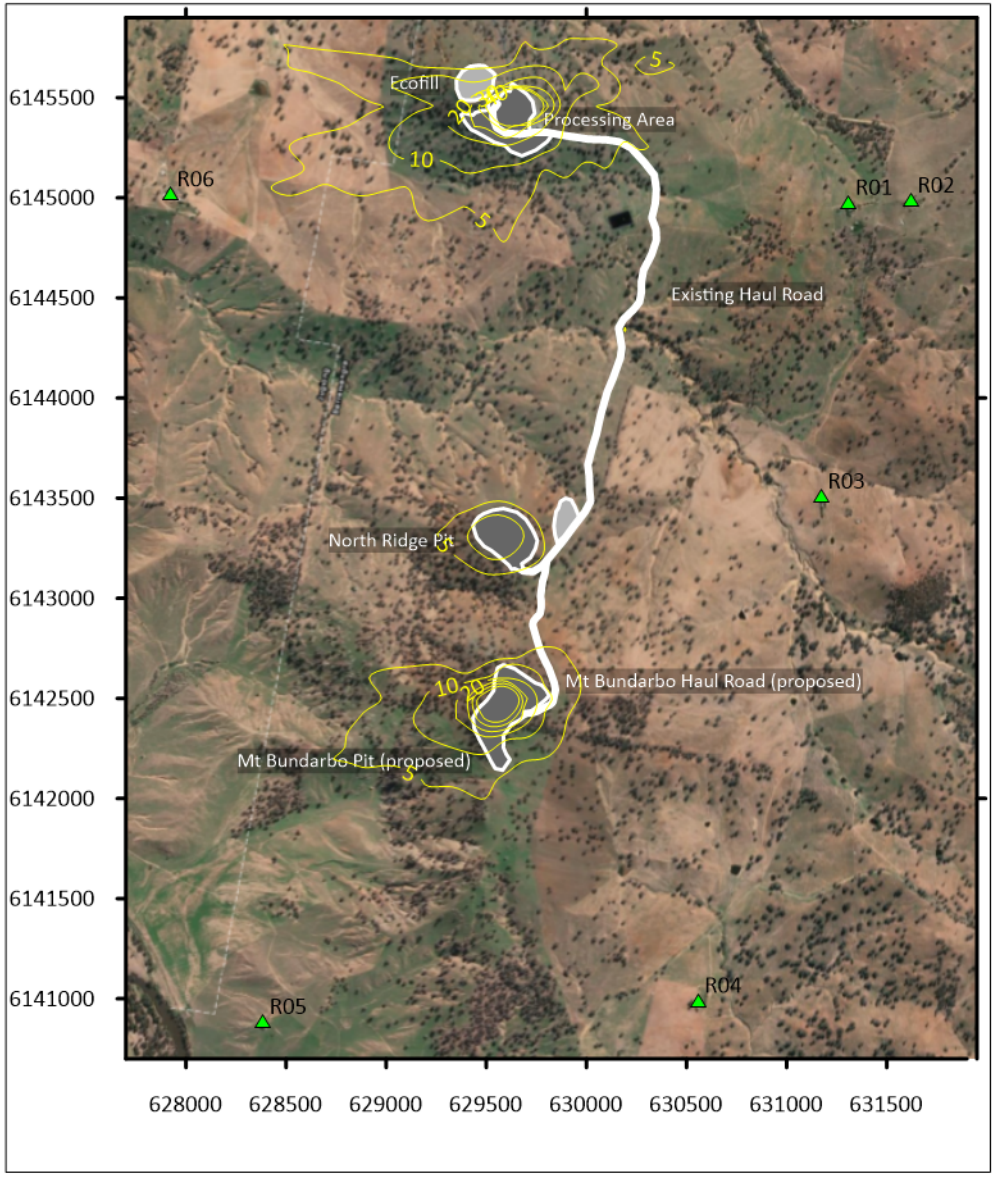
GDA 1994 MGA Zone 55S

Pollutant: PM_{10}
Averaging Period: Annual
Scenario: Existing Operations
Units: $\mu g/m^3$

Pollutant: PM_{10}
Averaging Period: Annual
Scenario: Proposed Operations
Units: $\mu g/m^3$

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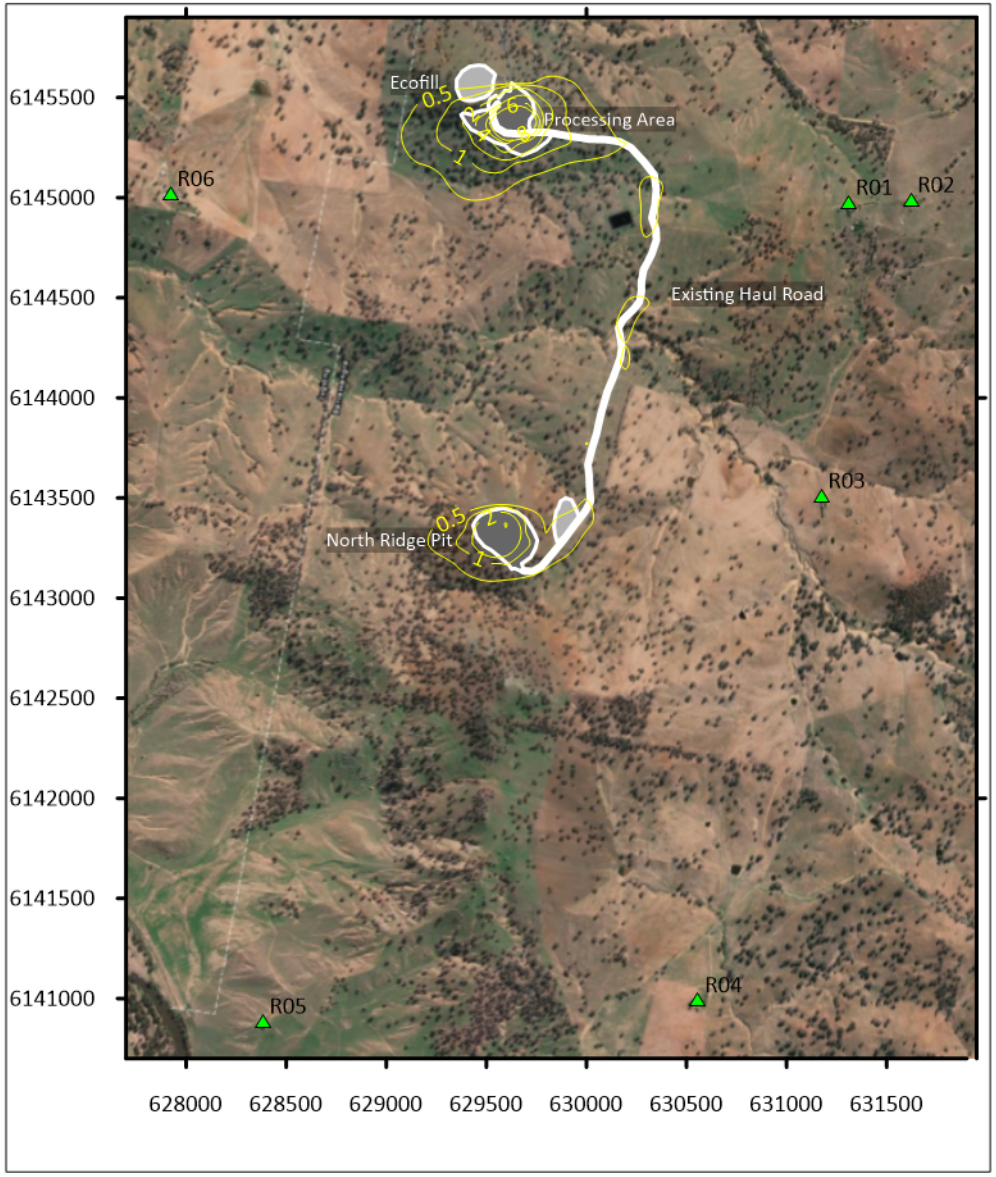
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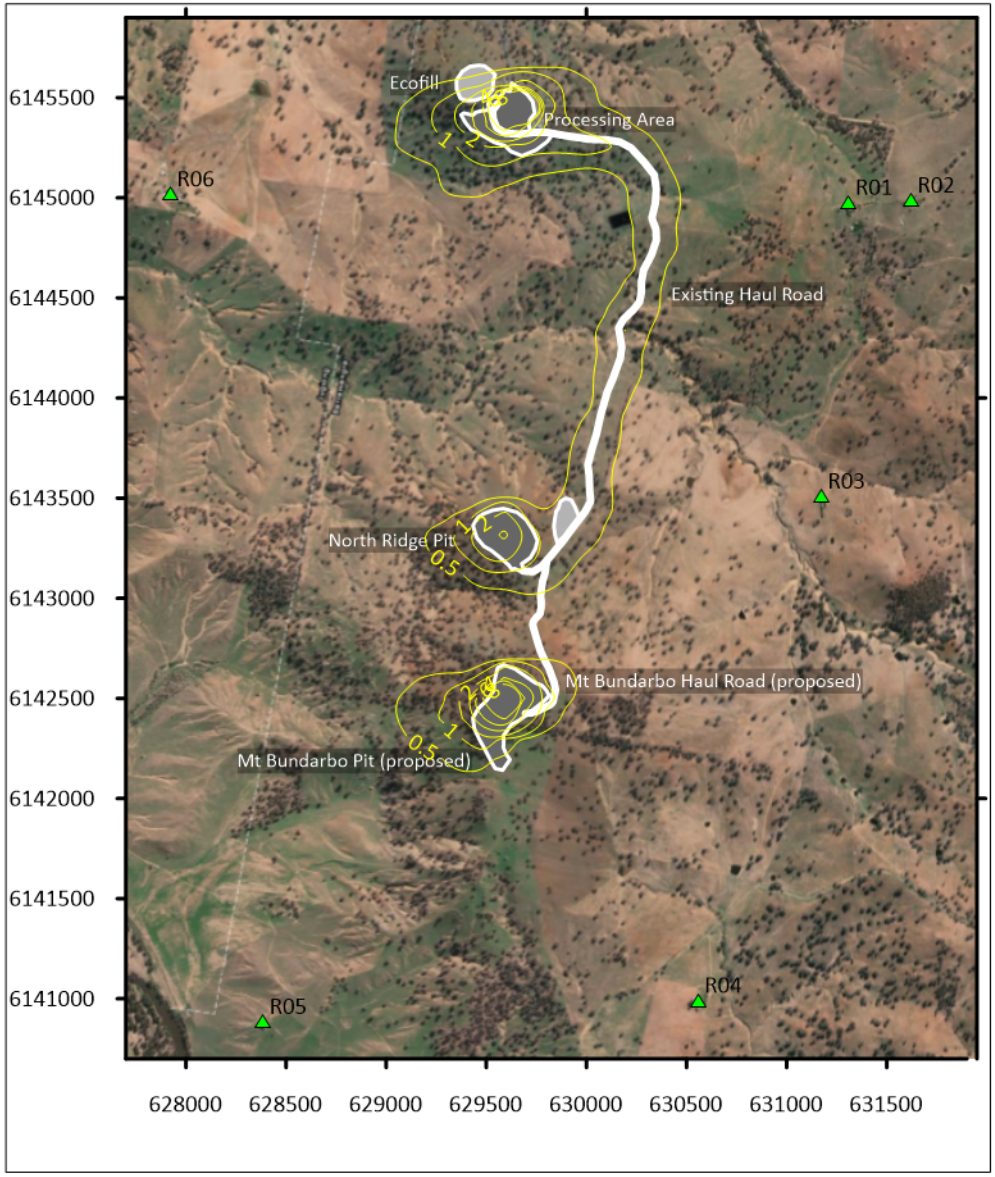
GDA 1994 MGA Zone 55S

Pollutant: $PM_{2.5}$
Averaging Period: 24-Hour
Scenario: Existing Operations
Units: $\mu g/m^3$

Pollutant: $PM_{2.5}$
Averaging Period: 24-Hour
Scenario: Proposed Operations
Units: $\mu g/m^3$

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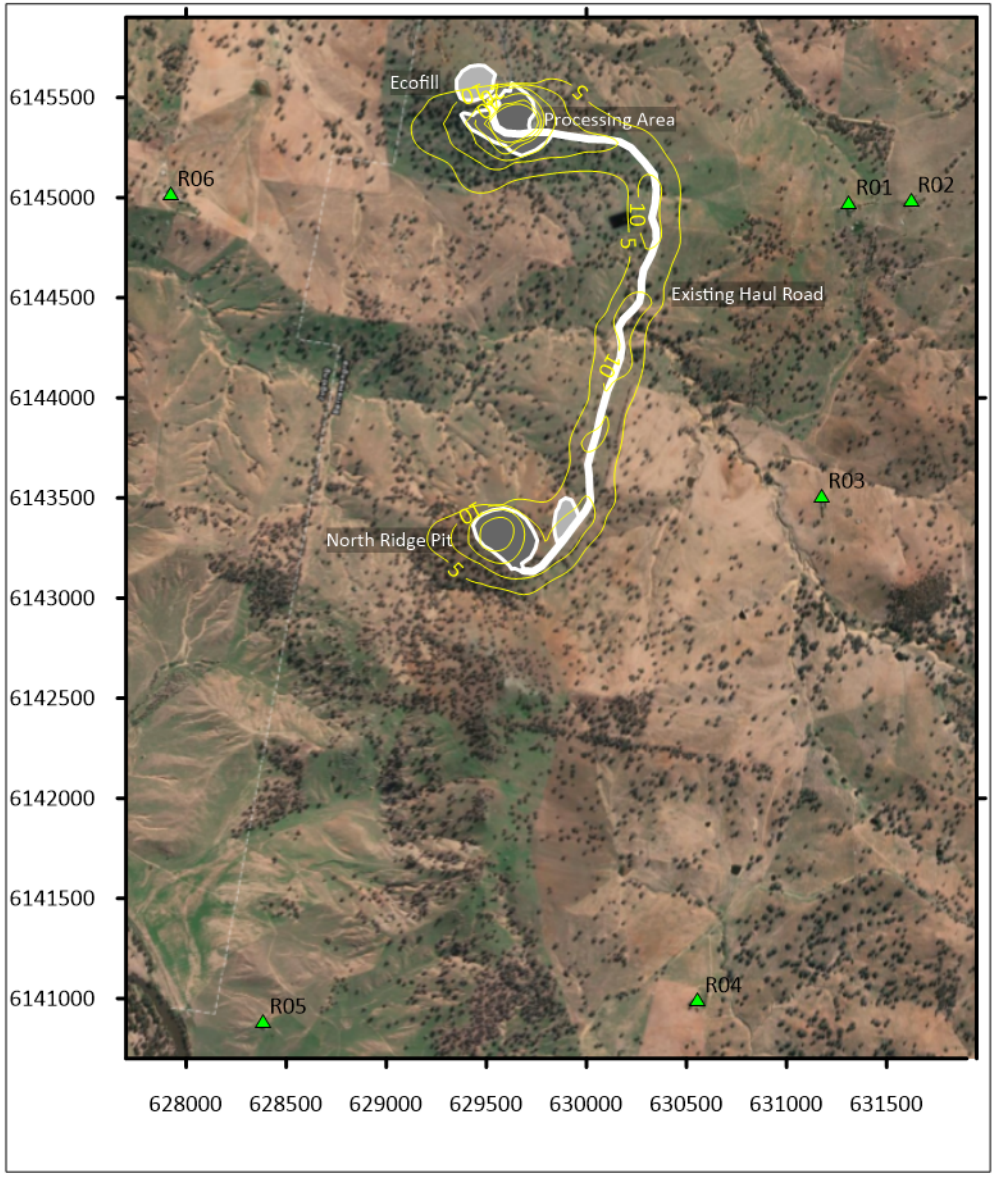
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slrconsulting.com/au PH 61 7 3858 4800

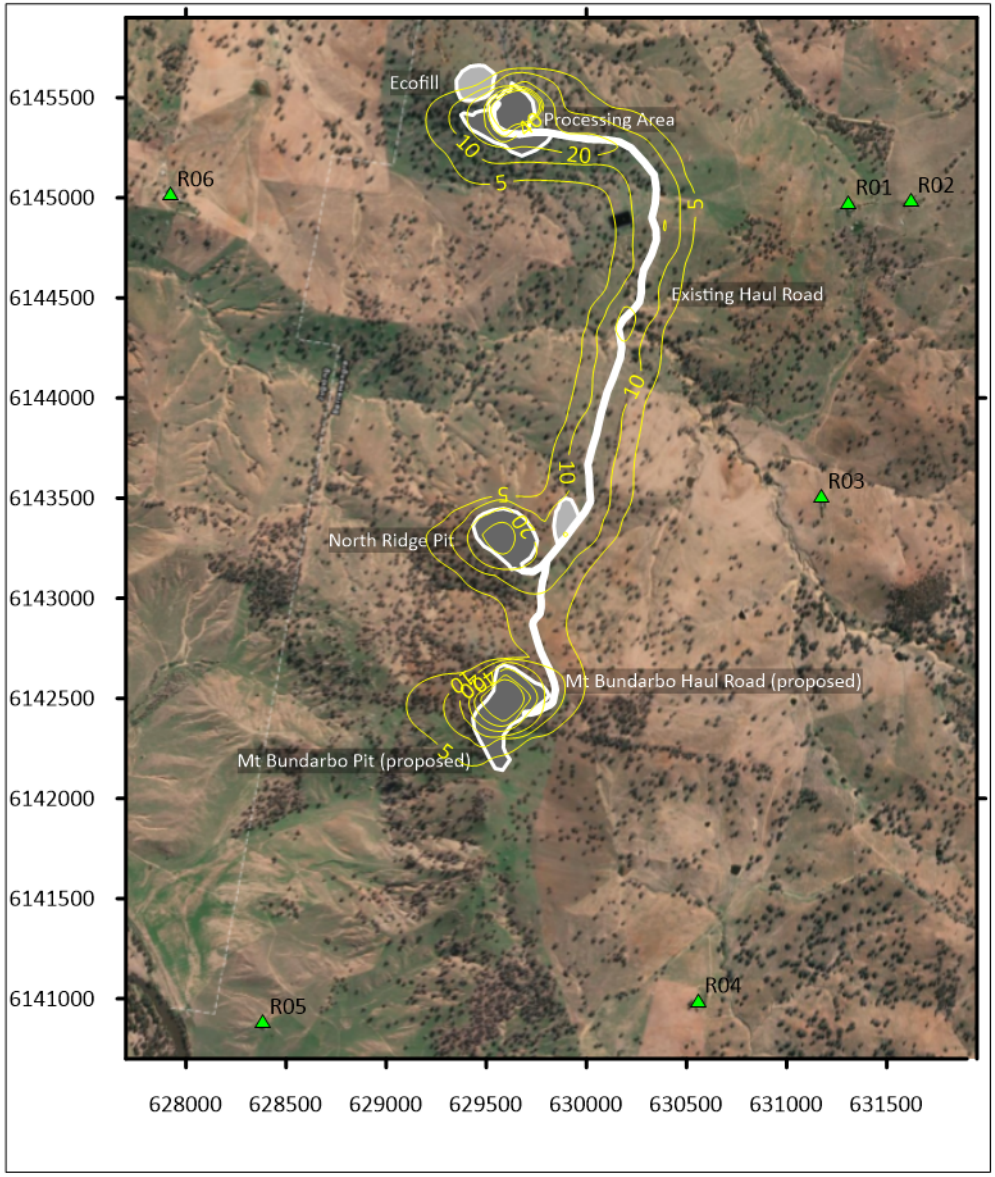
GDA 1994 MGA Zone 55S

Pollutant: $PM_{2.5}$
Averaging Period: Annual
Scenario: Existing Operations
Units: $\mu g/m^3$

Pollutant: $PM_{2.5}$
Averaging Period: Annual
Scenario: Proposed Operations
Units: $\mu g/m^3$

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GDA 1994 MGA Zone 55S

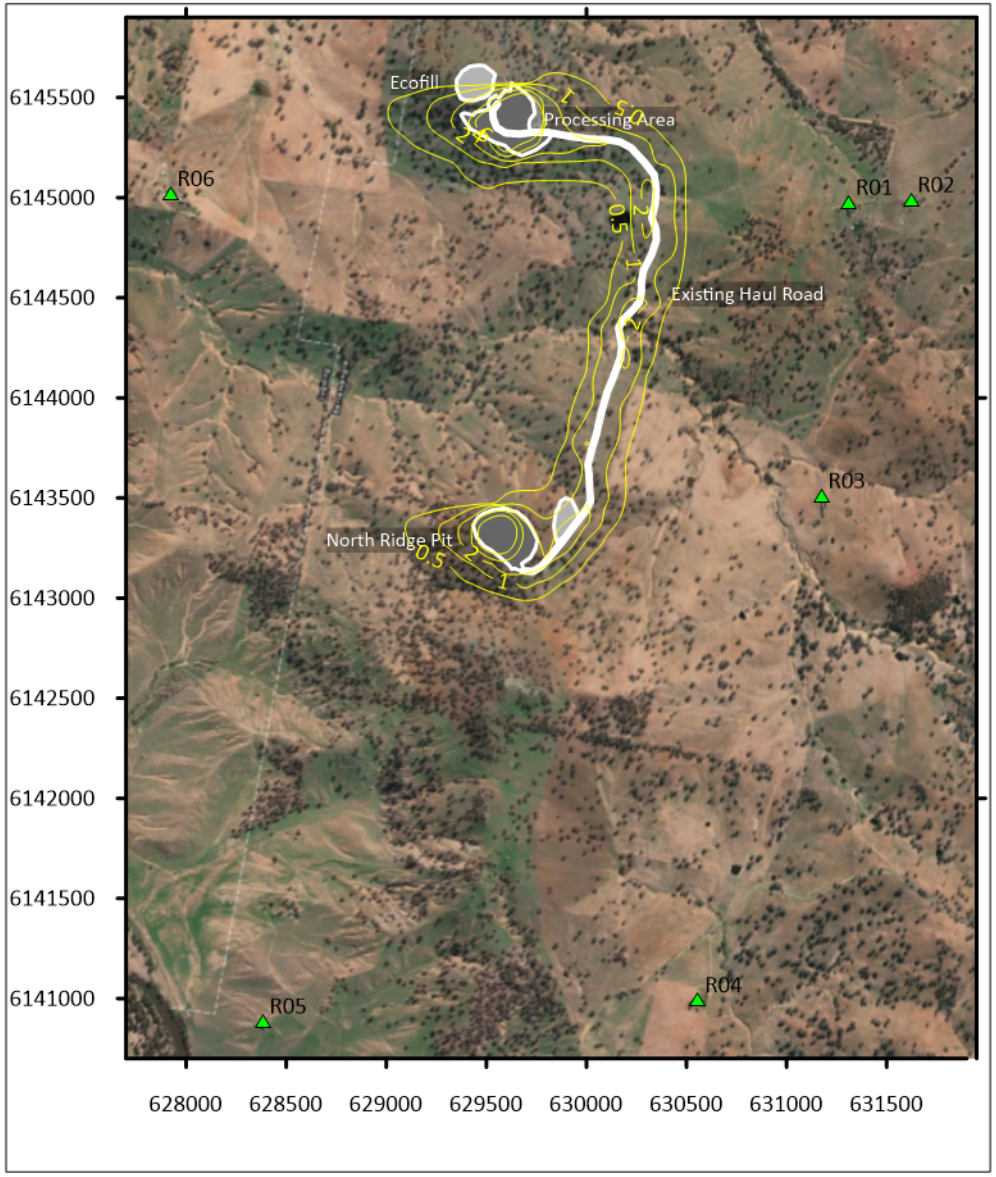
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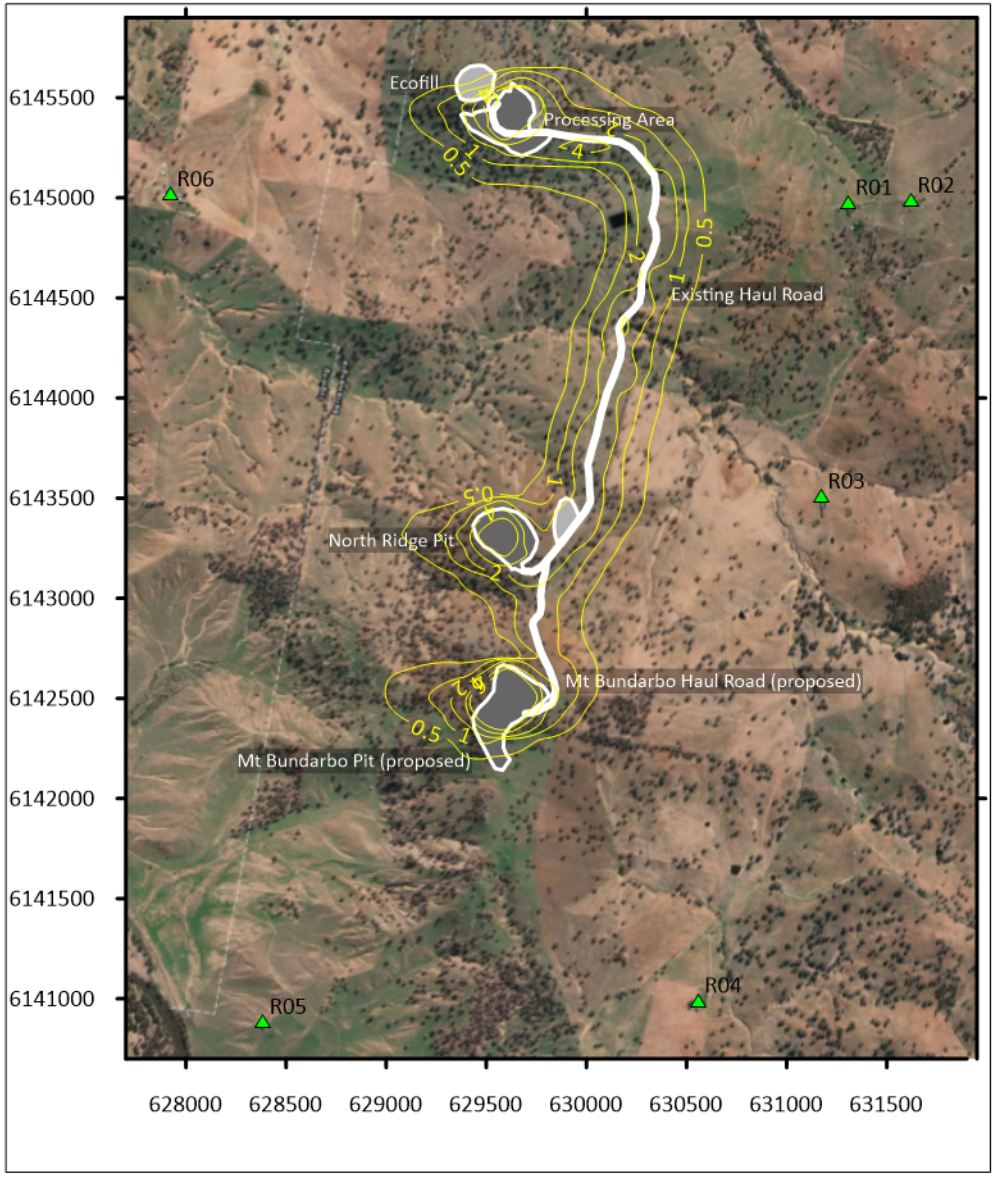
slrconsulting.com/au PH 61 7 3858 4800

Pollutant: TSP
Averaging Period: Annual
Scenario: Existing Operations
Units: $\mu g/m^3$

Pollutant: TSP
Averaging Period: Annual
Scenario: Proposed Operations
Units: $\mu g/m^3$

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Sheet Size: A4

GDA 1994 MGA Zone 55S

SLR
slrconsulting.com/au PH 61 7 3858 4800

Pollutant: Dust Deposition
Averaging Period: Annual
Scenario: Existing Operations
Units: g/m²/month

Pollutant: Dust Deposition
Averaging Period: Annual
Scenario: Proposed Operations
Units: g/m²/month

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APPENDIX G TRAFFIC IMPACT ASSESSMENT

Amber

Traffic & Transportation Direction



Mt Bundarbo Quarry

Traffic Impact Assessment

May 2021

Reference: 119 rep 210510 final

Mt Bundarbo Quarry

Traffic Impact Assessment

Prepared for: Bald Hill Quarry Pty Ltd

Status: Final report

Date: 10 May 2021

Reference: 119 rep 210510 final

Contact

Website: www.amber.org.au E: info@amber.org.au Phone: +61 432 022 363

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Appendix A
Hume Highway / Old Hume Highway Intersection Design

Appendix B
Hume Highway / Old Hume Highway Proposed Upgrades (Existing Development Application)

Appendix C
Transport Management Plan

1. Introduction

Amber Organisation Pty Ltd has been engaged by Bald Hill Quarry Pty Ltd to conduct a review of the traffic impacts of the proposed Mt Bundarbo Quarry.

The site is located approximately 7km east of Jugiong and is currently occupied by the Ecofill Landfill and the North Ridge Quarry. The operation of the site is currently the subject of a development application to increase the maximum extraction rate for the site from 300,000 tonnes per annum to 450,000 tonnes per annum.

Following a Road Safety Audit completed as part of the development application it is proposed to upgrade the site access which occurs via the intersection of Hume Highway and Old Hume Highway. The upgrades to the intersection include the following:

- Provision of linemarking to delineate the existing right and left turn facilities in accordance with the initial design plans for the intersection;
- Provision of a stop/hold line at the Old Hume Highway leg of the intersection; and
- Widening of the Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.

This application seeks approval to establish a new quarry on-site. The quarry is proposed to allow the extraction of 150,000 tonnes per annum, with peak periods of 450,000 tonnes per annum over 20 years, not exceeding a total of 5 million tonnes for the life of the project. The maximum extraction capacity is in line with the current development application and would not result in an increase in the overall site capacity.

Access to the site is proposed to continue via the site access road which connects with Old Hume Highway and subsequently Hume Highway. A maximum vehicle length of 19.0 metres is permitted on-site following a recently completed Road Safety Audit for the site access.

Initial comments have been provided by TfNSW regarding the access arrangements which requires the provision of a Traffic Impact Assessment. An assessment of the traffic impacts and the access arrangements for the quarry are provided below which responds to TfNSW comments.

2. Existing Conditions

2.1 Site Description

The site is currently occupied by the Ecofill Landfill and the North Ridge Quarry, which is situated approximately 7km east of Jugiong. The location of the site in relation to the surrounding road network is provided within Figure 1.

The site was initially occupied by the Bald Hill Quarry which was located approximately 1.1km south of Hume Highway, and was subsequently turned into the Ecofill Landfill. The North Ridge Quarry was subsequently established approximately 3.3km south of Hume Highway. Access to the site is provided via the site access road which connects with Old Hume Highway and subsequently Hume Highway.

The site and the surrounding land are zoned RU1 – Primary Production, a rural zone primarily intended to promote sustainable primary industry production and as such, the surrounding land use is rural in nature excluding the township of Jugiong. An aerial photograph of the site and the surrounding area is provided within Figure 2.

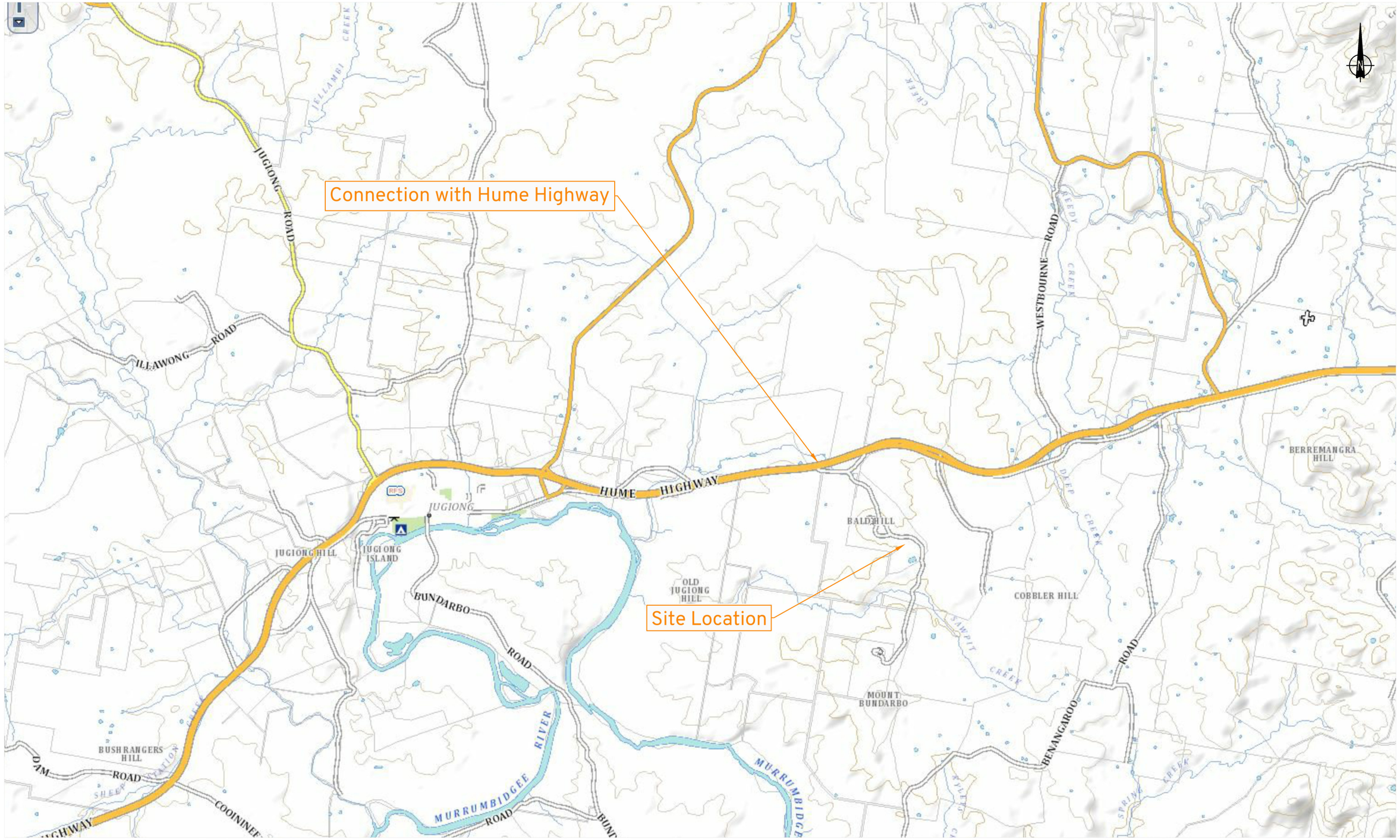
2.2 Road Network

Hume Highway is a State Road under the care and management of Transport for New South Wales (TfNSW). It runs in a northeast-southwest alignment from Sydney to Melbourne and forms one of Australia's major intercity national highways. Within the vicinity of the site, it has a sealed carriageway providing two lanes of traffic in each direction which are separated by a wide grassed median. It has a speed limit of 110km/hr adjacent to the site and is rated to accommodate B-Double movements as identified within the TfNSW Restricted Access Vehicle Map.

Old Hume Highway is a municipal local road under the care and management of Hilltops Council. It provides a loop that extends south from Hume Highway then runs east to its connection with the site access road. The road then runs in a northeast alignment to connect back with Hume Highway however this section of the road is currently discussed and has an unsealed carriageway. The remainder of the road has a sealed carriageway with a width of approximately 8 metres. It is noted that a cattle stop is currently provided on Old Hume Highway approximately 20 metres south of Hume Highway.

The site access road essentially forms a continuation of Old Hume Highway and extends south towards the site. It has a sealed carriageway width of approximately 8.0 metres for 1.5km to the weigh bridge of the Ecofill Landfill and has a gravel surface extending to the North Ridge Quarry. The site access road has a posted speed limit of 40km/hr.

The intersection of Hume Highway with Old Hume Highway is priority controlled with 'Give Way' signage and linemarking provided for drivers exiting Old Hume Highway. Turning movements from Hume Highway are facilitated by localised widening for vehicles turning left and right into the access road and is shown within Photograph 1 and 2. The additional sealed area provides effective lane widths of approximately 5.0 metres and extends for 200 metres for left turning vehicles and 165 metres for right turning vehicles. As can be seen from the photographs, the turn lanes are currently not linemarked.

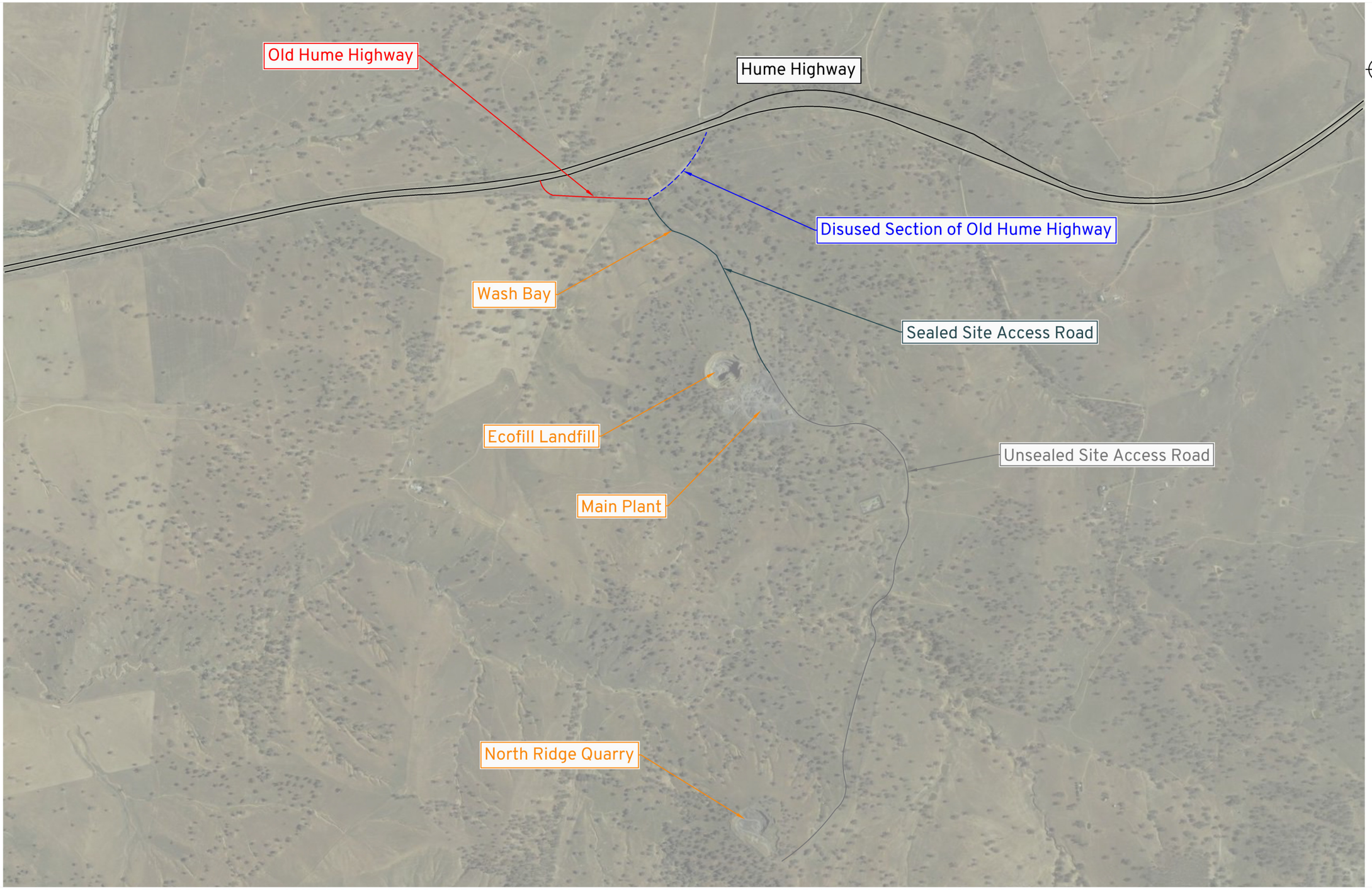


Mt Bundarbo Quarry

Surrounding Road Network

DRAWN: MW
DATE: 05/04/2021
SCALE: NTS @ A3
DWG NO: 119-F02A

Amber



Mt Bundarbo Quarry

Aerial Photograph

DRAWN: MW
DATE: 05/04/2021
SCALE: NTS @ A3
DWG NO: 119-F02A

Amber

Photograph 1: Left turn lane (looking east)



Photograph 2: Right turn lane (looking west)



2.3 Future Road Environment

Following a Road Safety Audit completed by D-Tal it is proposed to upgrade the intersection of Hume Highway and Old Hume Highway. The upgrades to the intersection include the following:

- Provision of linemarking to delineate the existing right and left turn facilities in accordance with the initial design plans for the intersection and is provided within Appendix A;
- Provision of a stop/hold line at the Old Hume Highway leg of the intersection; and
- Widening of Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.

A swept path assessment for the vehicle movement at the intersection is provided within Appendix B which also demonstrates the associated widening of Old Hume Highway.

2.4 Traffic Volumes

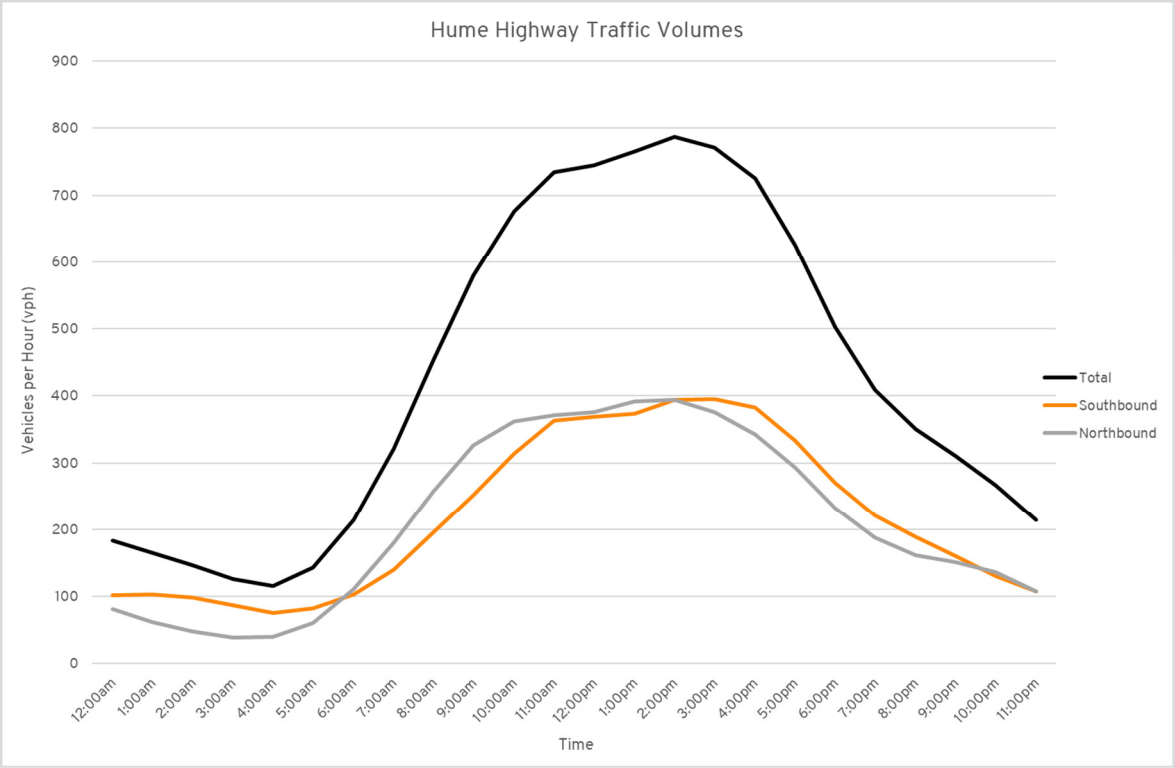
Traffic volume data for Hume Highway was obtained from the TfNSW traffic volume viewer. The closest available data was located approximately 2.11km north of Paynes Road near Bookham and is summarised below in Table 1. In order to calculate the current traffic volumes on the road network a growth rate has been applied to calculate the traffic volumes for 2021.

Table 1: Hume Highway Traffic Volume Data

Road	Survey Location	Survey Year	Recorded Volume	Direction (bound)	Growth Factor	Current Traffic Volume
Hume Highway	2.11km north of Paynes Road near Bookham	2018	10,063 vpd 64% light 36% heavy	North – 5,044 vpd South – 5,019 vpd	1.5%	10,334 vpd 788 vph (peak hour)

The 2021 traffic volumes have also been calculated for each hour and separated into north and southbound movements. The traffic volumes are shown below in Graph 1. The graph shows the there is no discernible morning and evening peak period. Instead, the traffic volumes peak through the middle of the day between 10:00am and 4:00pm. It is also noted that Hume Highway currently carries a high proportion of heavy vehicles (36%).

Graph 1: Hume Highway Traffic Volume Data Calculated to 2021



2.5 Walking and Cycling

There are no pedestrian or cyclist facilities provided within the surrounding area.

2.6 Public Transport / School Bus

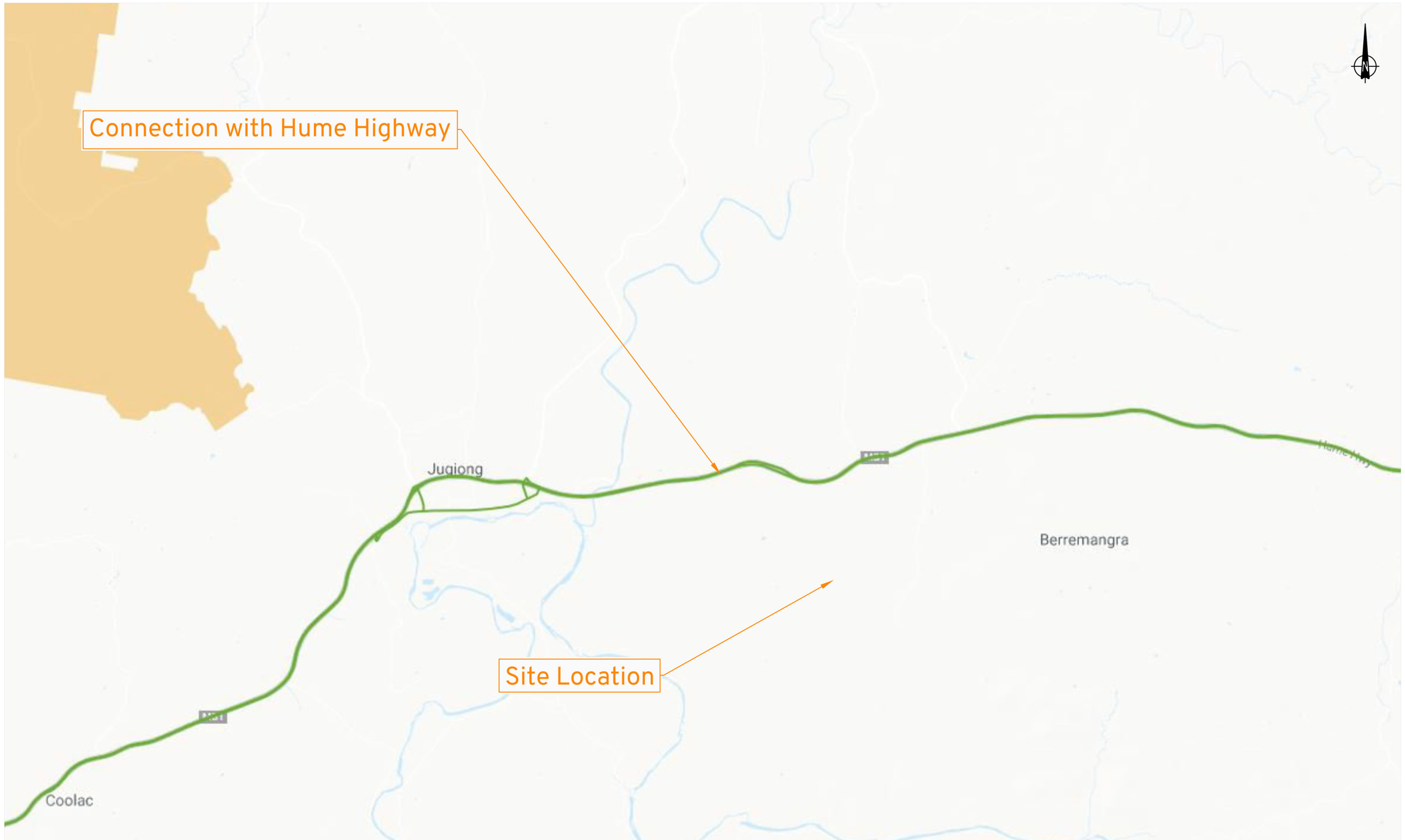
No public transport facilities are provided within the vicinity of the site. However, it is noted that some school bus services operate along Hume Highway.

2.7 Restricted Vehicle Access

The existing B-double (26m) approved routes in the broader vicinity of the site are detailed on the TfNSW combined Higher Mass Limits and Restricted Access Vehicle Map website and is provided within Figure 3. The figure demonstrates that all State and Regional Roads within the vicinity of the site are rated to accommodate B-double vehicles.

2.8 Crash Search

Amber has conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all injury crashes within 500 metres of the intersection of Hume Highway with Old Hume Highway. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2015 to 2019. The crash search revealed no crashes within the search area and as such, it is concluded that the road network is currently operating in a safe manner.



B-Double Route

Approved Route with Travel Conditions

Approved Area with Travel Conditions

Mt Bundarbo Quarry

Restricted Vehicle Access Map

DRAWN: MW
DATE: 05/04/2021
SCALE: NTS @ A3
DWG NO: 119-F02A

Amber

3. Project Description

The development involves establishing the Mt Bundarbo Quarry on-site which is being proposed to the south of the Ecofill Landfill and the North Ridge Quarry. The Mt Bundarbo Quarry is to act as a replacement to the North Ridge Quarry which is anticipated to be closed in the near future, with both quarries expected to be operating simultaneously for a short period.

The Mt Bundarbo Quarry is proposed to have a capacity of 150,000 tonnes per annum, with peak periods of 450,000 tonnes per annum over 20 years, not exceeding a total of 5 million tonnes for the life of the project. The maximum extraction capacity is in line with a current development application for the site and is not proposed to result in an increase in the overall site capacity.

The quarry will be utilised to provide material for road upgrades/maintenance and construction projects within the surrounding area. Approximately 12 staff are currently on-site at any one time and no changes are expected to the on-site staff numbers as part of the proposal. The current approved working hours for the site are as follows:

- Quarry Activity: Monday to Friday - 7am to 6pm; and
- Product Despatch: Monday to Sunday – 24 hours.

The material is proposed to primarily be transported by truck and dog trailers, with a maximum vehicle length of 19.0 metres is permitted on-site following a recently completed Road Safety Audit for the site access. Access is proposed to continue to occur via the existing access road which is to be extended to the new quarry site.

No changes are proposed to the operation of the landfill as part of the proposal.

4. Traffic Assessment

4.1 Traffic Generation

A maximum of 12 staff are anticipated to be on-site at any time which is not proposed to change as part of the proposal. Accordingly, the quarry is expected to generate 12 light vehicle movements during the morning and evening peaks associated with staff arriving and departing the site, respectively.

Truck and dog vehicles will primarily be used to transport the quarry material, with the Mt Bundarbo Quarry expected to generate approximately 50 truck movements per day. The truck movements will typically commence at 7:00am and be completed by 4:00pm in order to allow time for the last load to be delivered to the relevant destination. However, it is noted that the operating times may extend outside of these times and on weekends.

It is also noted that deliveries such as fuel will be generated by the quarries which will be undertaken by smaller MRV/HRVs and will generate approximately 2 vehicle movements per day outside of peak times.

Traffic information has been provided by the Applicant for the landfill and the existing North Ridge Quarry which is provided below along with the anticipated vehicle movements of the Mt Bundarbo Quarry. Based on the information provided, it is anticipated that the site could generate up to 160 heavy and 24 light vehicle movements per day (184 total vehicle movements per day). Table 2 summarises the traffic movements generated by the site.

Table 2: Traffic Generation

Vehicle Type	Daily (vpd)				Peak Hour (vph)			
	Landfill	North Ridge	Mt Bundarbo	Total	Landfill	North Ridge	Mt Bundarbo	Total
Light Vehicle (car / 4WD)	8	16	-	24	4	8	-	12
MRV/HRV	-	2	-	2	-	-	-	-
Truck and Dog / Semi-Trailer	20	88	50	158	3	11	6	20
Total	**28**	**106**	**50**	**184**	**7**	**19**	**6**	**32**

Accordingly, the site is expected to generate approximately 184 vehicle movements per day and 32 vehicle movements during the morning peak hour. The evening peak hour will only generate vehicle movements associated with staff as the last truck movements depart the site prior to the evening peak.

Overall, the Mt Bundarbo Quarry is expected to generate an increase in traffic of 6 truck movements during the morning peak hour and 50 truck movements per day.

4.2 Traffic Distribution and Assessment

Material from the quarry will be utilised for road upgrades/maintenance and construction projects within the surrounding area, resulting in the traffic movements being distributed on the surrounding road network. All vehicles will access and exit the site via Hume Highway to the east or west and are then able to access the wider area.

Hume Highway currently accommodates approximately 10,063 vehicles per day. Therefore, the proposed increase of 50 vehicle movements per day and 6 vehicles during the peak hour (approximately one vehicle every 10 minutes) can be readily accommodated on the road network and would be less than the daily variation in traffic volumes.

5. Site Access

5.1 Road Safety Audit

A Road Safety Audit was previously conducted for the site access as part of the proposed expansion of the site capacity which included the intersection of Hume Highway and Old Hume Highway. The Road Safety Audit identified a number of safety matters which have been addressed as part of the development application for the expansion of the site capacity and includes the following upgrades to the site access:

- Provision of linemarking to delineate the existing right and left turn facilities in accordance with the initial design plans for the intersection;
- Provision of a stop/hold line at the Old Hume Highway leg of the intersection; and
- Widening of Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.

The Road Safety Audit identified that the median width within Hume Highway is not sufficient to accommodate a vehicle with a length greater than 19.0 metres for vehicles turn right from Old Hume Highway. As such, a maximum vehicle length of 19.0 metres is currently proposed on-site which is to be controlled on-site by a suitably qualified person.

The proposed road upgrades as part of the previous application are expected to be able to safely allow vehicles with a length up to 19.0 metres to access and exit the site.

6. Traffic Management Measures

A Transport Management Plan (TMP) has been prepared for the site as part of the development application for the expansion of the overall site capacity. The objectives of the TMP are provided below:

- Minimise vehicle conflict and traffic impacts on the internal and surrounding road network by establishing a low frequency (regular) truck schedule rather than an intermittently-high frequency (campaign) trucking schedule;
- Identify measures to reduce the traffic impacts of site traffic and provide mechanisms to assist with the implementation of the measures;
- Ensure site vehicles are able to safely manoeuvre between the Hume Highway and the Old Hume Highway and that vehicle operators exercise caution at this intersection when negotiating high speed through traffic;
- Ensure drivers operate in a safe and appropriate manner and in accordance with the Drive Code of Conduct;
- Provide suitable consideration to the environmental impacts of the site traffic and limit any impacts as far as practicable; and
- Maintain a safe road environment for all road users, with an emphasis on vulnerable road users.

The TMP is provided within Appendix C and is expected to encourage safe and efficient vehicle movement to/from the site and on the surrounding road network, and reduce the overall traffic impact of the proposal.

7. Conclusion

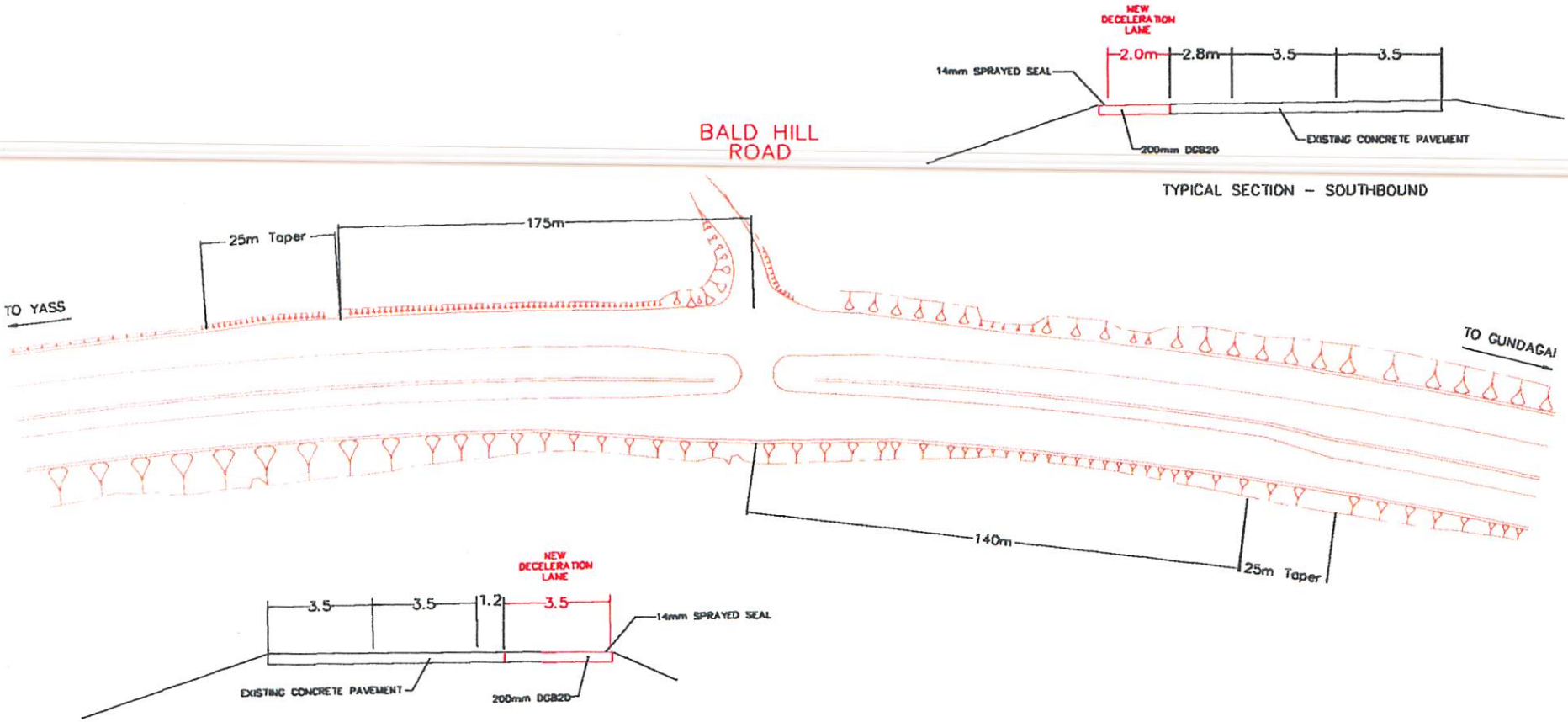
Amber has assessed the traffic impacts of the proposed Mt Bundarbo Quarry located approximately 7km east of Jugiong. The site currently accommodates the Ecofill Landfill and the North Ridge Quarry. The Mt Bundarbo Quarry is to act as a replacement to the North Ridge Quarry which is anticipated to be closed in the near future, with both quarries expected to be operating simultaneously for a short period. The above assessment determined the following:

- The site is expected to generate up to 184 vehicle movements per day as part of the proposal, which is an increase of 50 vehicle movements per day and 6 vehicle movements during the peak hour;
- The road network is able to readily accommodate the traffic generated by the development, and will be less than the daily variation of the road network;
- The intersection of the site access with Hume Highway is proposed to be upgraded as part of a previous application to expand the site capacity and will provide safe vehicle access and egress; and
- A Transport Management Plan has been prepared to encourage safe and efficient vehicle movement to/from the site and on the surrounding road network, and reduce the overall traffic impact of the proposal.

Accordingly, it is concluded that the proposed access arrangements for the quarry are suitable to accommodate the expected vehicle types and traffic volumes.

Appendix A

Hume Highway / Old Hume Highway Intersection Design



TYPICAL SECTION – SOUTHBOUND

TYPICAL SECTION – NORTHBOUND

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

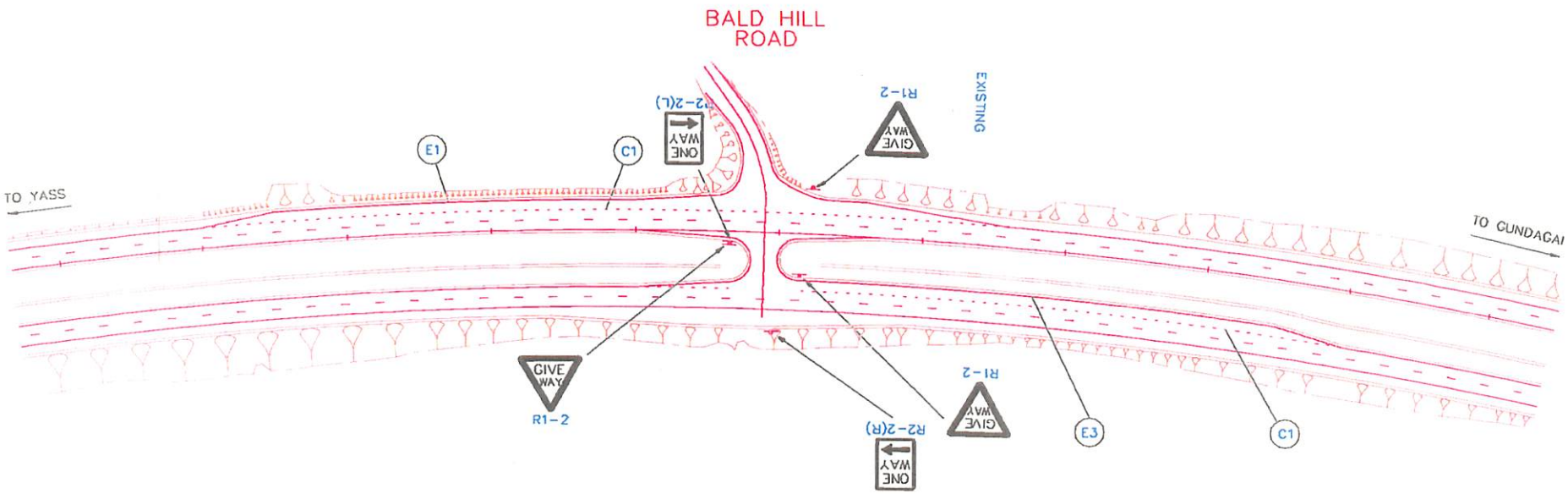
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DATE	
HPR No.	

BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Longitudinal Plan & Sections

DWG. No. / LOT No.	REV. No.
Sheet 1	A



1. Pavement Marking to be as per RTA Specification R141 & R142
2.

OPERATION CHECKLIST		INITIALS	DATE/S	NOTES
	1. VERIFIED			
	2. INSTALLED			
	3. CHECKED			

SCALE:	NTS
DRAWN	
CHECKED	
DATE	
HPR No.	

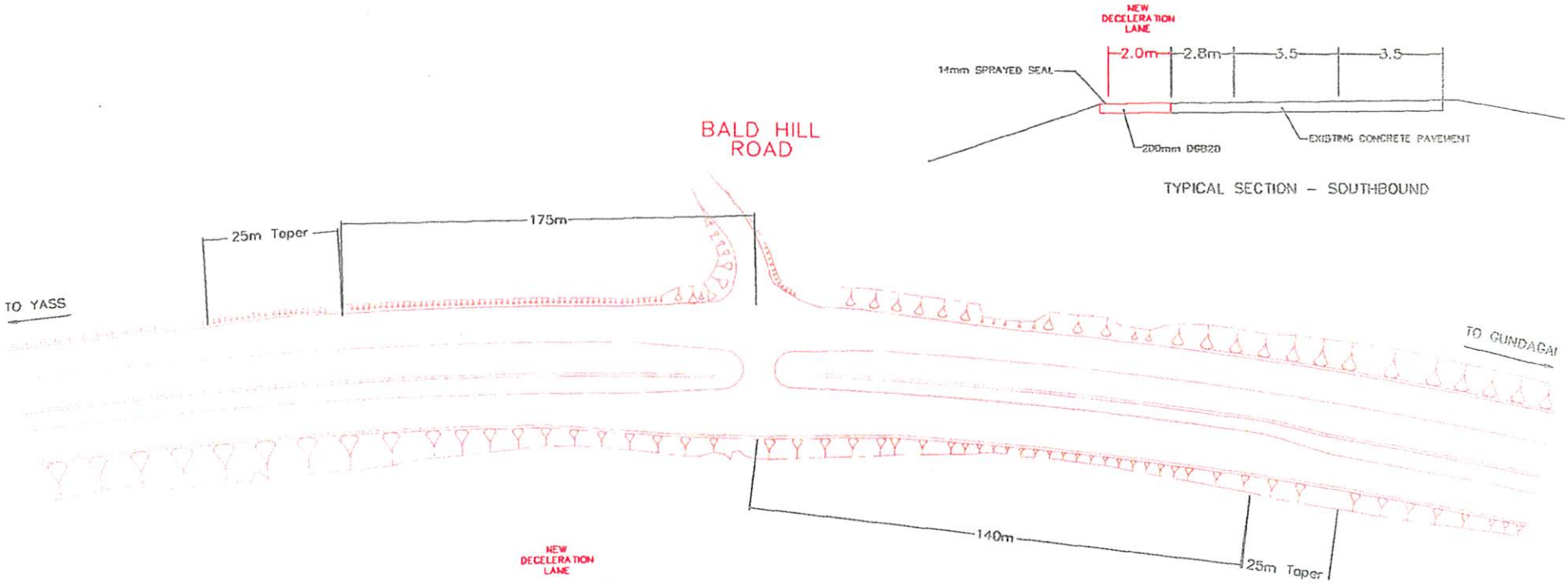
BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Pavement Marking and Signposting Plan

DWG. No. / LOT No.: Sheet 2

REV. No.: A



TYPICAL SECTION – SOUTHBOUND

TYPICAL SECTION – NORTHBOUND

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

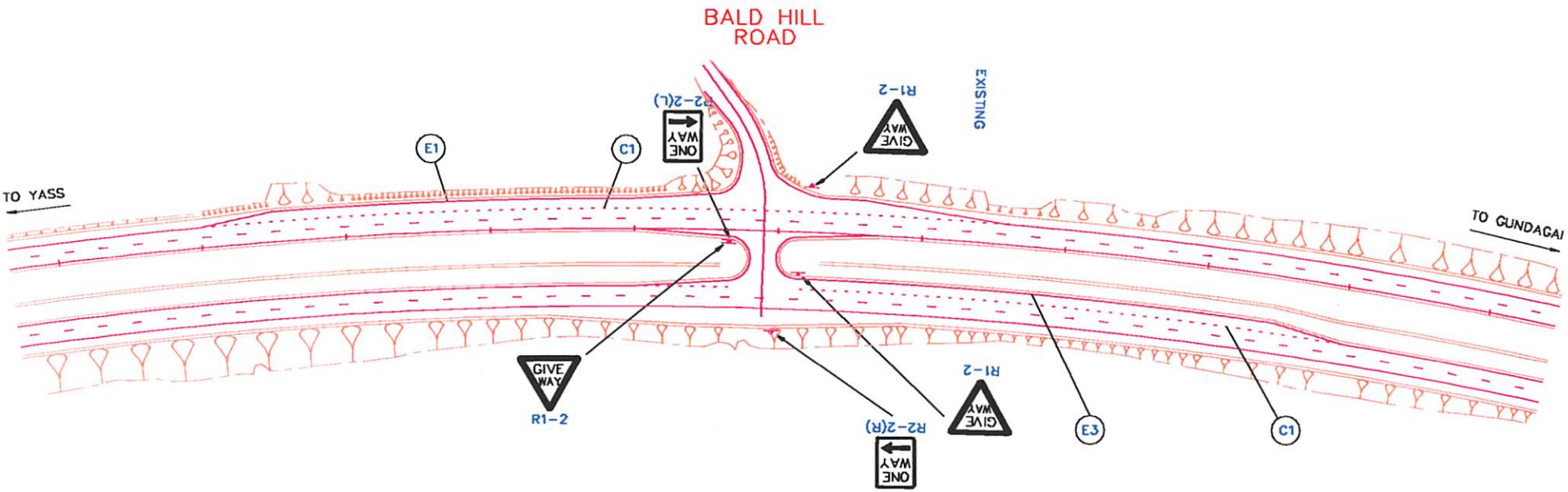
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DRAWN	
CHECKED	
DATE	
HPR No.	

BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Longitudinal Plan & Sections

DWG. No. / LOT No.	REV. No.
Sheet 1	A



1. Pavement Marking to be as per RTA Specification R141 & R142
2.

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

SCALE:	NTS
DRAWN	
CHECKED	
DATE	
HPR No.	

BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

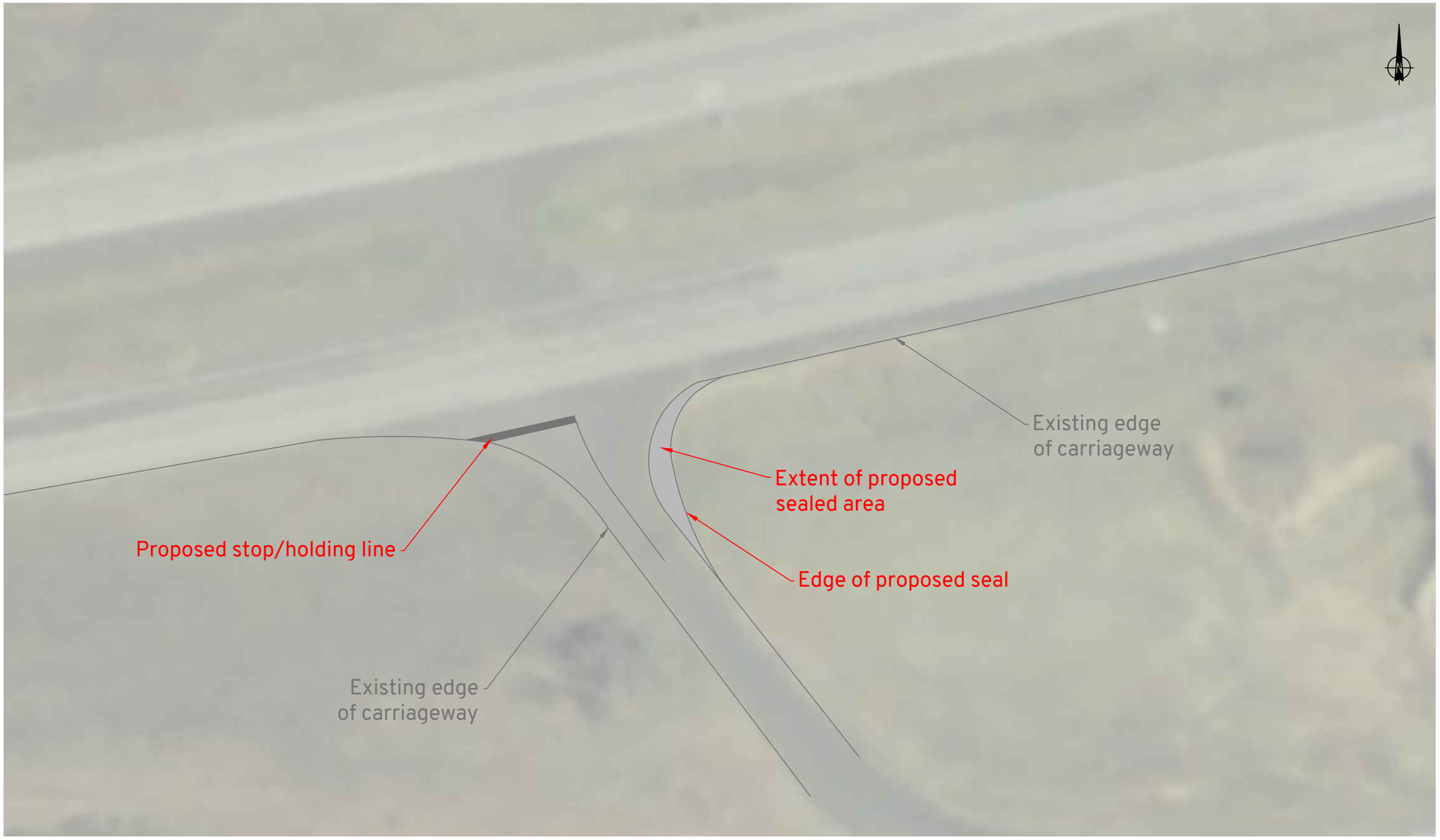
Pavement Marking and Signposting Plan

DWG. No. / LOT No.: Sheet 2

REV. No.: A

Appendix B

Hume Highway / Old Hume Highway Proposed Upgrades (Existing Development Application)



Bald Hill Quarry Modification
Site Access / Hume Highway Intersection
Proposed Design - 19.0m Articulated Vehicle

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

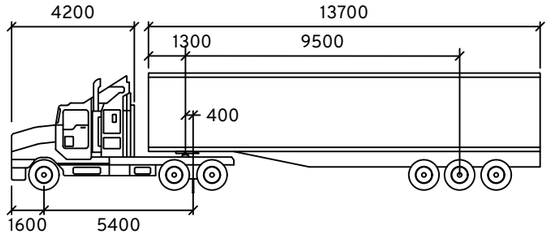
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

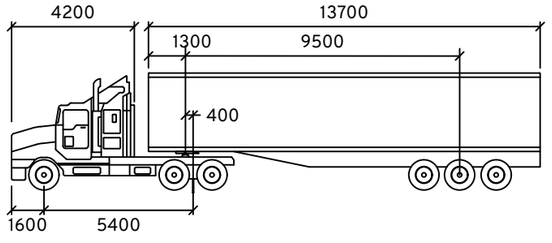
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

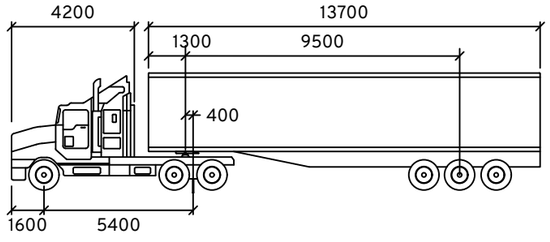
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
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Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Appendix C

Transport Management Plan

Amber

Traffic & Transportation Direction



Bald Hill Quarry

Transport Management Plan

March 2021

Reference: 119 tmp 210331 final

Bald Hill Quarry

Transport Management Plan

Prepared for: Bald Hill Quarry Pty Ltd

Status: Final report

Date: 31 March 2021

Reference: 119 tmp 210331 final

Contact

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Hume Highway / Old Hume Highway Intersection Design

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Appendix C
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Maintenance Requirements 3
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Appendix H
Annual Review Results

1. Introduction

1.1 Background

Amber Organisation Pty Ltd has been engaged by Bald Hill Quarry Pty Ltd to prepare a Transport Management Plan to outline measures to manage traffic related issues associated with the operation and haulage of material at the site.

The site is located approximately 7km east of Jugiong and is occupied by the Ecofill Landfill and the North Ridge Quarry. The operation of the site is proposed to be modified which represents an increase to the maximum extraction rate from 300,000 tonnes per annum to 450,000 tonnes per annum. Access to the site is proposed to continue via the site access road which connects with Old Hume Highway and subsequently Hume Highway.

This plan focuses on the management of traffic generated by the development, the potential traffic impacts, the measures to be implemented, and the procedures to monitor and ensure compliance with the document.

1.2 TfNSW Requirements

This document has been prepared to respond to comments provided by Transport for NSW (TfNSW) which requires a Transport Management Plan, in consultation with Council and Transport for NSW, to outline measures to manage traffic related issues associated with the operation of the development and haulage of material. As a minimum it is required to address, but not necessarily be limited to the following:

- *Measures to ensure heavy vehicles adhere to the designated haulage route,*
- *Measures to maximise the use of a low frequency (regular) trucking schedule rather than an intermittently-high frequency (campaign) trucking schedule,*
- *Plans to address poor visibility due to adverse weather eg heavy rain periods, fog etc at the intersection of the site access road with the Hume Highway,*
- *Contingency plans to address disruptions to haulage or closure of the haulage route,*
- *Measures to ensure that all loaded vehicles leaving the site are covered, and are cleaned of materials that may fall onto public roads,*
- *Details of procedures for receiving and addressing complaints from the community concerning traffic issues associated with truck movements to and from the quarry,*
- *Measures to be employed to limit disruption to other motorists, emergency vehicles and school bus timetables,*
- *A Driver Code of Conduct to address such items as; appropriate driver behaviour including adherence to all traffic regulations and speed limits, safe overtaking and maintaining appropriate distances between vehicles, etc and appropriate penalties for infringements of the Code,*
- *The management of worker fatigue during trips to and from the site,*
- *Appropriate vehicle maintenance and safety, and*
- *Procedures to provide for training and compliance with and enforcement of the plan.*

1.3 Report Structure

The purpose of this document is to establish the framework, objectives, targets, structure and systems for an operational Transport Management Plan for the site and associated increase in traffic associated with the increased operating capacity. The Transport Management Plan is structured as follows:

- Description of the existing sustainable transport facilities and services;
- The objectives and outcomes of the travel plan;
- Actions to be implemented;
- Strategy for promoting and marketing the actions;
- Commitment and resources;
- Monitoring and review; and
- Governance and support.

The Transport Management Plan initiatives are set out in the following sections of this document.

2. Existing Conditions

2.1 Site Description

The site is currently occupied by the Ecofill Landfill and the North Ridge Quarry, which is situated approximately 7km east of Jugiong. The location of the site in relation to the surrounding road network is provided within Figure 1.

The site was initially occupied by the Bald Hill Quarry which was located approximately 1.1km south of Hume Highway, and was subsequently turned into the Ecofill Landfill. The North Ridge Quarry was subsequently established approximately 3.3km south of Hume Highway. Access to the site is provided via the site access road which connects with Old Hume Highway and subsequently Hume Highway.

The site and the surrounding land are zoned RU1 – Primary Production, a rural zone primarily intended to promote sustainable primary industry production and as such, the surrounding land use is rural in nature excluding the township of Jugiong. An aerial photograph of the site and the surrounding area is provided within Figure 2.

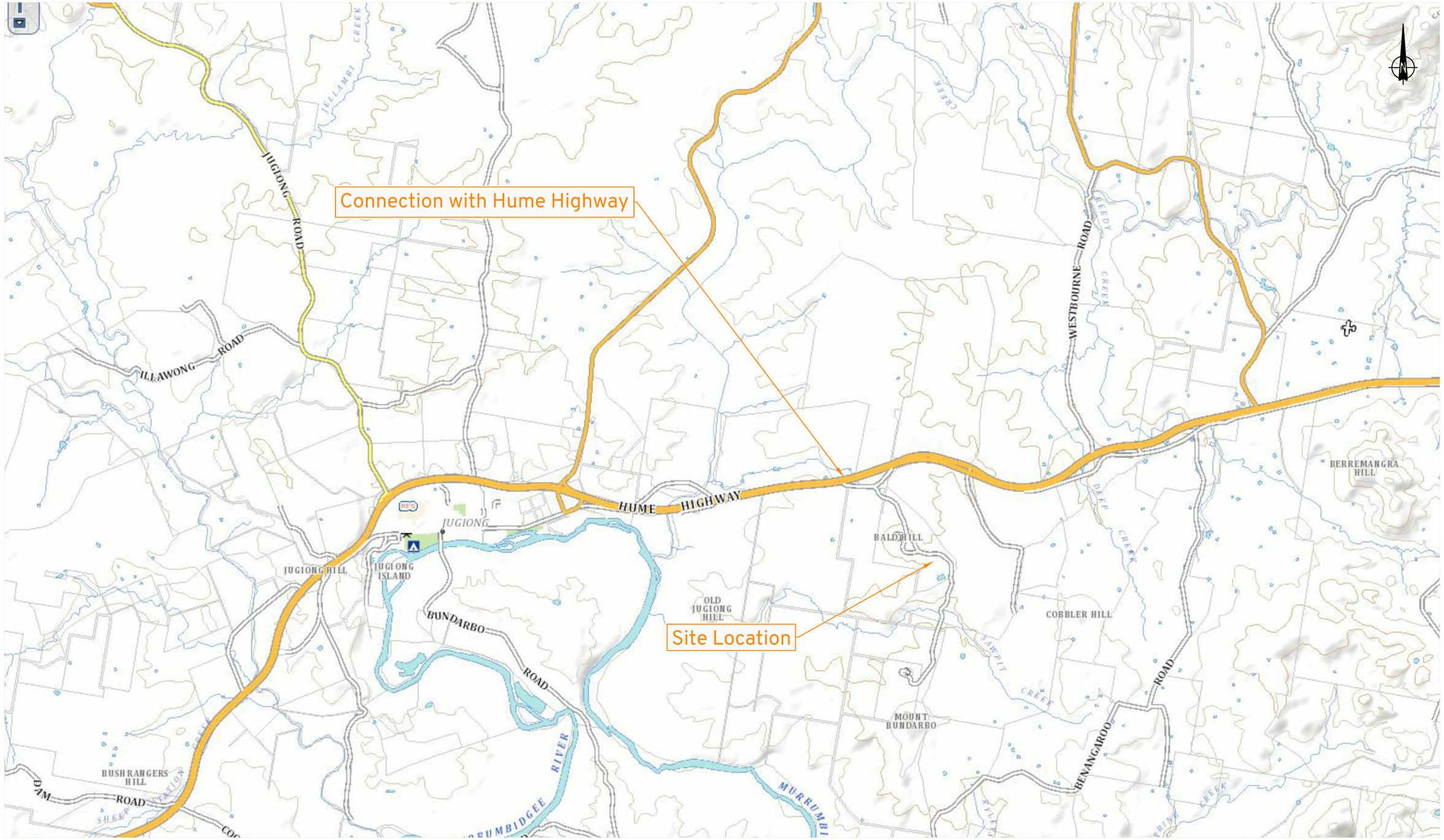
2.2 Road Network

Hume Highway is a State Road under the care and management of Transport for New South Wales (TfNSW). It runs in a northeast-southwest alignment from Sydney to Melbourne and forms one of Australia's major intercity national highways. Within the vicinity of the site, it has a sealed carriageway providing two lanes of traffic in each direction which are separated by a wide grassed median. It has a speed limit of 110km/hr adjacent to the site and is rated to accommodate B-Double movements as identified within the TfNSW Restricted Access Vehicle Map.

Old Hume Highway is a municipal local road under the care and management of Hilltops Council. It provides a loop that extends south from Hume Highway then runs east to its connection with the site access road. The road then runs in a northeast alignment to connect back with Hume Highway however this section of the road is currently discussed and has an unsealed carriageway. The remainder of the road has a sealed carriageway with a width of approximately 8 metres. It is noted that a cattle stop is currently provided on Old Hume Highway approximately 20 metres south of Hume Highway.

The site access road essentially forms a continuation of Old Hume Highway and extends south towards the site. It has a sealed carriageway width of approximately 8.0 metres for 1.5km to the weigh bridge of the Ecofill Landfill and has a gravel surface extending to the North Ridge Quarry. The site access road has a posted speed limit of 40km/hr.

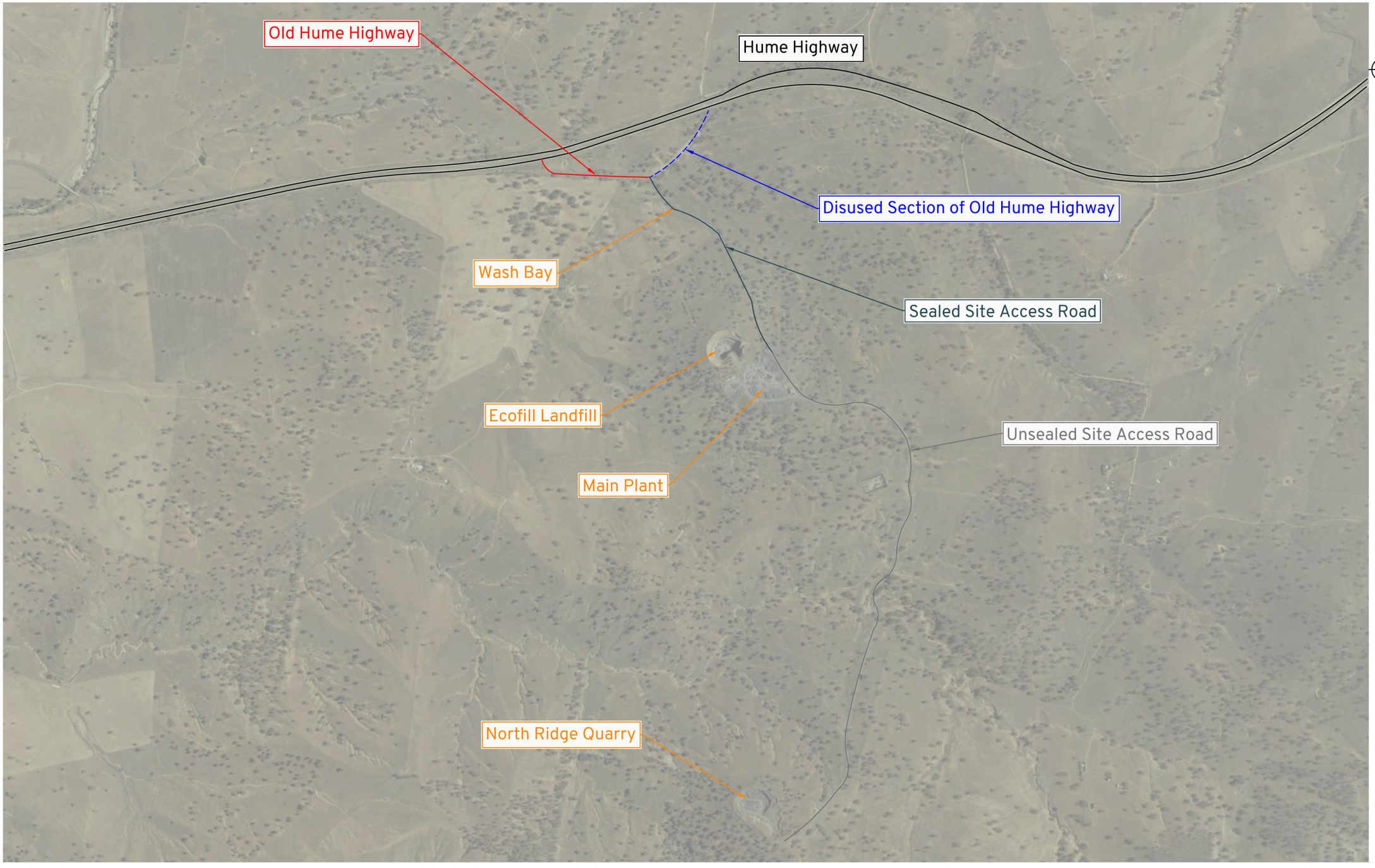
The intersection of Hume Highway with Old Hume Highway is priority controlled with 'Give Way' signage and linemarking provided for drivers exiting Old Hume Highway. Turning movements from Hume Highway are facilitated by localised widening for vehicles turning left and right into the access road and is shown within Photograph 1 and 2. The additional sealed area provides effective lane widths of approximately 5.0 metres and extends for 200 metres for left turning vehicles and 165 metres for right turning vehicles. As can be seen from the photographs, the turn lanes are currently not linemarked.



Bald Hill Quarry
Traffic Management Plan
Surrounding Road Network

DRAWN: MW
DATE: 17/02/2021
SCALE: NTS @ A3
DWG NO: 119-F01A

Amber



Bald Hill Quarry

Traffic Management Plan

Aerial Photograph

DRAWN: MW
DATE: 18/02/2021
SCALE: NTS @ A3
DWG NO: 119-F01A

Amber

Photograph 1: Left turn lane (looking east)



Photograph 2: Right turn lane (looking west)



2.3 Future Road Environment

Following a Road Safety Audit completed by D-Tal it is proposed to upgrade the intersection of Hume Highway and Old Hume Highway. The upgrades to the intersection include the following:

- Provision of linemarking to delineate the existing right and left turn facilities in accordance with the initial design plans which have been included within Appendix A;
- Provision of a stop/hold line at the Old Hume Highway leg of the intersection; and
- Widening of Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.

A swept path assessment for the vehicle movement at the intersection is provided within Appendix B which also demonstrates the associated widening of Old Hume Highway.

2.4 Traffic Volumes

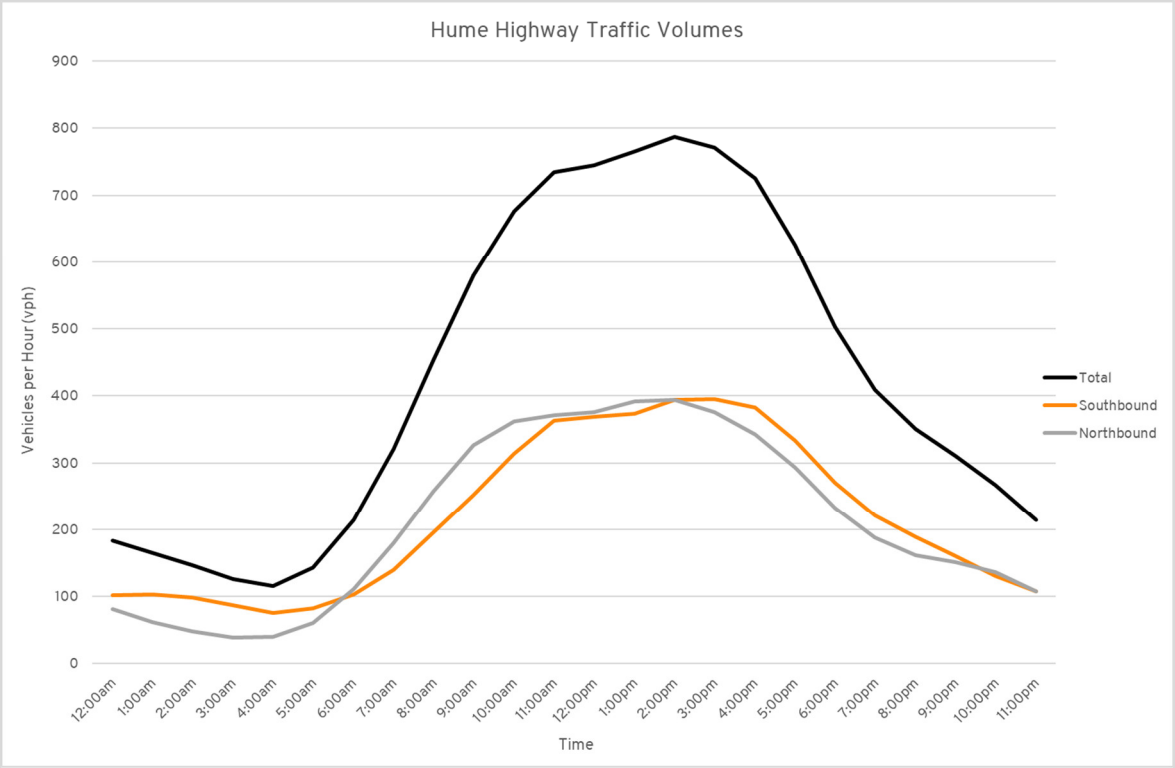
Traffic volume data for Hume Highway was obtained from the TfNSW traffic volume viewer. The closest available data was located approximately 2.11km north of Paynes Road near Bookham and is summarised below in Table 1. In order to calculate the current traffic volumes on the road network a growth rate has been applied to calculate the traffic volumes for 2021.

Table 1: Hume Highway Traffic Volume Data

Road	Survey Location	Survey Year	Recorded Volume	Direction (bound)	Growth Factor	Current Traffic Volume
Hume Highway	2.11km north of Paynes Road near Bookham	2018	10,063 vpd 64% light 36% heavy	North – 5,044 vpd South – 5,019 vpd	1.5%	10,334 vpd 788 vph (peak hour)

The 2021 traffic volumes have also been calculated for each hour and separated into north and southbound movements. The traffic volumes are shown below in Graph 1. The graph shows the there is no discernible morning and evening peak period. Instead, the traffic volumes peak through the middle of the day between 10:00am and 4:00pm. It is also noted that Hume Highway currently carries a high proportion of heavy vehicles (36%).

Graph 1: Hume Highway Traffic Volume Data Calculated to 2021



2.5 Walking and Cycling

There are no pedestrian or cyclist facilities provided within the surrounding area.

2.6 Public Transport / School Bus

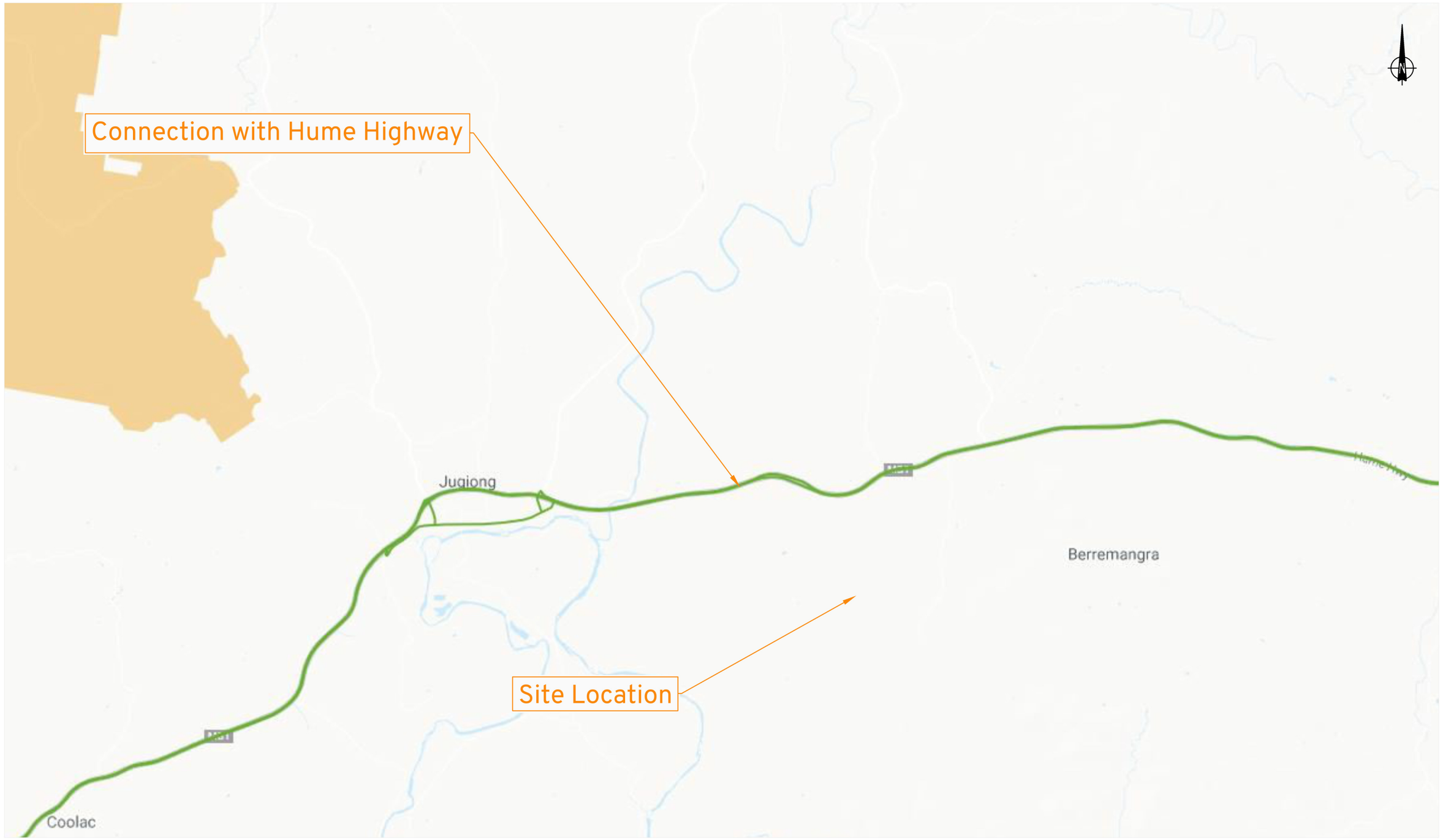
No public transport facilities are provided within the vicinity of the site. However, it is noted that some school bus services operate along Hume Highway.

2.7 Restricted Vehicle Access

The existing B-double (26m) approved routes in the broader vicinity of the site are detailed on the TfNSW combined Higher Mass Limits and Restricted Access Vehicle Map website and is provided within Figure 3. The figure demonstrates that all State and Regional Roads within the vicinity of the site are rated to accommodate B-double vehicles. It is noted that Old Hume Highway is not rated to accommodate B-Doubles.

2.8 Crash Search

Amber has conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all injury crashes within 500 metres of the intersection of Hume Highway with Old Hume Highway. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2014 to 2018. The crash search revealed no crashes within the search area and as such, it is concluded that the road network is currently operating in a safe manner.



B-Double Route

Approved Route with Travel Conditions

Approved Area with Travel Conditions

Bald Hill Quarry
Traffic Management Plan
Restricted Vehicle Access Map

DRAWN: MW
DATE: 17/02/2021
SCALE: NTS @ A3
DWG NO: 119-F01A

Amber 3

3. Site Operation

The site is currently occupied by Bald Hill Quarry Pty Ltd and operates the Ecofill Landfill and the North Ridge Quarry. The operation of the site is proposed to be modified which represents an increase to the maximum extraction rate from 300,000 tonnes per annum to 450,000 tonnes per annum.

Approximately 12 staff are currently on-site at any one time and the working hours for the site are Monday to Sunday, 7am to 5pm.

Quarry material is primarily transported by truck and dog trailers with access to the site provided via the site access road that connects with Old Hume Highway and Hume Highway. The truck movements typically commence at 7:00am and are completed by 4:00pm in order to allow time for the last load to be delivered to the relevant destination.

Deliveries such as fuel are generated by the site which are undertaken by smaller MRV/HRVs (as defined within AS 28902:2002) and generate approximately 2 vehicle movements per day outside of peak times.

Material from the quarry is utilised for road upgrades/maintenance and construction projects within the surrounding area, resulting in the traffic movements being distributed on the surrounding road network.

4. Transport Management Measures

The following sections establish the objectives and subsequent actions/mitigation measures of the Transport Management Plan for the site. In order to enact the transport management measures it is proposed to establish a Transport Management Group comprising at least the site owner, safety representatives, and the activity operators who will meet regularly, adopting ownership and accountability for the actions, target setting and deliverables. The TMP is expected to be a living document, developed and progressed with the actual performance of the activities, measured and reviewed against the key targets.

4.1 Objectives

The overall objectives of the Transport Management Plan are provided below:

- Minimise vehicle conflict and traffic impacts on the internal and surrounding road network by establishing a low frequency (regular) truck schedule rather than an intermittently-high frequency (campaign) trucking schedule;
- Identify measures to reduce the traffic impacts of site traffic and provide mechanisms to assist with the implementation of the measures;
- Ensure site vehicles are able to safely manoeuvre between the Hume Highway and the Old Hume Highway and that vehicle operators exercise caution at this intersection when negotiating high speed through traffic;
- Ensure drivers operate in a safe and appropriate manner and in accordance with the Drive Code of Conduct;
- Provide suitable consideration to the environmental impacts of the site traffic and limit any impacts as far as practicable; and
- Maintain a safe road environment for all road users, with an emphasis on vulnerable road users.

The following transport management measures have been prepared in order to address the above objectives of the TMP.

4.2 Traffic Volumes

A monthly truck movement report is to be prepared and submitted to the Transport Management Group. The truck movement report is to include the following information:

- The amount and type of material transported to/from the site;
- The time each truck arrived and departed the site and the vehicle classification; and
- The direction the vehicle was travelling to/from (i.e. north/east, south/west).

The monthly truck movement report is to be used to establish a low frequency (regular) truck schedule rather than an intermittently-high frequency (campaign) trucking schedule. The Transport Management Group is to meet regularly to set targets that clearly establish the goals required to meet this objective which should be documented as part of the truck movement report.

The goals should include minimising the total number of truck movements in each hour of operation so they are better distributed along the road network throughout the day. The goals should also look to reduce truck movements during times when school buses are on the road and during the midday peak along Hume Highway (refer Graph 1).

The results of the monthly truck movement report are to be reviewed regularly against the goals, and the goals themselves should be amended to ensure continued improvement. The results of the truck movement report and performance against the goals should be appended to this report under Appendix G.

4.3 Route Assessment

At the start of each project a route assessment is to be undertaken by a suitably appointed person to determine the access route to be taken by trucks to the delivery site. The route assessment is to include consideration, but not be limited to the following:

- The times the deliveries will take place and the associated existing traffic volumes on the road network at that time;
- The road classifications and whether the roads are permitted to accommodate the loads expected;
- Any local environmental factors that may impact truck movements and driver behaviour such as road condition, fatigue and potential locations to pull over and stop, weather conditions, likelihood of vulnerable road users being present, impact to public transport facilities;
- Any potential road works along the access route; and
- Deliveries by any other oversized or overmass vehicles in the area that may interact with site traffic.

Each driver is to be suitably advised of the access route which must be adhered to at all times. A contingency access route should also be established in the event of an incident such as a crash, adverse weather conditions, or any other unexpected incident.

The access route may only be amended by a suitably appointed person following consideration of the impacts of the alternative route. This person should be contactable at all times to address any urgent matters.

4.4 Driver Protocols

Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. Exemplar driver protocols are to be implementation and a driver code of conduct established. The Drive Code of Conduct is provided within Appendix C. All heavy vehicle drivers that regularly visit the site are required to read, agree to and sign the Driver's Code of Conduct.

4.5 On-site Mitigation Measures

The relevant Traffic Management Devices on-site are provided within Appendix F. On-site mitigation measures targeted at safety and reducing the impact of on-site transport will include:

- On-site speed restrictions;

- Transport access control to and from the site;
- On-site transport movement communications protocols;
- Appropriate dust suppression measures be implemented, including:
  - Vehicles will drive at slower speeds when travelling on unsealed roads. This can reduce the amount of dust created and the amount of dirt tracked onto the public road network. Standard mitigation measures such as a water trucks to dampen the roads and reduce the amount of dust in the air, can also be considered to reduce dust levels.
  - Vehicles entering/exiting the site loaded with loose materials shall be covered which is to be checked at the weighbridge.
  - All vehicles are required to use the wheel wash before departing the site.
- Maintenance program for on-site access tracks to ensure safe access;
- Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas;
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage at any time;
- Sufficient car parking is to be provided on-site to ensure vehicles do not park on the surrounding road network;
- All car parking and loading areas to be designed in accordance with the relevant Australian Standard (2890 series) and Council requirements; and
- The gates to the site are to be closed to avoid public access.

4.6 Other Considerations

The following provides additional measures that should be adopted to minimise the impact of construction traffic along the road network:

- An induction process for vehicle operators and regular toolbox meetings;
- A complaint resolution and disciplinary procedure;
- Due to the location of the site, there is an inherent risk that adverse conditions may impact on the movement of transportation vehicles and transport of staff. Consideration for driving in the rain, fog, frost, icy conditions, bright sunlight and within/near a bush fire is required. The following mitigation measures are to be considered when travelling in adverse conditions:
  - Inspection of roads prior to using them to ensure that the road is safe. If there is black ice on the road, depending on the location, signage shall be installed and/or transportation movements will be stopped until it is safe to proceed;
  - Ban or restrict vehicle movements during periods where adverse conditions may impact on the operation of the road and the safety of workers and other road users;
  - Reduce the speed along the transportation route;
  - Provide additional warning for drivers on the road network;
  - Train and inform staff on how to drive in adverse conditions relevant to the site location;

  - Ensure that vehicles are fitted with equipment to assist them during adverse conditions (first aid kit, fire extinguisher) and that drivers are able to communicate to one another to either warn each other or call for assistance.

- The requirements of the TMP must be followed. The site manager will ensure that site inductions occur on a regular basis or as deemed necessary; and
- Include a detailed program to monitor and report on the effectiveness of these measures and the code of conduct.

4.7 Road Safety Audit

A Road Safety Audit was conducted for the site access which included the intersection of Hume Highway and Old Hume Highway. The Road Safety Audit identified a number of safety matters which have been addressed as part of a separate response. However, the following sections set out key mitigation measures to be adopted to ensure the site access arrangements operate in a suitable manner.

4.7.1 Upgrades to Site Access Arrangements

Following a Road Safety Audit completed by D-Tal it is proposed to upgrade the intersection of Hume Highway and Old Hume Highway. The upgrades to the intersection include the following:

- Provision of linemarking to delineate the existing right and left turn facilities in accordance with the initial design plans which have been included within Appendix A;
- Provision of a stop/hold line at the Old Hume Highway leg of the intersection; and
- Widening of Old Hume Highway leg of the intersection to allow simultaneous two-way vehicle movements for a 19.0 metre long Articulated Vehicle.

A swept path assessment for the vehicle movement at the intersection is provided within Appendix B which also demonstrates the associated widening of Old Hume Highway.

4.7.2 Access Restrictions

The Road Safety Audit identified that the median width within Hume Highway is not sufficient to accommodate a vehicle with a length greater than 19.0 metres for vehicles turn right from Old Hume Highway. As such, a maximum vehicle length of 19.0 metres is permitted on-site which is to be controlled on-site by a suitably qualified person. Any longer vehicles would require the suitable approvals from the relevant transport authority(s).

4.7.3 Road Safety

The Road Safety Audit identified that when truck drivers are turning right from Old Hume Highway and are propped within the Hume Highway median there is the potential for a truck turning right into Old Hume Highway to block the drivers view of oncoming vehicles. Whilst this arrangement is typical for intersections within the vicinity of the site along Hume Highway it is recommended that drivers be made aware of this hazard as part of their induction and advised to proceed with caution if this occurs.

4.7.4 Road Dilapidation Survey

Regular road dilapidation surveys of the turn facilities at the intersection of Hume Highway and Old Hume Highway and along the site access road are to be undertaken, in consultation with Council and TfNSW. The sections of the road are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to the site are to be rectified.

5. Monitoring and Review

5.1 Strategy for Promoting Marketing Actions

The Transport Management Group is to appoint a Transport Plan Coordinator to prepare a promotional and marketing strategy, including actions to support and drive the TMP. In particular, the key responsibilities of the Transport Plan Coordinator will include:

- Coordinating implementation efforts;
- Conducting surveys or other data collection processes to measure progress;
- Communicating the transport plan to stakeholders;
- Coordinating events to promote awareness of the plan and associated initiatives; and
- Coordinating marketing and promotional programs.

The Transport Plan Coordinator is also to be responsible for monitoring, reviewing and updating the TMP over time. It is likely that coordinators will require assistance from 'champions' to promote specific actions and encourage the uptake of initiatives.

5.2 Commitment of Resources

The establishment of a TMP is to include financial support and human resources to allow for implementation, monitoring, review and continual improvement of the TMP. The TMP will require funding to support implementation and should identify existing and additional resources required to successfully implement the plan. The Transport Plan Coordinator is to prepare an annual plan of financial commitment and resource allocation to be reviewed, considered and adopted by the Transport Management Group.

5.3 Monitoring and Review

Monitoring and reviewing a TMP is one of the most critical components of the process and sets out a systematic approach to measuring the impact of the TMP. It is crucial to understand whether and how the TMP is having an impact on road safety. The TMP will be reviewed yearly to track progress with regards to implementation of actions and achievement of goals.

An annual assessment will be undertaken to firstly establish a baseline level of performance. The results of successive assessments are to be maintained in the Appendices (Refer Appendix F) for continued progress monitoring and evaluation.

The results of this assessment, the monthly truck movement report, and incident/complaints reports will be published in an annual report to the Transport Management Group. It will detail progress against objectives and targets, and will seek to answer the following:

- Are the targets still realistic? Are they still ambitious? Should they be updated?
- Is the site struggling to achieve particular targets? What are the likely reasons for this?
- Are there any gaps with regards to actions?
- What is preventing further improvement on road safety, and how can this be addressed?

The annual report will identify any modifications to the TMP that are needed, such as revision of objectives or targets, or the addition or alteration of measures.

Initially, the Transport Plan Coordinator will be responsible for implementing the assessment however this will eventually become the responsibility of the Transport Management Group.

The steps outlined above should not be considered as a linear process, but rather an on-going cycle. Transport planning requires regular review and adjustment – a review may reveal the need to reconsider objectives or targets, or to add new actions to create greater incentives for the uptake of sustainable transport choices.

5.4 Governance Support

Governance support for the Transport Plan Coordinator is to be provided by the Transport Management Group. The group is in effect a "Board". It shall therefore comprise:

- Key persons with an interest in the business, its efficient and effective operation;
- To enable the implementation of measures that may require works on the site, the committee should also include representation from the landlord or property owner representative;
- To provide for the application of the TMP in an everyday operational sense, the Transport Plan Coordinator should ideally be a person with operational responsibility and/or interface;
- Specialist expertise may be incorporated within the committee, seconded as required or engaged in relation to specific tasks or undertakings.

The Transport Plan Coordinator or Management Group will be required to oversee the implementation of the actions of the TMP. These might not all be implemented at the same time but may be staged over time as appropriate. There may be some crucial actions that are implemented immediately, while others might take longer to plan and develop.

Before implementing actions, it is a key responsibility of the Transport Plan Coordinator to make sure relevant stakeholders are on board. For example, if the TMP involves reviewing company policies and proposing changes, relevant members of the senior management team will need to be on board to sanction and approve such changes.

6. Roles and Responsibilities

6.1 Key Personnel

The following outlines the roles and responsibilities for the TMP.

Table 2: Roles and Responsibilities

Role	Accountable Task
General Manager	Must ensure adequate resources are available to enable implementation of this management plan. Accountable for the overall environmental performance of the site, including the outcomes of this management plan. Ensure road design, construction and maintenance is undertaken according to licence requirements.
Environmental Advisor	Ensure the implementation of this management plan. Ensure all site personnel are competent through training and awareness programs. Ensure vegetation is minimised at the site access to maintain clear vision for driver's entering or existing the site. Report all crashes, near misses and complaints to the General Manager and in the Annual Review.
WHS Advisor	Investigate all crashes and near misses and develop corrective actions if necessary. Report crashes to regulatory agencies as required. Retain all reports for a period of no less than four years.
Personnel Driving Trucks	Abide by all sections of this management plan. Abide by the Driver's Code of Conduct
Supervisors	Report all crashes, near misses or reports of persons not complying with this Traffic Management Plan to the Environment Advisor and WHS Advisor.
All Personnel	Report anyone not complying with this management plan to their supervisor.

The following provides the contact details of key personnel at Bald Hill Quarry Pty Ltd, Jugiong.

Table 3: Contact Details

Position	Number
Quarry Manager	0418 188 562
Landfill Manager	0418 772 249
Work, Health, Safety and Environment Manager	0490 552 596
General Manager	0418 670 291
Office Number	(02) 6227 7817

6.2 Incident Reporting

Incident Reporting will be undertaken in the event of a crash, incident, near miss or complaint, and Bald Hill Quarry Pty Ltd will initiate an investigation. The incident will be reported as soon as practicable after Bald Hill Quarry Pty Ltd becomes aware of an incident and the subsequent investigation will be reported to the relevant departments within seven days of the initial report. The investigation will seek to determine:

- What occurred at the time of the incident;
- The root cause of the incident;
- Any contributing factors which led to the incident;
- Whether appropriate controls were implemented to prevent the incident; and
- Recommendations for corrective and/or preventative actions that could be implemented to reduce the likelihood of the incident reoccurring.

Incident investigations will be communicated to all personnel through toolbox meetings and/or company memorandums. If required, the Traffic Management Plan and/or Driver's Code of Conduct will be reviewed and amended.

6.3 Complaints Management

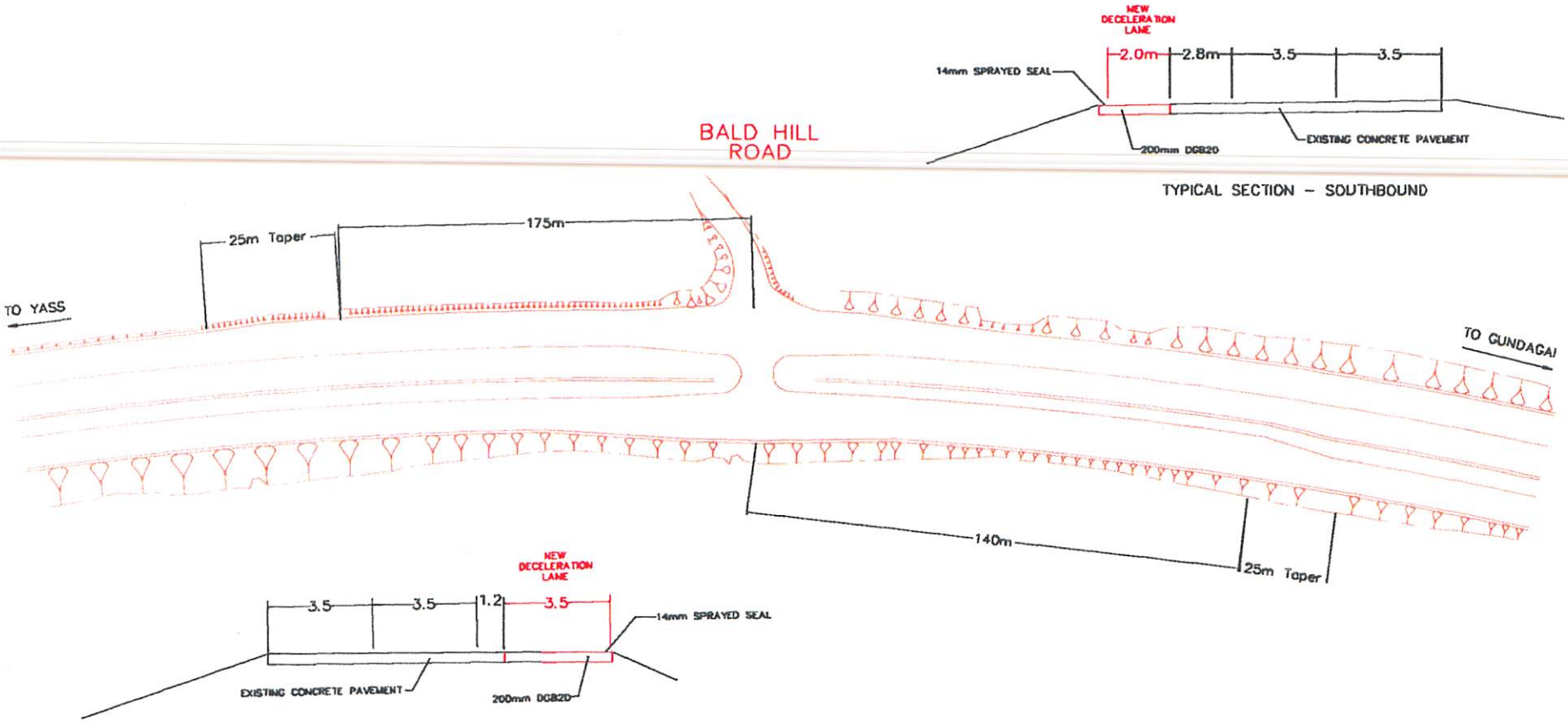
All complaints will initially be received by the on-site manager. On receipt of a complaint, the manager will:

- Contact the complainant.
- Complete a Community Complaints form to record:
  - date/ time
  - means of complaint (i.e. telephone, mail, email)
  - personal details
  - nature of complaint.
- Coordinate with appointed transport contractor and/or relevant contractors on potential corrective actions.
- Advise the complainant of the corrective actions and record these on the Community Complaints form.
- Complete the Community Complaints Register.
- If corrective actions cannot be implemented immediately, an incident report will be raised to manage the process.
- If appropriate, follow up with the complainant to review outcome of the implemented corrective actions.

Members of the community will be able to notify Bald Hill Quarry Pty Ltd with any complaints they may have on the following number (02) 6227 7817.

Appendix A

Hume Highway / Old Hume Highway Intersection Design



TYPICAL SECTION – SOUTHBOUND

TYPICAL SECTION – NORTHBOUND

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

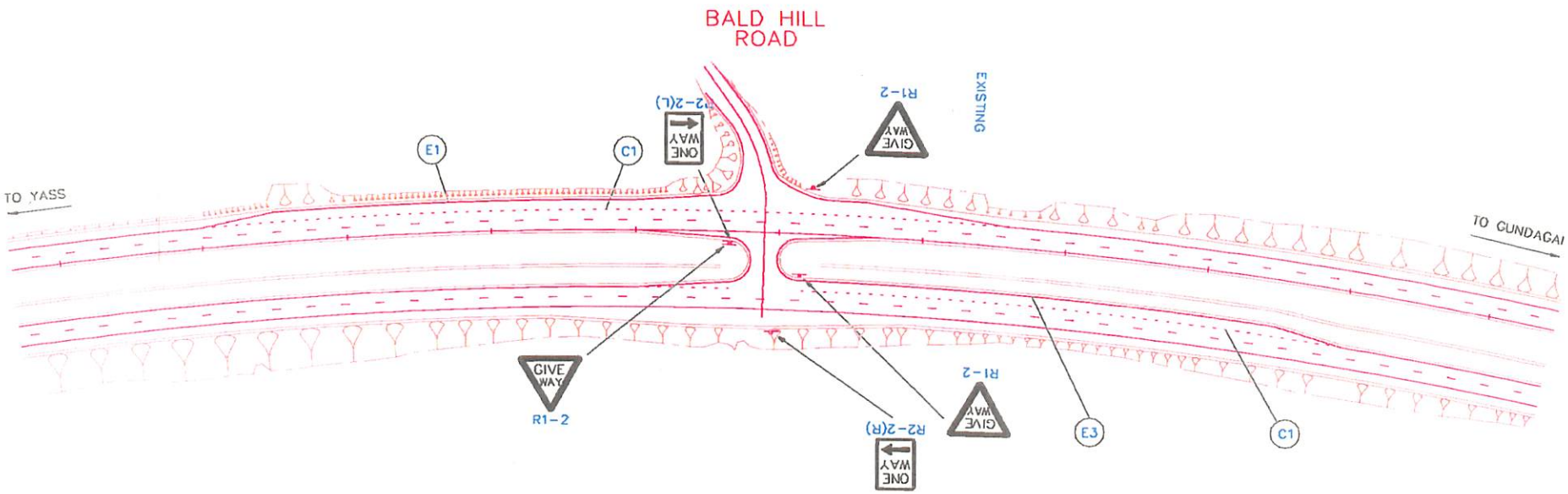
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BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Longitudinal Plan & Sections

DWG. No. / LOT No.	REV. No.
Sheet 1	A



1. Pavement Marking to be as per RTA Specification R141 & R142
2.

OPERATION CHECKLIST		INITIALS	DATE/S	NOTES
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	2. INSTALLED			
	3. CHECKED			

SCALE:	NTS
DRAWN	
CHECKED	
DATE	
HPR No.	

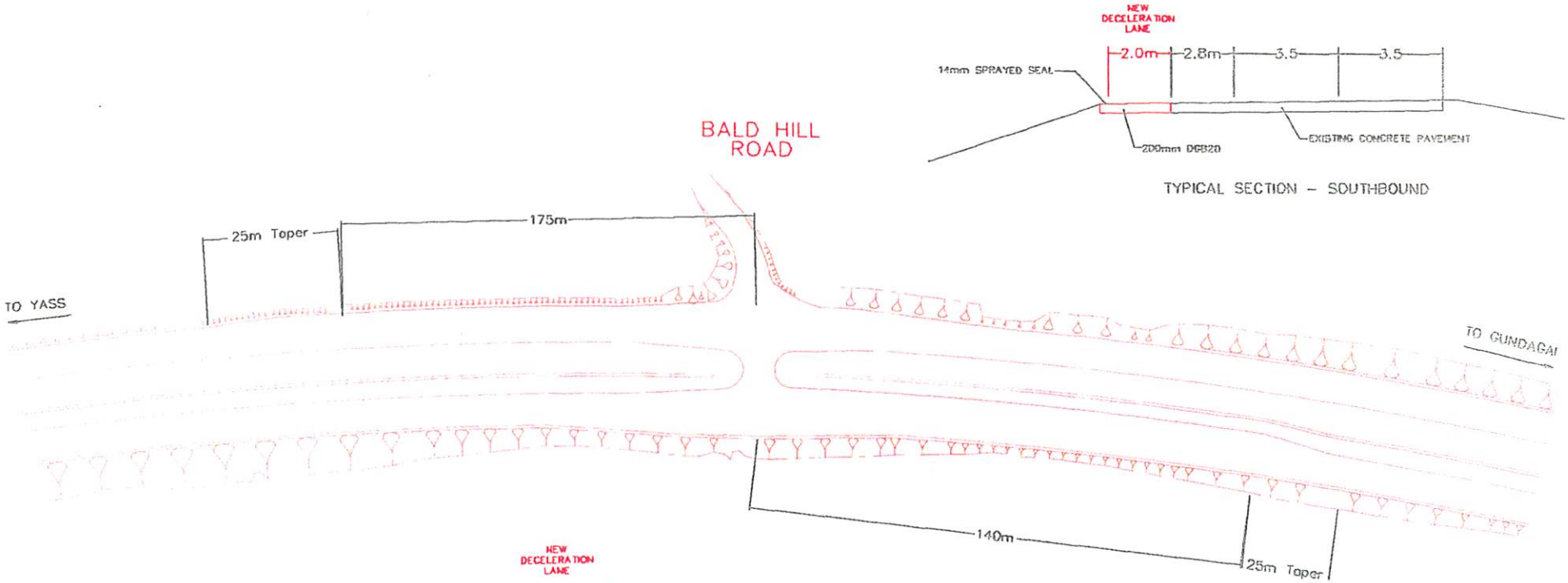
BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Pavement Marking and Signposting Plan

DWG. No. / LOT No.: Sheet 2

REV. No.: A



TYPICAL SECTION – SOUTHBOUND

TYPICAL SECTION – NORTHBOUND

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

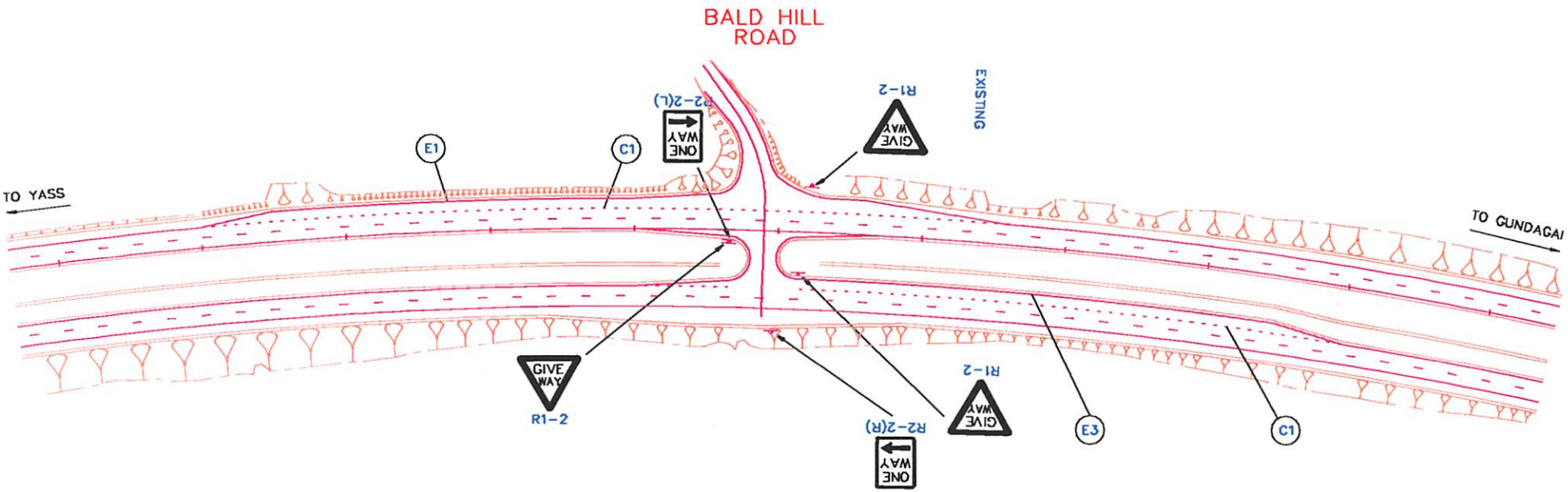
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DATE	
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BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

Longitudinal Plan & Sections

DWG. No. / LOT No.	REV. No.
Sheet 1	A



1. Pavement Marking to be as per RTA Specification R141 & R142
2.

OPERATION CHECKLIST	INITIALS	DATE/S	NOTES
1. VERIFIED			
2. INSTALLED			
3. CHECKED			

SCALE:	NTS
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DATE	
HPR No.	

BALD HILL QUARRY PTY LTD

BALD HILL QUARRY INTERSECTION

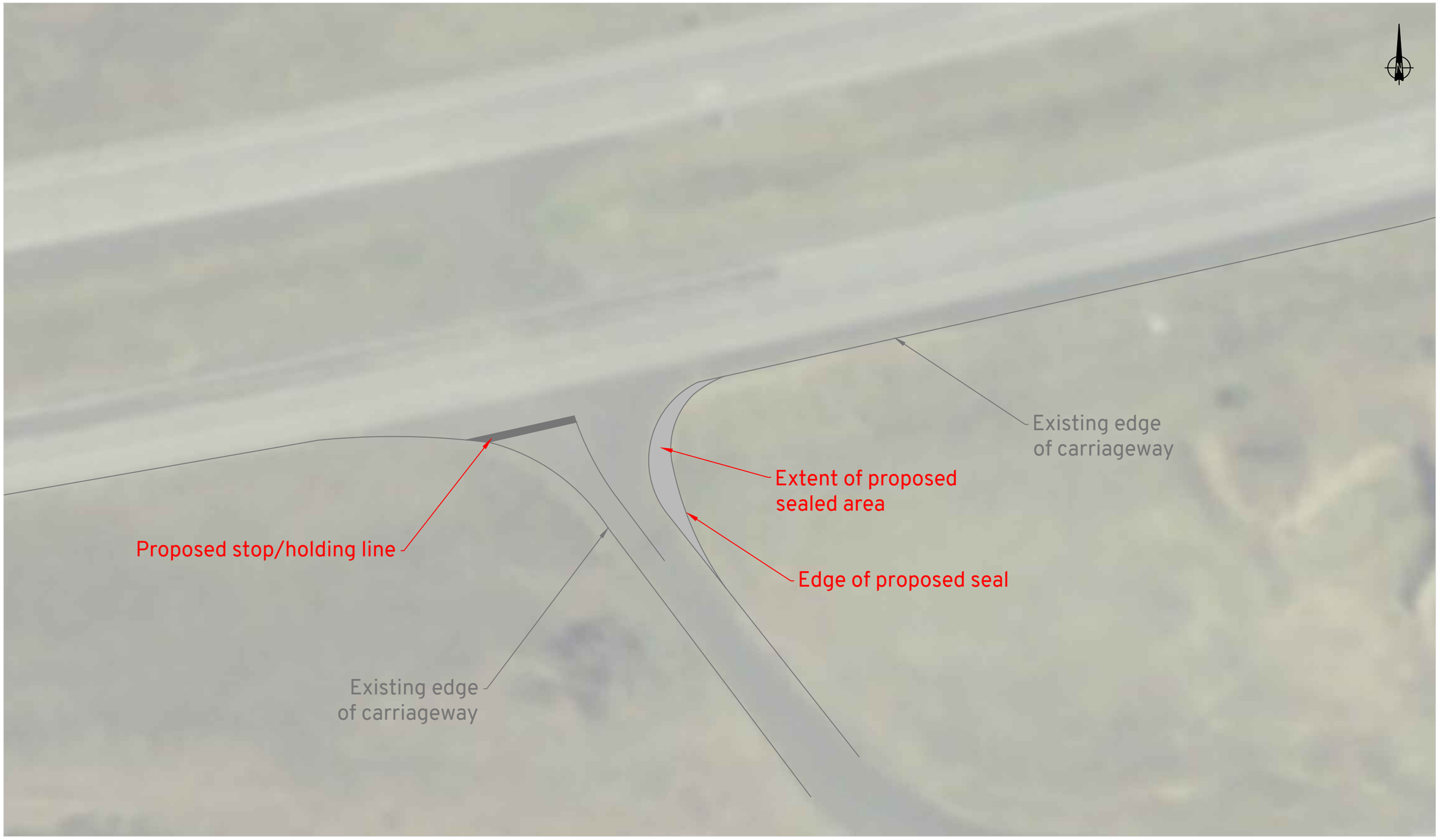
Pavement Marking and Signposting Plan

DWG. No. / LOT No.: Sheet 2

REV. No.: A

Appendix B

Hume Highway / Old Hume Highway Proposed Upgrades



Bald Hill Quarry Modification
Site Access / Hume Highway Intersection
Proposed Design - 19.0m Articulated Vehicle

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

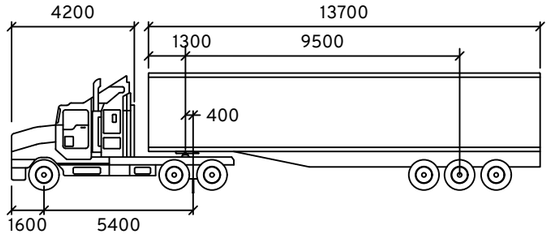
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

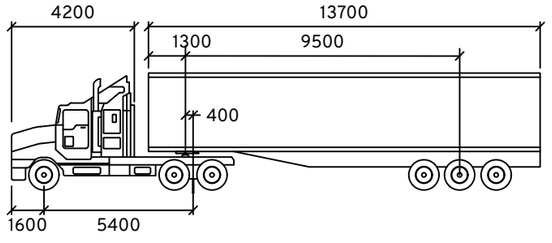
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Existing edge
of carriageway

Extent of proposed
sealed area

Edge of proposed seal

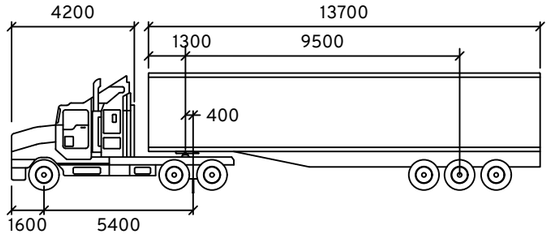
Proposed stop/holding line

Existing edge
of carriageway

Vehicle Envelope

300mm Clearance

AV



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 28.3
Articulating Angle	: 70.0

Bald Hill Quarry Modification

Site Access / Hume Highway Intersection

Swept Path Assessment

DRAWN: MW
DATE: 15/02/2021
SCALE: 1:500 @ A3
DWG NO: 119-S01B

Amber

Appendix C

Drive Code of Conduct

Drive Code of Conduct

This code of conduct will be communicated to all site workers during the site induction process. Workers will be reminded of the requirements of the code of conduct regularly in toolbox meetings.

Safe Driving Principles

The operators of all vehicles associated with the site would maintain a high level of awareness and respect for all other road users. All on-site staff will receive a site induction, which will include details regarding the TMP and this code of conduct. Regular toolbox meetings will be held to maintain awareness of required controls. Details of the traffic and access training and induction will focus on:

- Objectives of the TMP;
- Performance goals;
- Mitigation measures required to be implemented;
- Traffic and access monitoring and reporting requirements; and
- Incident investigation and response protocols.

Training is to be provided prior to start-up of any traffic and access related management tasks and updated if task, equipment or procedures are expected to, or have changed.

Primary Driver Code

The following requirements would be adhered to at all times:

- Obey all laws and regulations.
- Do not drive whilst under the influence of alcohol, drugs, nor any medication which may affect ability to drive.
- Be medically fit to drive at all times and must inform site coordinators if they have any medical condition which may affect their ability to drive.
- Drive in a considerate manner at all times and respect the rights of others to use and share the road space.
- Report all vehicle defects to their employer. Serious defects must be corrected immediately, or an alternative vehicle supplied.
- Any vehicle crash or incident resulting in injury or significant damage to property must be reported to the police.
- Report any near misses.
- Always adhere to the site working hours.
- Only drive the construction vehicle when conducting works related to the project.
- Securely fasten and cover loads, as appropriate.
- Keep their vehicle clean and in good mechanical condition to reduce the environmental impact.

- Extra care should be taken when driving at dawn or dusk, being particularly watchful for wildlife and/or livestock.
- Vehicles must give way to pedestrians, cranes, forklifts, mobile plant, emergency vehicles and livestock

The following provides further guidance as the required safety procedures for specific incidences:

- Drivers travelling to or from the site must do so safely, in full compliance with the law, including in respect of speed limits, following distances, forward sight when overtaking, being able to stop within the length of road visible (or half the length on roads without centrelines), and not driving carelessly or dangerously;
- Drivers to contact site manager or other authorised site representative when leaving the nearest town for traffic updates or notifications;
- When aware of any emergency vehicles, approaching from in front or behind, drivers must pull over well in advance to provide unimpeded movement;
- Drivers must reduce their speed and or stop in accordance with the law when passing a school bus which is slowing down, stopped, or accelerating in relation to picking up or setting down children;
- Drivers must reduce their speed in accordance with the law when:
  - Passing children walking, cycling or waiting on the side of the road;
  - Passing an oncoming school bus;
  - Passing someone riding or leading a horse along the road;
  - Approaching an area where a stock shift is known to be occurring.
- Truck drivers must not use engine brakes in built up areas, except where the load being carried and the grade of the road make use of such braking absolutely necessary for safe driving;
- Truck drivers travelling on school bus routes at the same time as an oncoming school bus to use their CB radio to identify the location of the bus and pull over in a safe location before the school bus reaches and passes them;
- Truck drivers are to let traffic behind them pass at regular locations including those opportunities that occur at intersections, wide driveways, sections of road with adequate forward sight distance, gravel pits etc.

The site operator is to develop and implement a maintenance program for the heavy transport vehicles that is consistent with these safety requirements.

Emergency Procedures

In the event of a breakdown, accident or road failure, the transporter crew shall do the following:

- Park the truck in locations where they maximise safety, considering overhanging components, and blind bends on approaches;
- Contact emergency services (including Police) as is appropriate in the case of an accident;
- Contact the project manager;
- Contact the Council or other road controlling authority as may be appropriate in the case of the incident;

- Contact the site manager to advise all other project traffic, and local traffic via CB radio as appropriate in the case of the incident; and
- Follow all instructions from Police and the road controlling authority.

In the case of an accident, the vehicles involved should not be moved until instructed by Police.

Heavy Vehicle Driver Fatigue

Fatigue is one of the biggest causes of crashes for heavy vehicle drivers. The Heavy Vehicle Driver Fatigue Reform was therefore developed by the National Transport Commission and approved by Ministers from all States and Territories in February 2007. The heavy vehicle driver fatigue law commenced in NSW on 28 September 2008 and applies to trucks and truck combinations over 12 tonne gross vehicle mass (however there are Ministerial Exemption Notices that can apply). Under the law, industry has the choice of operating under three fatigue management schemes:

- Standard hours of operation;
- Basic fatigue management; and
- Advanced fatigue management.

The Transport Management Group will be responsible to ensure all heavy vehicle drivers operating out of the site are to be aware of and understand the adopted fatigue management scheme and operate within its requirements, as included in Appendix D.

Maintenance Requirements

The operators of all vehicles associated with the site would maintain a high level of maintenance. The following requirements would be adhered to at all times:

- Ensure their vehicle complies with relevant State legislation in relation to roadworthiness and modifications;
- Undergo regular vehicle checks and maintenance; and
- Ensure their vehicles have correctly fitted mufflers to minimise noise disturbance.

Complaint Resolution and Disciplinary Procedure

All traffic related complaints will be managed in accordance with the Bald Hill Quarry Complaints Handling Procedure. A brief overview is described as follows, and all complaints will be collated via the following means and be responded within two business days:

- Phone: 02 6227 7817
- Email: jugiong@baldhillquarry.com.au
- Write: 5423 Hume Highway, Jugiong, NSW 2726

Failure to comply with these procedures for safe transport may result in disciplinary action. Disciplinary procedures shall include consideration of a requirement that a vehicle tracking system (with driver behaviour functionality) be installed in the vehicle of any project driver who is the subject of a credible complaint or identified breach of the road rules or the Transport Management Plan. Any subsequent breaches identified by the system shall result in disciplinary action.

Appendix D

Guidelines for Managing Heavy Vehicle Driver Fatigue

Guidelines For Managing Heavy Vehicle Driver **Fatigue**



These guidelines have been prepared to assist you to comply with the new road transport heavy vehicle driver fatigue laws that are likely to be implemented around Australia from 2008. They also promote compliance with general obligations to manage driver fatigue under current Occupational Health and Safety laws.

Following public consultation in the third quarter 2006 the draft guidelines and new laws were amended in response to feedback and the final documents were approved by Ministers of the Australian Transport Council (ATC) in February 2007.

NTC AUSTRALIA
National Transport Commission



Acknowledgments

The *Guidelines for Managing Heavy Vehicle Driver Fatigue* are based on the draft Fatigue Code of Practice for Heavy Vehicle Drivers prepared for the National Transport Commission (NTC) between 2003 and 2004. The draft Code of Practice was prepared through extensive consultation and the NTC thanks the many people and organisations from both government and non-government sectors for their efforts in progressing this important initiative.

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Design and editing: Adcore Creative 03 9662 3248

Disclaimer

This document describes the legal obligations of parties in general terms. The reader is advised to read this document in conjunction with the relevant legislation and, if necessary, take legal advice.

Guidelines for Managing Heavy Vehicle Driver Fatigue

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Title: Guidelines for Managing Heavy Vehicle Driver Fatigue

Address: National Transport Commission
Level 15/628 Bourke Street
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Type of report: Final report

Objectives: To provide guidance to all parties in the supply chain on the effective management of heavy vehicle driver fatigue.

NTC Programs: Fitness for duty, heavy vehicle driver fatigue

Key Milestones: Following public comment, the draft guidelines were revised as necessary, then considered by transport agencies in each State and Territory and the Commonwealth. This final version of these guidelines was approved by Australian transport ministers in February 2007.

Abstract: Heavy vehicle driver fatigue is a safety issue and is to be addressed by the national heavy vehicle driver fatigue reform which seeks to achieve consistency with current occupational health and safety legislation. The Guidelines provide guidance to all parties in the supply chain on the effective management of heavy vehicle driver fatigue

Purpose: Final report

Key words: Heavy vehicles, fatigue guidelines, fatigue, road safety, driver fatigue and fitness for duty

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Overview

Fatigue can affect a person's health, reduce performance and productivity, and can increase the chance of a workplace accident or road crash. Evidence also suggests that fatigued people are more likely to engage in risk-taking behaviour.

Importantly, fatigue may affect a person's judgment of his or her own state of fatigue. This means the effective management of fatigue should not be the responsibility of the driver alone. Employers, employees and all parties in the supply chain have a role in ensuring that any risks associated with fatigue are eliminated, minimised or controlled through the creation of an effective fatigue-management system. This can comprise a collation of associated fatigue management policies and procedures and may include a driver fatigue-management plan.

These guidelines are intended to assist drivers, employers, operators and schedulers, as well as users and customers of road transport to manage heavy vehicle driver fatigue through the creation of a fatigue-management system.

This will assist parties to meet their general duty to manage heavy vehicle driver fatigue under Occupational Health and Safety (OH&S) laws and the new road transport heavy vehicle driver fatigue laws. These new laws were developed by the National Transport Commission (NTC) in consultation with transport agencies and the road transport industry and unions.

Ministers of the Australian Transport Council (ATC) approved the development of the new laws in 2004. The final laws were approved by the ATC in February 2007, with implementation likely to occur from 2008.

The new laws will apply to trucks of greater than 12 tonnes gross vehicle mass and buses with 12 or more seats (9 seats in NSW) and will be implemented in New South Wales, Northern Territory, Queensland, South Australia, Tasmania and Victoria. This will enable a level of consistency with Western Australia, which already regulates fatigue management under OH&S law.

The new laws will include:

- a general duty in road transport law to manage fatigue, consistent with current OH&S laws;
- Chain of Responsibility provisions extending to parties in the supply chain whose actions, inactions or demands influence conduct on the road including drivers, operators, employers, directors and senior managers, loaders, schedulers, consignors and consignees (receivers), as well as agents of any of these parties;
- a much greater emphasis on opportunities for sleep and rest;
- strengthened record-keeping provisions, including replacement of log books with a new driver work diary;
- risk-based categorisation of offences and a revised range of sanctions;
- enhanced enforcement powers; and
- three fatigue-management options providing alternative drive, work and rest hour requirements with variable levels of flexibility in return for increased fatigue management and compliance responsibilities on operators and drivers.

These guidelines have been drafted to assist all parties to prepare for, and meet, the general duties to manage fatigue both under the new laws and in existing OH&S laws.

These guidelines explain the common factors that lead to fatigue and provide guidance for managing driver fatigue including some risk-management tools for use by different parties in the supply chain. Useful check lists for drivers to manage their fatigue are also provided and these can be used by other parties in the supply chain to meet their obligations.

Under existing OH&S laws, employers and employees are required to take all reasonably practicable steps to ensure safety in the workplace – including managing driver fatigue for employees and contractors. Similarly, the new laws will require all parties in the supply chain to take all 'reasonable steps' to ensure safety on the road by managing heavy vehicle driver fatigue.

Under this approach it will not be enough to just rely on the driver to comply with the law if there are other suitable steps that could be taken. Due to the many different modes of operation in the heavy vehicle industry and the many different factors that can influence how transport tasks are undertaken, it is very difficult to define 'reasonable steps' as it will depend on the options reasonably available to a particular business.

OH&S laws provide a framework for creating a fatigue-management system to assist all employers to meet their obligations for a safe workplace, and includes:

- implementation of a systematic process of hazard identification, risk assessment, risk control and review in the workplace;
- appropriate training, instruction and supervision, including induction and ongoing training for employees (including managers and contractors);
- consultation with employees and their OH&S representatives; and
- adequate record-keeping in relation to OH&S.

This framework is also suitable for use by all parties in the supply chain in order to meet their general duty to manage fatigue under the new laws.

While compliance with these guidelines is voluntary, all parties must take appropriate action to manage the risks of heavy vehicle driver fatigue in order to meet their obligations under both road transport and OH&S laws.

Businesses may use any reasonable method to manage driver fatigue, however, transport and OH&S regulators recommend that the suggestions for managing fatigue in these guidelines be followed by businesses unless better or equally effective methods of managing fatigue are used.

These guidelines may also be used by enforcement agencies and courts in determining whether reasonable steps have been taken to manage heavy vehicle driver fatigue under both the new laws and OH&S laws.

Further information will be available from transport agencies to assist various parties to understand their obligations to manage heavy vehicle driver fatigue. A range of Fact Sheets and Information Bulletins will also be available from the NTC website at www.ntc.gov.au

Industries are encouraged to develop more specific guidance through developing an Industry Codes of Practice tailored to the risks of that industry, in order to further promote compliance with fatigue and other safety-related laws.





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Part One Introduction

1.1 PURPOSE OF THESE GUIDELINES

The effective management of fatigue relies on more than just the driver. As such, these guidelines have been prepared to provide guidance to employers, employees and all parties in the supply chain to manage heavy vehicle driver fatigue – and in so doing, to achieve compliance with their specific and general duties in the new road transport heavy vehicle driver fatigue laws and Occupational Health and Safety (OH&S) laws.

Fatigue is a major cause of crashes involving heavy vehicle drivers, and the impact on families and the community is significant.

The new road transport heavy vehicle driver fatigue laws introduce revised drive, work and rest hours and introduce a new 'Chain of Responsibility' in road transport law to require all parties in the supply chain and their agents take all reasonable steps to manage the fatigue of heavy vehicle drivers. These changes will complement the general duty that already exists under OH&S law on all employers, employees and contractors to ensure safety in the workplace by managing fatigue.

Merely adhering to prescribed drive, work and rest hours and completing work diaries/logbooks may not be enough to comply with the general duties under OH&S laws and the new laws. Good fatigue-management practices encompassing a fatigue-management system with a systematic risk-management approach is also essential.

The fatigue-management measures suggested in these guidelines provide a foundation for complying with the general duties, but the steps that need to be taken will depend on the nature of the specific business operations and the level of fatigue risk involved.

The measures may need to be modified in relation to specific circumstances, as these guidelines cannot anticipate all possible situations in which fatigue has to be managed. For example, what a short-haul operator may do to effectively address a certain type and level of risk may not be the most appropriate or effective course of action for a long-haul operator facing similar risks.

1.2 SCOPE OF THESE GUIDELINES

These guidelines provide important information and guidance on:

- fatigue – its effect, its causes, and ways to reduce it;
- creating a fatigue-management system to manage risks – steps and factors to consider;
- meeting Chain of Responsibility obligations under new heavy vehicle driver fatigue laws on all parties in the supply chain whose actions, inactions or demands influence conduct on the road including drivers, operators, prime contractors, employers, directors and senior managers, loaders, schedulers, consignors and consignees (receivers); and
- current obligations under OH&S laws.

These guidelines are designed to assist all parties in the supply chain, including their agents, to create a fatigue-management system to help them comply with their obligations to manage heavy vehicle driver fatigue when using trucks greater than 12 tonnes gross vehicle mass and buses with 12 or more seats (9 seats in NSW).

By managing fatigue you help to protect the safety of workers and all other road users – and ensure compliance with your obligations under road transport and OH&S laws. There are also other major productivity and efficiency benefits that may be achieved by effectively managing fatigue.

It is important to recognise that fatigue may arise because of the actions or inactions of anyone in the supply chain. Figure 1 illustrates some of the points at which actions along the chain can have 'knock-on' effects for other parties.

Further information will be available from transport agencies to assist various parties to understand their obligations to manage heavy vehicle driver fatigue. A range of Fact Sheets and Information Bulletins will also be available from the NTC website at www.ntc.gov.au

Industries are encouraged to develop more specific guidance through developing Industry Codes of Practice, tailored to the risks of that industry, in order to further promote compliance with fatigue and other safety-related laws.



Figure 1: Examples of weak links in the supply chain

Consignor Weak Links
Inflexible pick up and delivery times
Commercial pressures more important than fatigue consequences for specific trips

Consignors need to be aware of their obligations not to make unreasonable or unrealistic demands on operators or drivers.

Operator Weak Links
Poor scheduling/rostering
Poor management practices
Inadequate training
Inappropriate vehicle for the job

Operators need to plan the transport task to minimise fatigue through a regular risk-assessment process.

Driver Weak Links
Not following Fatigue Management Procedures or Trip Plans
Family demands
Use of alcohol and other drugs
Poor fitness for duty

Drivers need to follow fatigue management and trip procedures that have been designed to reduce safety risk associated with fatigue.

Receiver Weak Links
Delays resulting from loading and unloading arrangements
Poor queuing of heavy vehicles
Lack of amenities for waiting drivers

Receivers need to ensure their operations do not create additional fatigue risks by delaying drivers or setting unrealistic delivery times.

This diagram illustrates some examples of weak links in the Chain of Responsibility. All parties in the supply chain should review their role to ensure they are not the 'weak link'.

1.3 STATUS OF THESE GUIDELINES

These guidelines apply to all parties in the supply chain, including their agents, and provide guidance on how these parties can meet their general duty to manage fatigue under current OH&S laws and under the new road transport heavy vehicle driver fatigue laws.

These guidelines explain common hazards and set out a range of processes and practices for managing fatigue. These include methods of identifying, assessing and controlling fatigue risks, and steps to develop and maintain an effective fatigue-management system.

These processes and practices provide a basis for all parties in the supply chain to work out how they might manage fatigue in their business, although the exact measures will depend on their specific situation, as a 'one-size-fits-all' approach is not suitable. Parties should refer to these guidelines unless a better or equally effective method of minimising fatigue can be demonstrated.

While compliance with these guidelines is voluntary, all parties in the Chain of Responsibility must take all reasonable steps to manage the risks of driver fatigue.

These guidelines provide guidance to parties on how to meet their obligations under OH&S laws and the new road transport laws to take all reasonable steps. These guidelines may also be used to assist enforcement agencies and courts in determining whether OH&S and road transport duties have been satisfied.

Ministers of the Australian Transport Council (ATC) approved the new laws in February 2007 and these are likely to be implemented from 2008 in NSW, NT, QLD, SA, TAS and VIC. Western Australia already regulates driver fatigue management, consistent with many of the new laws, under OH&S law. While there may be some minor differences from State to State, anyone seeking to ascertain their legal position should contact their local transport agency for information.

By following these guidelines, parties can prepare for the new laws and in so doing, will meet their duties under OH&S and insurance laws as explained in Section 1.4.



1.4 LEGISLATION

1.4.1 New road transport heavy vehicle driver fatigue laws

The new road transport heavy vehicle driver fatigue laws have four key components outlined below.

(i) A general duty on all parties in the supply chain under the Chain of Responsibility laws to take all reasonable steps to manage driver fatigue, complementing the general duty already in OH&S laws.

(ii) Changes to driving hours place a greater emphasis on opportunities for sleep and rest, the 'body-clock' influences, and the cumulative nature of fatigue.

There are three components:

- a Standard Hours option – a default option prescribing minimum rest and maximum working hours;
- a Basic Fatigue Management option (BFM) – allowing additional working hours while imposing increased fatigue management and compliance responsibilities on operators; and
- an Advanced Fatigue Management option (AFM) – allowing more flexible working hours based on risk management, alternative compliance and quality assurance approaches. Operators will need to adhere to agreed standards and operating limits in return for more flexible working arrangements defined by the regulatory agency according to the operator's specific fatigue risks and fatigue-management system.

(iii) Strengthened record-keeping provisions and replacing logbooks with a new driver work diary.

(iv) Risk-based categorisation of offences, revised range of sanctions, and enforcement powers.

Contact your local road transport agency or your industry association for further details.

1.4.2 New obligations under the Chain of Responsibility

The Chain of Responsibility concept recognises that fatigue may happen because of the actions or inactions of members of the supply chain. These parties include drivers, operators, schedulers, loaders, unloaders, loading managers, prime contractors and consigners including any agents of these parties. Under this concept, parties share responsibility to manage driver fatigue and cooperate and consult with each other to address fatigue risks.

Under the Chain of Responsibility parties in the supply chain must take all reasonable steps to check:

- the fatigue-management option under which the driver is operating;
- the accreditation details of the operator, if applicable;
- that the driver is complying with relevant work, rest and speed limit requirements; and
- that the driver is not impaired, or likely to become impaired by fatigue.

In addition, if a driver breaches their work and rest requirements, under the Chain of Responsibility all other parties in the supply chain can also be held liable unless they can show that they have taken all reasonable steps to prevent the offence. It is irrelevant whether or not they knew about the offence or intended that it occur. Drivers will continue to be held liable even if another party in the supply chain is found guilty.

Under the general duty to manage driver fatigue, all parties must also ensure they do not breach the general duty by their demands, actions or inactions. This includes for example:

- drivers properly managing their work and rest and not driving if fatigued;
- ensuring trip schedules have sufficient flexibility and are reasonable;
- maintaining effective loading practices; and
- ensuring that commercial requirements do not require a driver to break the law (e.g. driving excessive hours or speeding to meet a deadline).

The new law also makes it illegal for any person to make a reckless or negligent demand that they know, or reasonably ought to know, will lead to breach of the law.

Many influences on schedules and rosters flow from the decisions and requirements of other parties in the supply chain. It is unlikely to be enough to simply require in contracts that operators and drivers meet their legal obligations in order to prove that all reasonable steps have been taken where other steps are reasonably available.

All parties in the supply chain should work together to manage fatigue. Parties may adopt practices such as:

- implementing ongoing consultative mechanisms to identify and effectively control fatigue risks;
- developing clear contractual obligations that do not contribute to fatigue;
- providing training and implementing procedures to empower drivers to refuse unreasonable requests; and
- implementing ongoing operational reviews to identify practices that contribute to fatigue, develop improved practices and ensure that relevant parties are advised if existing practices are contributing to fatigue, such as:
  - inflexible delivery times and unloading times;
  - poor management of truck queues; and
  - inadequate equipment and/or resources to load/unload trucks.



1.4.3 Existing obligations under Occupational Health and Safety Law

OH&S laws in all Australian jurisdictions place a general duty on employers to provide a workplace and systems of work that are safe and healthy. OH&S laws require employers to:

1. implement a systematic process of hazard identification, risk assessment, risk control and review in all systems of work (references to "health" includes risks to psychological health)
2. monitor the health of employees
3. ensure that employees, including managers and contractors, receive appropriate training, instruction and supervision, including induction and ongoing training
4. obtain appropriate information to manage risks
5. consult with employees whose work is directly affected by decisions or changes in the workplace, and their OH&S representatives
6. implement and review control measures over time
7. keep adequate records in relation to OH&S.

Under these duties, parties must take all reasonably practicable steps to manage fatigue.

Maintaining a safe workplace is a shared responsibility of employers and employees. For example, heavy vehicle drivers have a legal duty to take reasonable care for their safety at work and cooperate with their employers in meeting their obligations. Employers owe a duty to protect the safety of all employees, including contractors.

These guidelines represent part of the 'state of knowledge' in OH&S law for managing heavy vehicle driver fatigue – assisting parties to comply with their obligations to manage fatigue under OH&S laws as well as road transport laws.

1.4.4 Other obligations and benefits

Effectively managing heavy vehicle driver fatigue may also provide other benefits in addition to compliance with road transport and OH&S laws, including:

- minimising the risk of negligence claims, for example, resulting from unintentional safety breaches that cause a vehicle crash;
- satisfying insurance obligations, for example, the obligation under the *Insurance Contracts Act 1984* that requires disclosure to the insurer of all reasonably foreseeable risks;
- productivity gains, for example, through minimising avoidable losses that may result from driver fatigue; and
- generating commercial opportunities, for example, by showing the ability to manage compliance, thereby reducing exposure of customers and suppliers under the Chain of Responsibility.



Part Two Understanding Fatigue

Fatigue is an acute or ongoing state of tiredness that affects employee performance, safety and health, and requires rest or sleep for recovery.

Key risks resulting in fatigue are poor understanding about the factors leading to fatigue including poor communication and consultation between parties in the supply chain. Managing fatigue is the shared responsibility of all parties in the supply chain and requires commitment from all parties to manage the risks. This requires genuine and open consultation and communication and increased understanding by all parties.

This section (Part 2) provides guidance on what constitutes fatigue, common contributing factors, and details on methods that may be used to control fatigue. This material should be consulted when using the risk-management approach described in Part 3.

2.1 EFFECTS OF FATIGUE

Fatigue is more than falling asleep at the wheel. Fatigue describes the feeling of being tired, drained or exhausted. It causes poor judgment, impaired coordination and slower reactions, and impacts on how well you work. It builds up, leading to a progressive loss of alertness that ultimately ends in sleep and is a major contributing factor in many road crashes. The effects of fatigue include:

- **Loss of Alertness** – when you respond more slowly to things as they arise. Loss of alertness is an early sign of fatigue and may result in less efficient vehicle control (e.g. changing gears, finding it hard to drive inside the lanes, or finding it hard to maintain a constant speed).
- **Poor Judgment** – before drowsiness sets in, fatigue affects the ability to think clearly, which is vital when making safety-related decisions and judgments. Someone who is very fatigued may not realise how fatigued they really are. As a result, fatigued people are unaware that they are not functioning as well or as safely as they would if they were not fatigued.
- **Drowsy Driving** – drowsiness means feeling sleepy, but not actually being asleep. When drowsy, a driver may actually drift in and out of sleep occasionally without knowing it (micro sleep). Drivers have been studied when drowsy and found to be asleep for 3 to 5 seconds – or as long as 15 seconds. Travelling at 100 kilometres per hour can mean 100-300 metres of travel and plenty of time to run off the road.
- **Falling Asleep at the Wheel** – this happens in a number of crashes, typically very severe single vehicle crashes where there has been no attempt by the driver to control the vehicle. Often the driver was completely unaware of events before the crash.
- **Poor Memory** – being fatigued will also affect your memory. For example, drivers may have travelled a significant distance without knowing it. This is directly related to loss of alertness.
- **Mood Change** – being fatigued can also make you irritable, agitated, aggressive and poor company. You start to overreact to things including those that wouldn't normally upset you.

> Driving is a complex mental and physical task requiring sustained levels of concentration and skill to maintain maximum performance. No driver can afford to be fatigued nor can anyone else afford a driver to be fatigued.

2.2 CAUSES OF FATIGUE

2.2.1 Time of day – body-clock factors

The body has natural rhythms that are repeated approximately every 24 hours – this is called the 'body clock' or the circadian rhythm. The body clock regulates sleeping patterns, body temperature, hormone levels, digestion and many other functions, and helps conserve resources. When the body clock is out of 'synch', effects such as jet lag result.

The body clock programs a person to sleep at night and stay awake during the day. Body temperature drops during the night resulting in sleepiness and rises during the day to assist in feeling alert. At night the digestive system slows (because individuals are less likely to be eating) and hormone production rises to repair the body.

The body clock is controlled partly by light and dark and partly by what activities are undertaken. When working normally from 9 am to 5 pm, things that happen as a result of your body clock include:

- morning light tells the body clock to be more alert;
- after lunch (siesta time) the body clock will turn alertness down for a couple of hours;
- alertness is heightened in the late afternoon and early evening;
- darkness at night tells the body clock to turn alertness down again to get ready to sleep; and
- after midnight, body temperature and alertness decrease to their lowest level.

2.2.2 Sleep factors

The optimum amount of required sleep varies. The average daily sleep required for an adult generally varies between 6 to 8 hours. People who have less sleep than necessary will incur a sleep debt. This 'sleep debt' builds up for each day you don't have enough sleep.

The best time for good quality sleep is in the early morning hours (midnight to 6 am). Unless a driver is on night shift, it is best to try to sleep during this period. It is important that all parties in the supply chain recognise that drivers working irregular hours or shift work are routinely exposed to conditions that reduce the amount and quality of their sleep.

It is not necessary to repay every hour of sleep debt immediately. However, if a sleep debt is not properly managed, driving performance could be as poor as if the legal alcohol limit was exceeded.

> Sleep debt is like a bank loan – you have to pay it back.

Every day that sleep is insufficient, a driver is more fatigued and therefore more dangerous. Fatigue will also build if sleep is lost over consecutive days as the effects of fatigue are cumulative.

It is not possible to just sleep and drive, and drive and sleep. Sleep time should not be shortened to fit in daily living activities such as washing, eating and domestic tasks. Drivers and schedulers must take this into account and include adequate time for sleep as well as other domestic and recreational activities.

> Time is needed both for sleep and other domestic activities.

Short-term measures such as taking naps can help compensate for lack of sleep but remember that naps are not a substitute for continuous sleep and that after a nap it can take some time to wake-up completely and get over the sleep inertia.

2.2.3 Health factors

There are some general health tips and lifestyle choices that will ensure safer driving – with many other benefits. However, the following are a number of health factors that can prevent a driver from getting a good long sleep.

Although most people over 50 years snore at night sometimes, for a few it is a serious problem. Sleep apnoea occurs when the windpipe collapses during sleep so that too little air reaches the lungs, resulting in frequent waking due to oxygen starvation. The condition is treatable.

A further problem is falling asleep during the day with no obvious sleep problem at night. This condition is called narcolepsy, and can be treated.



Some people also suffer from restlessness at night that keeps them awake. They find their legs keep moving or twitching. This too is treatable.

Some illnesses such as diabetes, if not controlled, can also result in fatigue. Again, this can be treated.

Being overweight or obese is not usually regarded as an illness. However, obesity can cause sleep problems and strongly contributes to sleep-disordered breathing (apnoea). Also, being overweight does cause other problems including medical sleep problems.

Tiredness and drowsiness after sufficient sleep may indicate a medical problem. It is recommended you seek medical advice.

Ongoing fatigue and stress can also contribute to serious long-term health effects such as cardiovascular disease. It makes sense to have regular health checks so these illnesses and medical problems can be diagnosed before they make drivers unsafe, unable to do their job or worse.

- Effect of alcohol, other drugs and stimulants

The effect of alcohol on people is very similar to fatigue. After consuming alcohol the only way to reduce its effect is to allow time. Large amounts of alcohol before bedtime will reduce the quality and amount of sleep a person can have.

Many drivers smoke cigarettes in the belief that it helps keep them alert, however this increases the risk of many diseases such as heart disease and lung problems.

There is a temptation to take stimulant drugs to manage fatigue but this is not recommended. These drugs have many side effects resulting in increased fatigue and can cause long-term effects on health including problems such as high blood pressure and other cardiac problems.

Caffeine and other related stimulants can have the effect of perking up an individual for a short amount of time. If you have caffeine all the time your body adapts to it so it has less effect. Whether it is coffee, tea, chocolate, cola drinks or perhaps something stronger, caffeine is a stimulant. But too much can be a problem.

Too much caffeine can stop a person from sleeping when they want to, as well as reducing the quality of their sleep. It can also cause digestive, cardiac and other problems, including headaches. Caffeine dehydrates the body, which is a serious problem when driving. And, if you are very fatigued, caffeine won't help you – only sleep will.

- Benefit of diet and exercise

Good health and fitness will assist in addressing issues associated with fatigue.

Exercise and a good diet will help drivers to be fit for work, assisting in alertness and better sleep. Exercising for 30 minutes a day, even in three 10 minute periods, can significantly improve health and reduce weight. Just walking or jogging instead of using the car for short trips is beneficial.

During a break from driving, walking is good exercise. As a driver, the health of your back is vital to your livelihood, so look after it by stretching, flexing regularly and lifting properly.

Unlike some other types of work, driving requires drivers to be alert and attentive all of the time. This depends on the work being done but also on what drivers have done on the days prior to driving. Drivers need to be ready to drive/work at all times when at work. This is commonly called 'fitness for duty'. Drivers need to be aware of the impact some types of activities may have on their fitness for duty such as a second job, recreational activities, sport, insufficient sleep and any stress-related situation.

Employers and all parties in the supply chain also have duties to ensure that drivers are fit for work – and drivers have a similar obligation.

A healthy diet and regular exercise will reduce weight and improve your fitness. Nutritionists recommend the following:

- breads and cereals: (4-5 servings daily) such as rice, pasta, bread and cereals;
- vegetables and fruit: (at least 4-5 servings daily) of fresh, frozen or canned fruits and vegetables;
- meat and meat substitutes: (1-2 servings daily) of lean beef, lamb, veal, chicken or pork (grilled rather than fried)
- milk or dairy products: (3-4 servings daily) of milk, cheese or yoghurt;
- fats: butter and margarine: (maximum of 1 tablespoon daily) of butter or table margarine; and
- fish: (preferably 1 serving daily) minimum of 2 servings per week.

The quantity of food consumed can also affect sleep. It is bad practice to eat a heavy meal before going to bed. Plan to eat no less than 3 hours before going to sleep.

Further detailed guidance on Fitness for Duty matters including sleep disorders can be found in *Assessing Fitness to Drive*, Austroads 2003 available at **www.ntc.gov.au**.



2.2.4 Work factors

In addition to those matters that can be controlled by a driver, actions or inactions by other parties in the supply chain can contribute to driver fatigue. In a recent survey of drivers[1], the key factors that contribute to fatigue are:

- long or excessive hours;
- unreasonable transit times or deadlines; and
- inflexible time slots, problematic loading and distribution.

Long working hours have been cited in driver surveys and in research as a major fatigue risk. While some drivers still drive hours in excess of legal limits, fatigue can still be a problem even within the legal limits, and the risk of long working hours must be properly managed.

Table 1: Check list of warning signs

Most people who have a sleep debt don't realise they are tired, so drowsiness can creep up on them. It is time to pull over for a nap or a break if any of the following is experienced.
trouble keeping your head up
wandering, disconnected thoughts – day dreaming
eyes close for a moment or go out of focus
eyelids droop
inability to stop yawning
inability to remember driving the last few kilometres
drifting over the centre line or onto the gravel at the side of the road
not noticing signs and hazards early enough
missing your exit
missing gear changes
starting to see things that are not there
approaching corners too fast
poor steering or braking too late
changing speed without noticing

1: SA WorkCover, Fitness for Work in the SA Heavy Vehicle Transport Industry, November 2004.



Unreasonable schedules increase the risk of fatigue by failing to allow drivers to take necessary rest breaks or failing to provide for reasonably expected delays. Actions of heavy vehicle customers, such as those regarding delivery deadlines, can place unreasonable demands on drivers and increase driver fatigue. In turn, delays in loading or unloading further increase fatigue risk.

Unsafe and unsuitable workplace conditions are a contributing factor to fatigue. Good vehicle design and depot facilities will assist drivers in reducing the effects of fatigue. Vehicles must comply with Australian Design Rules covering such things as ventilation, seating suspension and sleeper berths. Another factor that can contribute to driver fatigue is the time necessary for a driver to travel to and from work.

It is important that all factors are identified and that parties in the supply chain are reminded of their responsibilities.

2.2.5 Two-up driving

Two-up driving, when managed properly, can be an effective form of driving in long-haul operations. This is because a driver is able to rest when fatigued while the vehicle is still moving.

The safety of two-up driving depends though on whether a driver is able to work well with their driving partner and gain restorative rest.

Issues to consider when scheduling two-up driving include:

- drivers need to be capable of sleeping in a moving vehicle;
- drivers must be confident in the ability of the co-driver or the quality of rest may be lower;
- the sleeper berth needs to be compliant with the standard in the new laws;
- whether a sleeper berth requires better insulation and if it should be fitted with independent air-conditioning;
- allowing drivers to volunteer for two-up driving with the capacity to select their driving partner;
- drivers should share the driving to best fit each other's body clock e.g. is particularly important at night;
- if possible try not to have drivers participate in loading/unloading if they are undertaking ultra long trips; and
- match new two-up drivers with a more experienced driver for a probationary period involving a number of trips as a team. The experienced driver should provide feedback on the new drivers' skills, attitude and 'behaviours' and if the new driver is able to sleep well in a moving vehicle.

2.3 WAYS TO REDUCE FATIGUE

2.3.1 Listen to and plan around the body clock

No matter whether adequate sleep is achieved or not, there are high points of alertness and low points when one feels drowsy, or wants to sleep. Consider the body clock in scheduling breaks for rest or naps. Also explain to families and friends how important sleep is and avoid parties, etc. if occurring at times when you need sleep.

Employers must provide the opportunity for necessary sleep and ensure that drivers get off the road when feeling drowsy. Drivers should ensure they have enough sleep to cancel the debt and don't drive if feeling drowsy.

Most passenger and freight schedules will hinge on pick up and delivery times and dates. All parties in the supply chain equally share the responsibility for trip planning. Plans should include time for sleep, food and rest, including time for naps if needed and take into account possible delays. The driver must have the flexibility to adjust the schedule if circumstances change.

The likelihood of falling asleep when the body clock is set to 'sleep' is very much higher than at other times in the day and the associated risks must be considered by employers and other parties in the supply chain when setting schedules and agreeing to contracts. The risk also increases as sleep debt increases, so schedules need to take this into account.

Develop and maintain a regular routine that provides for sleep, meals, daily living and time off. This will improve sleep quality and alertness when awake.

Learn, plan and use counter-measures to better manage driver fatigue:

- set schedules so that wherever possible, drivers can take a power nap if starting to feel tired;
- take a nap before the start of a shift to help prevent fatigue;
- use rest breaks to maximise the quality of rest;
- combine short rest breaks with exercise;
- drink plenty of water and eat sufficient fresh food including fruit and vegetables; and
- even with adequate sleep, a monotonous trip can make us less alert – mental games and habits can be developed to help keep alert.

If early signs of drowsiness are ignored, micro sleeps may be experienced, resulting in loss of control of the vehicle leading to the vehicle running off the road or into an oncoming vehicle. Once fatigue sets in, the best counter-measure is sleep.

2.3.2 Obtaining good sleep and taking naps

The actual amount of sleep needed by each person varies and this needs to be considered by drivers and all members of the supply chain. Similarly, how to have a good sleep is an important consideration. Avoid stimulants – they are not the answer to fatigue as they only delay sleep.

To obtain good quality sleep and manage the risks associated with the quality of sleep…

- at home, a motel or driver quarters:
  - find the best room temperature to fall asleep (it will probably be between 18 & 22°C);
  - turn down your phone volume (or turn it off); wear earplugs; ask the family to be quiet;
  - if using a motel room, select one away from the road;
  - hang extra thick curtains; wear eye shades; and
  - have sufficient sleep before commencing driving/ working.
- on the road:
  - find a quiet truck bay and use dark curtains and liners to keep out light;
  - make sure your sleeping berth is well-ventilated;
  - take eye shades and earplugs with you;
  - turn off your mobile phone and radios;
  - take time to change out of your work clothes as you would at home; and
  - drink plenty of water.

If you are having trouble sleeping seek medical advice and remember regular health checks are important. It is important that drivers are aware of any sleep disorder or other medical condition that could affect their ability to drive safely.

> The best time to sleep is when you feel the onset of tiredness.

Short breaks are an important means of addressing driver fatigue and in addition to the short breaks specified in the new laws; additional breaks should also be taken when necessary. Naps should not be seen as a weakness as it is good fatigue management. Naps can be very effective in providing short-term relief, but they are only a temporary measure and not a substitute for continuous sleep. When driving, remember to:

- be prepared to take breaks when most needed;
- avoid extreme temperature and take breaks where relief from temperature is available;
- use short breaks to stretch and walk; and
- try and maintain some simple exercise routines between driving shifts.

Naps are a short-term answer to fatigue if it occurs, so those in the supply chain should plan the work and rest so that naps are not usually needed. If fatigue does occur however, a nap can help decrease fatigue.

The effectiveness of naps will depend on the time of day they are taken and how fatigued the driver is. Naps are most effective if taken before a driver is fatigued. However, if experiencing overwhelming sleepiness, stop and obtain adequate sleep as soon as practical. Naps should only be taken as a last resort in these circumstances. Consider the following points when napping;

- a minimum of a 10-minute up to 30-minute nap should be adequate to reduce the effects of fatigue;
- if a longer nap is needed, allow up to 80-90 minutes so that waking should occur during a shallower sleep;
- consider taking a nap before a long drive to help prevent fatigue developing during the drive;

- plan and schedule naps and ideally take advantage of facilities to coincide with natural drowsiness in the afternoon (2-4 pm) or during the hours of midnight to dawn if a night driver;
- sleep occurring when we are designed to be awake (e.g. late morning and the middle of the day) tends to be shorter and more fragmented and therefore less restorative;
- after naps taken during normal sleep hours, particularly the period between midnight and around 6 am, it can be hard to get going again. It may be better to have a nap slightly earlier in the evening; and
- build in a 'wake-up' period to get going again.

For more information on naps you can download the *Guidelines for Using Napping to Prevent Commercial Vehicle Driver Fatigue (2006)* from the NTC website at **www.ntc.gov.au.**



2.3.3 Managing fatigue at work

It is important that all parties in the supply chain cooperate to better manage driver fatigue. Simply adhering to prescribed driving hours and relying on work diaries/logbooks may not be enough to address the risks of driver fatigue. Good fatigue-management practice is also essential.

Part 2 of these guidelines highlights many of the common factors that contribute to driver fatigue. Part 3 sets out a suggested risk-management process, consistent with OH&S requirements, which can be used by all parties in the supply chain to manage the risk of their actions or inactions contributing to driver fatigue.

Managing fatigue requires a systematic fatigue-management system. Central to this is a risk-management approach and this is discussed in Part 3. Also necessary are associated policies and procedures to manage the risks associated with that business and that engenders an organisational commitment to the ongoing management of fatigue. An example of this might include a system involving use of Driver Fatigue Management Plans (DFMP).

See table 2, page 13

Share this information with your family so they can provide support and understand the importance of adequate sleep.

If in doubt – seek medical advice.

Factors to consider when developing policies and procedures include:

- methods to generate a culture of understanding and management of fatigue including good communication and consultation;
- the type of work to be performed and body-clock risks that can contribute to fatigue;
- scheduling and rostering drivers, including length of shift and allowing for necessary rest and recovery during and between shifts;
- availability of rest areas and amenities for drivers;
- consultation on fatigue risks with drivers, their representatives, and other parties in the supply chain;
- reviewing loading and unloading times and delays at pick up and delivery points;
- establishing drivers' capacity and fitness for work;
- contingency planning including providing for reasonably expected delays;
- training and education in fatigue management;
- managing incidents and near misses; and
- establishing and maintaining appropriate workplace conditions and audits.

Some or all of the policies and procedures may exist already in other corporate documents. Fitness for work policies and procedures may be in human resource management manuals and relevant information on training may be in general safety induction manuals. It is not necessary to create documents especially for a fatigue management system, providing that issues can be identified and referenced within existing policies and procedures.

Some policies and procedures that are used for fatigue management, such as policies on drugs and alcohol in the workplace or hazard and incident reporting procedures, may apply to a wide range of circumstances within the one organisation. Where relevant policies and procedures exist, which have been developed in consultation with employees and OH&S representatives, they could be used for fatigue management.

Table 2: Check list for managing fatigue

Here are some tips to help keep alert at the wheel:

Planning:

- Plan trips to provide adequate time for sleep, rest and food, taking into account appropriate places to stop
- Plan rosters so there is enough time to adjust to a change between day and night shift
- Talk to the family well in advance of departure time so that sufficient rest is achieved
- Be realistic about how much sleep is needed to be a safe driver and make sure it is acquired
- Start the journey without sleep debt
- Understand the body clock and be aware of low point of alertness
- Share this information with the family so they can provide support and understand the importance of adequate sleep
- Make sure there are no health problems. If in doubt – seek medical advice.

On the road:

- Take regular power naps (20 to 30 minutes)
- Keep the cab at a comfortable temperature, but not too warm
- Get fresh air into the cab. Smoke and stale air can contribute to drowsiness
- Eat sensibly and exercise regularly
- Drink plenty of water and never drink alcohol when working
- Use caffeine only when needed – it is only a short-term solution to mild fatigue if you don't usually have a lot of caffeine
- Learn to recognise the signs of sleepiness and pull over as soon as possible for a short nap
- Do not take drugs to manage fatigue.

To help manage boredom:

- Listen to music, talkback radio or talking books or chat on the CB radio
- Play mental games, such as calculating distances
- Take regular breaks to stretch, walk and check the vehicle
- Learn to recognise the signs of sleepiness and pull over as soon as possible for a short nap.



Table 3: Guidance on schedules and rosters to minimise fatigue

Here are some tips on designing schedules and rosters to manage driver fatigue:

1	Give a driver sufficient notice to prepare for a working period of 14 hours or more, or if this is not practical, ensure the driver's fitness for duty is assessed.
2	A solo driver needs the opportunity for at least 7 hours of continuous sleep in a 24 hour period.
3	Minimise irregular or unfamiliar work rosters.
4	Operate flexible schedules to allow for Short Break Time or discretionary sleep.
5	Minimise very early departures to give drivers the maximum opportunity to sleep in preparation for the trip.
6	When drivers return from leave, minimise night-time schedules and rosters to give drivers time to adapt to working long hours, especially at night.
7	Give sufficient notice of a change between night and day shift, with enough time to change sleep patterns.

Part Three Managing Fatigue — Risk-Management Approach

A suggested process to create a fatigue-management system that can be used by all parties in the supply chain to eliminate, minimise or control the risk of their contribution to driver fatigue, includes the following steps:

1. **Risk Identification**
2. **Risk Assessment**
3. **Risk Control**
4. **Monitor and Review**

No two operations are the same. Every member of the supply chain should assess the specific factors resulting from their operations and use the risk-management process to manage all resulting risks. Keep records of this process as evidence of the steps that have been considered and taken to manage the risks of driver fatigue. Parties in the supply chain should consult with other parties in the supply chain, and in particular with operators and drivers, in order to control risks of driver fatigue.

A detailed approach to risk management is already required under OH&S law and is the key to effectively managing the risks of heavy vehicle driver fatigue. This section (Part 3) provides guidance on applying the risk-management process. Further guidance is provided in Part 4 in highlighting questions to assist all parties in the supply chain identify, assess and develop controls in order to manage fatigue risks.

For more information on how to use the risk-management approach to meet workplace health and safety obligations, please refer to Australian Standard ASNZ4360 on Risk Management.

STEP ONE: RISK IDENTIFICATION

The first step is to identify factors that may contribute to driver fatigue. Employers and all other parties in the supply chain should develop a list and keep records of all the factors in their business that have the potential to contribute to driver fatigue.

There are many ways to identify workplace factors that contribute to fatigue, including:

- inspecting workplace rosters and work-time records;
- consulting with drivers – ask them about schedules and rosters. Also, ask about any problems they have encountered, or any near misses or unreported injuries;
- consulting with workplace OH&S representatives and committees;
- reviewing loading and unloading times and delays at pick up and delivery points;
- conducting safety audits;
- analysing injury and incident reports;
- undertaking driver surveys;
- reviewing loading and unloading times and delays at pick up and delivery points;
- conducting safety audits;
- keeping records and details of all workplace incidences and near misses;
- recording frequency – how often the situation occurs; and
- recording number of people exposed and duration.

Records should be kept of this process and of decisions made. This information can be useful as a starting point when undertaking regular reviews of risks in the future.



Factors to be considered include:

- length of shifts worked – the length of shifts worked can contribute to fatigue;
- previous hours and days worked – the effects of fatigue are cumulative (drivers may have sleep debt due to the previous hours and days worked, which can contribute to fatigue);
- type of work performed – pay attention to the level of physical and/or mental effort required;
- time of the day when the work is being performed – remember that disrupting the body clock can cause fatigue and also impact on task performance;
- delays loading or unloading at consignors or consignees;
- roster design & scheduling – allow for rest and recovery between shifts;
- work premises – layout and condition;
- work environment – vibration, noise, climate/temperature, etc;
- human factors – capability, skill, experience, age, physical fitness and health status; and
- driver's fitness for duty.

STEP TWO: RISK ASSESSMENT

The second step involves assessing each of the risks identified. That is, assessing the likelihood of the event occurring (e.g. two long shifts, two days in a row) and the expected consequences (loss of alertness). For each of the risks you have identified, assess and record:

- the likelihood of the incident occurring, bearing in mind the existing control measures;
- the consequences of an incident occurring, bearing in mind the existing control measures; and
- the combination of the likelihood and consequences to estimate the rate of risk.

Part 2 of these guidelines provides guidance about common fatigue hazards. Further guidance may be gained by all members of the supply chain by considering the various questions contained in Part 4. This further explains the nature of risks and contains examples of questions that further highlight various risks and consequences.

Example of a Risk Assessment Matrix

Instructions:

A Determine the most likely fatigue consequence of an incident (e.g. falling asleep, drowsiness)

B Select the phrase that best describes the likelihood of the event occurring (e.g. highly likely that a driver will work three night shifts in a row)

C Line up the consequence and likelihood to determine the risk score

All risks should be managed as soon as reasonably practicable. However, if this is not possible, a plan should be put in place to manage the risks as soon as reasonably possible. In this case, greatest priority should be given to risks in the dark blue zone that indicate high-level risks requiring priority action, the mid blue zone indicates medium-level risks that may be given lower priority, and the white zone indicates low-level risks. Remember, however, that this is just a guide.

When assessing the risks, refer to Table 5 that may help you determine what type of activities increase fatigue risks the most.

Records should be kept of this process including details of the assessment process undertaken, who is allocated responsibility to manage each risk and the relevant timeliness for action. Where necessary, this will demonstrate that matters are progressed appropriately and in a timely and efficient manner according to the order of priority.

Step 3 (page 19) provides further guidance on the types of controls that should be used to control risks.

Table 4. Risk Assessment Matrix

MOST LIKELY FATIGUE CONSEQUENCE	LIKELIHOOD			
	Definitely will occur	Likely to occur	Unlikely to occur	Won't occur
High levels of fatigue (e.g. drowsiness, micro sleeps)				
Medium levels of fatigue (e.g. loss of alertness, slowed reactions)				
Low levels of fatigue (e.g. slight tiredness)				
No fatigue				



Table 5. Risk Assessment Guide

Here are some tips on some risks and the seriousness they might have in your business

Lower Fatigue Risk	Some Fatigue Risk	Higher Fatigue Risk
Regular short shifts with little night work	Regular shifts	Unpredictable or long shifts with lots of night work
Schedules build in time for typical delays	Schedules allow some flexibility for delays	Schedules do not allow any time for delays
All trips avoid driving at low alertness periods (i.e. night, early morning)	Some trips during low alertness periods	Most trips during low alertness periods
Rosters ensure at least a week's notice to prepare for upcoming schedules	Rosters allow a few days notice for upcoming schedules	Notice for schedule changes do not allow an opportunity for good quality rest
Short breaks are taken frequently and from early in the shift	Short breaks taken only at end of allowed maximum driving period	Short breaks not always taken
Drivers are able to sleep at night in own bed	Drivers sometimes sleep at night and usually in own bed, or always at night but in vehicle/motel	Drivers rarely sleep at night and usually in vehicle
Drivers almost always get 7-8 hours continuous sleep per night	Drivers sometimes get 7-8 hours sleep	Drivers rarely get 7-8 hours sleep

STEP THREE: RISK CONTROL

The third step involves deciding on control measures to manage exposure to each fatigue risk identified and implementing the controls in a timely manner. Employers and other parties in the supply chain should implement control measures that adequately control exposure to fatigue in their business.

The hierarchy of control outlined in Table 6 provides a method of assessing control measures. Under the hierarchy, the ideal solution when managing fatigue is to completely eliminate factors contributing to fatigue. If this is not reasonably possible there are a number of control options that may be used alone, or in combination, to reduce the risk so far as is reasonably practicable. Measures should be supported by policies, procedures, information and training. Because fatigue is caused by a combination of factors, the most effective way to manage it is by using a combination of risk-control measures.

Table 6: Order of control measures to eliminate or reduce the risk of injury or harm (in some instances a combination if control measures may be appropriate).

1	**Elimination** removing the hazard or hazardous work practice from the workplace. *For example, eliminating schedules that result in undue pressure on drivers or through using effective policies and fatigue-monitoring equipment that ensure a driver stops driving before becoming impaired by fatigue.*	**Most effective control measure**
2	**Substitution** substituting or replacing a hazard or hazardous work practice with a less hazardous one. *For example, substituting an onerous schedule or through providing a changeover driver rather than requiring the one driver to complete a long shift.*	
3	**Isolation** isolating or separating the hazard or hazardous work practice from people involved in the work or people in the general work area. *For example, providing drivers with accommodation for quiet sleep away from the heavy vehicle and from noisy traffic.*	
4	**Engineering controls** if the hazard cannot be eliminated, substituted or isolated, an engineering control is the next preferred measure. *For example, re-engineering a queuing system in order to minimise queuing of heavy vehicles for loading/unloading.*	
5	**Administrative controls** this includes introducing work practices that reduce the risk, such as providing procedures, instruction and training. *For example, providing training to employees on combating fatigue and through supervising and assessing drivers' fitness for duty through a shift.*	
6	**Personal protective clothing and equipment** these should be considered only when other control measures are not practicable or to increase protection. While essential for some work procedures, these should be last in the list of priorities. *For example, through fitting heavy vehicles with safety equipment such as airbags or implementing policies and supervision to ensure drivers wear their seat belt.*	**Least effective control measure**

Control measures

It is important that once controls are developed they are implemented in a timely manner. This includes keeping records of decisions and of who is responsible for implementing the measures and, where appropriate, setting milestones for progress and providing necessary resources in order to complete the task. Further guidance on developing appropriate controls is provided below by referring to the questions contained in Part 4.

Control measures need to be specific to the risks identified and to the particular business. The types of measures may include:

- developing work procedures and/or policies;
- communicating control measures;
- providing training and instruction; and
- supervision.

Table 6 shows the order of priority in seeking to control risk. By following the order of controls, parties will be able to identify what types of controls are best suited to a specific risk. For example, if eliminating a risk is not reasonably possible, consider substituting the risk instead. A lower order control should only be used if the higher order control is not reasonably practicable. When assessing the type of control measure, consider options for their applicability and the interaction between combinations of hazard factors that could influence the level of risk. The order of controls can be used by any party in the supply chain and examples are given to highlight controls that various parties can use for their business.

Specific industries or industry sectors may also wish to consider developing their own tailored Industry Codes of Practice as a further guide to effectively managing driver fatigue.



Developing work policies and procedures

Work policies and procedures need to be developed and implemented to ensure that all reasonable fatigue control measures are in place and effective. This might include developing a driver fatigue-management plan as part of the overall fatigue-management system. A fatigue-management system can consist of a collation of policies and procedures to manage driver fatigue and may include a Driver Fatigue Management Plan (DFMP).

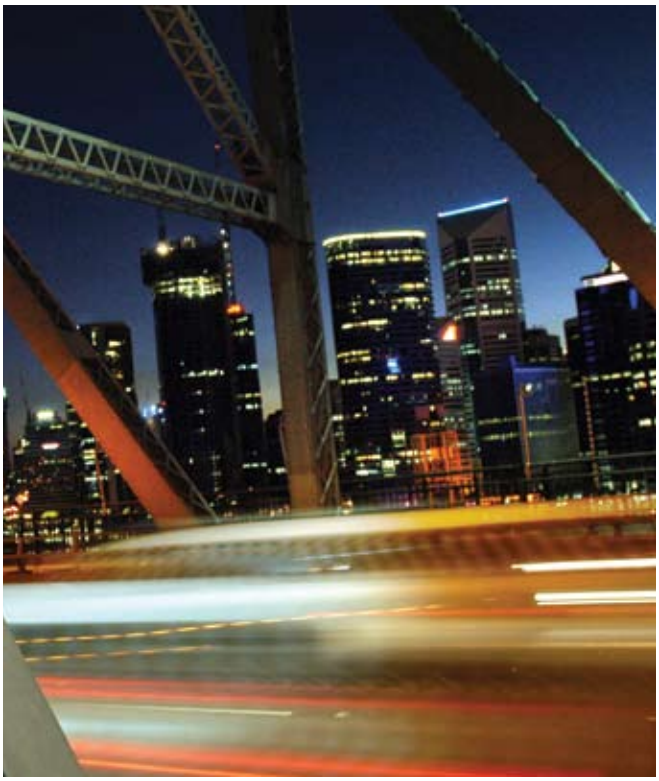
Effective fatigue-control measures should define and communicate responsibilities. For example, employers and persons conducting a business are responsible for providing a roster system that provides staff with sufficient opportunity for rest and recovery. It is a good idea to document and keep records of procedures and the reasons behind them, detailing when and how they must be implemented and who is accountable.

Communicating control measures

Employers and persons conducting a business should consult with drivers about the control measures, both in their development and when they are to be implemented. It is important to clearly communicate that the control measures are being introduced to effectively manage fatigue. When communicating control measures to drivers, it is important to remember that drivers (through their workplace health and safety representatives) are entitled to be consulted about any changes in the workplace that affect, or could affect, their safety.

Consultation may be achieved through the workplace OH&S representatives and should include:

- the possible health and safety impact of changes;
- the benefits and problems associated with the changes;
- measures needed to eliminate or control any adverse impact on health and safety;
- procedures for drivers to notify supervisors of any impairment or potential impairment that may place any person at risk before starting work; and
- clear definition and communication of responsibilities.



Providing training and instruction

Employers and persons conducting a business should provide training and instruction on fatigue for drivers, supervisors, schedulers and any other person whose actions may affect road safety. Specific training requirements are included in the requirements for participation in both the Basic and Advanced Fatigue Management schemes. Minimum information should include:

- common causes of fatigue including shift work, extended working hours, roster patterns, demands placed on drivers and delays in loading and unloading;
- tips to identify signs of fatigue;
- potential health and safety impacts of fatigue;
- how drivers are responsible for making appropriate use of their rest days, and for ensuring they are fit for duty; and
- policies and procedures.

Consideration should be given to the appropriate information and training to be provided to members of the chain, including all drivers. Drivers attending training outside their normal shift should be considered at work and rosters adjusted accordingly.

Supervision

Employers and persons conducting a business should also provide adequate supervision to ensure that control measures are being used correctly. This can include activities such as monitoring fatigue levels of drivers or ensuring compliance with safety procedures. Induction is also relevant to new employees or when new activities are undertaken. For drivers working alone, employers should consider providing a means of communication and a procedure for regular contact.

STEP FOUR: MONITORING AND REVIEW

The fourth step is to monitor and review the effectiveness of fatigue control measures, and revise if necessary. When working through this step it is useful for members of the supply chain to consider:

- have the chosen control measures been implemented as planned?
- are the chosen control measures working?
- are there any new problems that may, for example, have been caused by the control measures?



When answering these questions, employers and persons conducting a business can:

- consult with drivers, supervisors, OH&S representatives, OH&S officers, and safety committees;
- consult with other parties in the supply chain;
- measure exposure to fatigue – are drivers still getting fatigued?; and
- monitor incident reports and assess the likelihood for fatigue contributing to incidents.

If any new hazards have been identified, it is necessary to refer back to Step One and identify and manage risks as part of the ongoing risk-management process. Employers and persons conducting a business should ensure that there is a process for ongoing monitoring and evaluation of workplace fatigue using the risk-management process as this process should be regularly undertaken and reviewed. Once again, records should be kept of this process including steps undertaken and decisions reached.

Part Four | Developing A Road Transport Risk-Management System

IMPLEMENTING FATIGUE RISK MANAGEMENT SYSTEMS

This attachment has been prepared for the information of all parties in the supply chain including:

- road transport operators;
- owner/drivers;
- employee drivers;
- other influencing parties (for example, consignors, consignees and loaders); and
- agents of any of the above parties.

It is very important to note that given the diversity of road transport operations, it is very difficult to prescribe exactly what each duty holder should be doing in terms of fatigue counter-measures. That is, what may be effective for one party may be ineffective for another.

Instead of prescribing exactly what parties should do to address these common fatigue risk factors, questions or prompts that parties should consider are provided against a number of common fatigue risks to assist you in undertaking the risk-management process and formulation of your fatigue-management plan.

The questions provided will have varying degrees of relevance according to individual operating circumstances. Further, the questions should be considered against a background of whether you, or the business, do them 'adequately'.

Remember, it is not necessary to address every risk, but all reasonable risks that are appropriate to your circumstance.

Key points

- All personnel in your business who have an influence on driver fatigue levels should read these guidelines to gain an understanding of fatigue and risk-management theory.
- Using the questions below as prompts, systematically analyse your operations through genuine consultation and communication and begin to work out where the fatigue risks are, how serious they are, and what's the best way to address them. You should accurately record your discussions and steps that you take.
- Begin a process of monitoring and reviewing what you do.





Attachment 1: Questions to consider when developing a Fatigue Management System

Examples of fatigue risk factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
Poor understanding, communication, commitment, consultation and review	• Can lead to ineffective fatigue-management practices and systems	**Heavy vehicle operators, including owner/drivers – does my business:** • understand each party's legal obligations in relation to fatigue management? (see Part One) • understand the causes of fatigue and how/where my work systems may create fatigue risks? (see Part Two) • understand how the risk-management process can be used as a means to implement effective fatigue management? (see Part Three) • adequately communicate with all relevant parties in the supply chain including drivers of the importance of effective fatigue management and engender commitment from all parties to improved day-to-day practices? • keep abreast of ongoing fatigue and risk-management information and developments from sources such as industry associations, transport or OH&S agencies? • demonstrate a commitment to effective fatigue management that is supported by management and employees/contractors and backed up by appropriate training resources? • review written and/or verbal instructions from customers to ensure that they are not leading to breaches of fatigue regulations and/or creating unnecessary risks? • assess which customers are likely to promote effective fatigue management and give preference to them? • continually review its risk-management and fatigue management processes and plans to assess their effectiveness via mechanisms such as accreditation and auditing processes? **Consignors, consignees or loaders – does my business:** • understand each party's legal obligations to manage driver fatigue? (see Part One) • understand the causes of fatigue and how/where my work systems may create fatigue risks? (see Part Two) • understand how the risk-management process can be used as a means to implement effective fatigue management? (see Part Three) • keep abreast of ongoing fatigue and risk-management information and developments from sources such as industry associations, transport or OH&S agencies? • adequately consult with all supply chain parties to plan and implement effective fatigue-management practices? • provide adequate training to all relevant staff? • continually review the effectiveness of its risk-management and fatigue-management plans and processes? **Employee drivers – do I:** • understand my legal obligations in relation to fatigue management? (see Part One) • understand the factors that lead to fatigue? (see Part Two) • assist my employer to implement effective fatigue risk-management systems? (see Part Three) • comply with the company's other related policies such as drugs, alcohol and medications? • inform my employer or supervisor when I believe I may be affected by fatigue?

Examples of Fatigue Risk Factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
Long work shifts	• Long shifts without adequate breaks can contribute to fatigue – especially if there is a high amount of physical and/or mental exhaustion • Fatigue-related incidents are more likely in circadian low points (e.g. midnight to 6 am) • The effects of fatigue are cumulative so fatigue is more likely to occur towards the end of a shift and the end of the working week • Sleep at night is the most effective way of fixing accumulated sleep debt.	**Heavy vehicle operators – does my business:** • provide adequate information to drivers on short-term measures such as naps and breaks and do all parties understand the limitations of these temporary measures? **Employee drivers, or owner/drivers – do I:** • take the necessary breaks as legally obliged and seek to minimise fatigue by sleeping, where possible, in dark, quiet and comfortable places and preferably at night? • plan shifts and lifestyle generally so that the highest quality breaks and rest periods can be utilised? • utilise check lists such as those in Part Two to keep alert and detect fatigue warning signs? • inform relatives and friends of work schedules and sleep times to avoid unwanted disruptions? • minimise disruptions? (e.g. use an answering machine or turn phone down?) • develop ways of 'unwinding' after a long shift? (e.g. take a walk or watch some television?) • use breaks to stretch and exercise? **Consignors, consignees or loaders – does my business:** • adequately assist drivers in the latter stages of their shift by, where possible, introducing controls and procedures? • consider making allowances in the latter half of shifts or working periods to address the possible heightened fatigue levels of drivers?
Cumulation of a high number of previous hours and days worked without adequate sleep	• 'Sleep debt' accumulated over a period of time can contribute to fatigue • Broken sleep and day sleep may not be as restorative as night time sleep and must be considered.	**Heavy vehicle operators – does my business:** • have adequate flexibility in its work systems and processes to respond to busy times and/or unexpected delays? • consider how work systems such as work flexibility could be implemented? • consider how controls and procedures to assist staff performing hazardous work during high fatigue periods could be implemented? • monitor records such as logbooks, driver diaries, pay slips and output from electronic monitoring devices and other records to confirm that drivers are compliant with regulatory limits? • maintain an awareness of drivers having other employment responsibilities such as a second job? **Employee drivers, or owner/drivers – do I:** • take active steps to assess my fatigue levels and respond accordingly? **Consignors, consignees or loaders – does my business:** • check its work systems to ensure that drivers are compliant with regulatory limits?



Examples of Fatigue Risk Factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
High level of exertion	• Work that is mentally and/or physically demanding can contribute to fatigue • Fatigue can be exacerbated if work completed at circadian low points (e.g. midnight to 6 am).	**Heavy vehicle operators – does my business:** • design and redesign work practices so that levels of physical and/or mental exhaustion are taken into account? **Employee drivers, or owner/drivers – do I:** • understand that high levels of exertion can exacerbate fatigue and make the necessary allowances? • ensure I use my rest times to recuperate as much as possible? **Consignors, consignees or loaders – does my business:** • check its work systems to ensure that they minimise the amount of highly mental and/or physical work that is undertaken by drivers? • communicate to drivers and operators before the task is undertaken of the likely demands involved?
Time of the day when the work is being performed	• Work performed at circadian low points (e.g. midnight to 6 am) can result in fatigue.	**Heavy vehicle operators – does my business:** • design schedules to be as flexible as possible? • provide adequate opportunities to recover from night-time work? **Employee drivers, or owner/drivers – do I:** • understand that working at different times of the day and night can exacerbate fatigue levels? • take adequate steps to minimise these risks? **Consignors, consignees or loaders – does my business:** • provide systems that promote effective and efficient queuing and loading/unloading of heavy vehicles? • provide rest facilities for drivers?
Delays loading or unloading at consignors and consignees	• Delays can extend the length of shifts and can be physically and/or mentally exhausting which can contribute to sleep debt and fatigue.	**Heavy vehicle operators – does my business:** • promote flexibility in its work systems to be able to reschedule pick up and delivery times where possible? • promote flexibility in its work systems to be able to replace a fatigued driver prior to driving hours being in excess of regulations, where possible? • promote a work system to allow drivers to report delays and incidents that in turn allows the investigation of fatigue problems? • consider how contractual obligations with consignors and consignees and other influencing parties could be utilised to encourage effective and efficient loading and unloading practices? **Employee drivers, or owner/drivers – do I:** • have the ability to amend schedules? • communicate with 'base' to amend schedules? • balance longer working time with longer breaks or a longer sleep in the subsequent period? • record delays and all fatigue-related problems so they can be addressed?

Examples of Fatigue Risk Factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
		Consignors, consignees or loaders – does my business: • promote flexibility in its work systems to be able to reschedule pick up and delivery times and/or have greater loading and unloading capacity during busy times or following general delays? • promote a work system to allow all in the supply chain to report incidents? • promote a work system to allow the reporting and investigation of fatigue problems? • promote a work system to allow the implementation, monitoring and review of effective fatigue-management practices and policies?
Poor roster design and scheduling	• Rosters and schedules that do not allow for rest and recovery between and during shifts can contribute to fatigue • Swapping from day to night shifts and vice versa without adequate transition assistance can contribute to fatigue • Drivers may feel fatigued during the latter half of their working week (or working period) • Drivers may feel fatigued at the start of a working week (or working period).	**Heavy vehicle operators – does my business:** • assess fitness for duty of drivers? • take into account the effect of likely non-driving activities (e.g. bus driver attending to passenger needs) and delays when calculating maximum work hours permitted? • take into account drivers' commuting hours as a factor that may contribute to fatigue levels? • plan trips to allow as much sleep at night when operational requirements permit this? • consult with individual drivers where work will require regular and significant changes to work periods? • build in time to assist drivers adjust when returning from a break or from day to night (or night to day) driving where possible? • schedule trips to allow for appropriate rest breaks? • schedule trips allowing also for the impact of likely delays? • have contingencies in place? **Employee drivers, or owner/drivers – do I:** • report any fatigue problems within or between schedules so they can be fixed? • maintain logbooks, driver diaries or other paperwork required for fatigue purposes? • provide input to improve schedules and rosters? • advise when not fit for work? • advise any conditions that may affect my ability to perform tasks legally and safely? **Consignors, consignees or loaders – does my business:** • check contracts to ensure no undue pressure? • seek other forms of assurance that systems are not placing undue demands on parties? • audit its processes regularly to ensure safe work systems? • manage the flow-on effects to operators and drivers if changes to work systems occur? • when awarding work, consider factors other than financial?



Examples of Fatigue Risk Factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
Poor work environment	• Excessive vibration, noise, climate/ temperature, etc. can contribute to mental and/or physical exertion that can contribute to fatigue • Work premises – poor layout and condition • Poor ergonomics and poor facilities can contribute to mental and/or physical exertion that can contribute to fatigue.	**Heavy vehicle operators – does my business:** • provide amenities to assist drivers take high-quality rest (possibly including lunch rooms, sleeping accommodation, sleeper cabs, etc.) that are appropriate to the operation? • monitor the quality of amenities? • maintain vehicles to meet roadworthiness standards and fatigue-related standards (e.g. ADR 42 on sleeper berths and 42.18 on ventilation)? • consider cabin comfort, including vibration characteristics, particularly of vehicles used in long-haul operations? • make scheduling allowances for adverse weather and road conditions (e.g. heat, snow, roads under repair, etc.)? **Employee driver, or owner/driver – do I:** • advise managers where the work premises may be poor in terms of encouraging high-quality rest? • keep the cab well-ventilated and at a comfortable temperature? • adhere to equipment maintenance schedules? • report equipment faults? • undertake timely and accurate pre-trip, during trip and post-trip inspections? **Consignor, consignee or loader – does my business:** • provide amenities to assist drivers take high-quality rest? • monitor the quality of amenities? • design loading/unloading and queuing areas and monitor practices to minimise working hours as much as reasonably practicable? • accommodation for full vehicle combinations i.e. B-double, B-triple, etc.? • provide a working environment that will not exacerbate a driver's fatigue levels? **Other parties/governments – do we:** • provide appropriately maintained roads, rest areas and traffic systems? • provide amenities to assist drivers take appropriate rest? • monitor the quality of amenities?

Examples of Fatigue Risk Factors	Why is this factor a fatigue risk?	Questions that should be considered by parties to assist when determining what specific controls are appropriate and when/how should they be implemented
Inadequate/Poor human factors	• Capability, skill, experience, age, physical fitness and health status all influence a driver's ability to mange his or her own fatigue	**Heavy vehicle operators – does my business:** • encourage regular medical assessments? • assist drivers undertake their medical assessments when required and are the driver's medical certificates current? • assess the ability of drivers to safely perform the tasks requested of them? **Employee driver, or owner/driver – do I:** • disclose any matter that may affect my fitness for duty? • take active steps to ensure that I am fit for duty? (see Part One) **Consignor, consignee or loader – does my business:** • observe the wellbeing of drivers and actively intervene if behaviour and appearance of the driver is not normal?





Common terms used in these Guidelines

Minimum continuous break in a 24 hour period for a solo driver	*7 hours in the Standard Hours option, 7 hour continuous break or 8 hours in 2 parts (is limited) in the Basic Fatigue Management option, 6 hour continuous break or 8 hours in 2 parts (subject to conditions).*
Night sleep	*At least seven hours continuous rest between 10pm and 8am.*
Shift	*The period of driving and work time between two periods of continuous sleep opportunity. A shift is deemed to have started at the end of the last continuous sleep opportunity and finishes at the beginning of the next continuous sleep opportunity.*
Short rest break	*Any rest break that is 15 minutes or more in duration, but less than seven hours. Means time at work provided for rest and meals after a continuous period of active work and does not include non-driving work time or time not working. Short rest is recorded in minimum 15 minute periods (i.e. any non-work less than 15 minutes does not count towards rest, any period of non-work of 15 minutes but less than 30 minutes is counted as 15 minutes rest etc.).*
Night work	*Any driving or work undertaken between midnight and 6 am.*
Hazard	*A source or situation with a potential to cause injury, illness or disease.*
Hazard identification	*Process of recognising that a hazard exists.*
Risk	*The likelihood of an injury, illness or disease occurring and the severity of any injury, illness or disease that results from exposure to a hazard.*
Risk assessment	*Process of working out how big a risk is present and what risk factors are causing the problem.*
Risk control	*The process of applying appropriate prevention measures to eliminate or minimise any risks.*
Circadian rhythm	*Circadian rhythms or the body clock regulates physiological and behavioural functions on a 24 hour basis. Sleep and wakefulness are programmed and sleepiness is greatest between midnight to 6 a.m. and to a lesser extent between 2-4 p.m.*
ADR	*Australian Design Rules.*
Fatigue	*Fatigue can be described as a progressive loss of alertness that ultimately ends in sleep*
Sleep debt	*Failure to have a normal sleep results in sleep debt that accumulates and can only be paid back by undisturbed, restorative sleep.*
Schedule	*The pattern of driving and work covering one or more trips. For operators with rostered drivers a schedule might operate over a week or a month. For less regular or predictable situations a schedule may refer to a single trip.*



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Appendix E

National Heavy Vehicle Regulator Driver Fatigue Management Plan

Form 1 – Safe Driving Plan

Use this document as a template for your fatigue risk management system.

This form can be replaced with one from your current system if it is equivalent in the key areas and meets the standards and outcomes.

The key areas in this model document are:

- Section 4 Questions 1-4

Instructions

To be completed by the Scheduler at least once a day (prior to driver's being allocated a task) with reference to Form 2.

1. Retrieve the relevant Form 2 for the driver from [file location 3].
2. Complete all sections of the form in blue/black ink.
3. Advise the customer of the proposed plan.
4. Advise the driver of the proposed plan.
5. Have the Driver sign the form.
6. Sign the form.
7. Copy the form and hand it to the Driver.
8. Place the completed form in [file location 2]

Form 1 – Safe Driving Plan (complete as per instructions overleaf)

Section 1 – Company and Supply Chain Details

Name	Address	Role
[Transport Company Name]		**Transport Operator**
		Freight Customer

Section 2 – Driver/Vehicle Details

Date:		Driver Name:	
Person completing form:			
Rego. Number/s:			
Tick vehicle type:	Truck / Trailer: ☐	B-Double: ☐	Road Train: ☐
Tick Driving Hours Scheme:	STDH: ☐	BFM: ☐	AFM: ☐

Section 3 – Proposed Trip Plan

From	To	Estimated Start Time	Working Time	Rest Time	Total Time

NOTE: The driver is to use discretion and rest where or when required provided that regulated driving hours are not exceeded.

Section 4 – Fitness for Duty / Fatigue Checklist (Completed by Scheduler)

1. Has the driver had a reset rest break in the preceding 14 days		Yes / No
2. If the driver has worked in the preceding 24 hours: • Does the shift keep a similar work pattern? (night / day work) • Has a minimum of 7 hours continuous rest?		Yes / No Yes / No
3. Does the driver have sufficient work hours remaining to comply with legal limits?		Yes / No
4. Does the plan provide opportunity for the minimum required rest breaks?		Yes / No
Changes to driving plan made by:	Scheduler (Initials)	
	Customer (Initials)	
	Driver (Initials)	
Driver notified of relevant scheduled changes if any?	Yes / No	Date: _____ Time: _____

Form 1 – Safe Driving Plan (complete as per instructions overleaf)

Section 5 – General Risk Assessment

Are there any other risks associated with this trip?

1. Vehicle issues:	Yes / No
2. Speed issues or restrictions:	Yes / No
3. Communication or remoteness:	Yes / No
4. Fauna or vegetation:	Yes / No
5. Weather or visibility:	Yes / No
6. Other (Specify):	Yes / No

Section 6 – Special Instructions/Contingencies

DRIVERS MUST NOT DRIVE WHILST IMPAIRED BY FATIGUE

Drivers may modify this **Safe Driving Plan** providing work hour / rest requirements are met and notification of any changes is provided to the Scheduler as soon as possible by telephone.

Specific fatigue management instructions for this trip are:

Section 7 - Declarations

Driver acknowledgement

I understand that I am working under [Transport Company Name]'s AFM accreditation and have had the necessary training to do so.

I agree with the work and rest times allowed for this trip and agree to advise the Scheduler of any changes to this trip plan.

I have inspected the named vehicle/s and have rectified any defects likely to affect its safe operation.

Driver's Signature: _____

Scheduler acknowledgement

I certify that this plan has been discussed with the driver and customer.

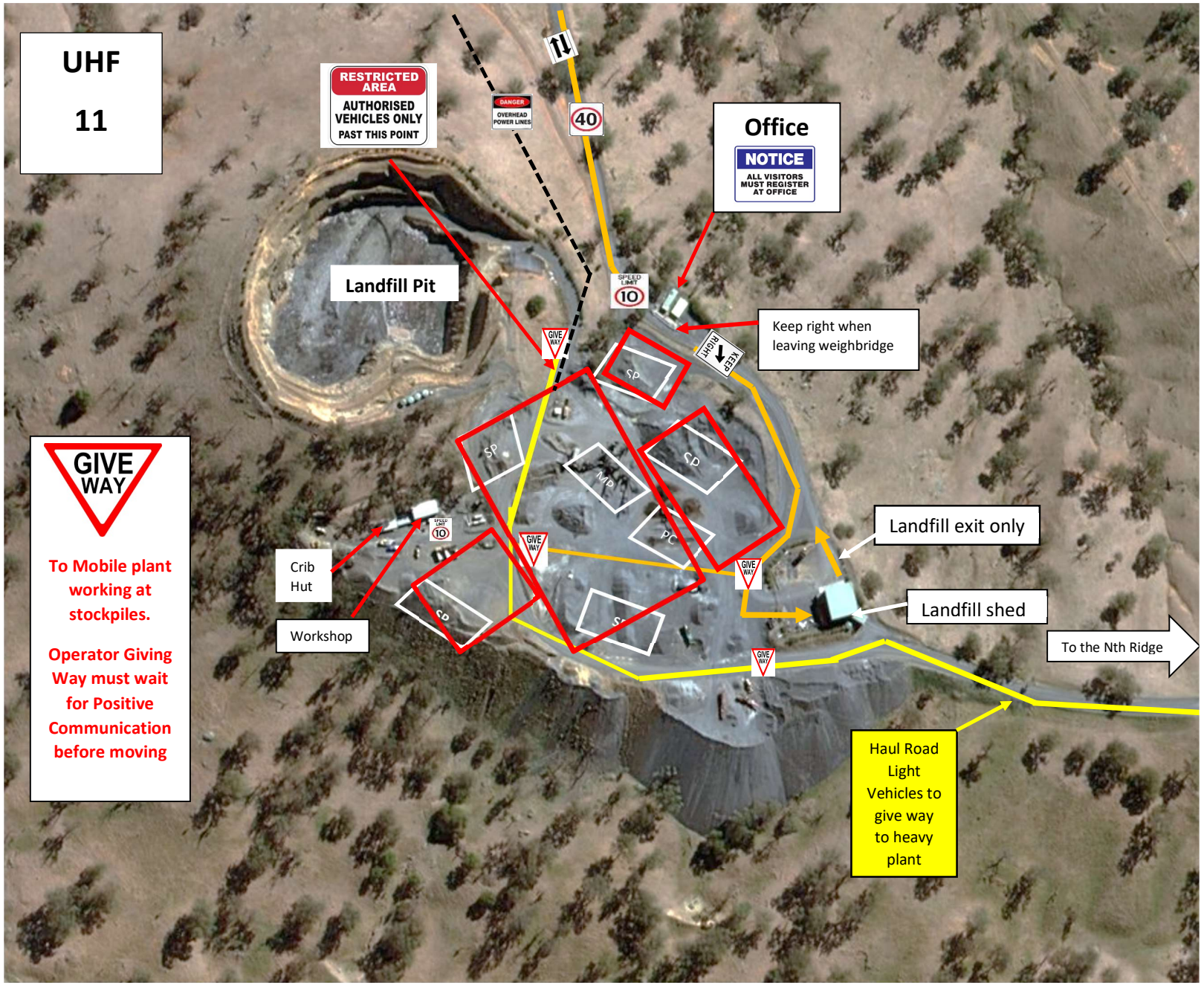
Scheduler's Signature: _____

Appendix F

Site Traffic Management Devices

BALD HILL QUARRY

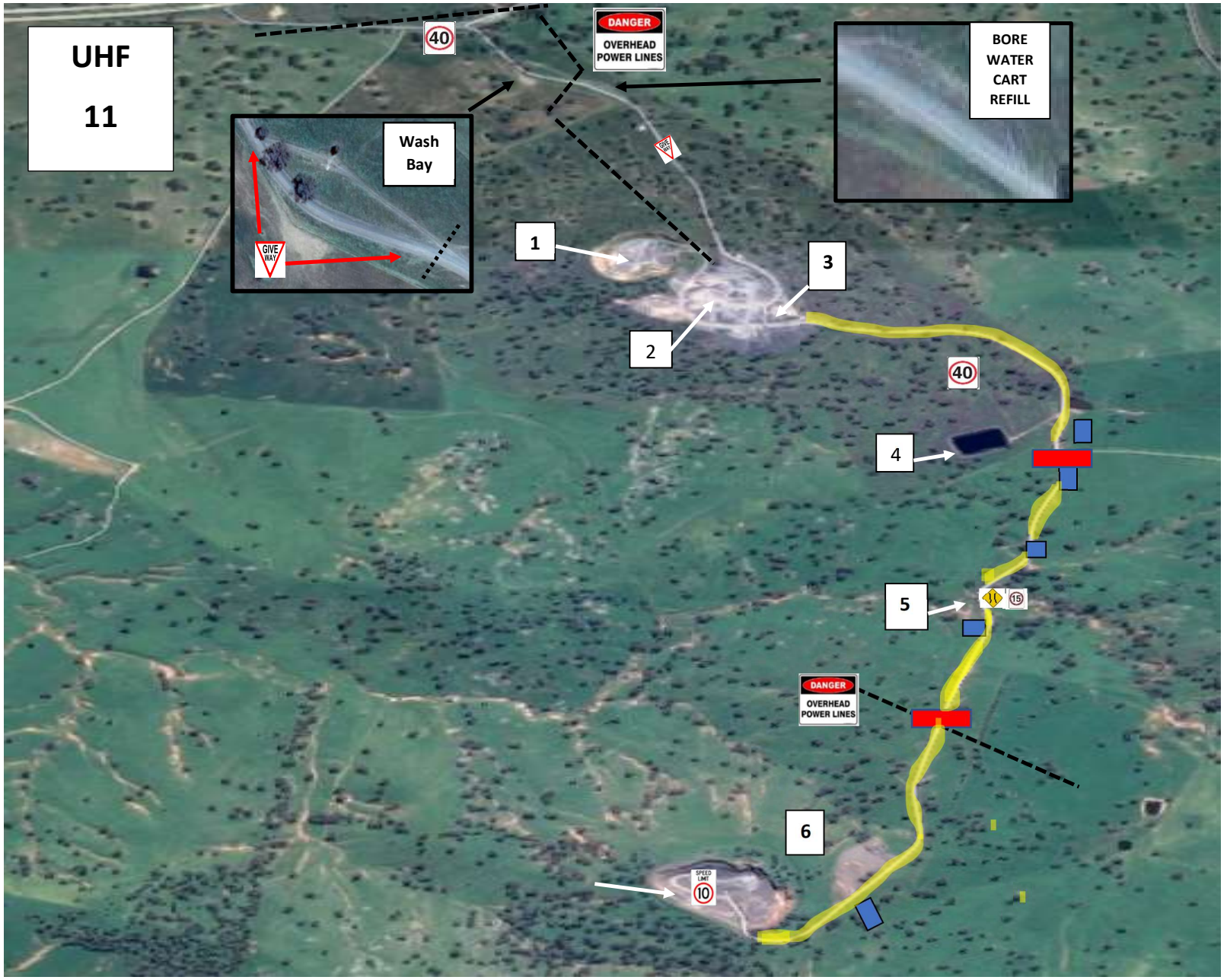
JUGIONG TRAFFIC MANAGEMENT MAP



TRAFFIC LEGEND	
---------	High Voltage overhead power lines
20	Within quarry unless signposted otherwise
⇅	Dual traffic
GIVE WAY	Give Way to vehicles on weighbridge and at all other signposted areas
40	Speed limit from Hume highway to Weighbridge
15	speed crossing Sawpit Creek
SPEED LIMIT 10	Approaching weighbridge, leaving weighbridge
KEEP RIGHT	When leaving weighbridge
	Narrow bridge crossing Sawpit creek
RESTRICTED AREA AUTHORISED VEHICLES ONLY PAST THIS POINT	Restricted access to landfill
	LOADER HAS RIGHT OF WAY

BALD HILL QUARRY

JUGIONG TRAFFIC MANAGEMENT MAP



LANDMARK LEGEND	
1	Landfill
2	Main Plant
3	Landfill Shed
4	Leachate Pond authorised access only
5	Sawpit creek Bridge
6	North Ridge Pit
	Haul Road
	Passing Bays
	Cattle Grid
- - -	High Voltage overhead powerlines

PAD LEGEND	
SP	**Stockpile**
MP	**Main Plant**
PC	**Precoat area**

Appendix G

Monthly Truck Movement Report

Appendix H

Annual Review Results

APPENDIX H NOISE ASSESSMENT

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R01
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1513	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***26***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R02
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1450	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***27***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R03
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2385	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***5***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R04
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2606	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***5***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R05
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2605	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***5***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Placement and compaction of road gravel
Receiver address	R06
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1697	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	2
Roller	107	82	1
Grader	110	85	1

Water cart	108	83	1

Total SPL L Aeq(15minute) (dB(A))	***25***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Quarry Operation and Road construction
Receiver address	R02
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1450	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	4
Roller	107	82	2
Grader	110	85	2

Water cart	108	83	2
Rock crusher	118	93	1
Compactor	113	88	1
Front End Loader	113	88	2

Total SPL L Aeq(15minute) (dB(A))	***35***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R01
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	**User Input**
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1513	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	**SWL L_{Aeq} (dB(A))**	**SPL @7m (dB(A))**	**Quantity**
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***25***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R02
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1450	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***26***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R03
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2385	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***4***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R04
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2606	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***4***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R05
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2605	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***4***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 1 - Loading
Receiver address	R06
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1697	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Truck (>20tonne)	106	81	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***24***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R01
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1513	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***31***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R02
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1450	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***31***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R03
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2385	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***9***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R04
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2606	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***9***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R05
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	2605	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***9***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 2 - Operation of mobile crushing plant and stockpiling
Receiver address	R06
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1697	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	1

Total SPL L Aeq(15minute) (dB(A))	***29***

Noise Estimator (Individual Plant)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	21-481 Mt Bundarbo
Scenario name	Scenario 3 - All opertional scenarios operating concurrently
Receiver address	R03
Select area ground type	Undeveloped green fields (rural areas with isolated dwellings)
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y	
Representative distance (m)	1450	***All at Representative Distan***

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity
Rock crusher	118	93	1
Front End Loader	113	88	2
Truck (>20tonne)	106	81	1

Total SPL L Aeq(15minute) (dB(A))	***32***

Bundarbo

Pressure	Distance	KG	Ka	a	Pa	SPL
0.002291	1513	106.9	10	-1.45	2.291392	101
0.002437	1450	106.9	10	-1.45	2.43715	102
0.001184	2385	106.9	10	-1.45	1.184425	95
0.001042	2606	106.9	10	-1.45	1.041605	94
0.001042	2605	106.9	10	-1.45	1.042185	94
0.00194	1697	106.9	10	-1.45	1.940114	100

PPV	Distance	Kg		
0.391151	1513	106.9	1140	1.6
0.418695	1450	106.9	1140	1.6
0.188845	2385	106.9	1140	1.6
0.163881	2606	106.9	1140	1.6
0.163981	2605	106.9	1140	1.6
0.325534	1697	106.9	1140	1.6

APPENDIX I SITE WATER BALANCE CALCULATIONS

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	
Decile 5 rainfall		mm	33.2	34.1	32.8	22.1	37.3	56.6	55.8	48.6	35.8	41.4	63.6	37.2	569.6	
		m	0.332	0.341	0.328	0.221	0.373	0.566	0.558	0.486	0.358	0.414	0.636	0.372	5.696	
	Site water balance															
Site water balance		m3	36520	37510	36080	24310	41030	62260	61380	53460	39380	45540	69960	40920	626560	
land size 110000 m2																
runoff C for all pervious		m3	**1460.8**	**1500.4**	**1443.2**	**972.4**	**1641.2**	**2490.4**	**2455.2**	**2138.4**	**1575.2**	**1821.6**	**2798.4**	**1636.8**	25062.4	

site total	12.8705	ha	128705 m2
quarry	8	ha	80000 m2
haul road	4.8705	ha	48705 m2

Quarry pit m2	80000	68000	0.332	0.341	0.328	0.221	0.373	0.566	0.558	0.486	0.358	0.414	0.636	0.372	5.696	
Fraction impervious		0.85	22576	23188	22304	15028	25364	38488	37944	33048	24344	28152	43248	25296	387328	m3
			903.04	927.52	892.16	601.12	1014.56	1539.52	1517.76	1321.92	973.76	1126.08	1729.92	1011.84	**15493.12**	m3
Haul Road m2	48705	41399.25	0.332	0.341	0.328	0.221	0.373	0.566	0.558	0.486	0.358	0.414	0.636	0.372	5.696	
Fraction impervious		0.85	13744.55	14117.14	13578.95	9149.234	15441.92	23431.98	23100.78	20120.04	14820.93	17139.29	26329.92	15400.52	235810.1	m3
			549.782	564.6858	543.1582	365.9694	617.6768	937.279	924.0313	804.8014	592.8373	685.5716	1053.197	616.0208	**9432.405**	m3

63.2% AEP 24hr duration (m3)) runoff (m3) 24925.53

48.5mm convert to m
0.043

Quarry pit m2 3440

Haul Road m2 2094.315

total AEP 24 hr 5534.315